



# CP600 Pivot Operation Manual

POM-EN-December 2018

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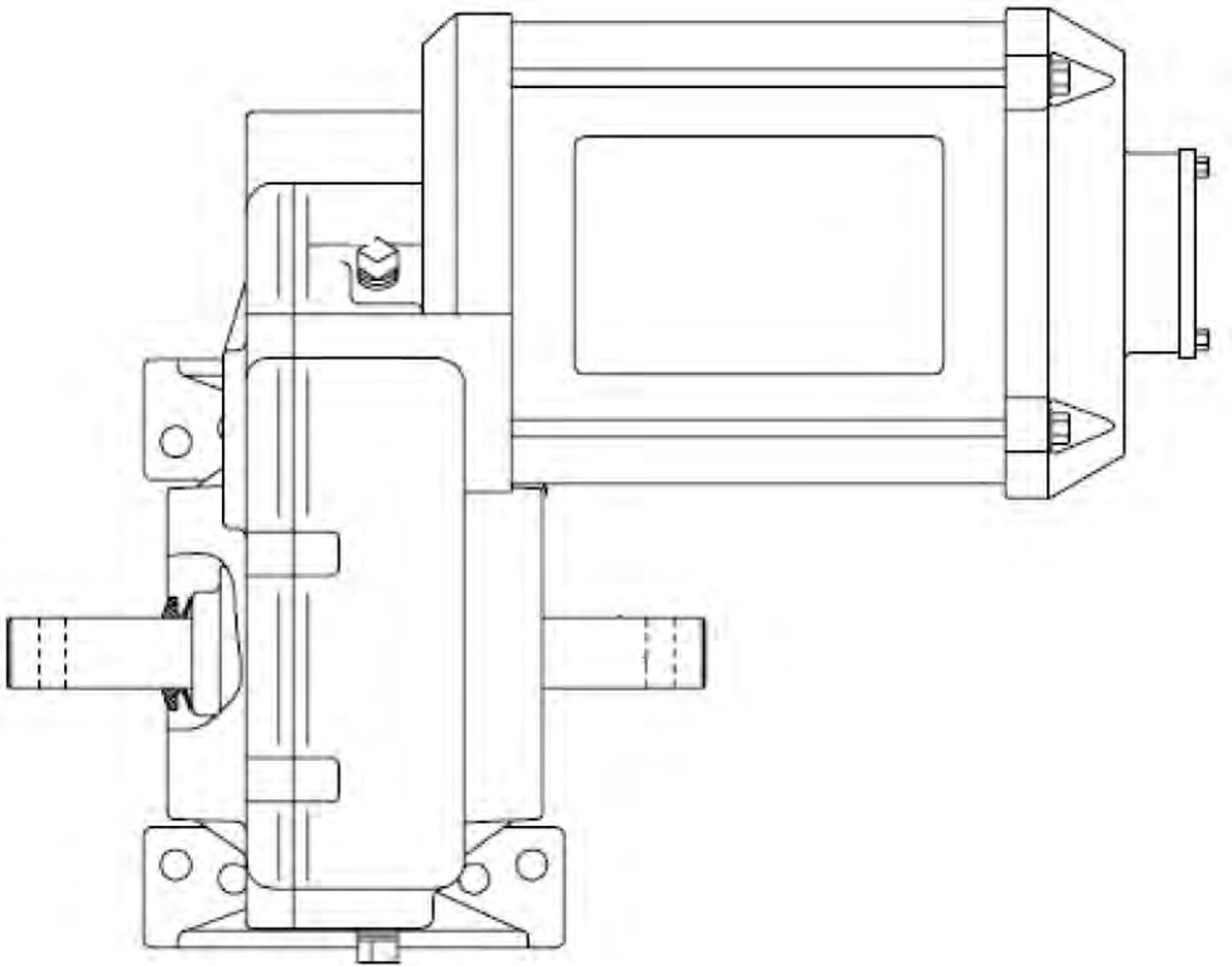
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# Section 1

## Operation, Safety & Maintenance



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Throughout the manual you will find pictures or symbols that are inserted for your safety. Most of these pictures and symbols are universal and are known to the reader. It is always a good idea to review these pictures and symbols to understand the context of how they are presented in the manual.



**WARNING: COULD CAUSE SERIOUS INJURY OR POSSIBLE DEATH.**



**WARNING: HIGH VOLTAGE POTENTIAL FOR ELECTROCUTION.**



**WARNING: MACHINE MAY INTERMITTENTLY START OR STOP.**



**WARNING: FOLLOW MANUFACTURES SPECIFICATIONS FOR PROPER TIRE INFLATION AND INSPECTION. OVER INFLATION MAY CAUSE SERIOUS INJURY OR DEATH.**



**WARNING: BE AWARE OF SURROUNDING POWER LINES WHEN INSTALLING OR TROUBLESHOOTING EQUIPMENT. FAILURE TO DO SO COULD CAUSE SERIOUS INJURY OR POSSIBLE DEATH.**



**WARNING: KEEP HANDS AND OBJECTS AWAY FROM MECHANICALLY MOVING PARTS. FAILURE TO DO SO COULD RESULT IN SERIOUS INJURY OR POSSIBLE DEATH.**



**WARNING: STAY CLEAR OF HEAVY MATERIAL BEING LIFTED ABOVE.**



**WARNING: DO NOT CLIMB ON OR JUMP OFF MACHINE.**



**WARNING: DO NOT ATTEMPT TO ASSEMBLE OR TROUBLESHOOT MACHINERY IF THERE IS POTENTIAL FOR A LIGHTENING STORM. COMPONENTS ARE HIGHLY CONDUCTIVE AND SERIOUS INJURY OR POSSIBLE DEATH MAY OCCUR IF STRUCK BY LIGHTENING.**



**DANGER: DO NOT IRRIGATE NEXT TO POWER LINES. SPRAYING WATER ON POWER LINES COULD CAUSE SERIOUS INJURY OR DEATH.**



**CAUTION:** Could cause minor injury and or damage to machinery equipment, components, product, etc.,



**CAUTION:** Be aware of pinch points when assembling equipment.



**CAUTION** or **WARNING** Disconnect electrical power prior to servicing or troubleshooting components.



**CAUTION:** Hard hat and steel toe work boots recommended when assembling equipment



**Lock Out / Tag Out** Manufacturer recommends locking the main power disconnect before servicing or troubleshooting electrical components. See



**Winterization** see manufacturers specifications Section 9-24.



*Note: Manufacture's general comment, recommendation or instruction.*

The following list of checks and operation procedures should be followed during the initial start up of the circle. These same basic procedures can also be followed at the initial start up of each irrigation season.

1. Bolts: Check to insure that all bolts have been properly installed and tightened.
2. Grounding: Be sure the machine is properly grounded. Refer to the Getting Started and Electrical sections for proper main panel grounding.
3. Control Limit Switches: The limit switches in the tower junction boxes have been pre-set at the factory, however, they should be checked according to the procedures out lined in maintenance section, Control Switch Adjustment.
4. Control rods: Check that all control rods are connected to the cam arm.
5. Alignment: The machine should be in a straight line when erection is completed. Adjust the control rod so the tower safety limit switch roller is in the middle of the “V” of the cam. Tighten the adjusting nuts. After the machine is started, final alignment should be performed according to the procedure in maintenance section, alignment.
6. Voltage: Voltage at the pivot panel should be 480V on all three legs of the power lines.

Note: Voltage is dependant upon your location. Voltage should not be more than 5% higher or lower than the recommended voltage or damage may occur.



7. Lubrication: Check the oil level in all gearboxes and motors. Grease the two fittings on the pivot elbow until grease is visible at the top and bottom of bearing.

8. Starting: When all the above checks have been made, the machine is ready to start. Close the main panel inner door and turn the main disconnect switch on. Follow operation instructions outlined in Section 4 Panel Operation.



**WARNING MAKE SURE POWER IS DISCONNECTED AT THE MAIN SERVICE PANEL BEFORE PERFORMING ANY ELECTRICAL SERVICE TO THE MACHINE OR BEFORE OPENING THE INNER DOOR OF THE MASTER CONTROL PANEL.**

Your Western Center Pivot irrigation system should be run with a slight leading bow (center towers ahead of pivot and end tower) in both directions. A correctly aligned machine will have an equal bow when operated in either direction. DO NOT let the machine run with a large leading bow in one direction and a lagging bow in the other. To align the machine, follow these steps:

Start at the pivot end of the machine with the machine running in the forward direction and the percent timer set to 75 percent. Stand between tower 2 and tower 3 and sight across motors No. 2 and 1 to the pivot stand pipe. Tower 1 should start when motor 1 appears to be slightly behind and shut off when it appears to be an equal distance ahead of the center of the standpipe.

When tower 1 is properly aligned, stand between towers 3 and 4 and sight across motors 3 and 2 to the pivot standpipe. Align tower 2 in the same manner as tower 1. As you get to the outer end of the machine and can no longer see the pivot standpipe, pick a motor on one of the inner towers and sight to it.

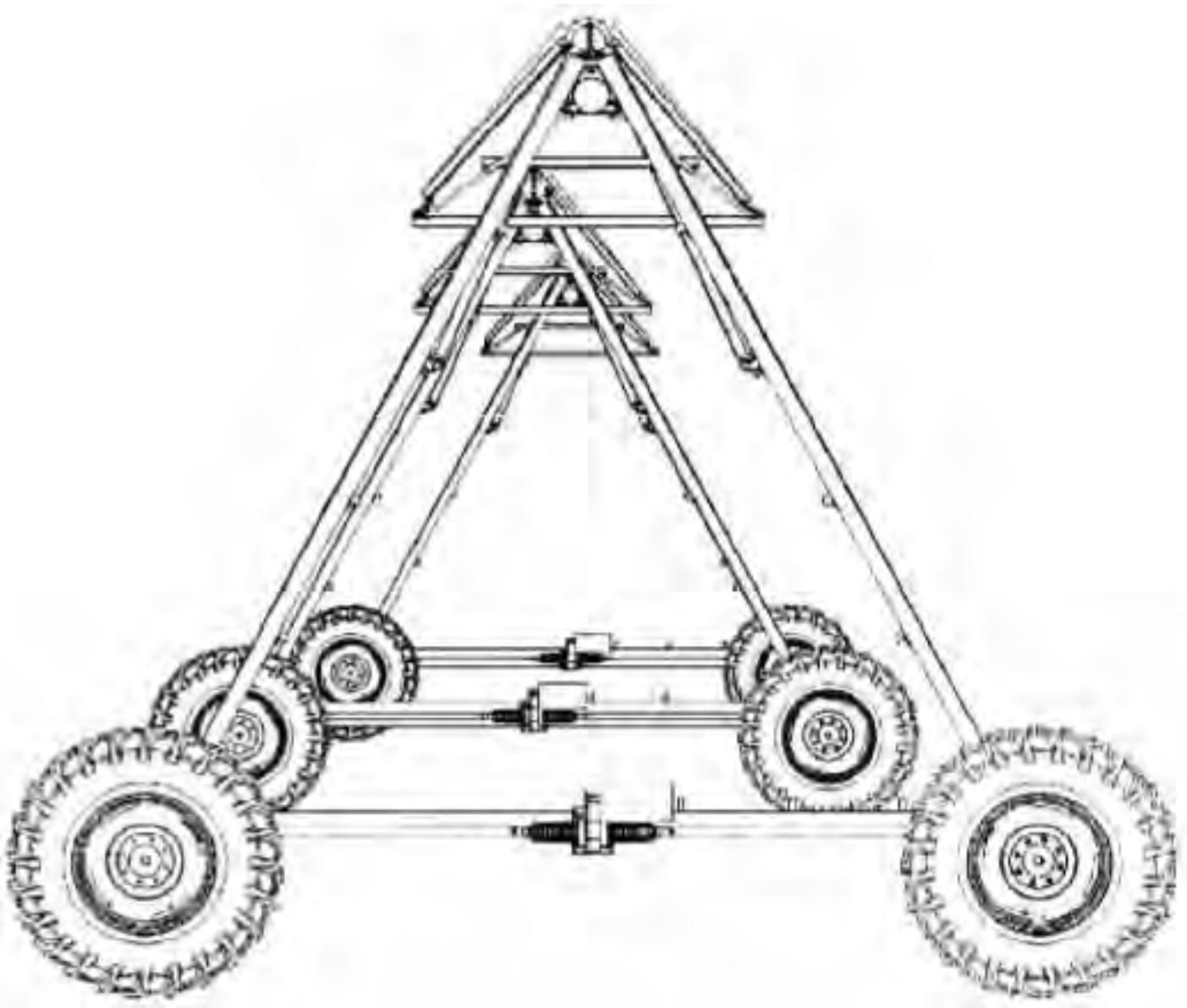


Figure 1-7.

Rotation Forward = Clockwise

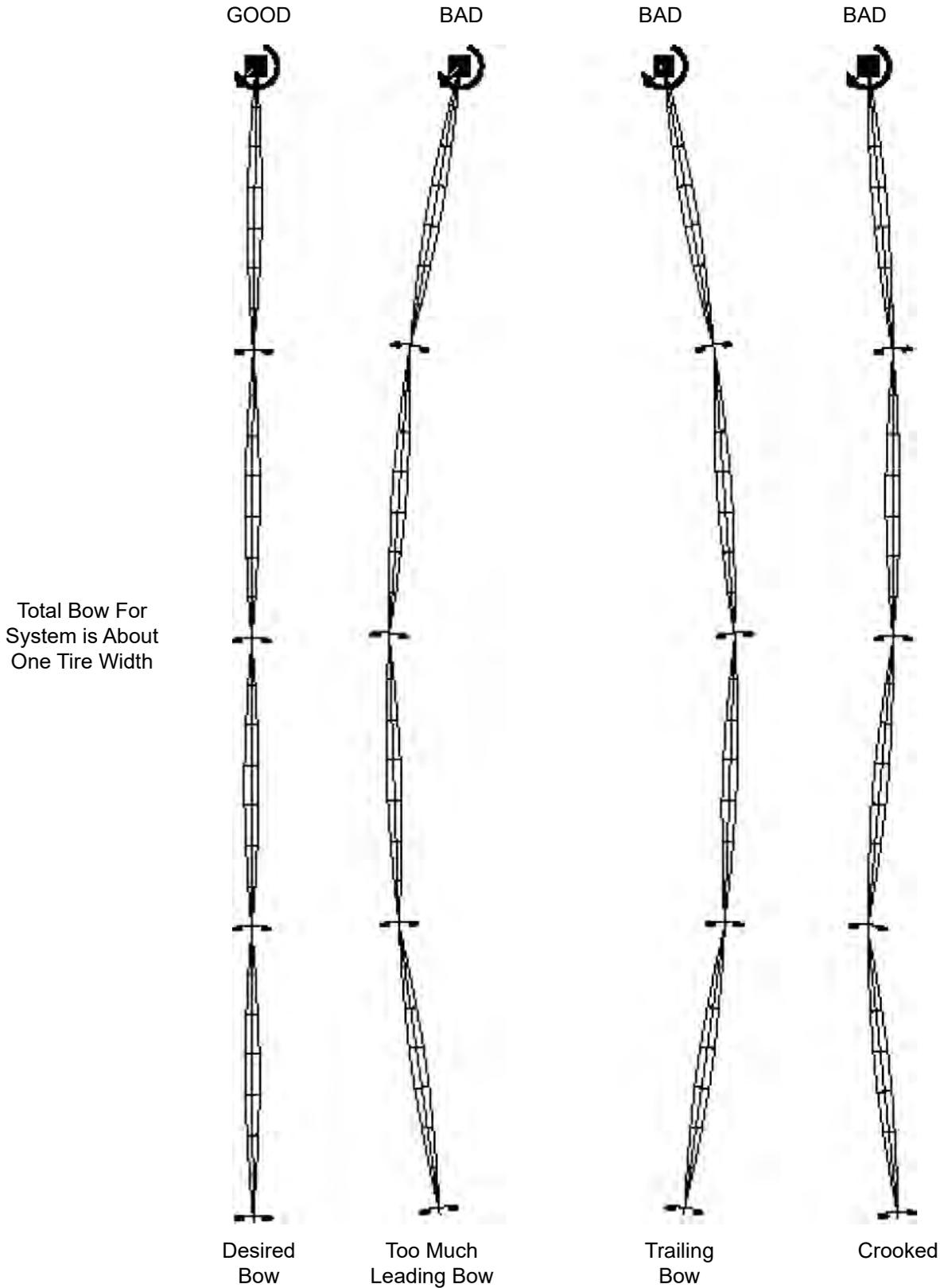
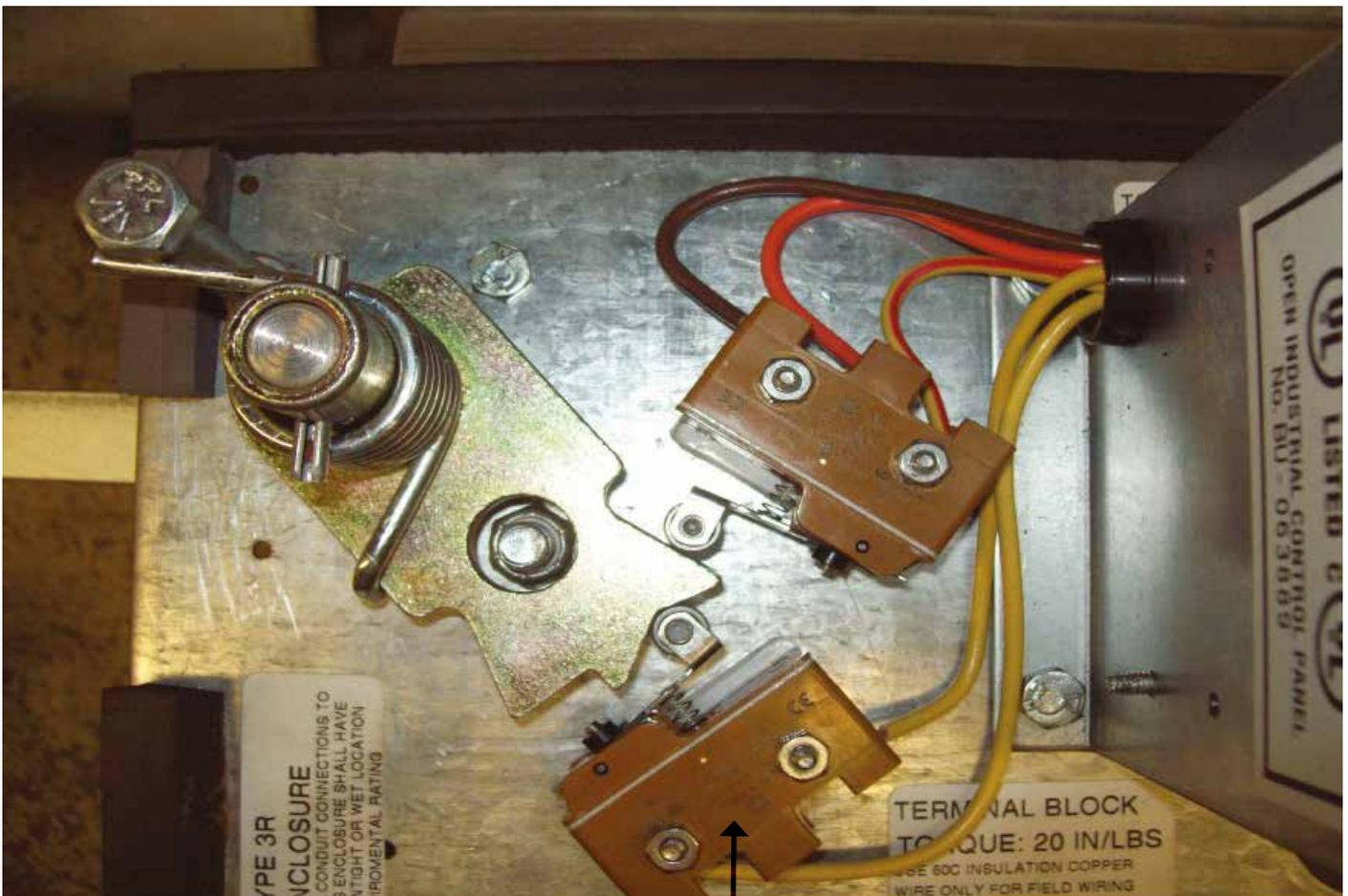


Figure 1-8.

Overhead View of Cam and Safety Switch



Safety Switch

- **PIVOT:** At start of irrigation season, grease pivot bearings. Repeat every 400 hours of operation.
- **GEARBOXES:** At start of irrigation season, drain all gearboxes and refill with recommended oil. See Power Drivetrain Maintenance section for detailed information.
- **MOTOR GEARBOXES:** At start of irrigation season drain any water that may have accumulated during the irrigation season and fill to the proper level with the proper lubricant.
- **TIRES:** Check tire inflation (use low pressure tire gauge). Western Corporation inflates all new tires to a higher pressure for truck loading requirements. Set tire pressure so side wall has slight flex. If tire creases increase pressure. If tire pressure too low tires will lose bead and damage the tube.



**CAUTION:** Operating tires below the manufacturers recommended pressure can result in damage to the tire sidewall in addition to voiding your warranty.

Tire Size	Recommended Pressure	Max Span Length / WT
11 x 22.5 Recap	35 PSI [241 kpa]	All Spans
11.2 x 24 Tire	20-24 PSI [138-165 kpa]	164 x 6-5/8 max
11.2 x 38 Tire	20-24 PSI [138-165 kpa]	184 x 6-5/8 max
14.9 x 24 Tire	20-24 PSI [138-165 kpa]	All Spans
16.9 x 24 Tire	18-22 PSI [124-152 kpa]	All Spans

- **WHEEL BOLTS:** Check to ensure they are tight.



*Note: Wheel bolts can loosen after initial installation. They should be checked after 100 hours of operation.*

- **STRUCTURE:** Routinely check pivot, span and tower structures for loose or missing bolts.
- **CONNECTORS:** Check for leaking gaskets, boots, drains, and malfunctioning sprinklers or pressure regulators.



**Lock Out / Tag Out:** lock the main power disconnect before servicing or troubleshooting electrical components.

- **ELECTRICAL:** Check pivot and junction box starters for burned or pitted contacts.
- **ELECTRICAL:** Check all wire connections, particularly on starters, to ensure they are tight.
- **ELECTRICAL:** Check safety limit switches in tower junction boxes.
- **ELECTRICAL:** Check function of automatic switching devices such as Auto Reverse, Auto Stop and End Gun (lube as required).
- **CONTROL:** Check junction box cam and bushings. Turn cam back and forth several times to ensure there is no binding.



*Note: The following maintenance procedures must be performed or the drivetrain warranty will be void.*

The final drive wheel gearbox, center drive gear motor and the worm gear center drive require pre-season maintenance. Please refer to the following service information for the above items.

If you should have any questions, please call your Western Dealer or Customer Service Representative.

## FINAL DRIVE GEARBOX MAINTENANCE PROCEDURES

### A. The final drive gearbox must be serviced as follows after each crop cycle:

1. Inspect input and output shaft seals for leakage. Should either the input or output shaft show excessive leakage, the seals should be replaced. All replaced seals must be installed with generous amounts of #2 Barium/Lithium based grease or use equivalent quality #2 water-resistant grease.
2. External (dust exclusion) seals should be used to keep dirt and water out of internal seal locations. If the external seals are damaged or worn, replace with new seals.
3. The seal drain hole located on both input caps must be kept clear of dirt. Clear the hole with a 12-gauge wire, nail or punch. Rotate the tool to loosen and remove dirt. Make sure the vent hole in the expansion chamber is free of dirt or debris.

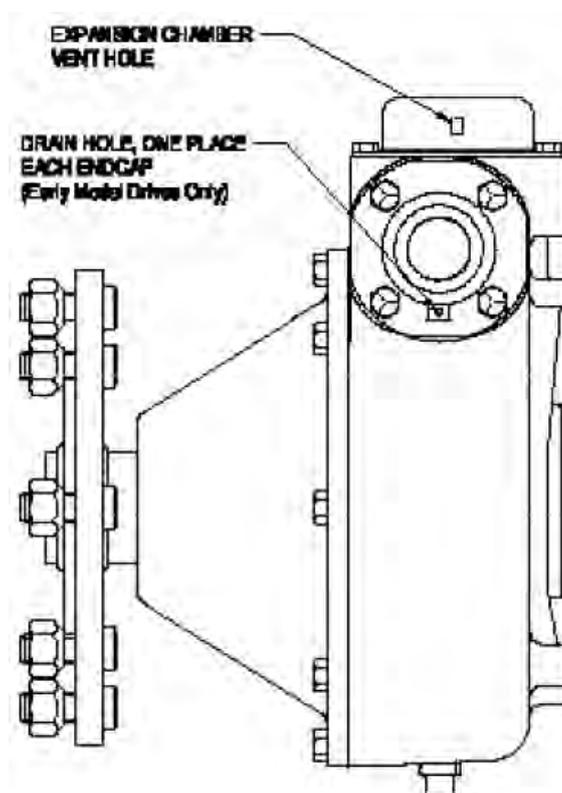


Figure 1-12.

- Each input and output shaft should be checked for excessive endplay after each crop cycle. Disconnecting the driveline coupler & tapping the input shaft on both sides with a dead blow hammer or mallet does this. If play is present, input shims should be installed to eliminate bearing backlash.
- All cover and end cap bolts should be torqued to 28-31 ft.-lbs (38-42 N-m).
- All wheel lug nuts should be torqued to 115-120 ft.-lbs (156-162 N-m).
- Remove drain plug located at bottom of gearbox and completely drain gearbox. If oil is contaminated or emulsified, flush gearbox with a cup of specified oil and let drain completely.
- Replace drain plug and refill gearbox through top fill hole to the proper operating level (top of worm gear) as shown below. After one or two hours the oil should be re-checked. Air may be trapped in the gearbox during initial filling. Top off with oil as needed.

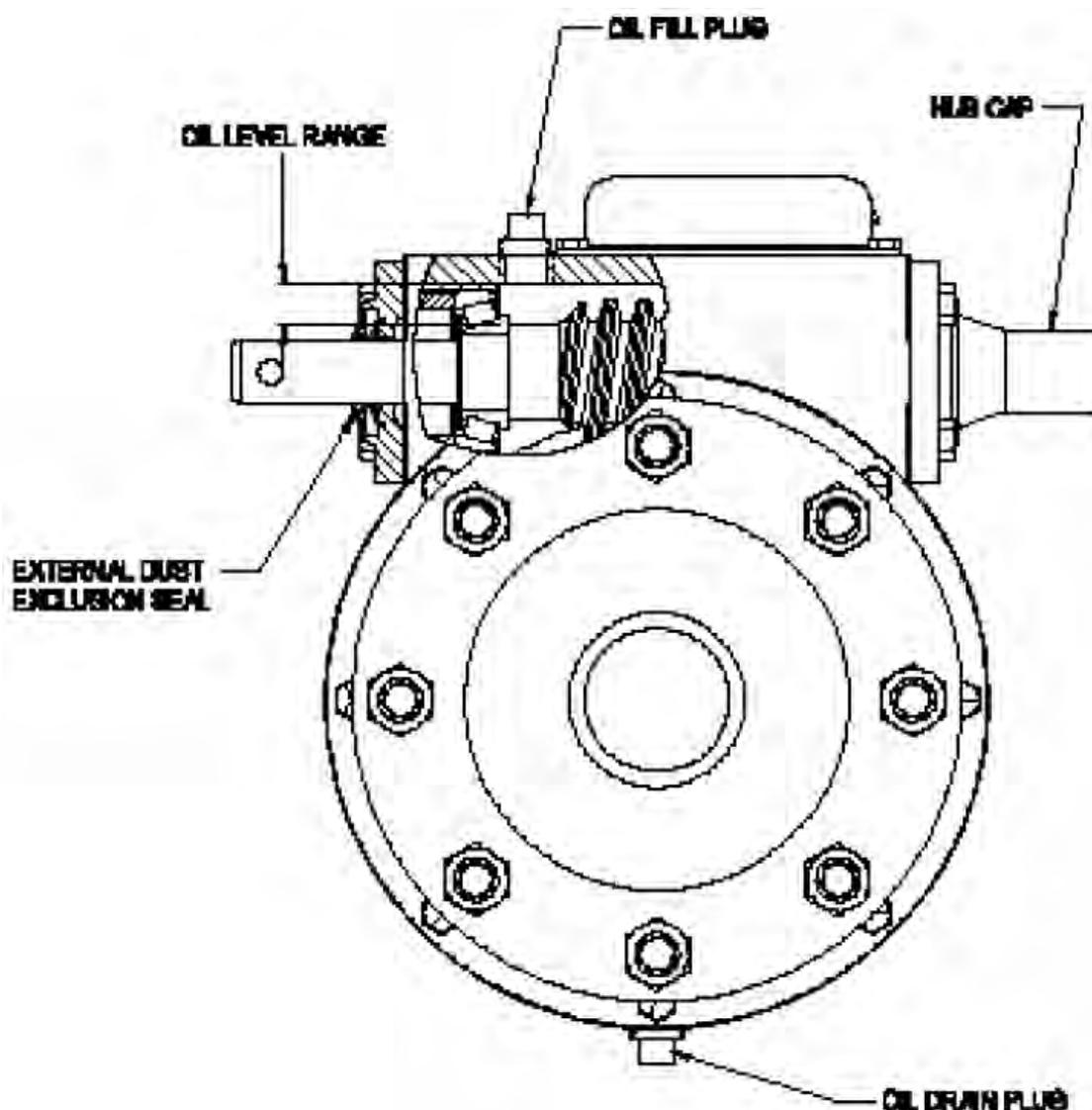


Figure 1-13.

**B. Final drive gearbox lubricants**

A GL-5 SAE 140 or MIL-C-2105 gear lube must be used in final gearboxes. Some common brands meeting this specification are shown below. Contact your dealer or local petroleum products distributor for other equivalent products. Use of improper oil will void the gearbox warranty.

- Hector S-150 Philube 1-LB Gear Oil #140
- Chevron Gear Compound #140
- Valvoline 85-140 Gear Oil
- Mobil 85-140 Gear Oil
- Pennzoil 85-140
- Texaco Multigear Lubricant EP SAE 85W-140
- Sprinkler Lube 1200

Oil capacity is approximately 1 U.S. Gallon, (3.8 Liters).

**C. In-season final drive gearbox Maintenance:**

Final drive gearboxes should be inspected periodically during the operating season, for the following:

1. The proper oil level should be maintained at all times.
2. Contaminated or emulsified oil should be replaced with fresh oil.
3. Input seal drain holes on the final drive gearbox should be kept clear.
4. Input & output shaft seals should be inspected for excessive leaks and replaced if necessary.
5. Expansion chamber vent holes should be kept clean.



Note: Failure to maintain gearboxes as specified will void the gearbox warranty.

**A. The Helical gear center drive must be serviced as follows after each crop cycle (Minimum of once per year):**

1. Inspect input and output seals for leakage. Should either of the seals show excessive leak age, the seals should be replaced. All replaced seals must be installed with generous amounts of #2 Barium/Lithium based grease or equivalent quality #2 water resistant grease.
2. External seals should be used to keep dirt and water out of internal seal locations. If the external seals are damaged or worn, replace with new seals.

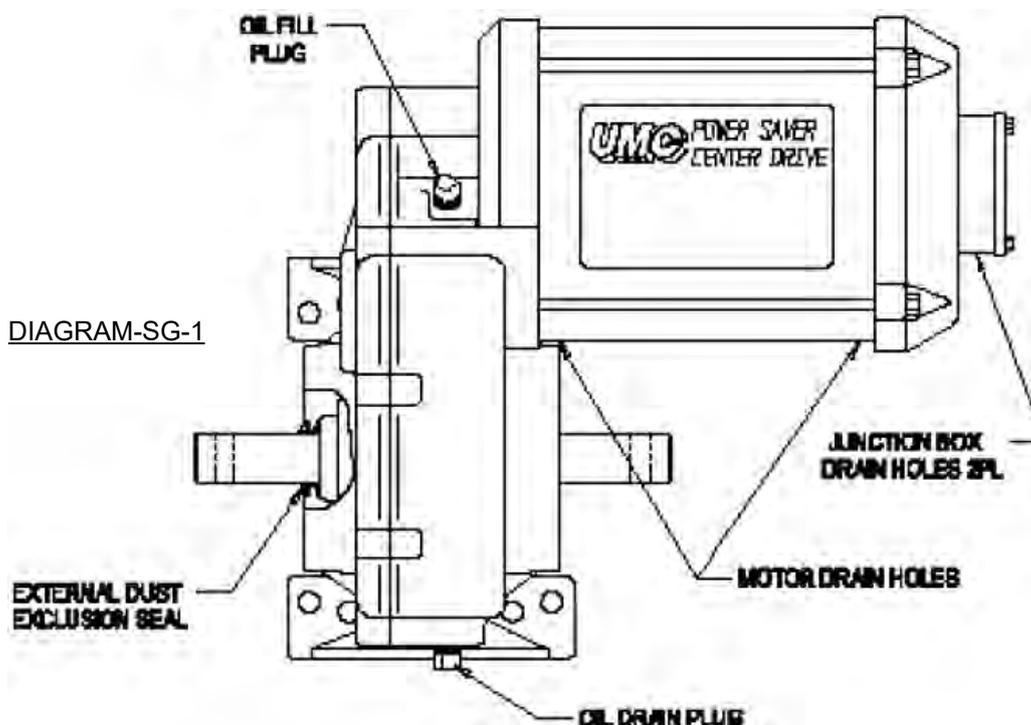


Figure 1-15.

3. The two (2) drain holes located under the motor can must be kept clear to allow for drainage of accumulated moisture inside the motor if required. Do not Western or remove plug.
4. The two (2) drain holes located under the end bell must be kept clear to allow drainage of accumulated moisture inside of the junction box.
5. Remove drain plug located at bottom of gearbox and completely drain gearbox. If oil was contaminated or emulsified, flush gearbox with a cup of specified oil and let drain completely.
6. Replace drain plug and refill to 1-1/2" (45 mm) from top of gear case as shown in the drawing. Refer to gearbox oil specifications. After one or two hours the oil should be re-checked. Air may be trapped in the gearbox during initial filling. Top off with oil as needed.

**B. Helical gear center drive lubricants Reference Figure 1-15. :**

Use only SAE 30W, SAE 40W, SAE 50W, or SAE 20W-50 multi viscosity engine oil. Use of improper oil will void the gearbox warranty. Oil capacity is approximately one (1) U.S. gallon (3.8 Liters).

**C. In-season spur gear center drive maintenance.**

Helical gear center drive gearboxes should be inspected periodically during the operating season as follows:

1. The proper oil level (1-1/2" [45 mm] from top of gear case) should be maintained at all times.
2. Contaminated or emulsified oil should be replaced with fresh oil.
3. Input & output shaft seals should be inspected for excessive leaks and replaced if necessary.
4. Motor drain holes must be kept clear to allow moisture to drain.
5. Expansion chamber vent holes.

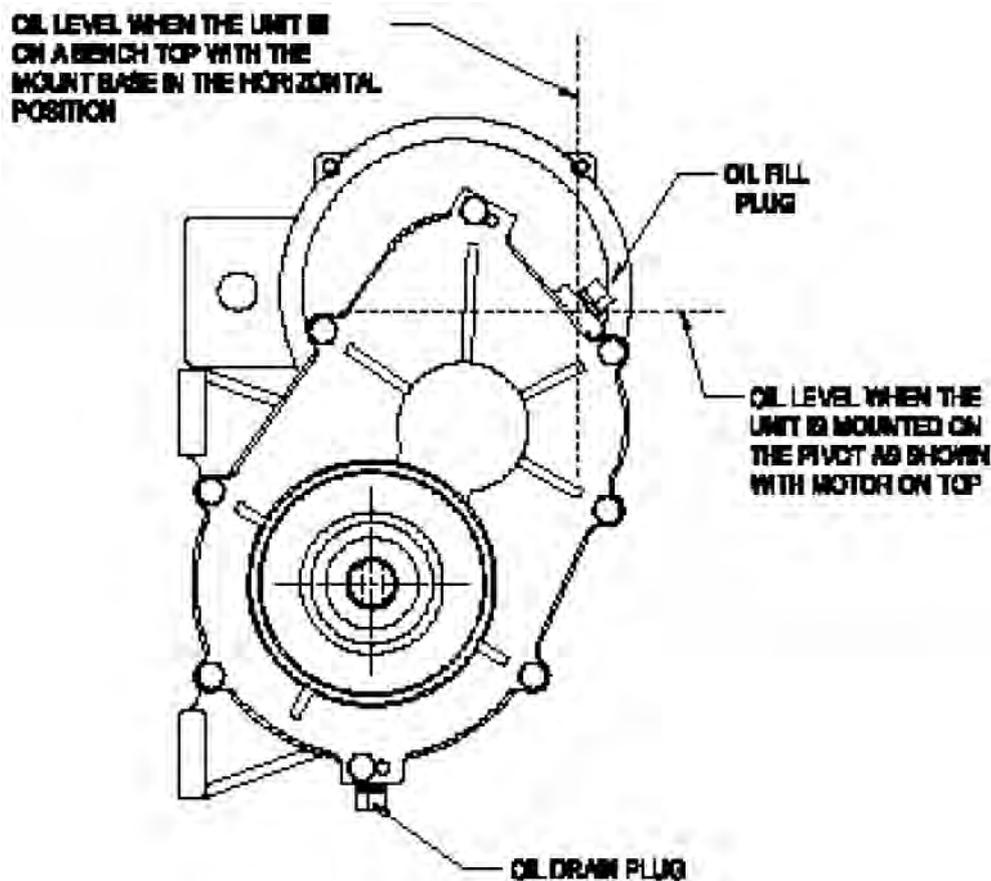


Figure 1-16.

## Worm Gear Center Drive Maintenance

### A. The worm gear center drive must be serviced as follows after each crop cycle (minimum of once per year):

1. Inspect input and output shaft seals for leakage. Should either the input or output shaft seals show excessive leakage, the seals should be replaced. All replaced seals must be installed with generous amounts of #2 Barium/Lithium based grease or equivalent quality #2 water resistant grease.
2. External dust exclusion seals should be used to keep dirt and water out of internal seal locations. If the external seals are damaged or worn, replace with new seals.
3. The flange drain hole located under the motor mount flange must be clear. Clear the hole with a 12 gauge wire, nail or punch by rotating the tool in the hole to loosen and remove dirt.
4. All 5/16-18 flange bolts and end cap bolts should be torqued to 13-15 ft-lbs (18-0N-m).
5. To drain gearbox, remove drain plug located at bottom of worm gear and bottom of side case cover. If oil is contaminated or emulsified, flush gearbox with a cup of specified oil and let drain completely.
6. Replace drain plug and refill gearbox through top side fill hole to proper operating level (mid worm gear). Refer to gearbox oil specification. After one or two hours the oil should be re-checked. Air may be trapped in the gearbox during initial filling. Top off with oil as needed.

**B. Worm gear center drive gearbox lubricants:**

A GL-5 SAE 140 or MIL C-2105 gear lube must be in worm gear center drive gearboxes. Some common brands meeting this specification are listed in section B of Final Drive Gearbox. Oil capacity is 3 ½ U.S. pints (1.6 Liters) approximately.

**C. In-season worm gear center drive maintenance:**

1. Proper oil level (mid bull gear) should be maintained at all times.
2. Contaminated or emulsified oil should be replaced with fresh oil.
3. Input and output shaft seals should be inspected for excessive leaks and should be replaced if necessary.

**A. Driveline Coupler Maintenance**

1. Drive line couplers should be inspected periodically for loose bolts and worn rubber inserts. Worn inserts should be replaced.

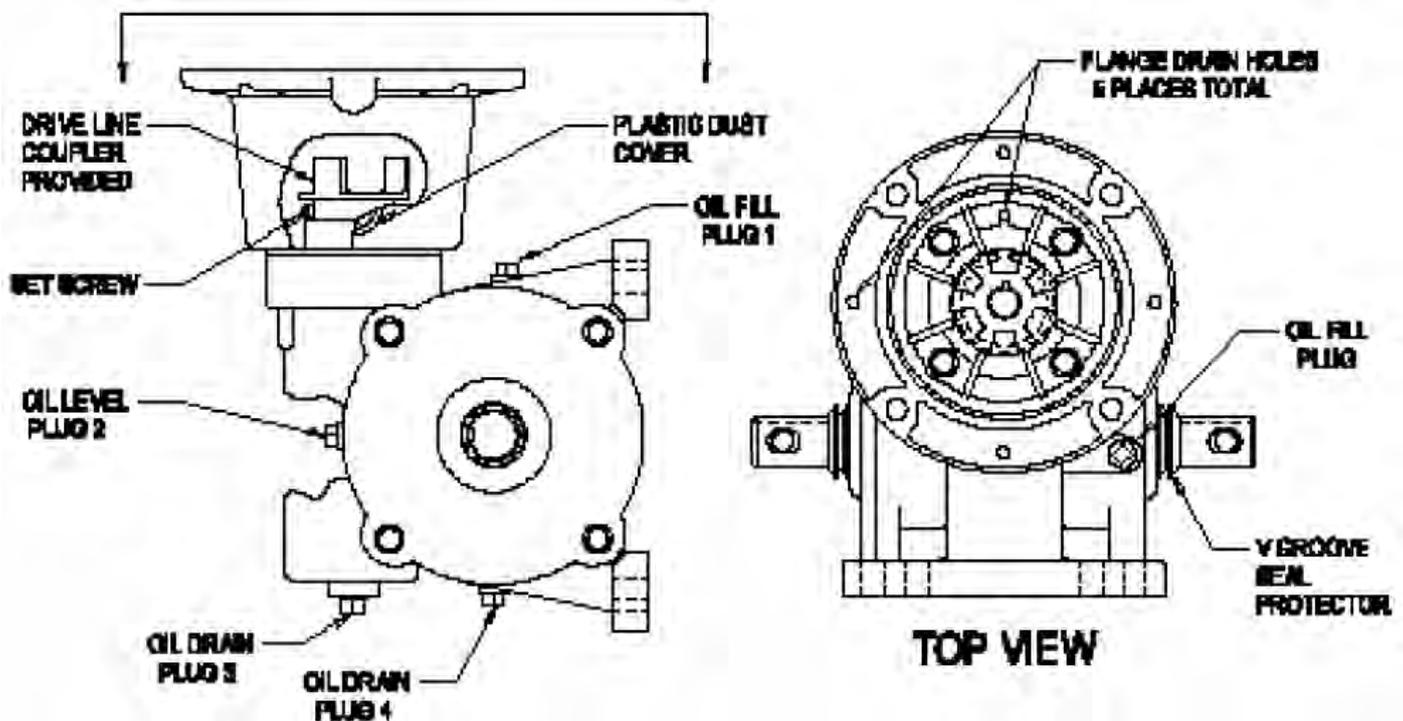


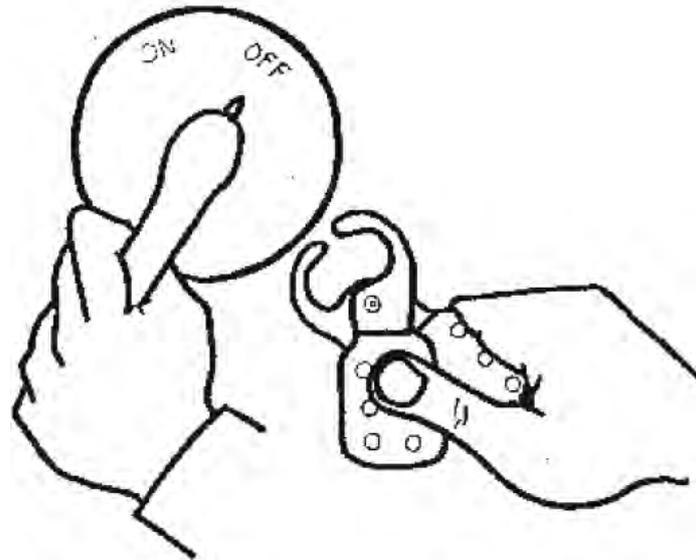
Figure 1-18.

This standard covers the lockout/tagout procedures you must use when servicing your Western pivot. The intent of Western corporation's pivot lockout/tagout standard is to protect you or your workers anytime the pivot requires servicing. Before any worker performs maintenance on the pivot where unexpected energizing, start up release stored energy could occur and cause injury, the pivot must be isolated and rendered inoperative. This standard establishes minimum performance requirements for the control of such hazardous energy.



**You must lock the pivot out if you are going to:**

1. Remove or bypass a guard or other safety device.
2. Place any part of your body into an area on the pivot where there is a pinch point.
3. Work on the electrical circuitry.
4. Obstruct the pivot path (wheel track) with vehicles, equipment, or other obstacles while performing work on the field itself.
5. Perform structural service which requires equipment to lift spans (i.e. boom truck).



Your Western pivot requires 480 volt 60 cycle, 3-phase electric power to operate sufficient charge. There is also 110-volt control power throughout the system. Other potential hazards include any injected fertilizers and pesticides, and water under pressure.



*Note: Voltage is dependant upon location. Voltage should not be more than +/- 5% than the recommended voltage in your area.*

### Sequence of Lockout or Tagout Procedure

1. Notify all affected persons that you are about to lockout the pivot, and tell them why the pivot is being placed “out of service”. Before locking out the pivot, you must familiarize yourself with the type and magnitude of the pivot’s energy source and determine any related hazards.
2. If the machine or system is operating shut it down by rotating the forward / reverse selector switch to the off position.
3. On the main control panel, turn the main disconnect lever to the off position so the pivot cannot be energized while it is being serviced. Drain all water from the system and disengage any automatic valves. If your pivot is rigged with an automatic valve, it must be locked out so that the pivot does not unexpectedly fill with water while you are servicing.
4. Lockout the main disconnect (energy-isolating device) on the main control panel. If working down line on the pivot, the tower disconnect switches on the individual tower boxes must also be shut off.
5. After ensuring that no personnel are exposed, and as a check on having disconnected the energy source, operate the start button to make certain the pivot will not operate.



**CAUTION: Return operating controls to “neutral” or “off” position after maintenance is completed.**



**WARNING: EVEN THOUGH YOU HAVE LOCKED OUT THE PIVOT CONTROL PANEL DISCONNECT SWITCH, THERE IS STILL 480 VOLTS PRESENT GOING INTO THE PANEL BOX.**

### Locks and Tags

When you purchase lockout/tagout devices, keep the following points in mind:

Lockout devices and tagout devices shall be singularly identified as belonging to only one worker; shall be the only device(s) used for controlling energy; shall not be used for other purposes.

Tagout devices shall warn against hazardous conditions if the pivot is energized and shall include a legend such as the following: DO NOT START, DO NOT OPEN, DO NOT CLOSE, DO NOT ENERGIZE, and DO NOT OPERATE. Attachment devices for tags shall be non reusable and have a minimum of 50 lb. (222 N) breaking strength.

Locks used to lockout machines or equipment shall have a key unique to that lock.

### Using Tags without Locks

There are limitations to the tagout system. Since tags are warning devices only, they must meet the following requirements:

- They must be legible. (If you employ migrant workers, the tags should also be bilingual.)
- They must not be removed, bypassed, or ignored.
- They must be sturdy enough to withstand the elements and be securely attached.



**WARNING: TAGS ARE WARNING DEVICES ONLY, AND DO NOT CARRY THE SAME PROTECTION AS LOCKS, SO USE EXTRA CARE WHEN USING THEM.**

### **Procedure Involving More Than One Person**

In the proceeding steps, if more than one person is required to lockout or tagout equipment, each shall place his/her own lockout or tagout device on the energy-isolating device. When an energy-isolating device cannot accept multiple locks or tags, a multiple lockout or tagout device may be used that allows the use of multiple locks to secure it. Each worker will then use his own lock (s) or tag (s) to secure the multiple lockout or tagout device. When work is completed and each person no longer needs to maintain his lockout/tagout protection, that person will remove his/her lock(s) or tag (s) from the multiple lockout/tagout device(s).

### **Restoring the Pivot to Normal Operations**

1. After maintenance is complete and the pivot is ready for normal operations, check around the area of the pivot to ensure that the field is not obstructed by vehicles and that everyone is clear of the pathways of all pivot towers. It is especially important to check the entire length of the pivot if it is set up on hilly terrain. It is easy to lose sight of someone working on the opposite side of the hill.
2. After all the tools have been removed from the pivot and all workers are in the clear, remove all lockout or tagout devices. Operate the energy isolating devices to restore energy to the pivot.
3. When possible, test run the machine to ensure proper operation.
4. If additional maintenance or service is required, shut down all systems and follow the lockout/tagout procedure again.



**WARNING: EXPLOSIVE SEPARATION OF A TIRE AND RIM PARTS CAN CAUSE SERIOUS INJURY OR DEATH.**

Always maintain the correct tire pressure. DO NOT inflate tires above the recommended pressure or maximum pressure stated on the tire.

Inspect tires and wheels daily. DO NOT operate with low pressure, cuts, bubbles, damaged rims, or missing lug bolts and nuts.

Carefully inspect any tire and rim assembly that has been run flat or severely under inflated before reinflating the tire. Damage to the rim and tire may have developed. Call your authorized dealer or a qualified repair service to inspect the rim and tire assembly and make necessary repairs.

When inflating tires, use a clip-on chuck and extension hose long enough to allow you to stand to one side and NOT in front of or over the tire assembly. Use a safety cage if possible.

NEVER cut or weld on an inflated tire or rim assembly. Heat from welding could cause an increase in pressure and may result in tire explosion.

Do not attempt to mount a tire if you do not have the proper equipment and experience to perform the job. Have it done by your authorized dealer or a qualified repair service.

Check tire pressure with an accurate gauge having 6.9 kPa (0.07 bar) (1 psi) graduations.

1. Shut off air supply to hose.
2. Move gauge hand to correct pressure.
3. Lock air chuck on tire valve.
4. Turn on air supply. Stand to front or rear of tire when you add air to tire.
5. After tire is at correct pressure, shut off air supply. Release chuck. (See Tire Pressure chart in Specification section.)

1. Lock the power disconnect switch in the “OFF” position. Be sure all electrical panels are closed and securely latched.
2. Drain the center pivot supply line to a level below the frost line.
3. Remove the flush cap and Flex-Span supply hose. Make sure the low pressure drain valves are working and that the center pivot is completely drained.
4. Disconnect poly line tubes from solenoid valves and end gun components to drain water from lines.
5. All sprinkler control valves should be in the “open” position and drained. Valve control hoses should be drained. Solenoid manifold assembly filters should be cleaned.
6. Protect moving parts and bearing surfaces against rust and corrosion by greasing all fittings.
7. Sufficient oil should be drained from the center and wheel gearboxes to remove water and contaminants. Refill with manufacturers specified lubricant.

Component	Operation	Start of Season	Before Operation	100 hrs	400 hrs	End of Season	Oil / Lube
Pivot Elbow Fittings	Grease	X	X			X	
Pivot Bearings	Grease	X			X	X	
Final Drive Gearboxes	Drain Oil and refill	X				X	*Hector S150 Philube 1-LB Gear Oil #140 *Chevron Gear Compound #140 *Valvoline 85-140 Gear Oil
	Drain Water and refill oil after first year of operation					X	*Mobile 85-140 Gear Oil *Texaco Multi Gear Lubricant EP SAE 85W-14 *Sprinkler Lube 1200
Gearbox input / output shaft seals	Inspect for leakage	X	X			X	#2 Barium / Lithium based grease or equivalent quality #2 water-resistant grease
Helical Gear Center Drive	Lubricants	X	X			X	*SAE 30W *SAE 40W *SAE 50W
	Drain water and refill oil					X	*SAE 20W-50 *Sprinkler Lube 1200

Component	Operation	Start of Season	Before Operation	100 hrs	400 hrs	End of Season	Oil / Lube
Worm Gear Center Drive	Lubricants	X	X			X	*GL-5 SAE 140 -OR- *MIL C-2105
	Drain water and refill oil					X	
Cover and End Cap Bolts	Tighten to 28-31 ft lbs.		X			X	
Tires	Pressure check	X	X			X	
Wheel Bolts	Tighten to 115-120 ft lbs	X		X		X	
		X	X			X	
Structure	Inspect for loose or missing bolts	X		X		X	
Automatic Switching Devices	Check for binding	X		X		X	
Auto Reverse	Lubricate	X		X		X	#2 Barium / Lithium based grease or equivalent quality #2 water-resistant grease
Auto Stop	Lubricate	X		X		X	
End Gun	Lubricate	X		X		X	



*Note: The charts listed above are intended to be used as a quick reference. Review the sections that pertain to the equipment being serviced or the individual manufacturers warranty for specific details.*







<u>Symptom</u>	<u>Possible Cause</u>	<u>Solution</u>
<p>Machine Will Not Start</p> <p>No control panel indicator lights turn ON when Start switch is actuated</p>	<ol style="list-style-type: none"> <li>1. Main Disconnect is OFF</li> <li>2. Blown 480VAC fuse</li> <li>3. 120VAC circuit breaker in panel tripped or OFF</li> <li>4. Bad Master Control Relay (RM) in control panel</li> </ol>	<ol style="list-style-type: none"> <li>1. Move Disconnect to ON position</li> <li>2. When power is OFF, check and replace fuses as necessary</li> <li>3. Check circuit breaker in control panel</li> <li>4. Ensure Master Relay is fully seated in socket. Check resistance of relay coil between A1 and A2. If coil circuit is open or resistance is zero, replace relay. Proper resistance is ~1.8 ohms</li> </ol>
<p>Running panel indicator light and Forward or Reverse panel indicator light turn ON only when Start switch is actuated but Safety panel indicator light does not. All panel indicator lights turn OFF when Start switch is released</p>	<ol style="list-style-type: none"> <li>1. Bad tower alignment</li> <li>2. Machine on barricade Safety (if barricades are present)</li> <li>3. Tower box power switch OFF</li> <li>4. Low temperature switch tripped</li> <li>5. Loose wire in Forward (Brown) circuit, Reverse (Orange) circuit, or Safety (Yellow) circuit</li> <li>6. Stall timer wired incorrectly</li> <li>7. Bad stall timer</li> </ol>	<ol style="list-style-type: none"> <li>1. Check for tower misalignment. Realign machine using Safety Override procedure as necessary (improper use will Damage Machine)</li> <li>2. Move direction switch to proper position to move machine OFF barricade. Hold Safety Override button and Start switch until machine moves off barricade</li> <li>3. Ensure every tower box power switch is in the ON position</li> <li>4. Check temperature switch set point and wiring. Move Water Control switch to Dry to move machine when temperature is low</li> <li>5. With Disconnect off, check connections at control panel terminal strip, in collector ring, and in each tower box</li> <li>6. Check stall timer wiring using wiring diagram in Electrical section of manual</li> <li>7. Replace stall timer</li> </ol>

Symptom	Possible Cause	Solution
<p>Machine Starts But End Tower Will Not Move</p> <p>Running panel indicator light, Forward or Reverse panel indicator light, and Safety panel indicator light turn ON when Start switch is actuated and STAY ON when Start switch is released. End Tower panel indicator light never turns ON</p>	<ol style="list-style-type: none"> <li>1. Percent timer is set to 0%</li> <li>2. Low pressure switch tripped</li> <li>3. Bad pressure switch</li> <li>4. Bad percent timer</li> </ol>	<ol style="list-style-type: none"> <li>1. Move percent timer to desired setting</li> <li>2. Check pressure switch setting and water pressure at gage and lower pressure setting as necessary. Check pressure switch wiring</li> <li>3. Bypass pressure switch by moving water control switch to Dry. If machines moves and pressure is normal, replace pressure switch</li> <li>4. Set percent timer to 100% and check for power on Purple wire at terminal strip after one minute. If no power on Purple, check for power at terminal 1 and terminal 2 of percent timer. If power is present, check for power at terminal 3 of percent timer. If no power is present, replace percent timer</li> </ol>
<p>Running panel indicator light, Forward or Reverse panel indicator light, and Safety panel indicator light turn ON when Start switch is actuated and STAY ON when Start switch is released. End Tower panel indicator light cycles ON and OFF with Percent Timer</p>	<ol style="list-style-type: none"> <li>1. End tower is stuck</li> <li>2. No power on End Tower (Purple) wire in end tower box</li> <li>3. Bad neutral at contactor in end tower box</li> <li>4. Bad 480VAC connection at contactor in end tower box or a bad connection at motor</li> <li>5. Motor thermal overload is tripped</li> <li>6. Bad contactor in end tower box</li> <li>7. Bad thermal overload or bad motor</li> </ol>	<ol style="list-style-type: none"> <li>1. Repair and maintain wheel ruts</li> <li>2. Check for power on Purple in control panel. If power is present, check for power on Purple in each tower box. If no power is present, turn OFF main disconnect and check collector ring wiring</li> <li>3. Check neutral connection at contactor and terminal strip in end tower box</li> <li>4. Check Purple connection at contactor and terminal strip in end tower box and check connections at motor</li> <li>5. Turn panel OFF and allow motor to cool, then attempt to restart machine</li> <li>6. Check for power across contactor coil. If power is present and contactor does not pull in, replace contactor</li> <li>7. With main disconnect OFF, check resistance of each leg of 480VAC at motor to ground. If continuity to ground is present, replace motor. Check resistance between 480VAC leg 1 and leg 2, leg 2 and leg 3, and leg 1 and leg 3. If one leg is open or shorted, replace motor. If all legs are open, thermal overload is tripped or damaged</li> </ol>

Symptom	Possible Cause	Solution
<p>Machine Starts and End Tower Moves But an Intermediate Tower Will Not Move</p> <p>Intermediate tower does not move</p>	<ol style="list-style-type: none"> <li>1. Intermediate tower is stuck</li> <li>2. Alignment or micro-switch out of adjustment in tower box</li> <li>3. Bad neutral at contactor in tower that will not move</li> <li>4. Bad 480VAC connection at contactor in tower box or a bad connection at motor</li> <li>5. Motor thermal overload is tripped</li> <li>6. Bad micro-switch in tower box</li> <li>7. Bad contactor in tower box</li> <li>8. Bad thermal overload or bad motor</li> </ol>	<ol style="list-style-type: none"> <li>1. Repair and maintain wheel ruts</li> <li>2. If machine is straight, ensure Run micro-switch (Orange and Brown wires) arm is at center of travel in each direction and that it clicks near the center of travel. Adjust alignment arm and micro-switch as necessary</li> <li>3. Check neutral connection at contactor and terminal strip in intermediate tower box</li> <li>4. Check connection at contactor and terminal strip in intermediate tower box and check connections at motor</li> <li>5. Turn panel OFF and allow motor to cool, then attempt to restart machine</li> <li>6. If power is present at COM of Run micro-switch but not at NC (Brown) when micro-switch is not actuated or NO (Orange) when micro-switch is actuated, replace micro-switch</li> <li>7. Check for power across contactor coil. If power is present and contactor does not pull in, replace contactor</li> <li>8. With main disconnect OFF, check resistance of each leg of 480VAC at motor to ground. If continuity to ground is present, replace motor. Check resistance between 480VAC leg 1 and leg 2, leg 2 and leg 3, and leg 1 and leg 3. If one leg is open or shorted, replace motor. If all legs are open, thermal overload is tripped or damaged</li> </ol>

<u>Symptom</u>	<u>Possible Cause</u>	<u>Solution</u>
<p>Machine Runs In Forward But Not In Reverse</p> <p>Machine runs in Forward only</p>	<ol style="list-style-type: none"> <li>1. Bad neutral at end tower relay coil in end tower box</li> <li>2. No power on Reverse (Orange) wire at end tower relay coil</li> <li>3. End tower relay not fully seated in relay base in end tower box</li> <li>4. Bad end tower relay</li> </ol>	<ol style="list-style-type: none"> <li>1. Check neutral connection at end tower relay and terminal strip in end tower box</li> <li>2. Check for power across end tower relay coil while attempting to start machine. If no power is present, check for loose connections or improper wiring of Reverse (Orange) circuit at control panel, in collector ring, and in each tower box</li> <li>3. Ensure end tower relay is fully seated in relay base</li> <li>4. Check resistance of relay coil between A1 and A2. If coil circuit is open or resistance is zero, replace relay. Proper resistance is ~1.8 ohms</li> </ol>
<p>Machine Starts and Runs in Both Directions But Shuts Down Intermittently</p> <p>Intermittent machine shutdowns</p>	<ol style="list-style-type: none"> <li>1. Machine shut down due to a low temperature condition (if low temperature switch is installed)</li> <li>2. Machine shut down due to a stall condition</li> <li>3. Machine shut down due to an alignment problem</li> <li>4. Loss of pressure for longer than the stall timer setting when running in Wet</li> <li>5. Loss of power to control panel during operation</li> <li>6. Loose wire in Forward (Brown) circuit, Reverse (Orange) circuit, or Safety (Yellow) circuit</li> <li>7. Motor thermal overload stopping a tower, causing a stall or alignment safety shut down</li> </ol>	<ol style="list-style-type: none"> <li>1. Install temperature auto-restart option to restart machine automatically if desired</li> <li>2. If no tower is stuck, check stall timer wiring or replace stall timer if faulty</li> <li>3. Check for tower misalignment. Realign machine using Safety Override procedure as necessary (improper use will Damage Machine)</li> <li>4. Install pressure auto-restart option to restart machine automatically if desired</li> <li>5. Install power auto-restart option to restart machine automatically if desired</li> <li>6. With Disconnect off, check connections at control panel terminal strip, in collector ring, and in each tower box</li> <li>7. With main disconnect OFF, check resistance of each leg of 480VAC at motor to ground. If continuity to ground is present, replace motor. Check resistance between 480VAC leg 1 and leg 2, leg 2 and leg 3, and leg 1 and leg 3. If one leg is open or shorted, replace motor. If all legs are open, thermal overload is tripped or damaged</li> </ol>

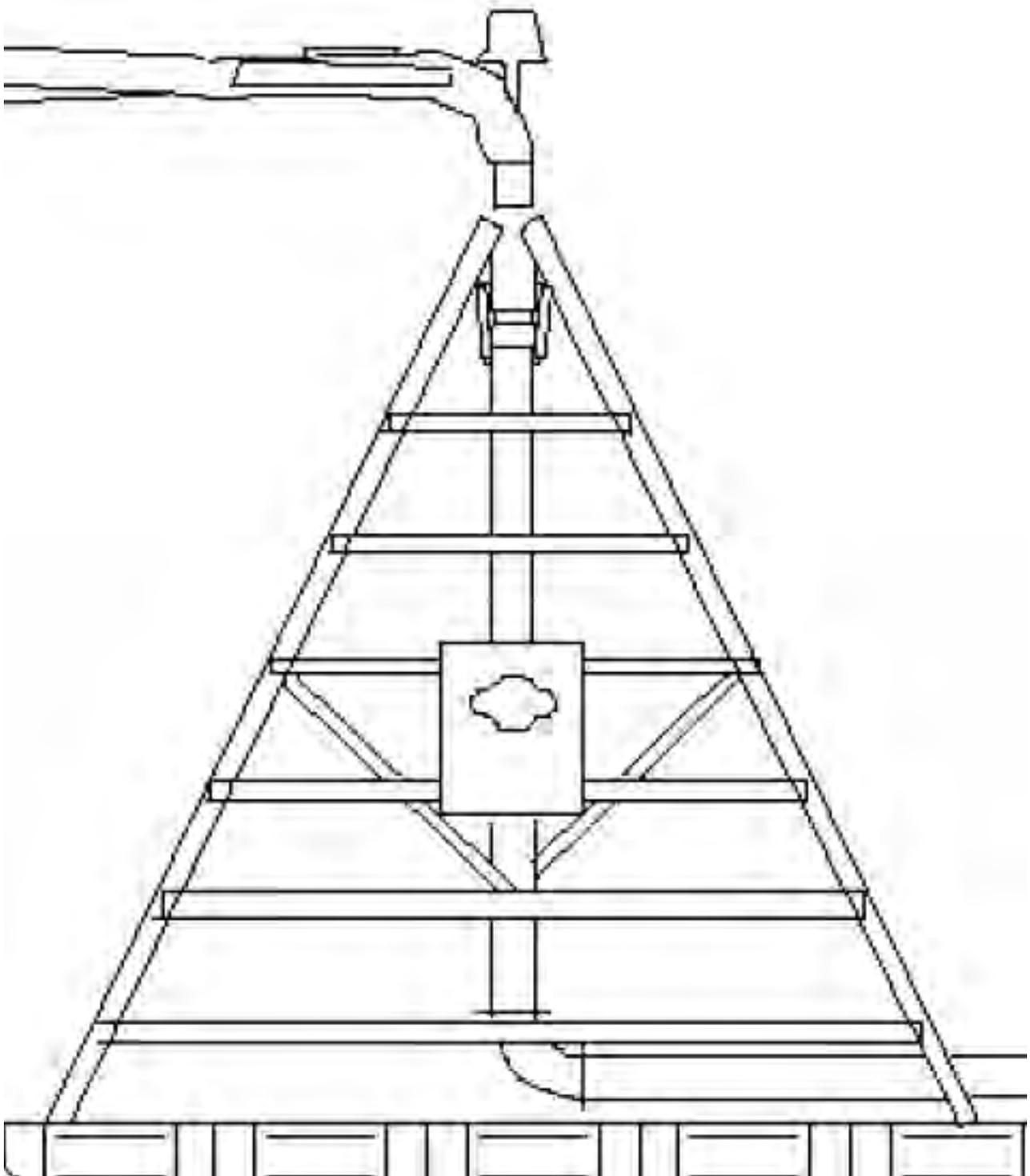
Symptom	Possible Cause	Solution
<p><b>Auto Reverse Problems</b></p> <p>Machine does not change directions at barricade</p>	<ol style="list-style-type: none"> <li>1. End tower auto reverse box and/or cables are misadjusted</li> <li>2. Loose wire in the auto reverse (Yel w/Red stripe) circuit</li> <li>3. Direction switch not in the Auto position</li> <li>4. Auto reverse option incorrectly wired in the control panel</li> <li>5. Bad auto reverse latching relay in the control panel</li> </ol>	<ol style="list-style-type: none"> <li>1. Ensure Forward and Reverse switch in auto reverse junction box actuate before Safety switch actuates when manually depressing trip arms</li> <li>2. Check connections in control panel, collector ring, and in each tower box</li> <li>3. Refer to the Auto-Reverse/Auto-Off Option section of the Manual for proper switch settings</li> <li>4. Compare wiring to diagrams in the Options section of the Manual</li> <li>5. Actuate the DIR switch to test relay. If relay does not actuate, check for voltage at relay coil when DIR switch is actuated. If voltage is present, replace the latching relay</li> </ol>
<p>Machine does not start in FWD or REV</p>	<ol style="list-style-type: none"> <li>1. Auto reverse latching relay is in the wrong state</li> </ol>	<ol style="list-style-type: none"> <li>1. Actuate the DIR switch to change the state of the relay, then attempt to start the machine. Refer to the Auto-Reverse/Auto-Off Option section of the Manual for proper switch settings</li> </ol>
<p>No auto stop functionality</p>	<ol style="list-style-type: none"> <li>1. Switches on control panel set incorrectly</li> <li>2. Auto reverse option incorrectly wired in the control panel</li> </ol>	<ol style="list-style-type: none"> <li>1. Refer to the Auto-Reverse/Auto-Off Option section of the Manual for proper switch settings</li> <li>2. Compare wiring to diagrams in the Options section of the Manual</li> </ol>
<p>Machine shuts down due to an alignment safety when changing direction at a barricade</p>	<ol style="list-style-type: none"> <li>1. Safety delay timer not set correctly</li> <li>2. Improperly wired safety delay timer</li> <li>3. Bad safety delay timer</li> </ol>	<ol style="list-style-type: none"> <li>1. Ensure safety delay timer in control panel is set to 50% and 3s to provide 1.5 seconds of safety dropout delay</li> <li>2. Check delay timer wiring using diagrams in the Electrical section of the Manual</li> <li>3. If delay timer is adjusted correctly and wired properly, replace the delay timer</li> </ol>

Symptom	Possible Cause	Solution
<p><b>Auto End Gun Problems</b></p> <p>End gun does not turn ON</p>	<ol style="list-style-type: none"> <li>1. Clearance between end gun trips and proximity switch is too large</li> <li>2. Proximity switch is wired incorrectly</li> <li>3. Loose wire in the End Gun (Pink) circuit</li> <li>4. Bad neutral at the end gun solenoid valve</li> <li>5. End gun relay in control panel is not fully seated, is wired incorrectly, or is bad</li> <li>6. End gun solenoid valve is plumbed incorrectly</li> <li>7. Bad end gun solenoid valve</li> <li>8. Bad end gun control valve</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust proximity switch so it passes within 1/4" of the end gun trip(s)</li> <li>2. Refer to the Options section of the Manual for proper wiring</li> <li>3. Check connections in control panel, collector ring, and in each tower box</li> <li>4. Check connections at the end gun solenoid valve in the end tower box</li> <li>5. Open control panel and ensure the end gun relay is fully seated in the relay base. Check the relay wiring against the wiring diagrams in the Electrical and Options sections of the Manual</li> <li>6. Refer to the Auto End Gun portion of the Options section in the Manual</li> <li>7. With disconnect in the OFF position, check the resistance of the solenoid valve coil. If the coil is open or has zero resistance, replace the valve</li> <li>8. With the machine running in Wet and at normal operating pressures, disconnect the 1/2" poly tubing at the end gun control valve. If the end gun does not turn on, replace the end gun control valve</li> </ol>
<p>End gun does not turn OFF</p>	<ol style="list-style-type: none"> <li>1. Proximity switch is wired incorrectly</li> <li>2. End gun solenoid valve is plumbed incorrectly</li> <li>3. End gun solenoid valve filter is clogged</li> <li>4. Bad end gun solenoid valve</li> <li>5. Bad end gun control valve</li> </ol>	<ol style="list-style-type: none"> <li>1. Refer to the Options section of the Manual for proper wiring</li> <li>2. Refer to the Auto End Gun portion of the Options section in the Manual</li> <li>3. Remove filter element and clean or replace</li> <li>4. With disconnect in the OFF position, check the resistance of the solenoid valve coil. If the coil is open or has zero resistance, replace the solenoid valve</li> <li>5. With the machine running in Wet and at normal operating pressures, disconnect the 1/2" poly tubing at the end gun control valve. If there is sufficient water pressure at outlet of poly tubing, replace the end gun control valve</li> </ol>

<u>Symptom</u>	<u>Possible Cause</u>	<u>Solution</u>
<p><b>Booster Pump Problems</b></p> <p>Booster pump will not start</p>	<p>1. Pressure switch in booster pump box is improperly adjusted                      2. Booster pump contactor not pulling in                      3. Booster pump overload is tripped</p>	<p>1. Lower pressure switch setting until booster pump starts                      2. Check for power across contactor coil. If power is present and contactor does not pull in, replace contactor. If no power is present but end gun is ON and there is power at end gun solenoid valve in end to wer box, check End Gun (Pink) circuit in booster pump box and end to wer box                      3. Check overload in junction box and reset if necessary. If overload continues to trip, turn main disconnect OFF, check resistance of each leg of 480VAC at motor to ground. If continuity to ground is present, replace motor. Check resistance between 480VAC leg 1 and leg 2, leg 2 and leg 3, and leg 1 and leg 3. If one leg is open or shorted, replace motor</p>
<p>Booster pump runs but pressure is not being boosted</p>	<p>1. Booster pump motor is rotating backwards</p>	<p>1. With main disconnect OFF, reverse any two legs of 480VAC at motor or at the booster pump contactor</p>
<p><b>Miscellaneous Problems</b></p> <p>Machine runs in Forward (clockwise) direction with switch in REV or runs in Reverse direction with switch in FWD</p> <p>A tower or towers move in the opposite direction of the rest of the towers</p> <p>All towers move at once</p>	<p>1. Phase reversal of the incoming 480VAC power</p> <p>1. Phase reversal of the 480VAC power at the offending motor or tower box contactor</p> <p>1. Short between the Forward (Brown) and Reverse (Orange) circuits</p>	<p>1. With main disconnect OFF, reverse any two legs of 480VAC at bottom of FWD/REV contactor in the control panel</p> <p>1. Re-phase motors as necessary to obtain proper direction of rotation</p> <p>1. Check for power on both the Forward and Reverse circuits at the same time. If power is present on Brown and Orange, turn off main disconnect and check for short in control panel, collector ring, and in each tower box</p>

## Section 2

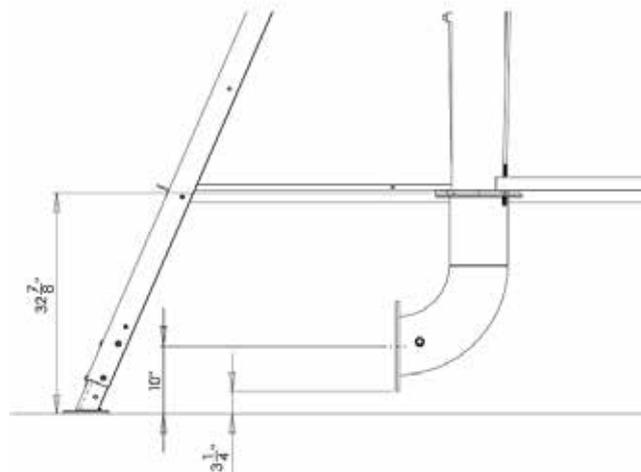
### General Information



6' 5/8" Pipe Span Weights (lb)			168 mm Pipe Span Weights (kg)		
Span (ft)	Dry	Wet	Span	Dry	Wet
125.5	3212	4964	38.3 m	1457	2252
145.0	3512	5536	44.2 m	1593	2511
164.5	3853	6149	50.1 m	1748	2789
184.0	4173	6741	56.1 m	1893	3058
203.5	4513	7353	62.0 m	2047	3336

8' 5/8" Pipe Span Weights (lb)			219 mm Pipe Span Weights (kg)		
Span	Dry	Wet	Span	Dry	Wet
125.5	3539	6550	38.3 m	1605	2971
145.0	3910	7384	44.2 m	1774	3351
164.5	4375	8321	50.1 m	1985	3775

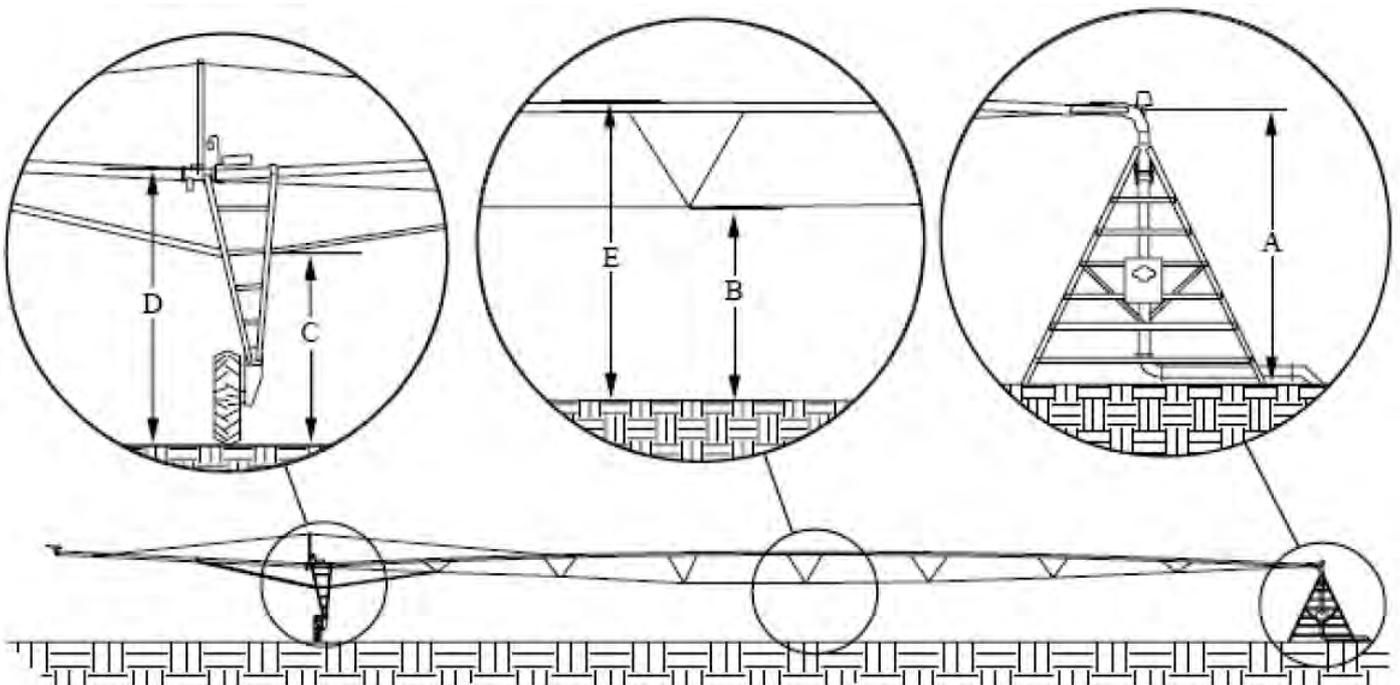
6' 5/8" Overhang Weights (lb)			168 mm Overhang Weights (kg)		
Overhang	Dry	Wet	Overhang	Dry	Wet
6.0	77	106	1.8 m	35	48
12.0	141	308	3.7 m	64	140
19.5	278	550	5.9 m	126	250
25.5	401	702	7.8 m	182	319
31.5	553	993	9.6 m	251	450
39.0	593	1137	11.9 m	269	516
45.0	638	1212	13.7 m	289	550
51.0	858	1570	15.5 m	389	712
58.5	833	1295	17.8 m	378	587
64.5	878	1369	19.7 m	398	621
78.0	1031	1765	23.8 m	468	801
84.0	1075	1838	25.6 m	488	834



Note: For Low Profile Machines, subtract 126lbs or 157.15kg For High Profile Machines, add 280lbs or 127.01kg

Span Dimensions with Water						
	Standard	Standard	High Profile	High Profile	Low Profile	Low Profile
A =	12'-2"	3.71 m	17'-6"	5.33 m	8'-7"	2.65 m
B =	9'-6"	2.90 m	14'-0"	4.52 m	6'-1"	1.86 m
C =	9'-6"	2.90 m	14'-10"	4.52 m	6'-1"	1.86 m
D =	14'-1"	4.29 m	19'-5"	5.92 m	10'-6"	3.23 m
E =	16'-7"	5.05 m	21'-11"	6.68 m	13'-2"	4.02 m

Actual Span Dimensions			
Pivot to 1st Wheel Track		Wheel Track to Wheel Track	
125'-11"	38.38 m	125'-7"	38.28 m
145'-5"	44.32 m	145'-1"	44.22 m
164'-11"	50.27 m	164'-7"	50.17 m
184'-5"	56.21 m	184'-1"	56.11 m
203'-11"	62.15 m	203'-7"	62.05 m



To determine how much water will be applied by your machine:

1. Measure the time it takes for your machine to complete one revolution (this will be variable "h" you will need for the formula on the next page).

The most accurate measurement is obtained by running the machine for one full revolution at 100% on the percent timer. An alternative method is shown below.

2. Fill in the blanks on **Chart 1** (page 7). First, insert the 100% revolution time ("h") in the first blank in each row, then do the arithmetic to fill in the second blank.
3. Calculate variable "i" (amount of water delivered, in inches per revolution) by using the formula on the next page.

*Alternative method to Step 1:*

*You can calculate the hours-per-revolution by using the formula below.*

$$h = \frac{6.28 \times l \times d}{t \times 21,600}$$

h = Hours per full-cycle revolution at 100% on percent timer.

l = Length (in feet) of your machine from pivot point to the tires at the last tower.

t = Tire speed of your machine based on tire size and/or type. This number is found in Table 1 below.

d = Number of degrees machine moves through during 1 "revolution". For example, for a half-circle machine, d = 180.

*Note: Field topography, steering efficiency, and wheel slippage can effect your actual results compared to the calculated time. If the difference appears to be significant, use your actual time measured in Step 1 for variable "h" on the next page.*

Table 1. Tire Speed Ft/min

Tire Size	0.75 HP 40:1		1.5 HP 30:1		1.5 HP 20:1	
	60 hz	50 hz	60 hz	50 hz	60 hz	50 hz
11.2 x 24	9.3	7.4	12.3	10.2	18.4	15.0
14.9 x 24	10.4	8.2	13.7	11.3	20.5	16.7
11.2 x 38	12.6	10.0	16.6	13.7	24.9	20.3
16.9 x 24	11.2	8.9	14.8	12.2	22.1	18.1

*To convert ft/min to meters/min, divide ft/min by 3.3.*

4. Use the following formula below to determine how many inches of water your machine will deliver during a single revolution with the percentage timer set at 100%.

$$i = \frac{h \times gpm \times 11029}{lm \times lm \times d}$$

$i$  = Amount of water delivered, in inches per revolution.

$h$  = Hours per revolution, from Step 1 of the preceding page.

$gpm$  = Gallons per minute delivered to the field by your machine.

$lm$  = Length of your machine from pivot point to last drive tower, plus length of overhangs and end gun watering radius, measured in feet.

$d$  = Number of degrees machine moves through in one revolution.

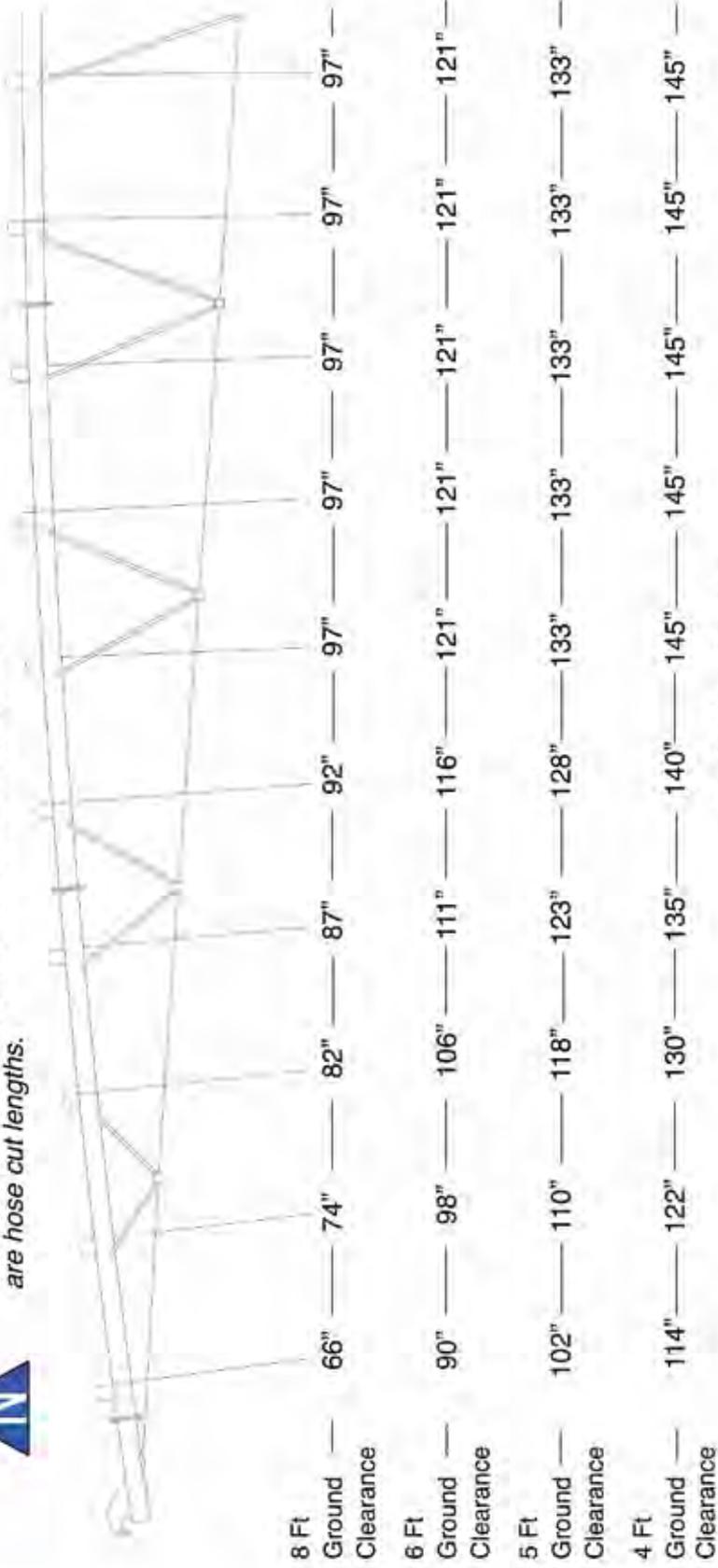
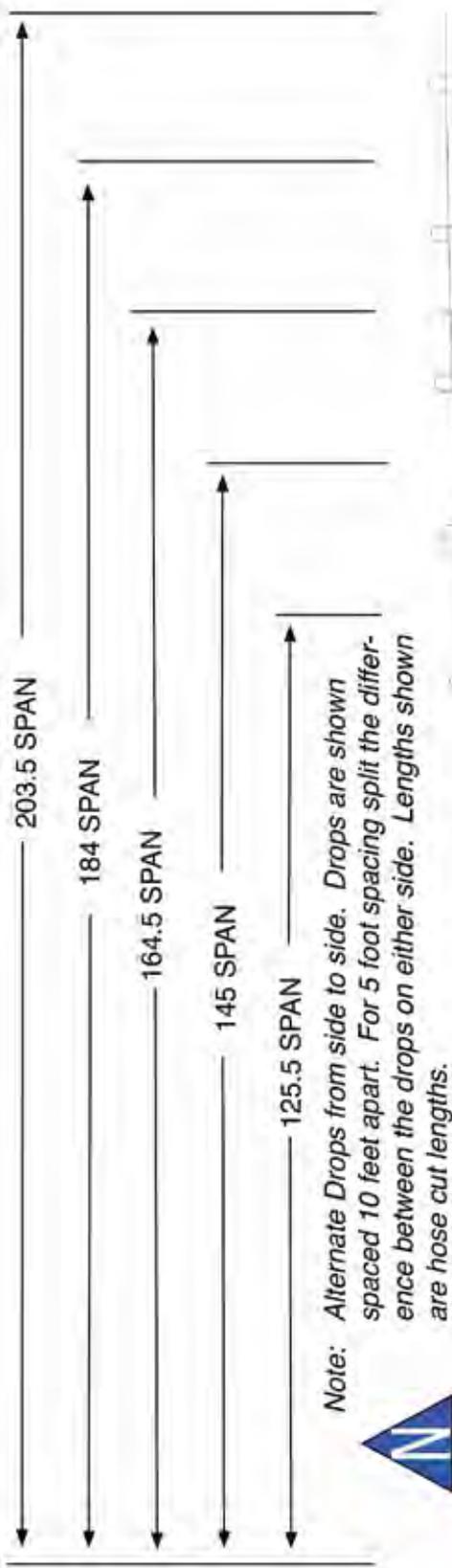
5. When you have determined the inches per revolution, complete **Chart 2** on the next page by inserting the 100% inches-per-revolution time ( $i$ ) in the first blank of each row, then do the arithmetic and fill in the second blanks.

**Quick-Reference Chart 1**  
**Hrs / Revolution**

<b>% Timer Setting</b>	<b>Hrs / rev. (actual or calculated "h") at 100% Timer</b>			
90% =	_____	÷ 0.9 =	_____	Hrs / rev
80% =	_____	÷ 0.8 =	_____	Hrs / rev
70% =	_____	÷ 0.7 =	_____	Hrs / rev
60% =	_____	÷ 0.6 =	_____	Hrs / rev
50% =	_____	÷ 0.5 =	_____	Hrs / rev
40% =	_____	÷ 0.4 =	_____	Hrs / rev
30% =	_____	÷ 0.3 =	_____	Hrs / rev
20% =	_____	÷ 0.2 =	_____	Hrs / rev
10% =	_____	÷ 0.1 =	_____	Hrs / rev

**Quick-Reference Chart 2**  
**Water Application Rates**

<b>% Timer Setting</b>	<b>Inches / Rev (calculated "i")</b>			
100% =	_____	÷ 1.0 =	_____	In / rev
90% =	_____	÷ 0.9 =	_____	In / rev
80% =	_____	÷ 0.8 =	_____	In / rev
70% =	_____	÷ 0.7 =	_____	In / rev
60% =	_____	÷ 0.6 =	_____	In / rev
50% =	_____	÷ 0.5 =	_____	In / rev
40% =	_____	÷ 0.4 =	_____	In / rev
30% =	_____	÷ 0.3 =	_____	In / rev
20% =	_____	÷ 0.2 =	_____	In / rev
10% =	_____	÷ 0.1 =	_____	In / rev

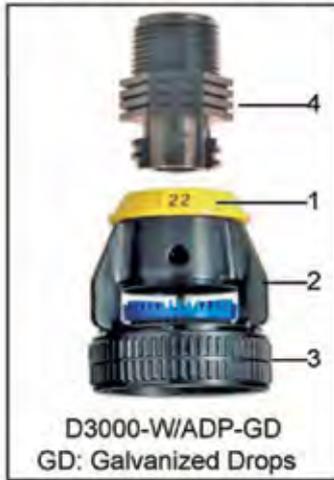


**Sprinkler Drops**

Note: Lengths were calculated with 14.9 x 24 tires. Please use Table 2-8 when calculating lengths if other tire sizes are being used:

Tire Size	Add / Subtract	Inches
11.2 x 24	Subtract	3
11.2 x 38	Add	4
16.9 x 24	Add	2

D3000 FOR GALVANIZED DROPS



D3000-W/ADP-GD  
GD: Galvanized Drops



- Pressure Regulator
- 9769006 - 10 PSI
- 9769003 - 15 PSI
- 9769002 - 20 PSI
- 9769004 - 25 PSI
- 9769005 - 30 PSI



D3000-W/O-ADP

Item	Part No.	Description
1	9569390	3TN Nozzle #9
to	9569349	3TN Nozzle #50
2	9569348	Body - A3000 / D3000
3	9569267	Plate, dual Nelson blue/green
4	9569399	Adapter Nelson 3000 series
5	9569395	Nelson 3/4 hosebarb x sq. head
6	95.30086	3/4" hosebarb x 3/4" MNPT



**9569267**  
Plate, dual Nelson blue/green

Sprayhead D3000

D3000 FOR FLEX HOSE



D3000-W/ADP-FH  
FH: Flex Hose



- Pressure Regulator
- 9769006 - 10 PSI
- 9769003 - 15 PSI
- 9769002 - 20 PSI
- 9769004 - 25 PSI
- 9769005 - 30 PSI



D3000-W/O-ADPFH

D3030 FOR GALVANIZED DROPS



- Pressure Regulator
- 9769006 - 10 PSI
- 9769003 - 15 PSI
- 9769002 - 20 PSI
- 9769004 - 25 PSI
- 9769005 - 30 PSI
- 9769037 - 10 PSI
- 9769036 - 10 PSI



Item	Part No.	Description
1	12035-009	3NV Nozzle #9
to	12035-050	3NV Nozzle #50
2	9569488	Body - A3030 / D3030
3	9569267	Plate, dual Nelson blue/green
4	9569399	Adapter Nelson 3/4 3000 series
5	9569395	Nelson 3/4 hosebarb x sq. head
6	95.30086	3/4" hosebarb x 3/4" MNPT



**9569267**  
Plate, dual Nelson blue/green

SPRAYHEAD D3030

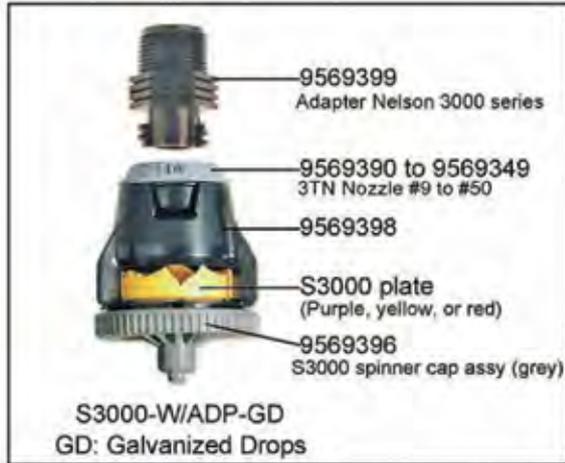
D3030 FOR FLEX HOSE



- Pressure Regulator
- 9769006 - 10 PSI
- 9769003 - 15 PSI
- 9769002 - 20 PSI
- 9769004 - 25 PSI
- 9769005 - 30 PSI



**S3000 FOR GALVANIZED DROPS**



**S3000 PLATES**



**Sprayhead S3000**

**S3000 FOR FLEX HOSE**



**S3030 FOR GALVANIZED DROPS**



**S3030-W/ADP-GD**  
GD: Galvanized Drops



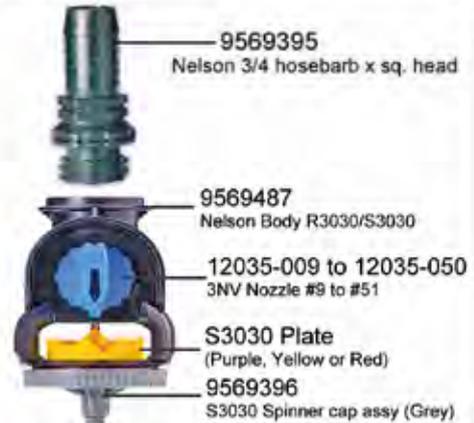
**S3030-W/O-ADP**

**S3030 PLATES**

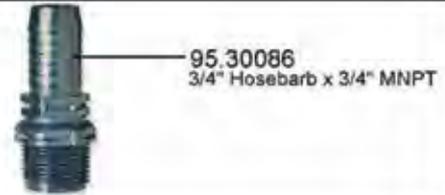


**SPINNER S3030**

**S3030 FOR FLEX HOSE**



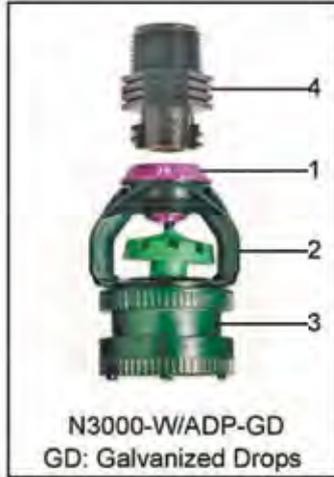
**S3030-W/ADP-FH**  
FH: Flex Hose



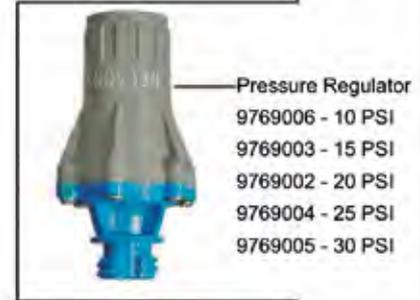
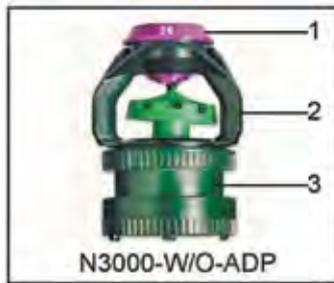
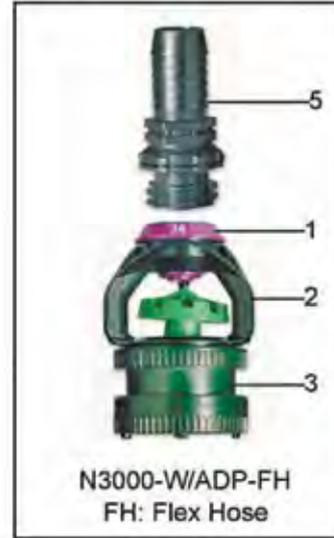
**S3030-W/O-ADPFH**

Sprayhead N3000

N3000 FOR GALVANIZED DROPS



N3000 FOR FLEX HOSE



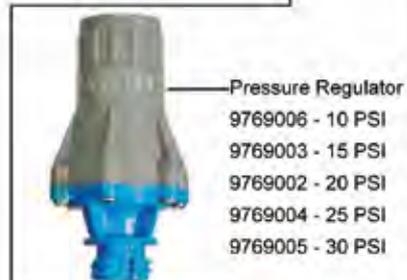
Item	Part No.	Description
1	9569390	3TN Nozzle #9
to	9569349	3TN Nozzle #50
2	9569299	Spk MS Nelson body for N3000
3	9569300	N3000 cap/plate assy-9grv-grn
4	9569399	Adapter Nelson 3000 series
5	9569395	Nelson 3/4 hosebarb x sq. head
6	95.30086	3/4" Hosebarb x 3/4" MNPT

ORBITOR O3030

O3030 FOR GALVANIZED DROPS



O3030 FOR FLEX HOSE



Item	Part	Description
1	12035-009	3NV Nozzle #9
to	12035-050	3NV Nozzle #50
2	12317-103	O3030 Orbitor Purple Plate w/Weight
3	9569399	Adapter Nelson 3000 series
4	9569395	Nelson 3/4 hosebarb x sq. head
5	95.30086	3/4" Hosebarb x 3/4" MNPT

Sprayhead R3000

R3000 FOR GALVANIZED DROPS



R3000-W/ADP-GD  
GD: Galvanized Drops



R3000-W/O-ADP

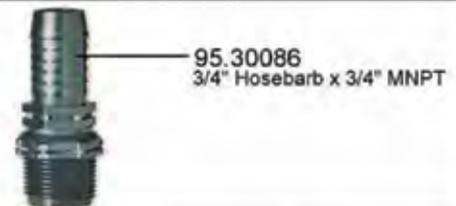
R3000 PLATES



R3000 FOR FLEX HOSE DROPS



R3000-W/ADP-FH  
FH: Flex Hose



R3000-W/O-ADPFH

ROTATOR R3030

R3030 FOR GALVANIZED DROPS



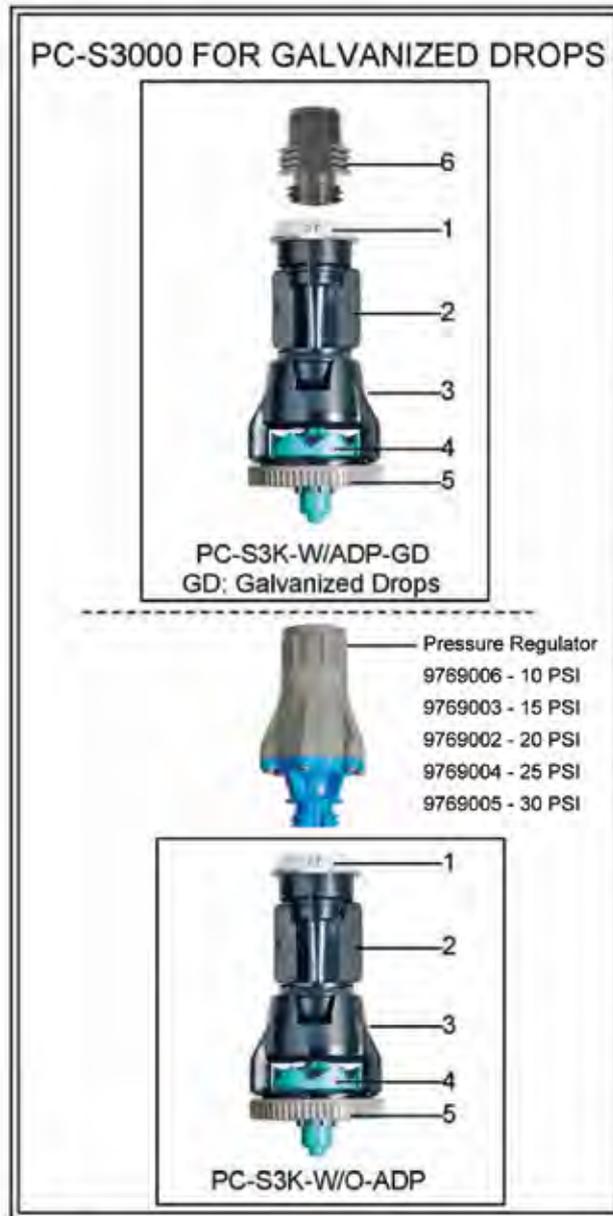
R3030/R3000 PLATES



R3030 FOR FLEX HOSE DROPS



Part Circle Sprayhead S3000



Item	Part No.	Description
1	9569390	3TN Nozzle #9
to	9569349	3TN Nozzle #50
2	9569400	Part circle stream deflector
3	9569398	Body R3000/S3000
4	9569465	U4-8deg rotor plate (blue)
5	9269396	S3000 spinner cap Assy (grey)
6	9569399	Adapter Nelson 3000 series
7	9569395	Nelson 3/4 hose barb x sq. head
8	95.30086	3/4" Hose barb x 3/4" MNPT

Part Circle Sprayhead D3000

PC-D3000 FOR GALVANIZED DROPS



- Pressure Regulator
- 9769006 - 10 PSI
- 9769003 - 15 PSI
- 9769002 - 20 PSI
- 9769004 - 25 PSI
- 9769005 - 30 PSI



Item	Part No.	Description
1	9569390	3TN Nozzle #9
to	9569349	3TN Nozzle #50
2	9769021	PC-D3000 Spray head
3	9569399	Adapter Nelson 3000 series
4	9569395	Nelson 3/4 hosebarb x sq. head
5	95.30086	3/4" Hosebarb x 3/4" MNPT

A3000 FOR GALVANIZED DROPS



- Pressure Regulator
- 9769006 - 10 PSI
- 9769003 - 15 PSI
- 9769002 - 20 PSI
- 9769004 - 25 PSI
- 9769005 - 30 PSI



Sprayhead A3000

A3000 FOR FLEX HOSE

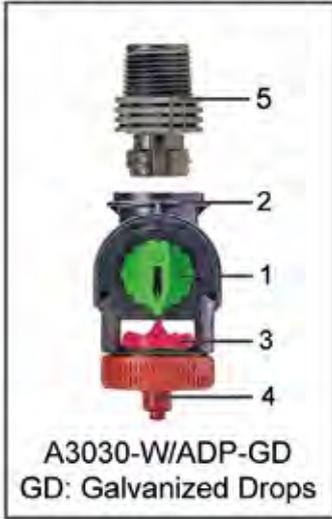


- Pressure Regulator
- 9769006 - 10 PSI
- 9769003 - 15 PSI
- 9769002 - 20 PSI
- 9769004 - 25 PSI
- 9769005 - 30 PSI



Item	Part No.	Description
1	9569390	3TN Nozzle #9
to	9569349	3TN Nozzle #50
2	9569348	Body - A3000 / D3000
3	9769032	Rotor plate-A3000 - Maroon
4	9769022	A3000 cap assembly
5	9569399	Adapter Nelson 3000 series
6	9569395	Nelson 3/4 hosebarb x sq. head
7	95.30086	3/4" Hosebarb x 3/4" MNPT

A3030 FOR GALVANIZED DROPS



Item	Part No.	Description
1	12035-009	3NV Nozzle #9
to	12035-050	3NV Nozzle #50
2	9569488	Body - A3030 / D3030
3	9769032	Rotor Plate-A3030-Maroon
4	9769022	A3030 cap assembly
5	9569399	Adapter Nelson 3/4 3000 series
6	9569395	Nelson 3/4 hosebarb x sq. head
7	95.30086	3/4" hosebarb x 3/4" MNPT

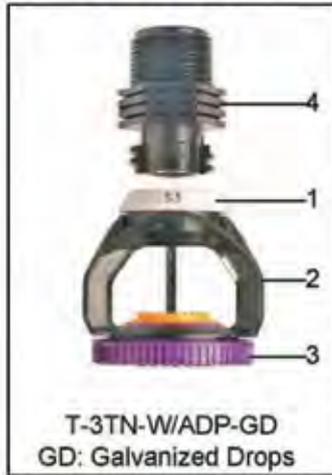
SPRAYHEAD A3030

A3030 FOR FLEX HOSE

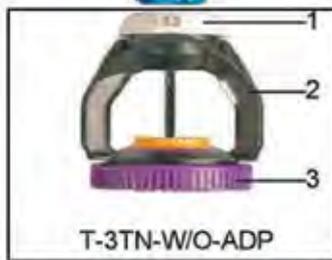
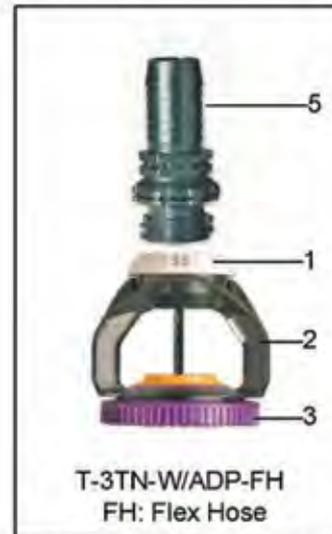


Sprayhead T3000

T3000-3TN FOR GALVANIZED DROPS



T3000-3TN FOR FLEX HOSE



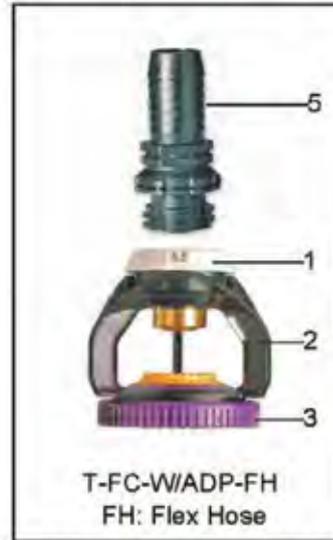
Item	Part No.	Description
1	9569390	3TN Nozzle #9
to	9569349	3TN Nozzle #50
2	9769025	Body T3000
3	9769024	T3000 cap/plate assy - yellow
4	9569399	Adapter Nelson 3000 series
5	9569395	Nelson 3/4 hosebarb x sq. head
6	95.30086	3/4" Hosebarb x 3/4" MNPT

Sprayhead T3000 FC

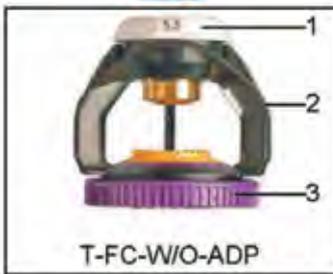
T3000-FC FOR GALVANIZED DROPS



T3000-FC FOR FLEX HOSE



- Pressure Regulator
- 9769006 - 10 PSI
  - 9769003 - 15 PSI
  - 9769002 - 20 PSI
  - 9769004 - 25 PSI
  - 9769005 - 30 PSI

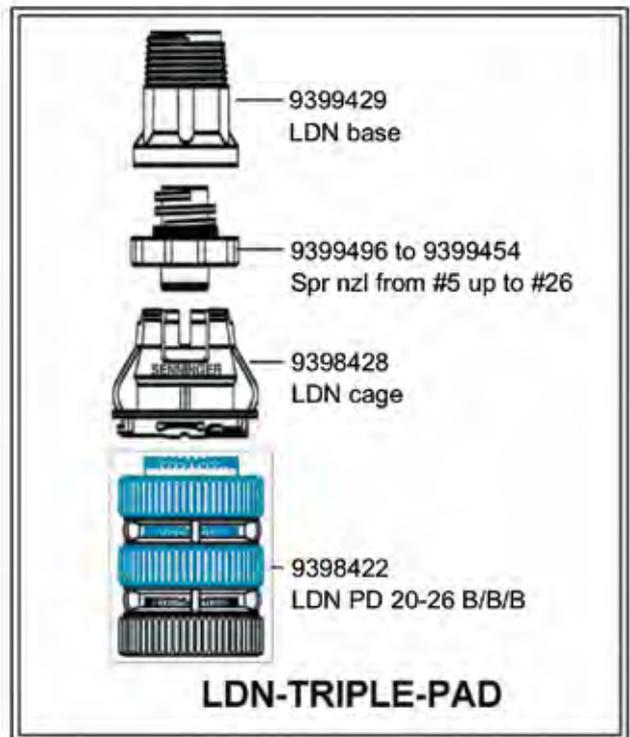
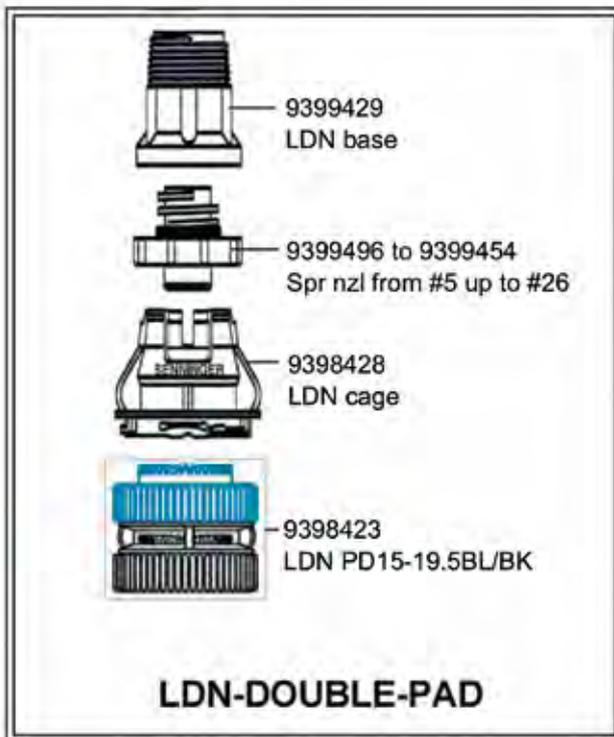
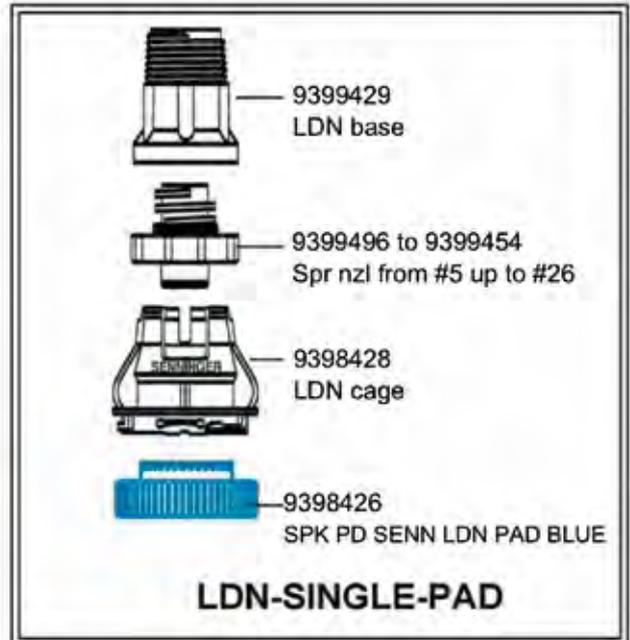
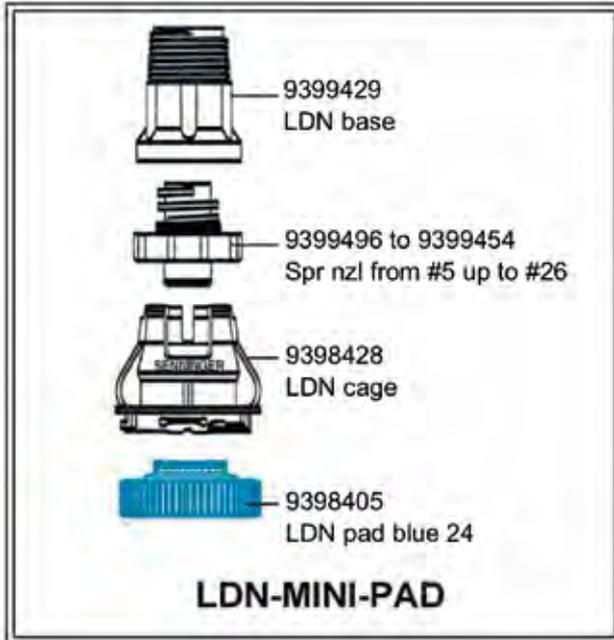


- Pressure Regulator
- 9769006 - 10 PSI
  - 9769003 - 15 PSI
  - 9769002 - 20 PSI
  - 9769004 - 25 PSI
  - 9769005 - 30 PSI

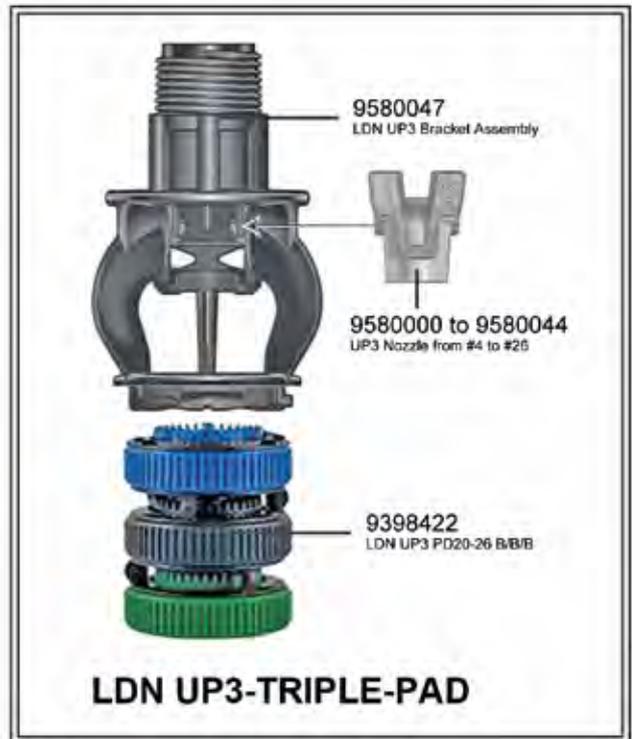


Item	Part No.	Description
1	9569550	FC nozzle 2.0 gpm
to	9569562	FC nozzle 10.0 gpm
2	9769025	Body T3000
3	9769024	T3000 cap/plate assy - yellow
4	9569399	Adapter Nelson 3000 series
5	9569395	Nelson 3/4 hosebarb x sq. head
6	95.30086	3/4" Hosebarb x 3/4" MNPT

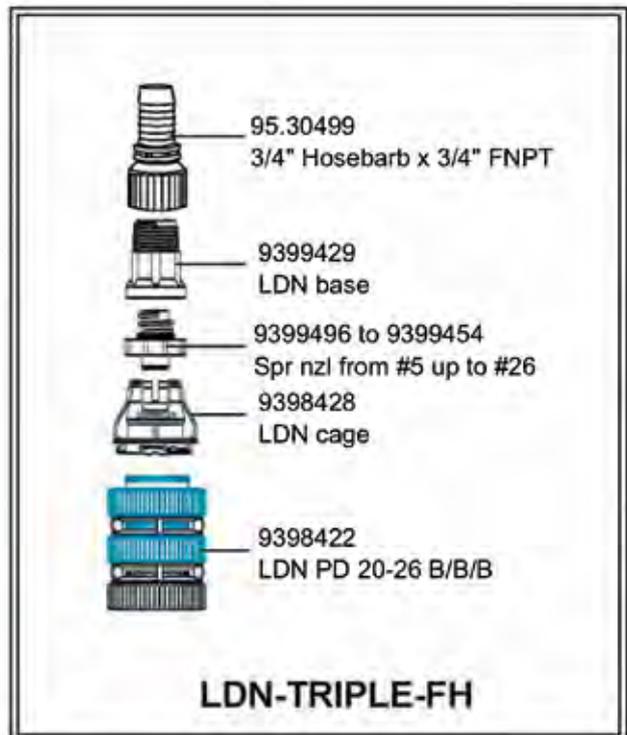
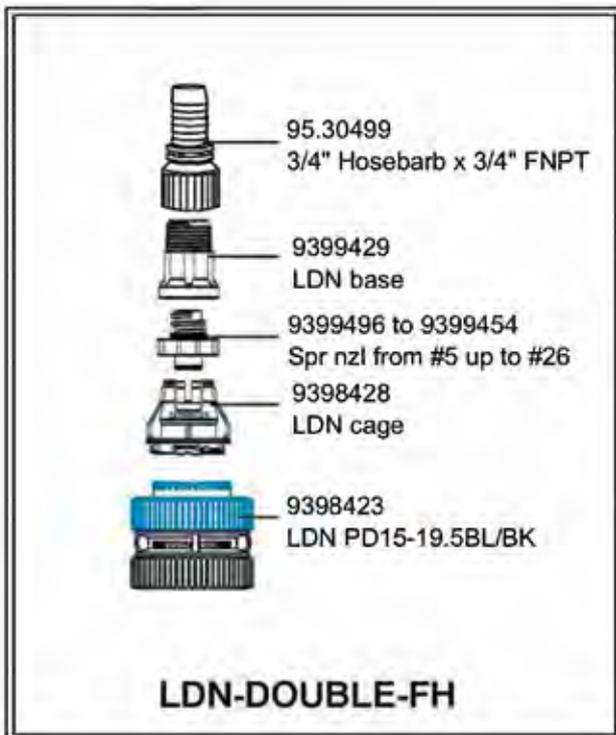
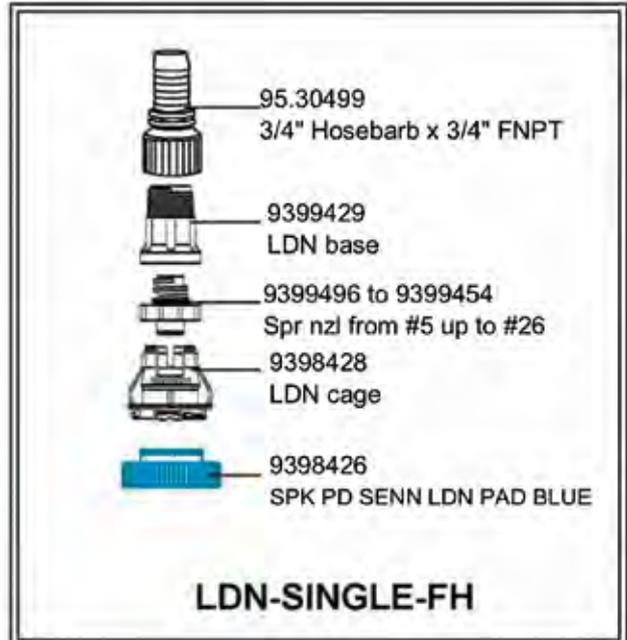
### LDN for Galvanized Drops



LDN UP3 FOR GALVANIZED DROPS



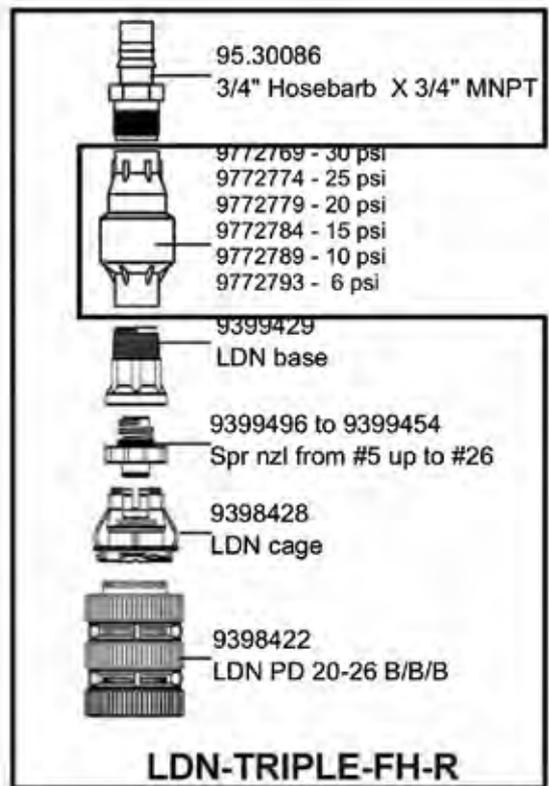
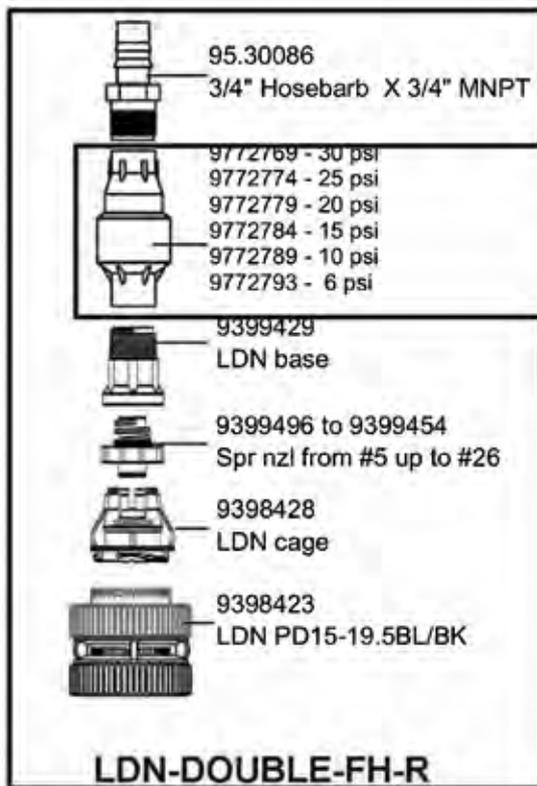
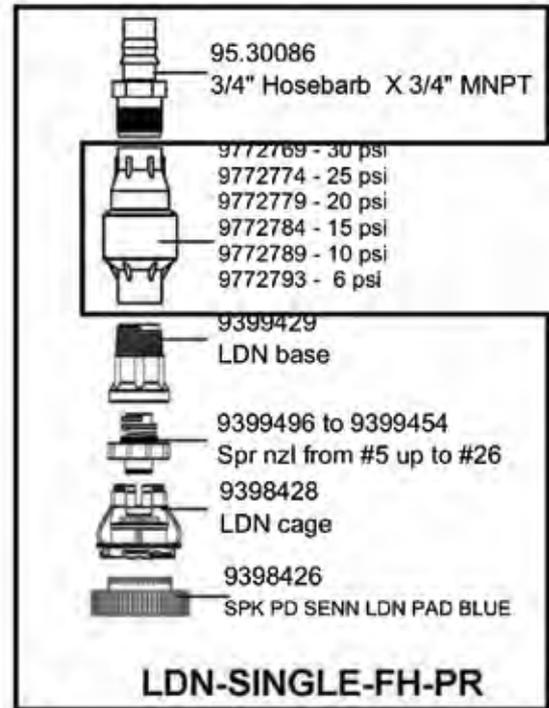
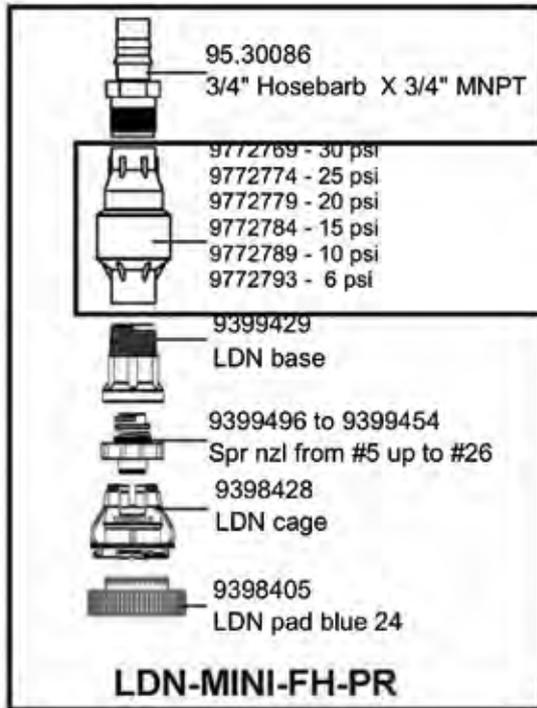
LDN w/o Pressure Regulator for Flex Hose



LDN UP3 w/o Pressure Regulator for Flex Hose



LDN with Pressure Regulator for Flex Hose



LDN UP3 with Pressure Regulator for Flex Hose



95.30086  
3/4" Hosebarb X 3/4" MNPT

Pressure Regulator  
9772769 - 30 psi  
9772774 - 25 psi  
9772779 - 20 psi  
9772784 - 10 psi  
9772793 - 6 psi

9580047  
LDN UP3 Bracket Assembly

9580000 to 9580044  
UP3 Nozzle from #4 to #25

9398405  
LDN UP3 Pad Blue 24

**LDN UP3-MINI-FH-PR**



95.30086  
3/4" Hosebarb X 3/4" MNPT

Pressure Regulator  
9772769 - 30 psi  
9772774 - 25 psi  
9772779 - 20 psi  
9772784 - 10 psi  
9772793 - 6 psi

9580047  
LDN UP3 Bracket Assembly

9580000 to 9580044  
UP3 Nozzle from #4 to #25

9398405  
LDN UP3 Pad Blue 24

**LDN UP3-SINGLE-FH-PR**



95.30086  
3/4" Hosebarb X 3/4" MNPT

Pressure Regulator  
9772769 - 30 psi  
9772774 - 25 psi  
9772779 - 20 psi  
9772784 - 10 psi  
9772793 - 6 psi

9580047  
LDN UP3 Bracket Assembly

9580000 to 9580044  
UP3 Nozzle from #4 to #25

9398423  
LDN UP3 FC15-10 5 96.206

**LDN UP3-DOUBLE-FH-PR**



95.30086  
3/4" Hosebarb X 3/4" MNPT

Pressure Regulator  
9772769 - 30 psi  
9772774 - 25 psi  
9772779 - 20 psi  
9772784 - 10 psi  
9772793 - 6 psi

9580047  
LDN UP3 Bracket Assembly

9580000 to 9580044  
UP3 Nozzle from #4 to #25

9398422  
LDN UP3 FC20-24 108.618

**LDN UP3-TRIPLE-FH-PR**

### LDN Part Circle

#### LDN PC FOR GALVANIZED DROPS



#### LDN PC

---



#### LDN PC

LDN UP3 PART CIRCLE

LDN UP3 PC FOR GALVANIZED DROPS



LDN UP3 PC

I-WOB



95.30086 - 3/4" Hosebarb x 3/4" MNPT

- 9772769 - Regulator 30 psi
- 9772774 - Regulator 25 psi
- 9772779 - Regulator 20 psi
- 9772784 - Regulator 15 psi
- 9772789 - Regulator 10 psi
- 9772793 - Regulator 6 psi



401158 - Magnum Weight



I-WOB2

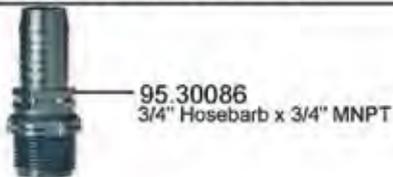


95.30086 - 3/4" Hosebarb x 3/4" MNPT

- 9772769 - Regulator 30 psi
- 9772774 - Regulator 25 psi
- 9772779 - Regulator 20 psi
- 9772784 - Regulator 15 psi
- 9772789 - Regulator 10 psi
- 9772793 - Regulator 6 psi



**KPS FOR FLEX HOSE**



**KPS-W/ADP-FH-PR**



**KPS-W/ADP-FH**  
FH: Flex Hose

**KPS FOR GALVANIZED DROPS**



**KPS-W/ADAPTER**



**KPS-W/ADAPTER**

**KPT FOR FLEX HOSE**



95.30086  
3/4" Hosebarb x 3/4" MNPT



9772769 - Regulator 30 psi  
9772774 - Regulator 25 psi  
9772779 - Regulator 20 psi  
9772784 - Regulator 15 psi  
9772789 - Regulator 10 psi  
9772793 - Regulator 6 psi



9330080 to 9330520  
KOMET Nozzles #8 to #52

9331107  
Black Deflector Std. Angle

**KPT-W/ADP-FH-PR**



95.30499  
3/4" Hosebarb X 3/4" FNPT

9330080 to 9330520  
KOMET Nozzles #8 to #52

9331107  
Black Deflector Std. Angle

**KPT-W/ADP-FH**  
FH: Flex Hose

**KPT- Komet Precision Twister**

**KPT FOR GALVANIZED DROPS**



9772769 - Regulator 30 psi  
9772774 - Regulator 25 psi  
9772779 - Regulator 20 psi  
9772784 - Regulator 15 psi  
9772789 - Regulator 10 psi  
9772793 - Regulator 6 psi



9330080 to 9330520  
KOMET Nozzles #8 to #52

9331107  
Black Deflector Std. Angle

**KPT-W/O-ADAPTER**



9330080 to 9330520  
KOMET Nozzles #8 to #52

9331107  
Black Deflector Std. Angle

**KPT-W/O-ADAPTER**

**KPT FOR FLEX HOSE**



95.30086  
3/4" Hosebarb x 3/4" MNPT



9772769 - Regulator 30 psi  
9772774 - Regulator 25 psi  
9772779 - Regulator 20 psi  
9772784 - Regulator 15 psi  
9772789 - Regulator 10 psi  
9772793 - Regulator 6 psi



9330080 to 9330520  
KOMET Nozzles #8 to #52

9331108  
Black Deflector Std. Angle

**KPT-W/ADP-FH-PR**



95.30499  
3/4" Hosebarb X 3/4" FNPT

9330080 to 9330520  
KOMET Nozzles #8 to #52

9331108  
Black Deflector Std. Angle

**KPT-W/ADP-FH**  
FH: Flex Hose

**KPT- Komet Precision Twister**

**KPT FOR GALVANIZED DROPS**



9772769 - Regulator 30 psi  
9772774 - Regulator 25 psi  
9772779 - Regulator 20 psi  
9772784 - Regulator 15 psi  
9772789 - Regulator 10 psi  
9772793 - Regulator 6 psi



9330080 to 9330520  
KOMET Nozzles #8 to #52

9331108  
Black Deflector Std. Angle

**KPT-W/O-ADAPTER**



9330080 to 9330520  
KOMET Nozzles #8 to #52

9331108  
Black Deflector Std. Angle

**KPT-W/O-ADAPTER**

End Guns - Nelson

Section F  
Irrigation Application (IA)

**P85 NOZZLES**

Item	Part No.	Description
1	9494510-01	NOZZLE # 8DRN 11/32"
2	9494510-02	NOZZLE # 8DRN 3/8"
3	9494510-03	NOZZLE # 8DRN 13/32"
4	9494510-04	NOZZLE # 8DRN 7/16"
5	9494510-05	NOZZLE # 8DRN 15/32"
6	9494510-06	NOZZLE # 8DRN 1/2"
7	9494510-07	NOZZLE # 8DRN 17/32"
8	9494510-08	NOZZLE # 8DRN 9/16"
9	9494510-09	NOZZLE # 8DRN 19/32"
10	9494510-10	NOZZLE # 8DRN 5/8"
11	9494510-11	NOZZLE # 8DRN 21/32"
12	9494510-12	NOZZLE # 8DRN 11/16"



9494510 - Impact Sprinkler - P85



9494520 - SR-75



9494999 - SR 100

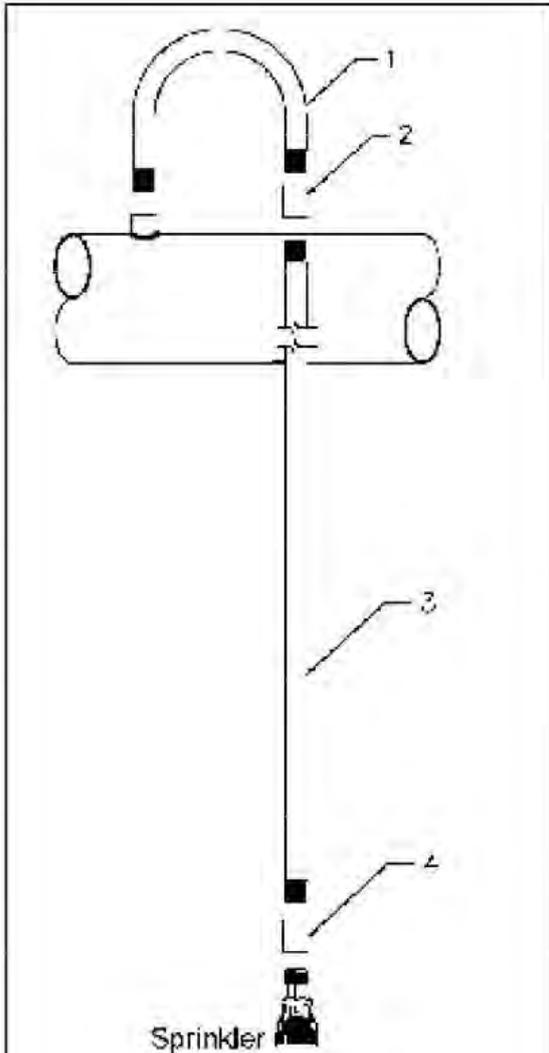


9494500 - SR150

Item	Part No.	Description
1	9494500-09	NOZZLE # 0.4" TAPER
2	9494500-14	NOZZLE # 0.45" TAPER
3	9494500-01	NOZZLE # 0.5" TAPER
4	9494500-08	NOZZLE # 0.55" TAPER
5	9494500-11	NOZZLE # 0.60" TAPER
6	9494500-02	NOZZLE # 0.65" TAPER
7	9494500-12	NOZZLE # 0.70" TAPER
8	9494500-03	NOZZLE # 0.75" TAPER
9	9494500-13	NOZZLE # 0.80" TAPER
10	9494500-04	NOZZLE # 0.9" TAPER
11	9494500-05	NOZZLE # 0.96" T. RING
12	9494500-10	NOZZLE # 1.0" TAPER
13	9494500-06	NOZZLE # 1.1" TAPER
14	9494500-07	NOZZLE # 1.2" TAPER

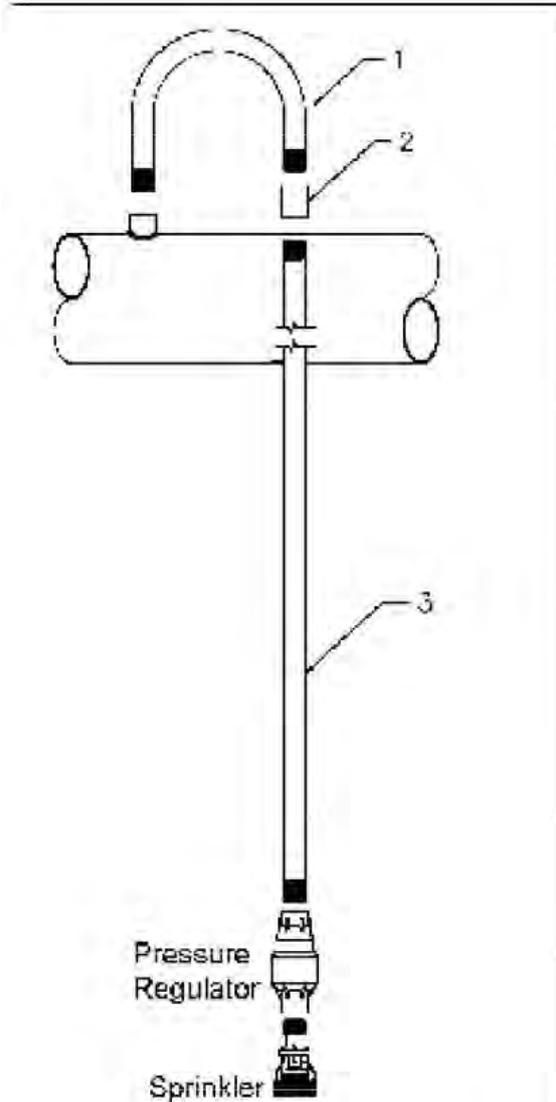
**Section F**  
Irrigation Application (IA)

**Standard Galvanized Drop Details**



**98.1420**  
3/4"X2M GALV DROP ASSY

Item	Part No.	Description
1	98.10100	U-pipe 3/4" galvanized
2	95.30302	Coupling, pipe 3/4" galvanized
3	98.10101	Nipple, 3/4" x 2.00m. Galvanized
4	95.30085	Coupling, PE 3/4"

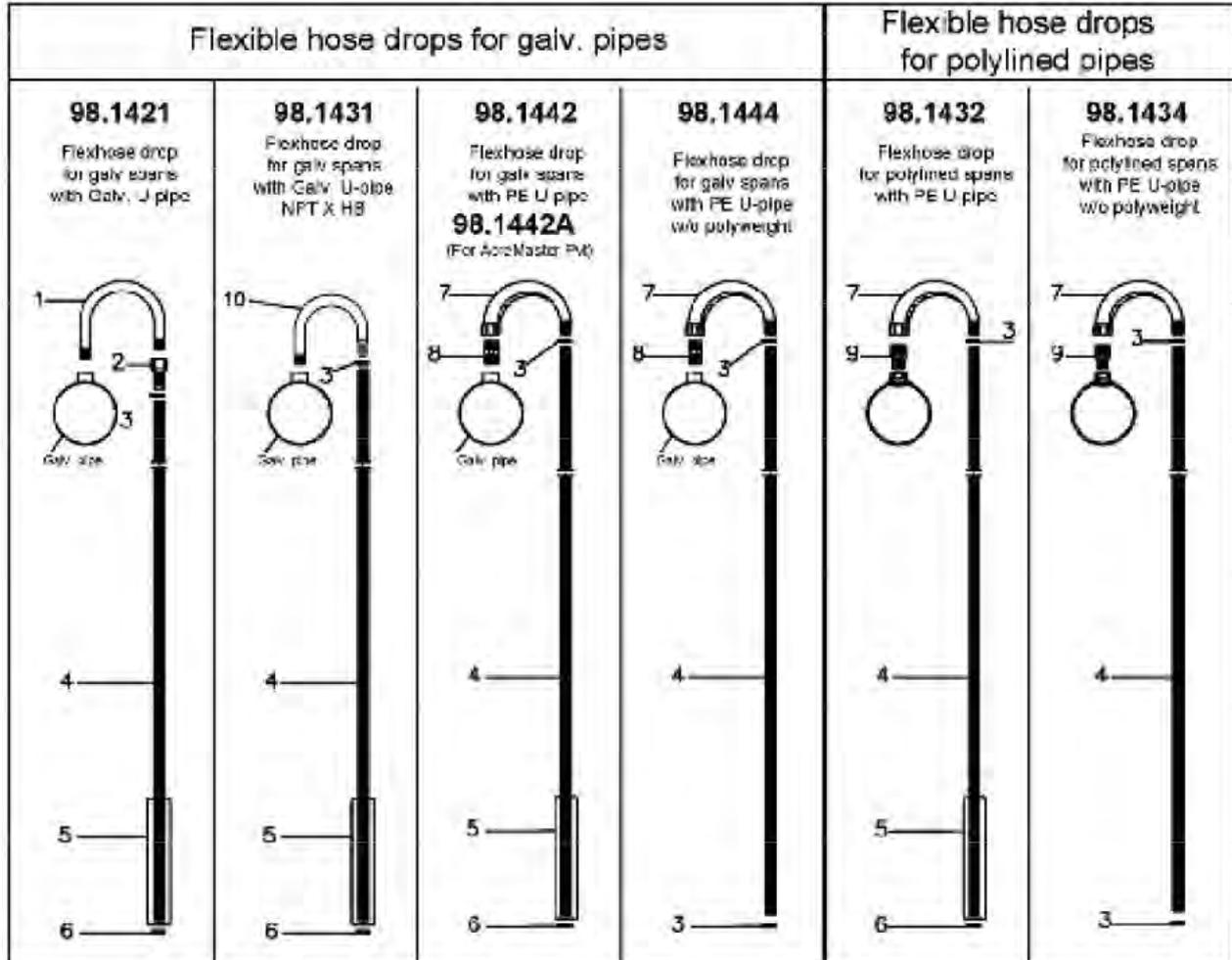


**98.1420R**  
3/4"X2M GALV DROP ASSY w/reg

Item	Part No.	Description
1	98.10100	U-pipe 3/4" galvanized
2	95.30302	Coupling, pipe 3/4" galvanized
3	98.10101	Nipple, 3/4" x 2.00m. Galvanized

Standard Flexible Hose Drop Detail

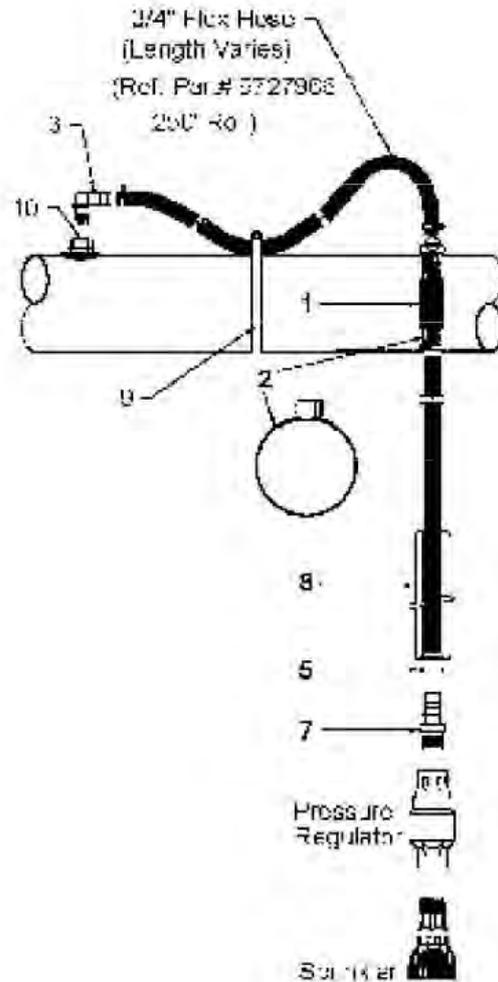
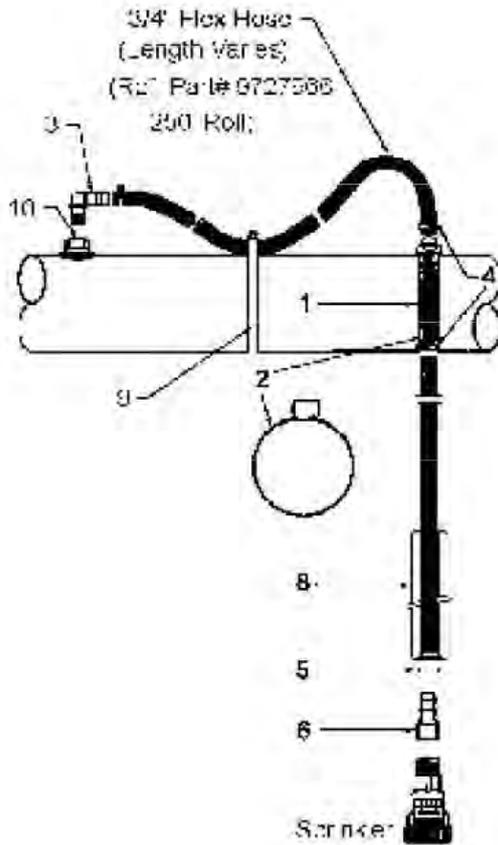
Section F  
Irrigation Application (IA)



Item	Part No.	Description
1	98.10100	U-pipe, 3/4" galvanized
2	9530499	3/4" hose barb x 3/4" FNPT
3	9728915	Drop hose clamp 1-1/4" SS
4	9727986	Flex drop hose 3/4" x 250' Reel
5	9085814	Poly weight 52x28x700mm 900 gr.
6	9728919	Hose crimp clamp 1-1/8"
7	9398400	U-pipe PE barb/F 3/4" Senninger
8	95.30500	Nipple, hex 3/4" galvanized
9	9398399	Red. nipple 3/4" x 1/2" PE-Senninger
10	98.10099	U-pipe, 3/4" Galv. M X HB

**Section F**  
Irrigation Application (IA)

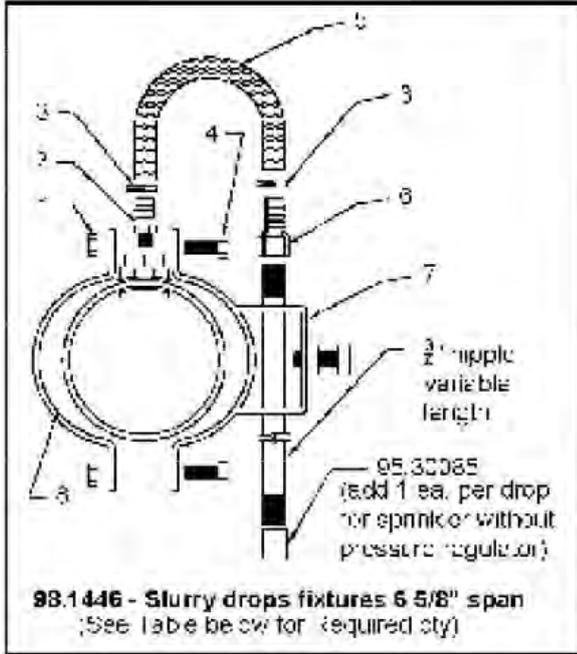
**Variable Spacing Drop Details**



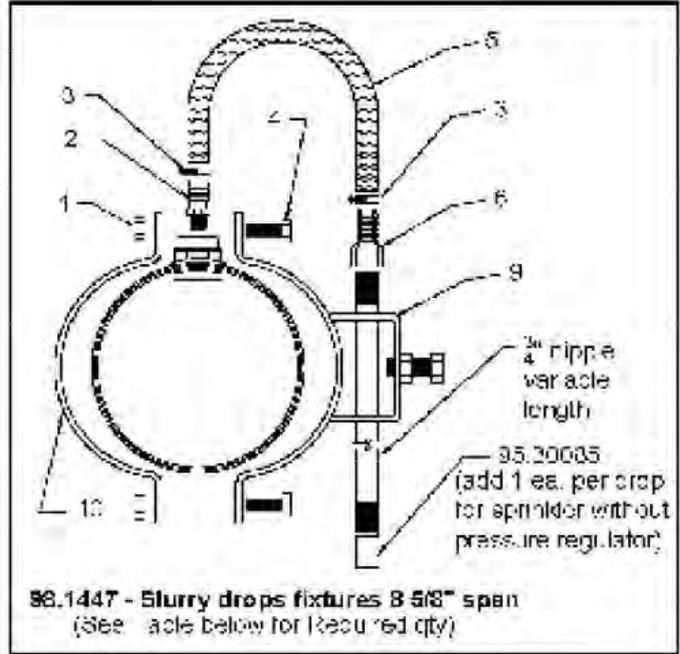
Item	Part No.	Description
1	0839834	Flex drop mount 3/4"
2	9728912	Screw clamp 8-5/8"
3	28894 S	rew clamp 8-5/8"
3	9530760	PE Elbow 1/2" NPT X 19mm Hosebarb
4	9728915	Drop hose clamp 1-1/4" SS
5	9728919	Hose crimp clamp 1-1/16"
6	9530499	3/4" hosebarb x 3/4" FPT PLYPR
7	9530088	Hosebarb, PE 3/4" MPT X 19mm.
8	9085614	Poly weight 52x28x700mm 900 gr.
9	9728975	8" Cable banding clamp (30" long)
10	9753800	8-5/8" x 1/2" outlet assembly
	9753799	8-5/8" x 1/2" outlet assembly

Slurry Drops

Section F  
Irrigation Application (IA)



98.1446 - Slurry drops fixtures 6 5/8" span  
(See table below for required qty)



98.1447 - Slurry drops fixtures 8 5/8" span  
(See table below for required qty)

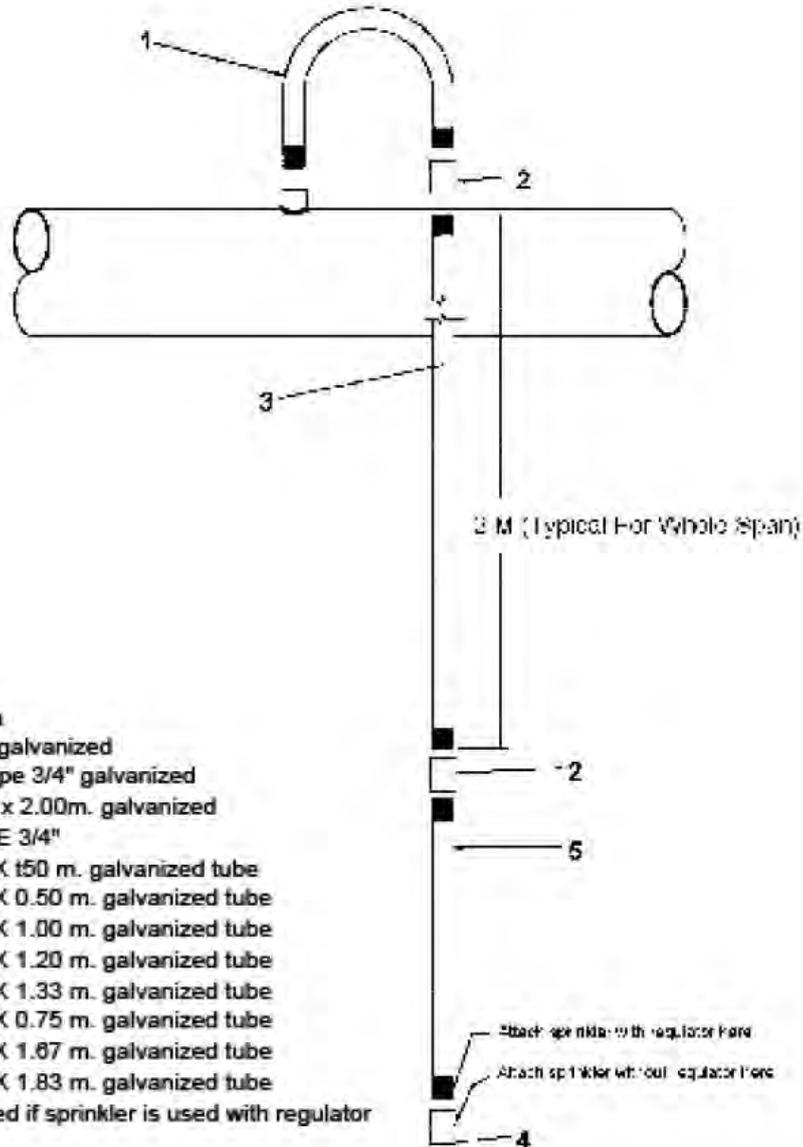
Item	Part No.	Description
1	02031-07	Nut lock 1/2
2	95.30099	1/2" NPT x 3/4" hosebarb
3	9728915	Drop hose clamp 1-1/4" SS
4	02088-04	Bolt hex G5 EG NC.50 X 1.50
5	9727968	Flex drop hose 3/4" x 250' reel

Item	Part No.	Description
6	95.30499	3/4" hosebarb x 3/4" FNPT
7	98.340031-bolt	Adj drop mtg bkt w/ bolt 6 5/8" pipe
8	8279709	Half clamp 6 5/8" clamp x 2" wide
9	98.340032-bolt	Adj drop mtg bkt w/ bolt 8 5/8" pipe
10	98.340033	Half clamp 8 5/8" clamp x 2" wide

Drop Packages (Package of variable length 3/4" galv. Pipe nipples) ( Complete for one full span )	+ Drop Fixtures (98.1446 for 6 5/8" pipe) or (98.1447 for 8 5/8" pipe) (Complete for one full span)
98.10160 - Drop package for 142' W	+ 15 ea. (98.1446 or 981447)
98.10159 - Drop package for 142' M	+ 22 ea. (98.1446 or 981447)
98.10158 - Drop package for 142' C	+ 43 ea. (98.1446 or 981447)
98.10132 - Drop package for 161' W	+ 17 ea. (98.1446 or 981447)
98.10162 - Drop package for 161' M	+ 25 ea. (98.1446 or 981447)
98.10161 - Drop package for 161' C	+ 49 ea. (98.1446 or 981447)
98.10134 - Drop package for 180' W	+ 19 ea. (98.1446 or 981447)
98.10164 - Drop package for 180' M	+ 28 ea. (98.1446 or 981447)
98.10163 - Drop package for 180' C	+ 55 ea. (98.1446 or 981447)
98.10167 - Drop package for 199' W	+ 21 ea. (98.1446 or 981447)
98.10166 - Drop package for 199' M	+ 31 ea. (98.1446 or 981447)
98.10165 - Drop package for 199' C	+ 61 ea. (98.1446 or 981447)

**Section F**  
Irrigation Application (IA)

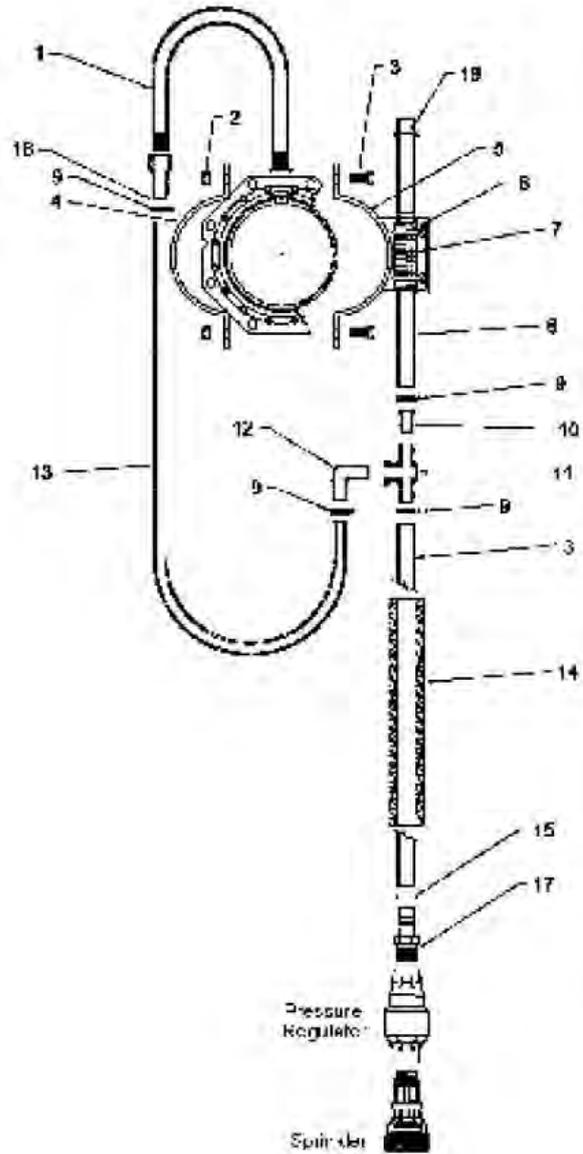
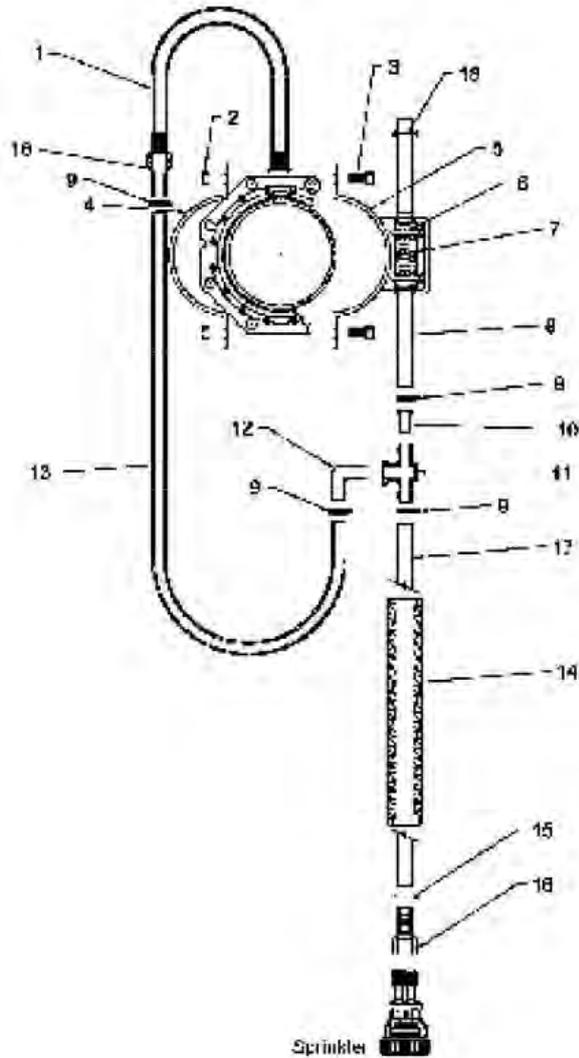
**Standard Galvanized Extended Drop Detail**



Item	Part No.	Description
1	98.1010	U-pipe 3/4" galvanized
2	95.3030	Coupling, pipe 3/4" galvanized
3	98.10101	Nipple, 3/4" x 2.00m. galvanized
*4	95.30085	Coupling, PE 3/4"
5	98.10102	Nipple, 3/4 X 1.50 m. galvanized tube
	98.10109	Nipple, 3/4 X 0.50 m. galvanized tube
	98.10110	Nipple, 3/4 X 1.00 m. galvanized tube
	98.10112	Nipple, 3/4 X 1.20 m. galvanized tube
	98.10113	Nipple, 3/4 X 1.33 m. galvanized tube
	98.10114	Nipple, 3/4 X 0.75 m. galvanized tube
	98.10116	Nipple, 3/4 X 1.67 m. galvanized tube
	98.10118	Nipple, 3/4 X 1.83 m. galvanized tube

\*Note: Item no. 4 is not needed if sprinkler is used with regulator

Package Number	Description
98.1420EXT142W	3/4" EXT GLVDROP 142' SPN 113" SPC
98.1420EXT142M	3/4" EXT GLVDROP 142' SPN 75" SPC
98.1420EXT142C	3/4" EXT GLVDROP 142' SPN 37" SPC
98.1420EXT181W	3/4" EXT GLVDROP 181' SPN 113" SPC
98.1420EXT181M	3/4" EXT GLVDROP 181' SPN 75" SPC
98.1420EXT181C	3/4" EXT GLVDROP 181' SPN 37" SPC
98.1420EXT180W	3/4" EXT GLVDROP 180' SPN 113" SPC
98.1420EXT180M	3/4" EXT GLVDROP 180' SPN 75" SPC
98.1420EXT180C	3/4" EXT GLVDROP 180' SPN 37" SPC
98.1420EXT199W	3/4" EXT GLVDROP 199' SPN 113" SP
98.1420EXT199M	3/4" EXT GLVDROP 199' SPN 75" SPC
98.1420EXT199C	3/4" EXT GLVDROP 199' SPN 37" SPC

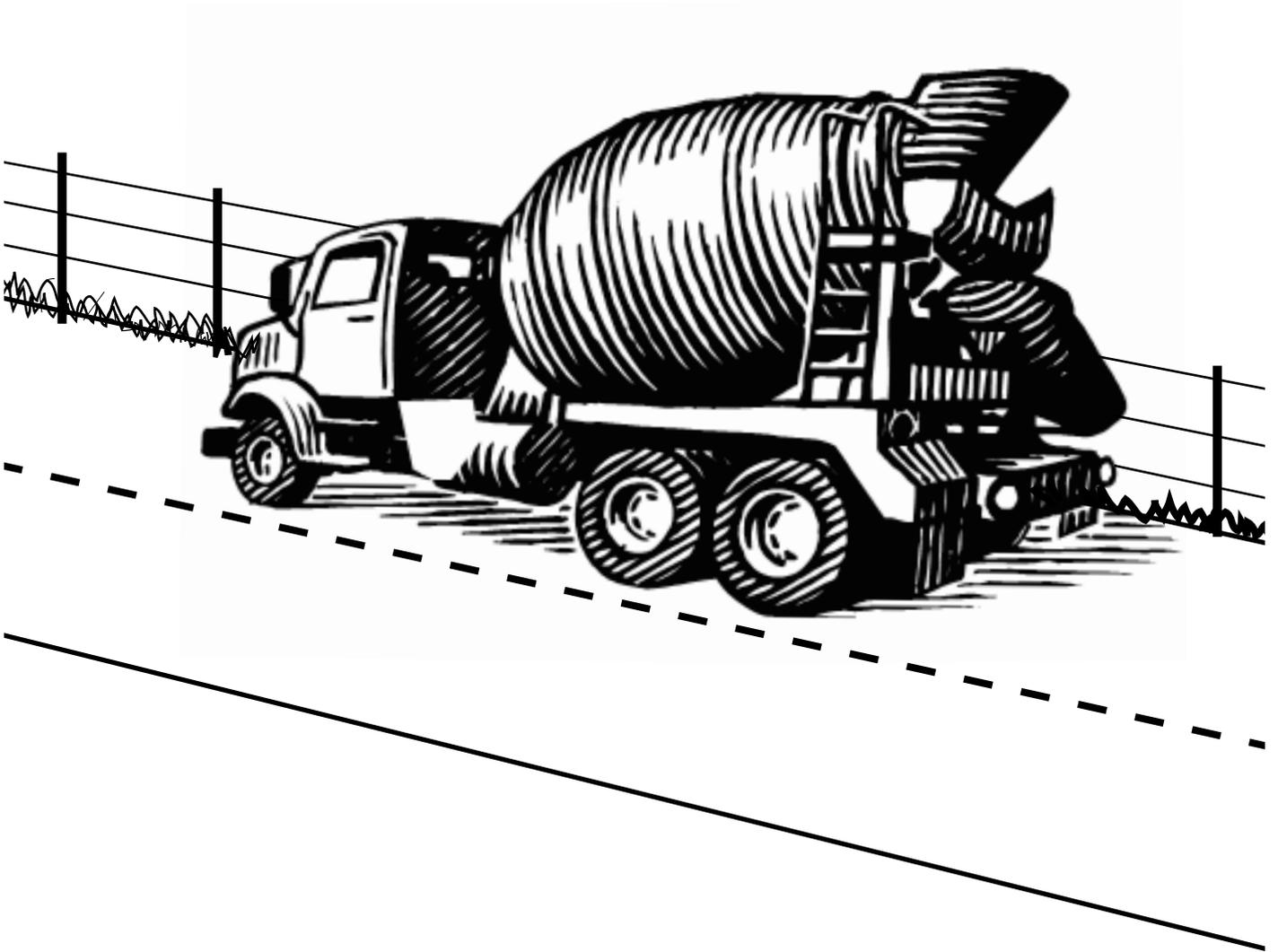


Item	Part No.	Description
1	98.10100	U-pipe 3/4" galvanized
2	02031-07	Nut lock 1/2"
3	02066-04	Bolt hex G5 EG NC.50 X 1.50
4	8279709	8-5/8" Clamp 2" wide
	98.340033	Half clamp 8-5/8" X 2" wide
5	98.340031	Adj drop mtg bkt 6-5/8" span
	98.340032	Adj drop mtg bkt 8-5/8" span
6	9728936	Spring clamp 1"
7	98.340003	Adjustable drop friction grip
8	98.340013	Adjustable drop tube

Item	Part No.	Description
9	9728915	Drop hose clamp 1-1/4" SS
10	95.30781	PE plug 16 mm.
11	95.30759	PE tee 1/2" FNPT x 19mm HB
12	95.30760	PE elbow x 1/2" NPT x 19mm HB
13	9727066	Flex drop hose 3/4" x 250' roll
14	9085614	Poly weight 52x28x700mm 800 gr.
15	9728919	Hose crimp clamp 1-1/16"
16	95.30499	3/4" NPT female x 3/4" HB
17	95.30086	HB, PE 3/4" MPT x 19 mm.
18	70.10553	Cotter pin 3.5diax32lng plated

# Section 3

## Getting Started



POM-EN-December 2018

Before your machine arrives at the field, verify that the terrain does not contain conditions that may cause structural damage. Refer to the Slope Limitations Table (right) and the Slope Considerations section following to ensure that your machine will run safely with your current field conditions. Slopes exceeding the limitations for specified span lengths could cause structural damage to the machine. To calculate the slope at a given point, divide the rise of the slope by the horizontal run of the slope, as shown in the slope details following. For example, if a slope rises one foot in ten feet measured horizontally, then the slope is 1/10, or 10%.

Other more obvious considerations may include obstacles such as buildings, power poles, fences, trees, rock outcroppings, well sites, etc. Be sure that the machine will adequately clear these before assembly, or running the machine unattended. Allow adequate clearance for obstacles. The system passes over to ensure there is no contact if the machine creates wheel ruts during operation. The system may become closer to the ground as it operates.

<b>Span</b>	<b>Longitudinal</b>	<b>Transverse</b>
125.5	18%	18%
145.0	16%	16%
164.5	15%	15%
184.0	12%	12%
203.5	9%	9%

On flat ground, a center pivot is subjected to certain stresses in certain proportions, all of which it is designed to easily handle. However, when the machine is subjected to various slope conditions, stresses and their proportions to each other change dramatically.

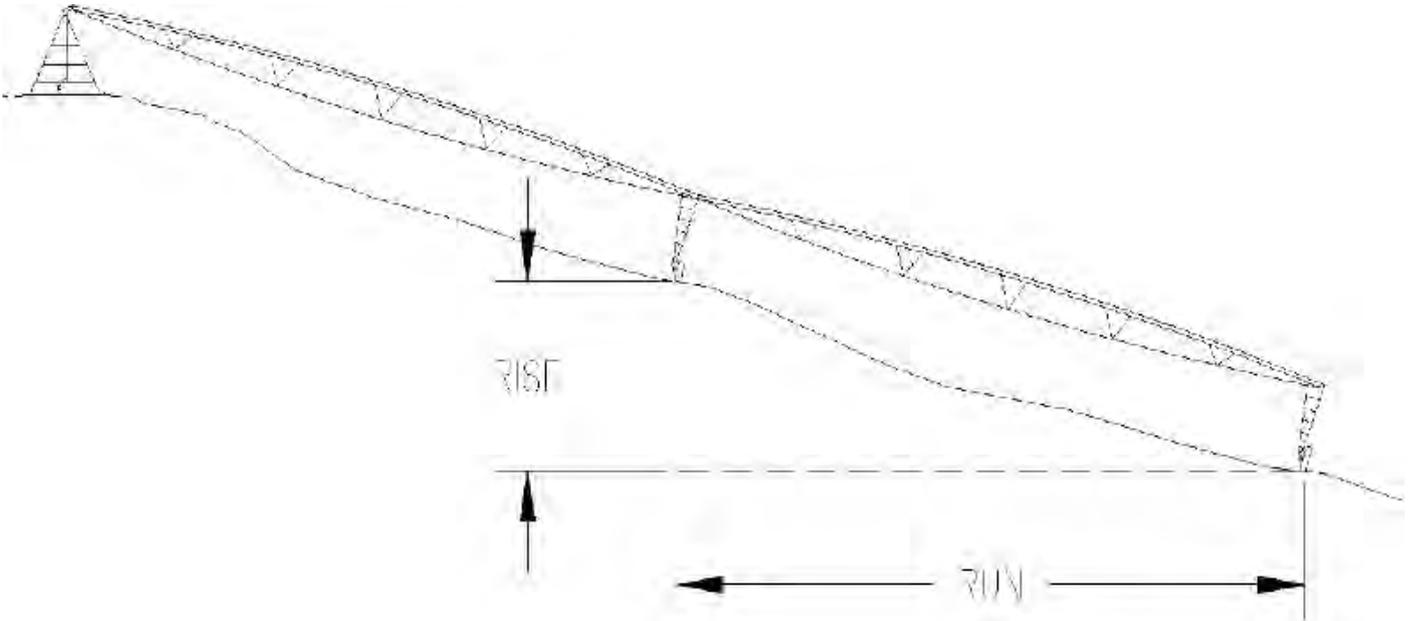


Figure 3. Longitudinal Slope

In a longitudinal slope situation as shown in Figure 1-6.a., the spans are placed in either tension on a descending slope (as shown) or compression on an ascending slope. Exceeding the slope limitations set forth could create excessive tension and compressive forces in both spans, and especially the pivot point.

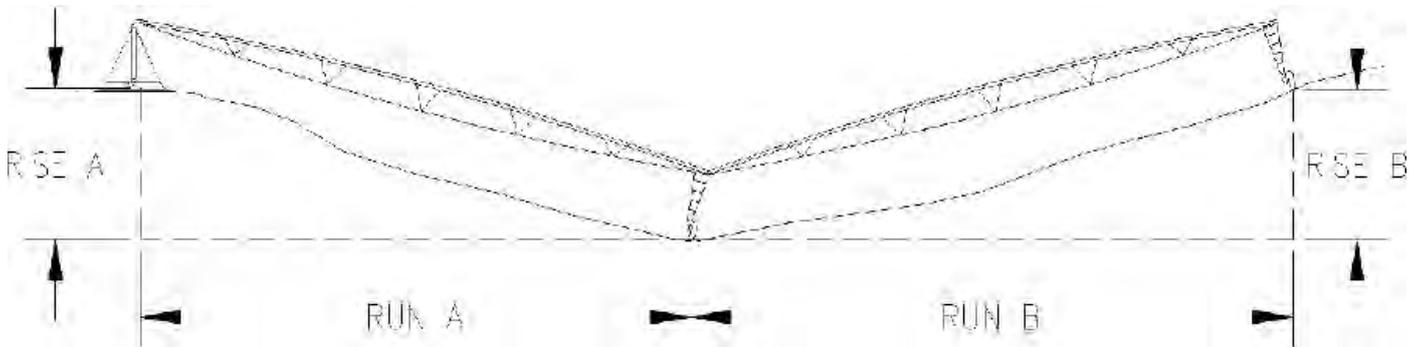


Figure 3-4a. - Dips and Ravines

In a longitudinal slope situation as shown in Figure 1-6.a., the spans are placed in either tension on a descending slope (as shown) or compression on an ascending slope. Exceeding the slope limitations set forth could create excessive tension and compressive forces in both spans, and especially the pivot point.

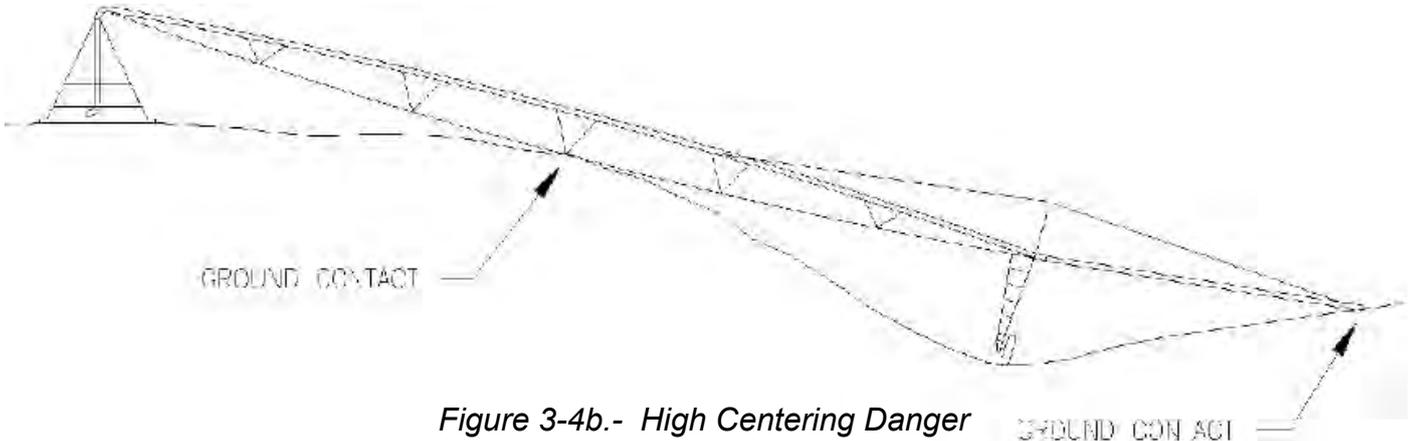


Figure 3-4b.- High Centering Danger

Another factor that should be considered with dips and ravines is the reduction of crop clearance that will occur as the span runs over the crest of the ravine. Extreme cases of dips and ravines could cause either the span under trussing or overhang to come in contact with the ground, as shown in Figure 1-4.b. This situation could occur even if the slope in question does not exceed the slope limitations for the span, so care must be taken to know where the towers will run in the field. If this situation occurs, solutions include smoothing down the slope with earth moving equipment, or reconfiguring the span lengths and tower placements of the machine to cause the towers to run over the higher spots in the field. If machine reconfiguration is chosen, be sure to consider the entire field, as changing the machine configuration to alleviate one problem may cause another problem somewhere else.

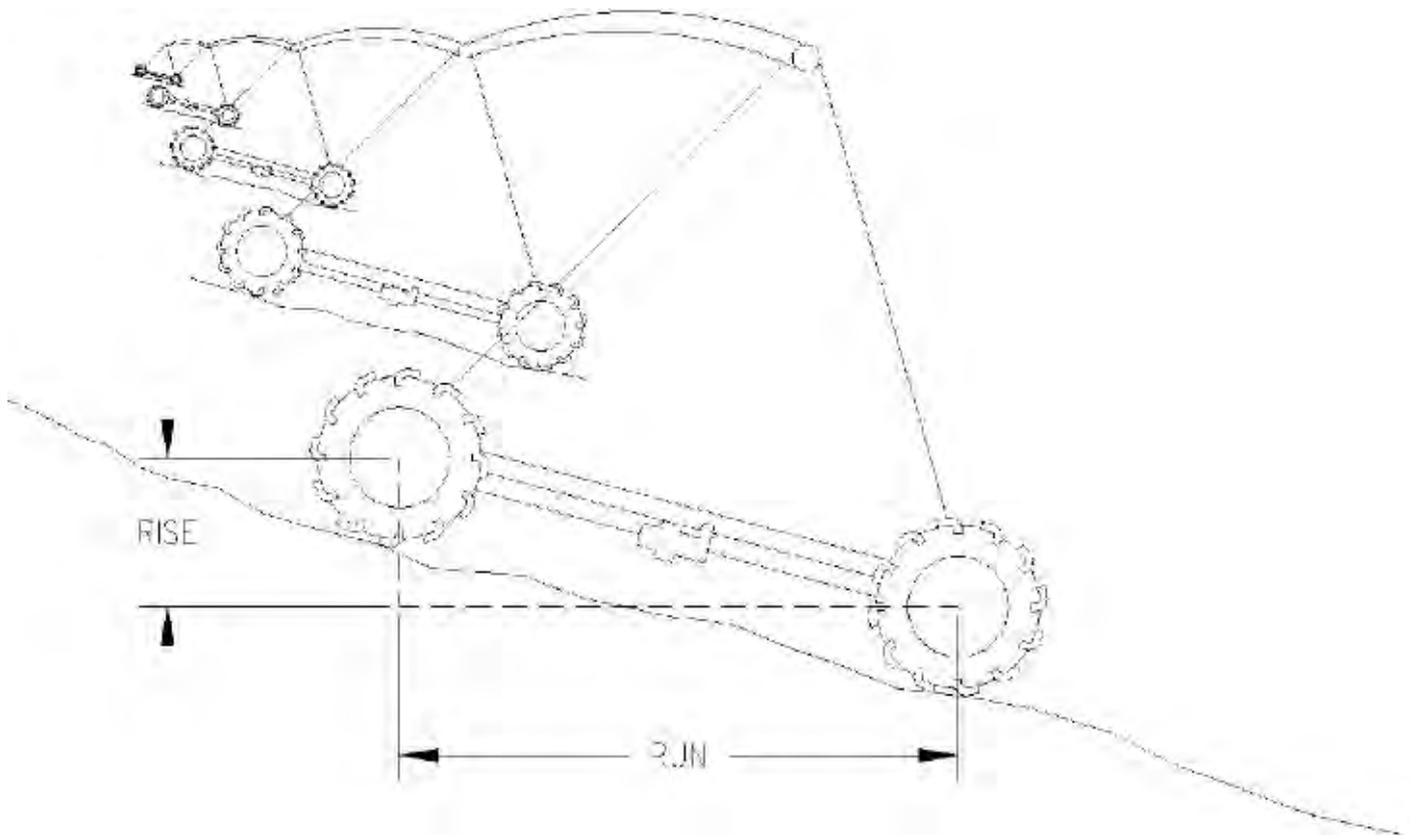


Figure 3-5. Transverse Slope

Lateral movement of a machine on a slope, as shown in Figure 1-7., is when more than one tower is on the same type of slope (i.e., ascending or descending). Exceeding slope limitations here could move the center of gravity of the span sideways enough to cause the span to roll, thus collapsing the machine. On this type of slope, more weight gets redistributed to the downhill tire than the uphill tire, which could cause excessive rutting in soft soils. This situation could further be complicated by erosion of the soil in the wheel rut due to water being channeled down the rut from the machine.



Note: The transverse slope for the given span length is not to exceed 30%.

Must not be more than twice the transverse slope limit and must not exceed 30%.

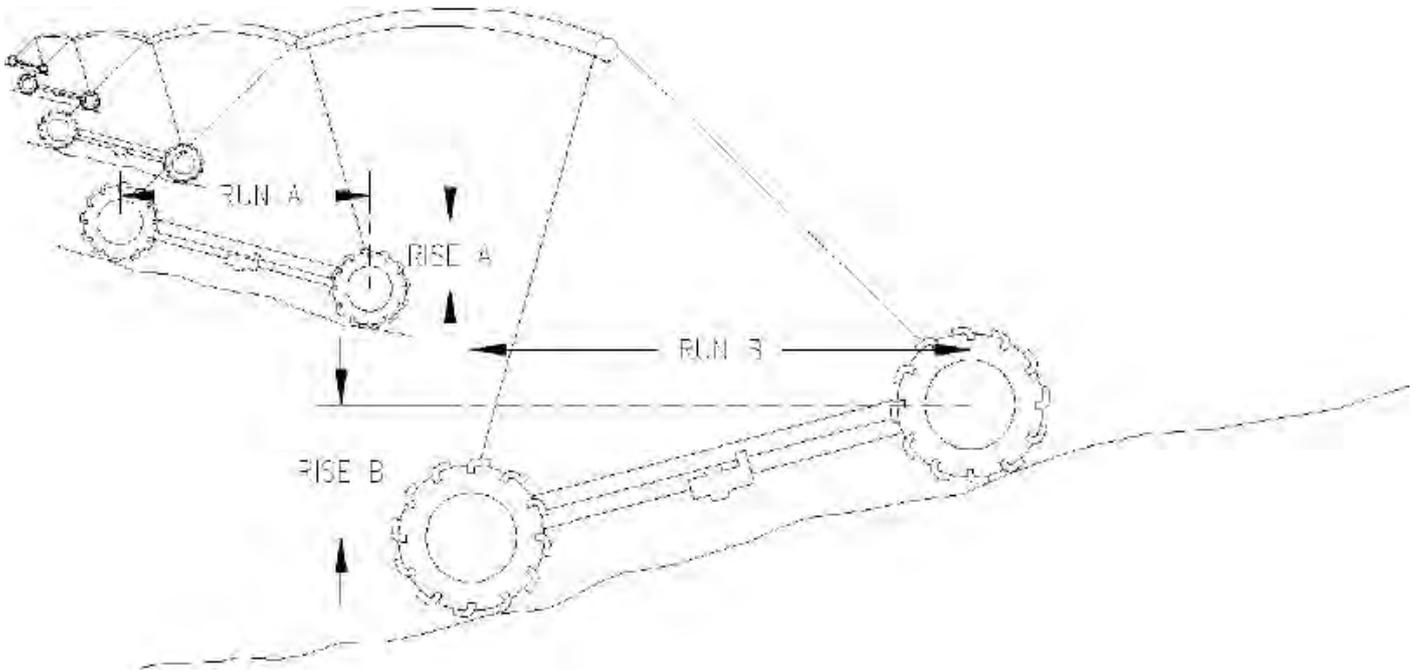


Figure 3-6. Torsional Slope

Torsional loading of the span caused by each tower of one span running on opposing slopes, as shown in Figure 1-6, is the most likely condition to cause actual structural damage, since the span is actually being twisted. In this situation, both slopes should be calculated and added together to determine whether or not slope limitations have been exceeded. For example, if the ascending slope was calculated at 7%, and the descending slope 6%, the overall slope would be 13%.



**WARNING: IT IS HIGHLY RECOMMENDED THAT A PROFESSIONAL ELECTRICIAN BE CONTRACTED TO PERFORM THE POWER SOURCE HOOK-UP TO PREVENT SERIOUS INJURY OR POSSIBLE DEATH.**

The power supply for your Western pivot can be provided by either the electric utility company or by an engine driven generator. The system requires 480 volts, 60 cycle, 3 phase electric power for operation. The maximum operating voltage must not exceed 504 volts AC, nor should it be operated at less than 456 volts. Other voltage and 50 Hz power is available upon request.

If you intend to operate your pivot with an electric generator, be sure to consult with your Western Dealer regarding generator specifications. A conventional generator may not be adequate to power your machine. You should also thoroughly familiarize yourself with the grounding and lockout/tagout procedures set forth in the Safety & Maintenance sections of this manual.

*A Note on underground wire installation...*

*Western Corporation provides the electrical wiring used on the pivot itself, but the buyer will need to acquire sufficient wiring to connect the pivot to its power source. All material must be new and not secondhand, and must meet all applicable sections of the National Electric Code.*

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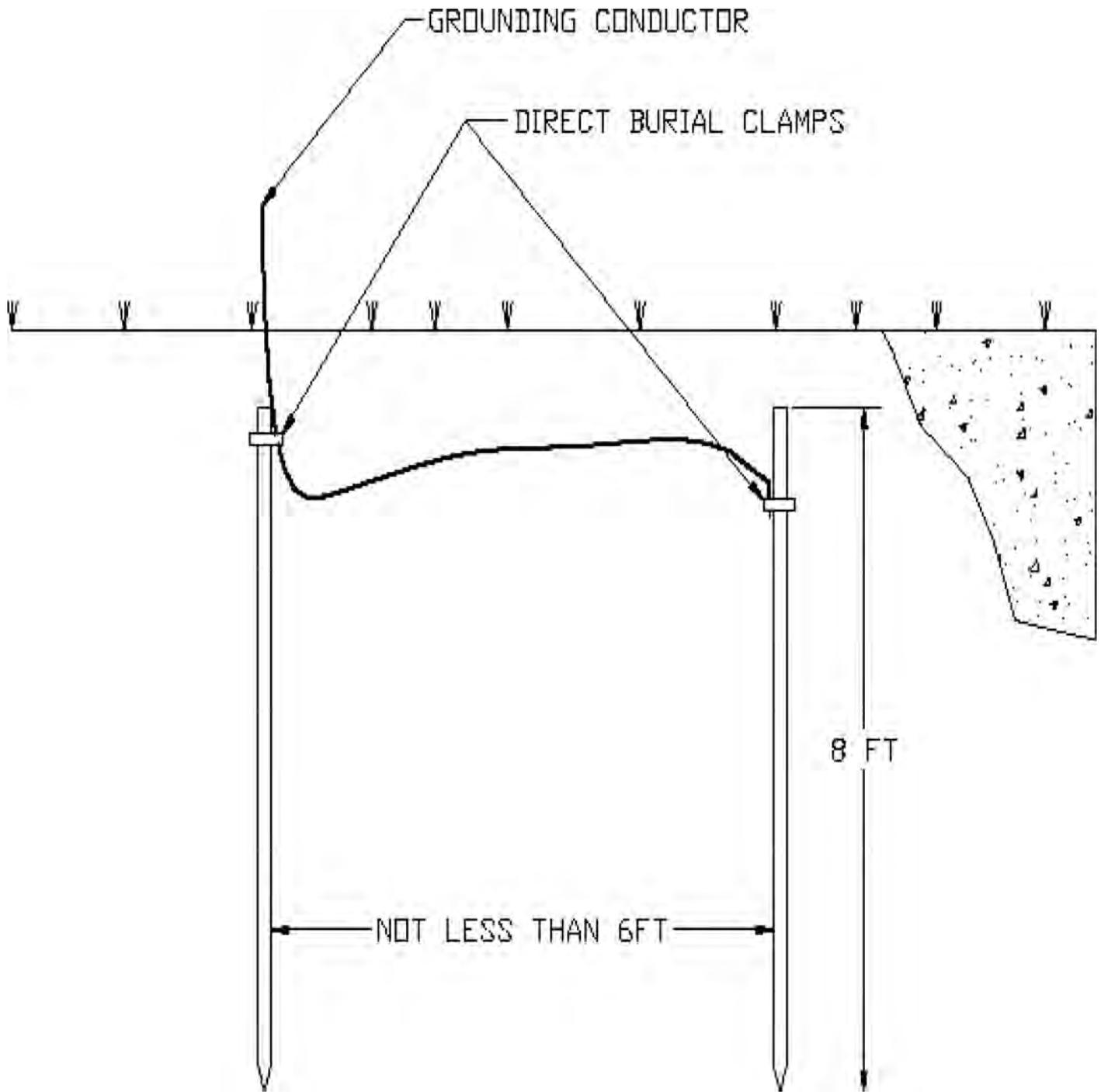


Figure 3-8.



**WARNING: DO NOT OPERATE MACHINE WITHOUT A PROPER EARTH GROUND. REFERENCE SECTION 6-3.**

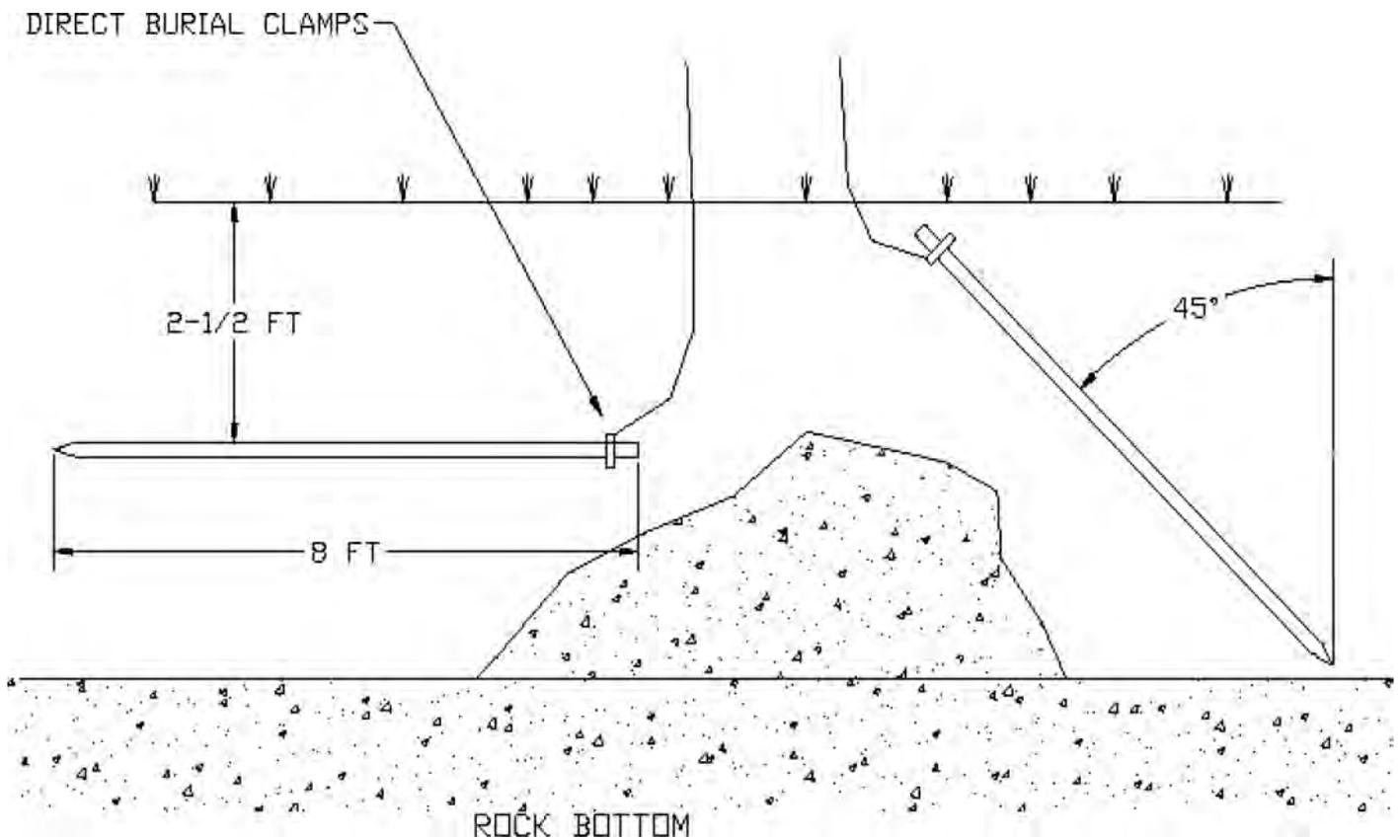


Figure 3-9.



**WARNING: DO NOT OPERATE MACHINE WITHOUT A PROPER EARTH GROUND. REFER-  
ENCE SECTION 6-3.**

The pivot point is the center of the irrigation radius. Its location defines the area to be watered, so placement of the pivot point is a critical part of the planning stage. It is vitally important that the pivot point be located to maximize irrigation coverage while avoiding any potential obstacles. A survey of your property completed by a professional surveyor would be most helpful in positioning your pivot.

The center of the field should serve as only a tentative position for your pivot. Once you have determined the exact center of your field, the next step will be to review the field once more and evaluate potential hazards. You can then either clear the hazards or adjust the pivot point so that the spans maneuver around them. If you decide to adjust the pivot point off-center, ensure that the new pivot will not cross the path of any other pivots already operating in adjoining fields or other obstacles in the field.

Your pivot will be delivered on a flatbed truck. To make unloading easier, take the time to measure in a straight line out from the pivot point and place a marker where each of the towers will go. This will guide you in accurately off loading components.

The concrete pivot pad is the first item of construction. If possible, the concrete work should be done prior to delivery of the machine. Enough time should be allotted to ensure proper curing of the concrete pad.

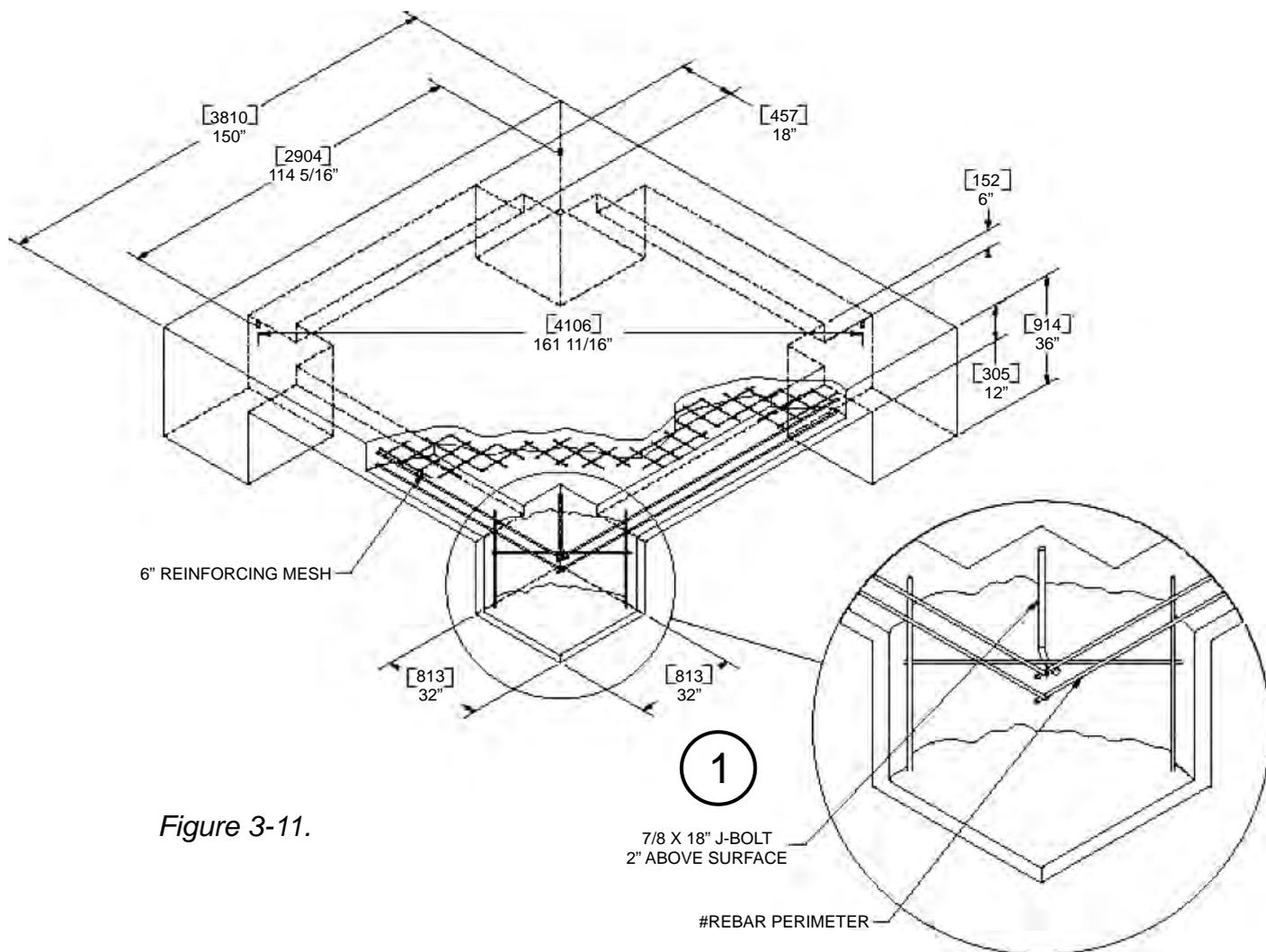
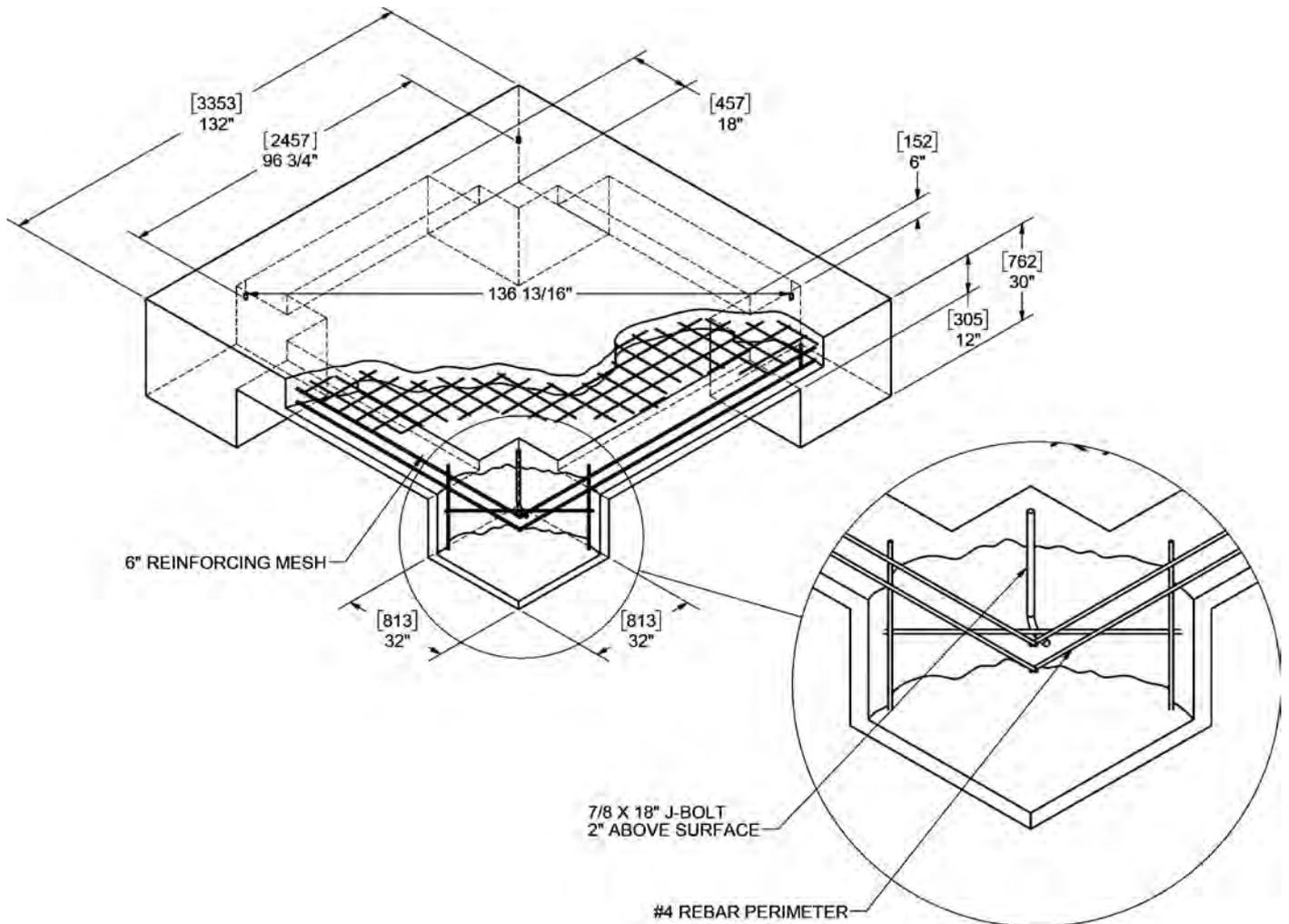


Figure 3-11.

\* Not Shown

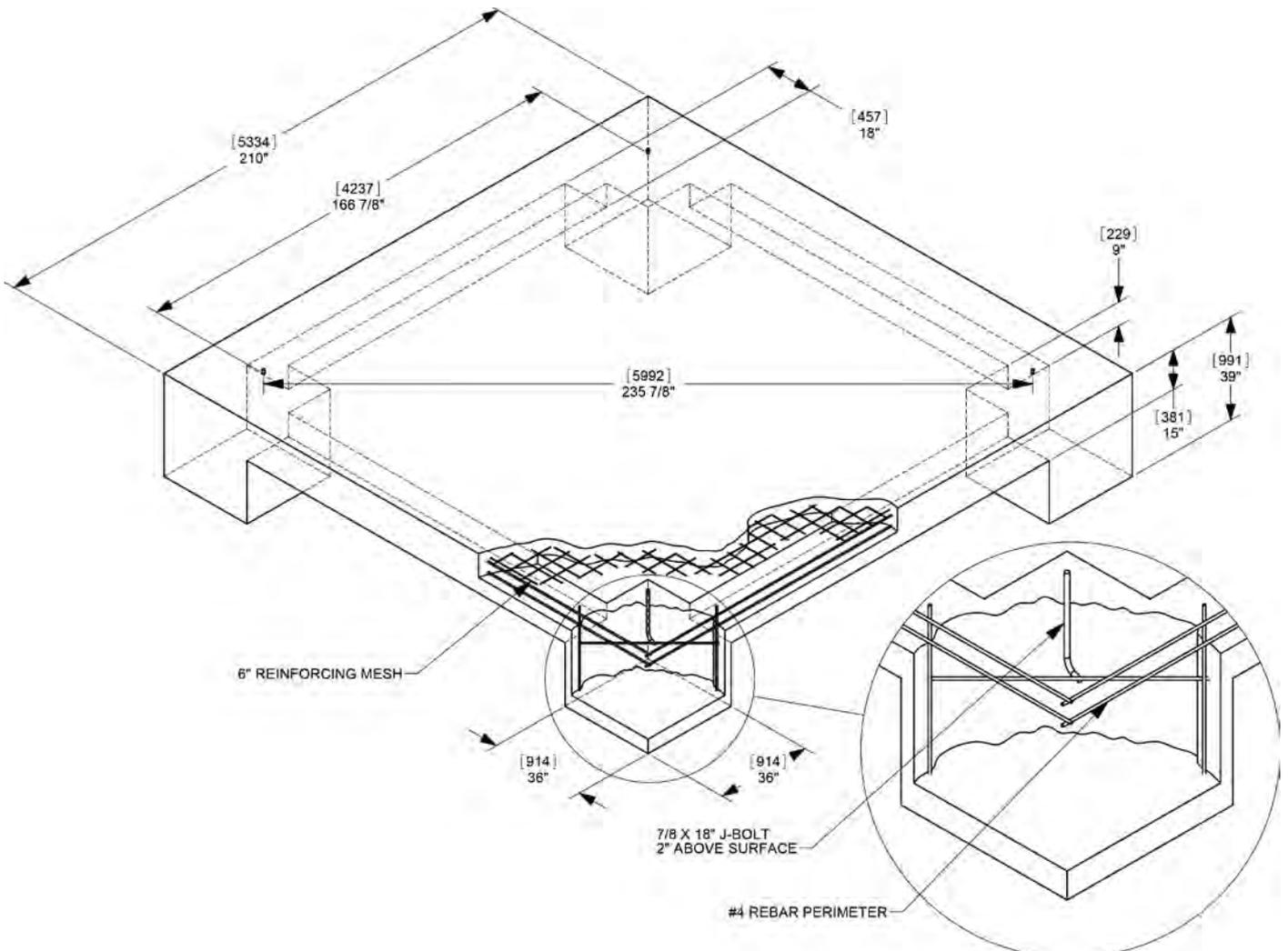
Item	Pierce #	Western #	Qty	Description
1		90030-01	1	Pivot Anchor Bolt 7/8 x 18
*		02031-18	4	Nut Lock 7/8 in.
*		10045-11	4	Washer Plate
*		90030-01	4	J Bolt Anchor Set (4) -OR-
*		10038-11	1	J Bolt Anchor ea (1) replacement bolt
*		N/A	-	Concrete (6.5 Cubic Yards) 3000 PSI min.
*		N/A	-	#4 Rebar (140 ft.)
*		N/A	-	6" Reinforcing Wire Mesh (144 sq. ft.)

\* [ ] Indicates Metric, in millimeters (mm).



\* Not Shown

Item	Std (inch)	Std (mm)	LP (inch)	LP (mm)	HP (inch)	HP (mm)	Towable (in)	Towable (mm)
A	150	3810	122	3099	210	5334	157	3988
B	114-5/16	2904	86-15/32	2196	170-1/8	4321	*145	*3683
C	18	457	18	457	18	457	18	457
D	161-11/16	4106	122-9/32	3106	240-9/16	6111	205-1/16	5209
E	6	152	6	152	9	229	6	152
F	36	914	36	914	39	991	36	914
G	12	305	12	305	15	381	12	305
H	32	813	32	813	36	914	32	813
I	32	813	32	813	36	914	32	813
Concrete Cubic Yards	6.5		5.1		13.2		6.7	
Rebar	140 Ft	42.7 M	122 Ft	37.21 M	186 Ft	56.73 M	145 Ft	44.23 M
Wire Mesh	144 Sq Ft	13.38 Sq M	88 Sq Ft	8.18 Sq M	290 Sq Ft	26.94 Sq M	171 Sq Ft	15.89 Sq M



Pad requires approximately 13.2 cubic yards of concrete.

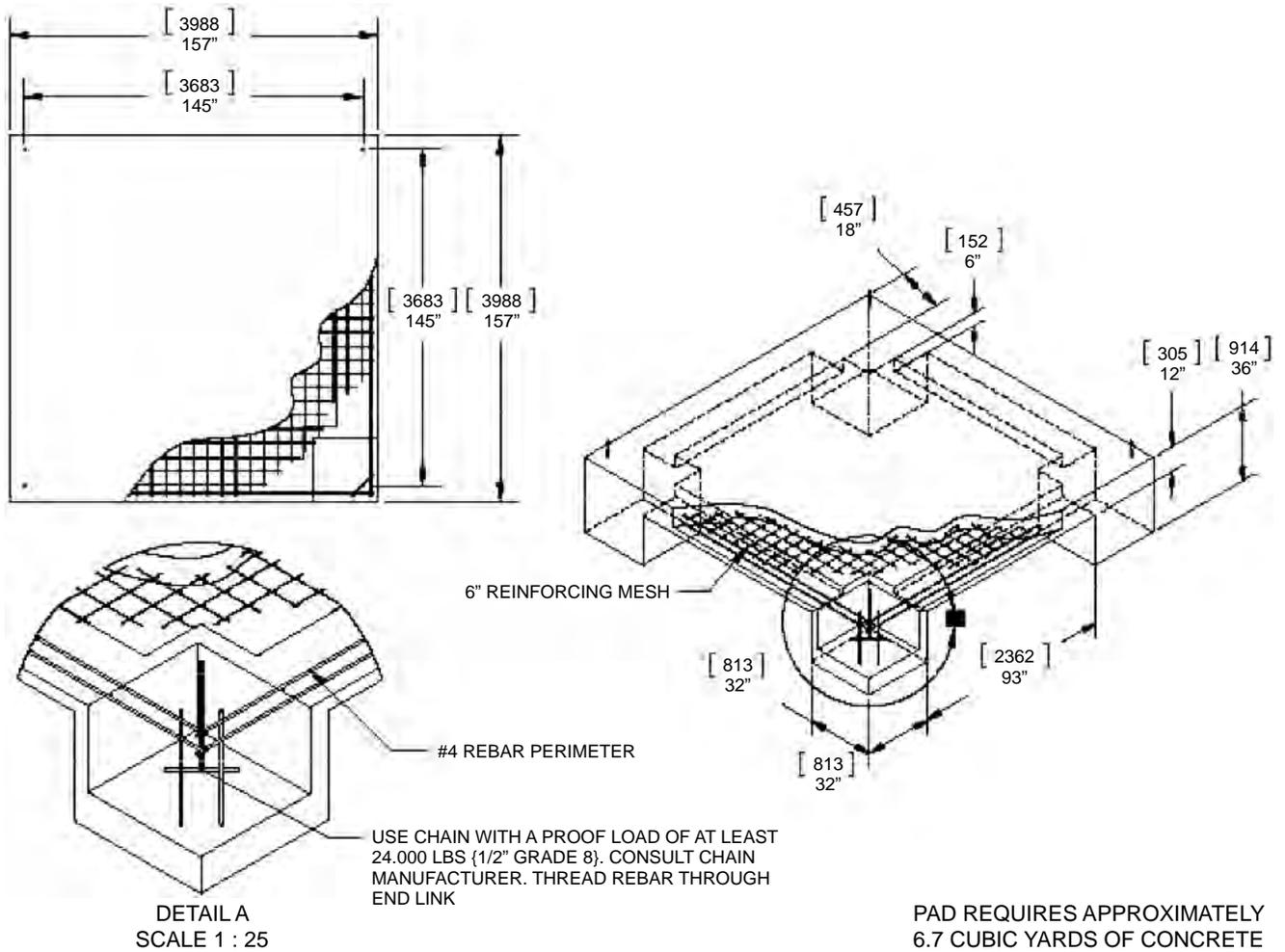


Figure 3-13.

- 1- Boom truck capable of lifting a minimum of 6,000 lbs., to a height of 15 feet (20 feet for high profile).
- 1- Nylon strap with same or better rating as boom truck, in good condition (not frayed or cut).

See CAUTION listed below.

- 1- Impact wrench, air or electric.
- 1- Each 9/16" through 1-1/4" impact sockets (deep well recommended).
- 2- Combination wrench set 7/16" through 1-1/2".
- 1- Deep well socket set, 3/8" drive, 7/16" through 3/4".
- 1- Deep well socket set, 1/2" drive, 9/16" through 1".
- 1- Each 3/8" and 1/2" drive ratchet.
- 2- Alignment bars.
- 1- 18" pipe wrench.
- 2- 12" Channel lock pliers.
- 1- Large pry bar (approximately 6')
- 1- Regular flat screwdriver.



**CAUTION: Lifting with chain or cable can cause damage to coated surfaces.**



*Note: Since Western Corporation recommends all wiring be completed by a professional electrician, tools involving the electrical hook-up are not included.*

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# **Section 4**

## Panel Operation



1. Percent Timer: To control the overall speed of the machine by controlling how long the end tower motor runs in a 60 seconds time period. For example, if the percent timer is set at 50%, the endtower motor will run for 30 seconds, and then shut off for 30 seconds (50% of one minute. In effect, the machine will take twice as long to make one revolution around the field compared to a 100% timer setting.

2. Voltage Meter: Monitors voltage coming into the panel from main power source.

3. Hour Meter: Clocks amount of hours pivot is used.

4. Main Disconnect- Disconnects all incoming power from the machine.



Note: Panel door will not open unless the Main Disconnect is in the "OFF" position.

5. Operation Indicator Lights: Indicates operations currently in use.

6. Future Option: N/A

7. Future Option: N/A

8. Option Auto Restart Off / On: Overrides the Auto-Restart option, and prevents the machine from starting in the event of a power outage, or from automatically starting the machine from a remote location.

9. Dry, Wet, Aux: Dry-No water or fertilizer; Wet-water only; Aux- Water and Fertilizer.

10. Determines the direction of travel and enables the auto-reverse or auto-off feature. If the auto-reverse feature is used, turn the selector switch to AUTO and turn the Stop-Run-Start switch to Start. The machine will travel in the direction that the Auto Reverse option is currently set to. If Auto Off is used, simply place the selector switch in the desired direction, then Start the system. Machine will move in the selected direction and stop when the machine reaches the barricade.



Note: Forward is to be clockwise.

11. Stop, Run, Start: Stop or Start machine



**WARNING! CARE SHOULD BE TAKEN WHEN USING THE SAFETY OVERRIDE FEATURE. SEVERE MISALIGNMENT MAY RESULT IN STRUCTURAL DAMAGE. DO NOT USE OVERRIDE UNLESS MACHINE IS IN COMPLETE VIEW.**

12. Safety Override: The machine shutdown feature may be overridden by pressing the safety override button and turning the Stop, Run, Start switch to "START".

13. iControlRemote

See Section 1-6 for proper machine alignment.

1. Turn disconnect switch to on position.
2. Look at voltage meter on panel. Voltage meter will indicate current supply voltage.



NOTE: Incoming voltage may vary depending on your location. If you are not getting the correct voltage for your area, contact a licensed electrician for diagnosis.



3. Move selector on panel door to "Fwd" position.



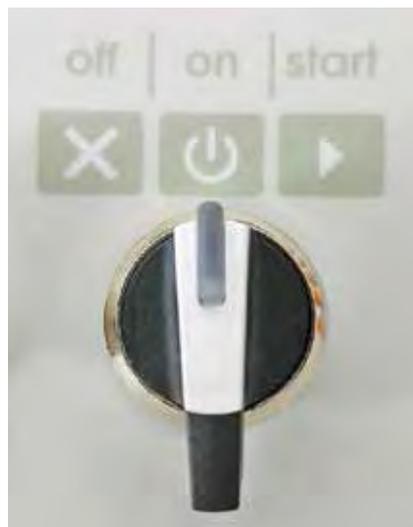
4. Set the Percent Timer on the panel door to desired application rate.  
NOTE: Reference Sections....for desired results.



5. Move Dry, Wet, Aux switch to the desired operation.



6. Move Stop-Run-Start switch on panel door to Start to energize safety and latch circuit.



7. Check the lights on the front of the control panel door. The following lights should be ON:  
RUNNING, FORWARD, SAFETY, END TOWER



1. Turn disconnect switch to on position.
2. Look at voltage meter on panel. Voltage meter will indicate current supply voltage.



NOTE: Incoming voltage may vary depending on your location. If you are not getting the correct voltage for your area, contact a licensed electrician for diagnosis.



3. Move selector on panel door to "Rev" position.



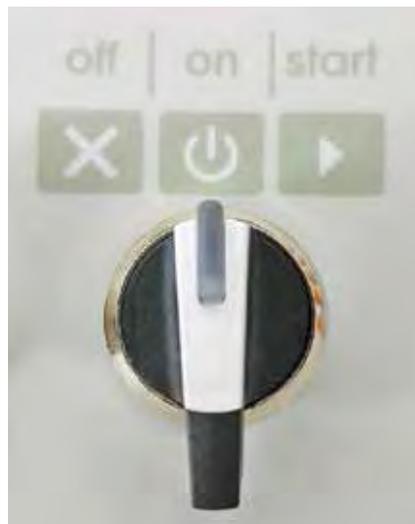
4. Set the Percent Timer on the panel door to desired application rate.  
NOTE: Reference Sections....for desired results.



5. Move Dry, Wet, Aux switch to the desired operation.



6. Move Stop-Run-Start switch on panel door to Start to energize safety and latch circuit.



7. Check the lights on the front of the control panel door. The following lights should be ON:  
RUNNING, REVERSE, SAFETY, END TOWER



The CP600 Auto Reverse / Off option is designed for both End Tower and Pivot Point operation. It uses the direction wires in the span cable to send a momentary pulse signal to the main control panel.

The Auto Reverse Switch is located at the End Tower or Pivot Point and uses a Normally Open contact to pulse the wire of the desired direction to actuate the relay in the main panel. If the system is running in Forward and the direction switch is in the Auto position, a pulse on the Reverse wire will change the direction of the machine. The logic is reversed for changing from Reverse to Forward.

Reference the following steps to assist you in the successful operation of this feature:

**Auto Reverse Option:**

1. Turn the Rev-Auto-Fwd switch (1) to the Auto position.
2. Turn the Stop-Run-Start switch (3) to the Start position.

When the machine is started with the Start switch (item 3) it should run in the direction that it was last running. If the opposite direction is desired, start the system with the switch in the desired direction, then move it back to Auto.

**Auto Off Function:**

The Auto Off function is a built-in feature of the Auto Reverse option. To operate the Auto Off function:

1. Place the Rev-Auto-Fwd switch in the desired direction of travel of the machine.
2. Turn the Stop-Run-Start switch (3) to the Start position.

When the Auto Reverse switch is operated at either the barricade or pivot point, the machine will shut down. To restart the machine:

1. Return the Rev-Auto-Fwd switch to either the Auto position or the new direction.
2. Turn the Stop-Run-Start switch to Start position.



**Auto Restart Option:**

The Auto restart option allows the machine to automatically resume operation after a loss of incoming power occurs. Using a timer, the option will automatically energize the Start circuit if in Auto, starting the machine. If in Hand, the timer pulse is not applied to the Start circuit so the machine remains Off.

**Auto Restart Off:**

Place the selector switch in the position shown below to prevent the machine from automatically restarting after a power failure

**Auto Restart On:**

Place the selector switch in the position shown below to allow the machine to automatically restart after a power failure



### Local / iControl Remote Operation:

The iControl Standard panel comes “iControl Remote” ready! Using the Local / iControlRemote switch, you can enable or disable remote control of your center pivot. Please refer to the iControl Remote documentation for more information regarding proper operation of that option.

To enable or disable remote control of your pivot, simply move the selector switch between Panel (disabled) and iControl Remote (enabled).



**Safety Override:**

The Safety Override button is used to override the machine's safety circuit and realign the system if a tower or towers gets out of alignment. The use of this button forces the three phase contactor and direction wires to energize, allowing machine movement as necessary.

**WARNING! CARE SHOULD BE TAKEN WHEN USING THE SAFETY OVERRIDE FEATURE. SEVERE MISALIGNMENT MAY RESULT IN STRUCTURAL DAMAGE. DO NOT USE OVERRIDE UNLESS MACHINE IS IN COMPLETE VIEW.**

The machine Safety shutdown feature may be overridden by moving the Direction switch to Forward or Reverse, pressing the Safety Override button and turning the Stop-Run-Start switch to "Start." This will force the End Tower to move in the desired direction.



### STOPPING YOUR MACHINE IN AN EMERGENCY

The CP600 is equipped with a disconnect switch at each tower. An On/ Off switch is located on the underside of each tower junction box, see Figure 4-12a. and Figure 4-12b. Turning this switch to the "OFF" position will shut down the entire machine by interrupting the safety circuit. This switch is not the machine disconnect and should ONLY be used in emergencies.

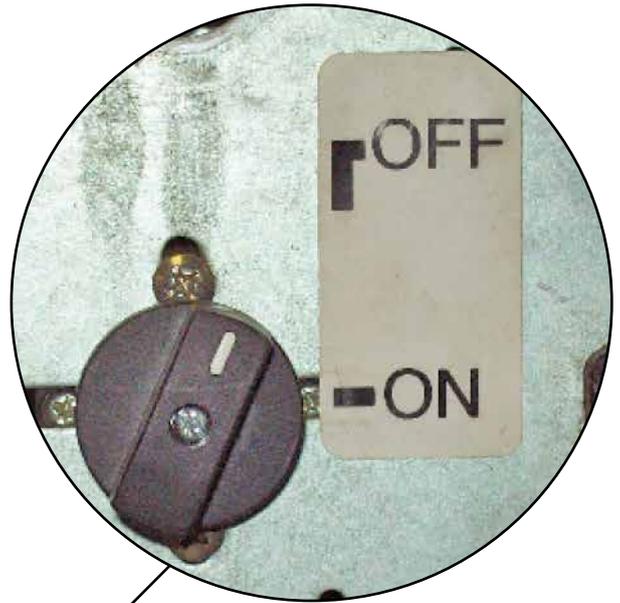


Figure 4-12a.



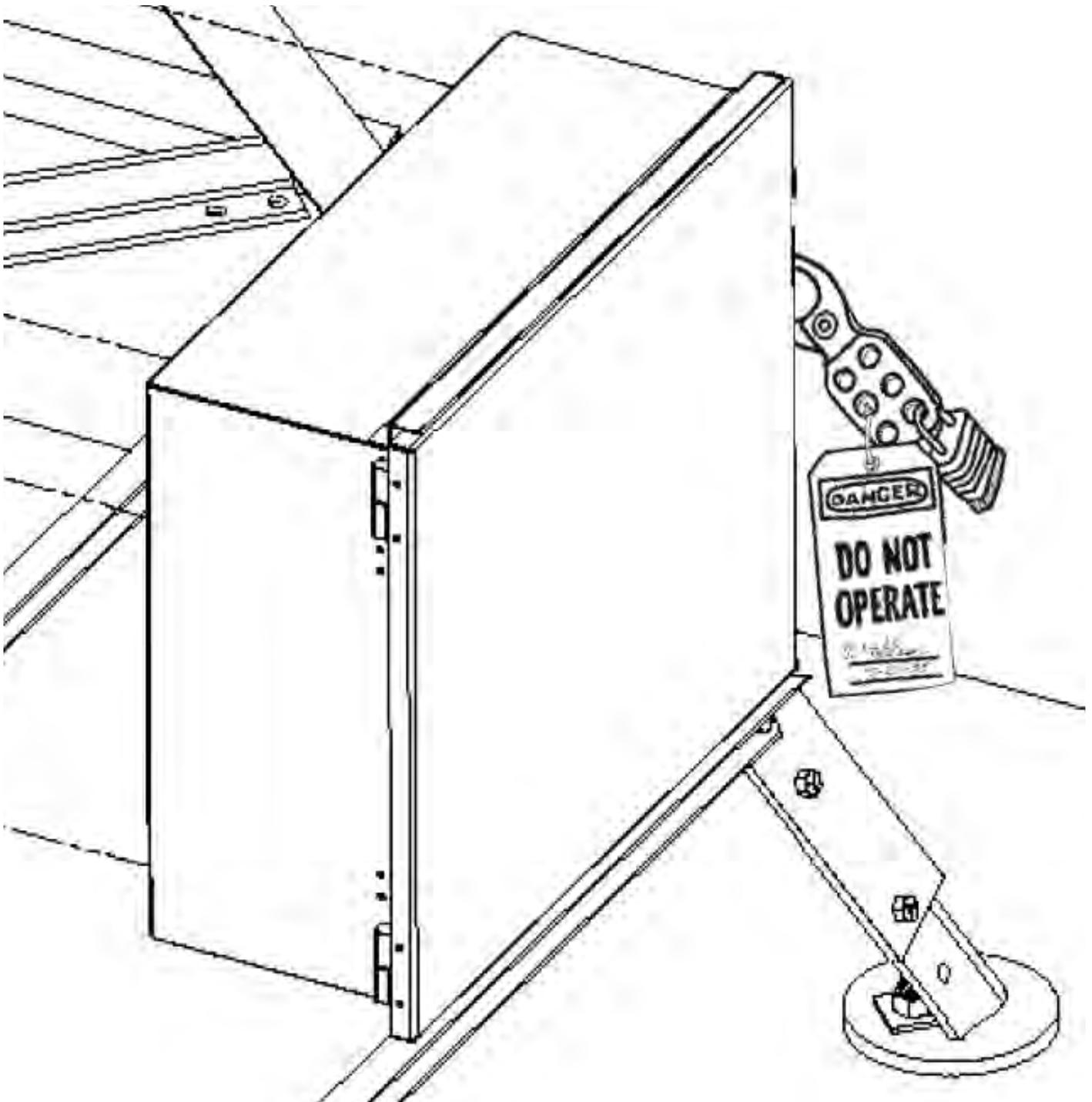
Figure 4-12b.

The pictures shown may not depict what your machine may have. Your tower junction box may be equipped with a gray cover and also may contain a flip switch style emergency shut off.

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# Section 5

## Electrical

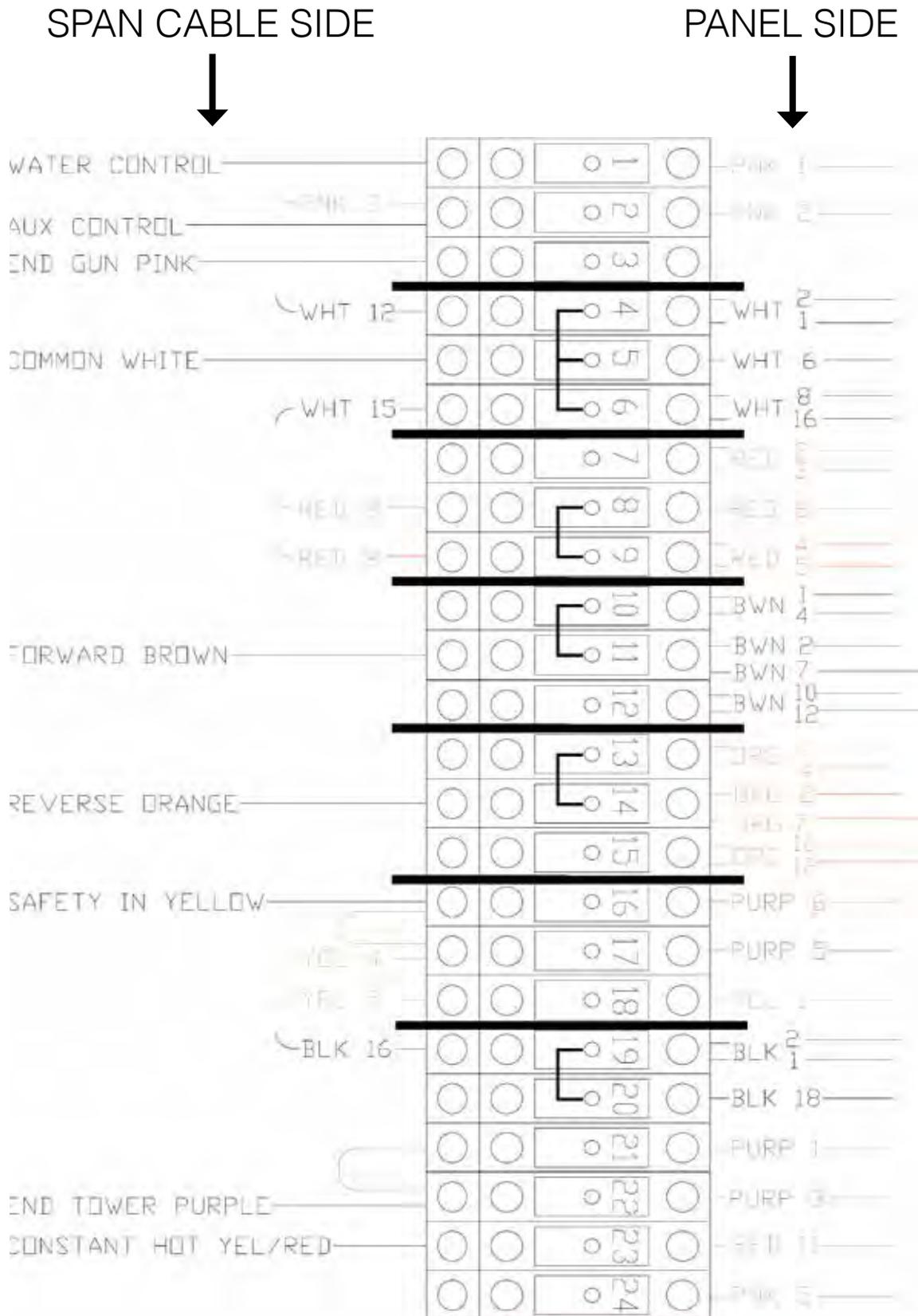


Due to the wet environment of irrigation equipment, it is very important that your Western CP600 Center Pivot Irrigation System be properly grounded. The NEC (National Electric Code) requires a grounded conductor of a grounded utility system to extend to every piece of equipment served. This means that for a three-phase electrical system, three power wires and one ground wire are required between your main service entrance disconnect and the pivot panel. For center pivot equipment, this service entrance should be a fused disconnect switch located before the power cable goes underground to the center pivot machine.

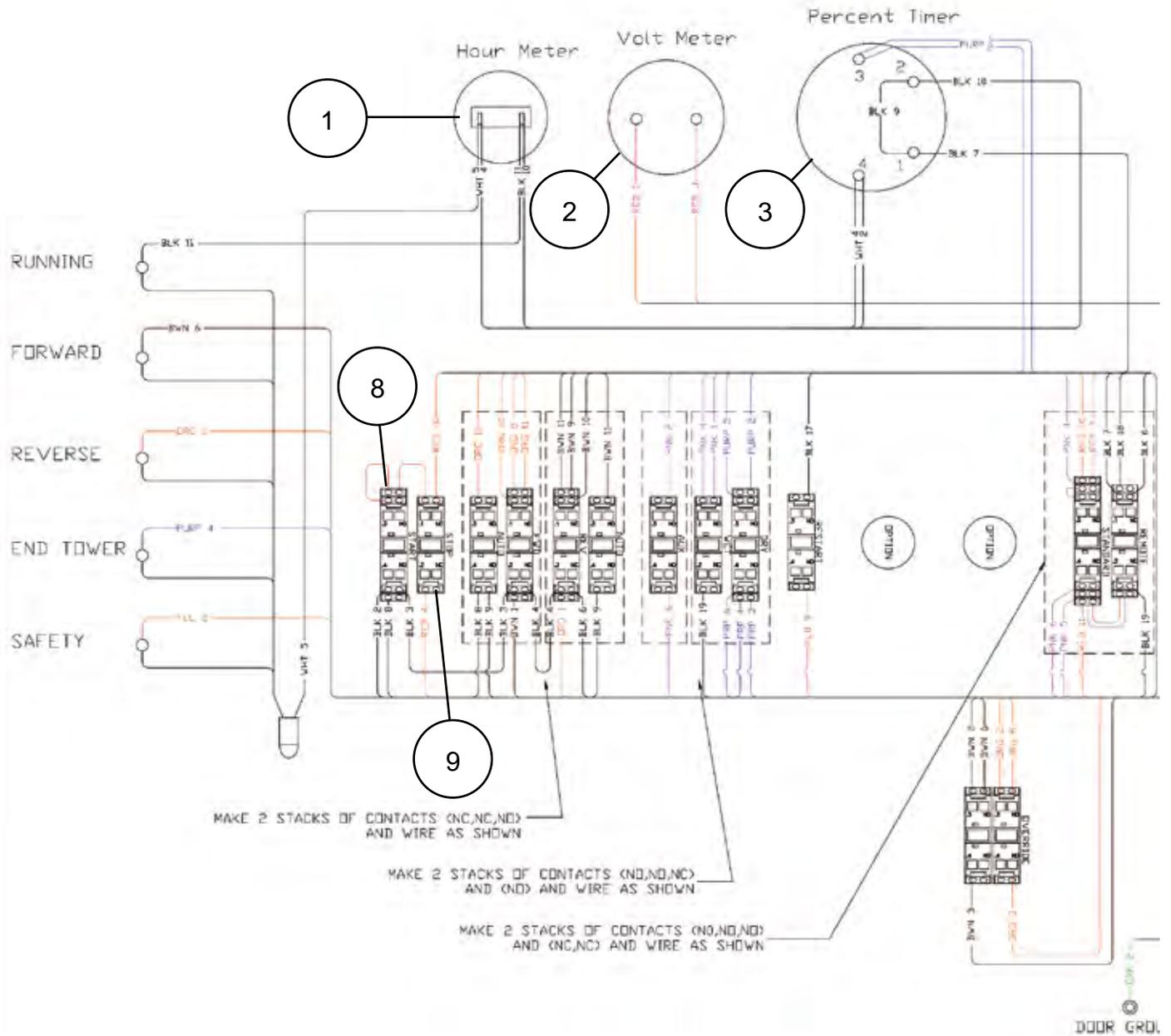
An irrigation system may be served from wye, open-delta, or grounded-delta transformers. The grounded-delta three-wire transformer, however, is not recommended because there are only three wires from the transformer to the service entrance. Most newer installations will have three power leads and a ground from the transformer to the main service entrance. If only three leads are provided from the transformer, a grounding lead should be installed from the transformer to the service panel to ensure a low impedance path-to-ground required due to the long lengths of wire used on pivot machines. Consult an electrician qualified to make this installation.

In addition to the grounding circuit, two ground rods should be driven at the transformer, service disconnect or pump panel, and at the pivot panel. The ground rods should be connected to the enclosures with a minimum of No. 6 bare copper wire, and in accordance with the National Electric Code.

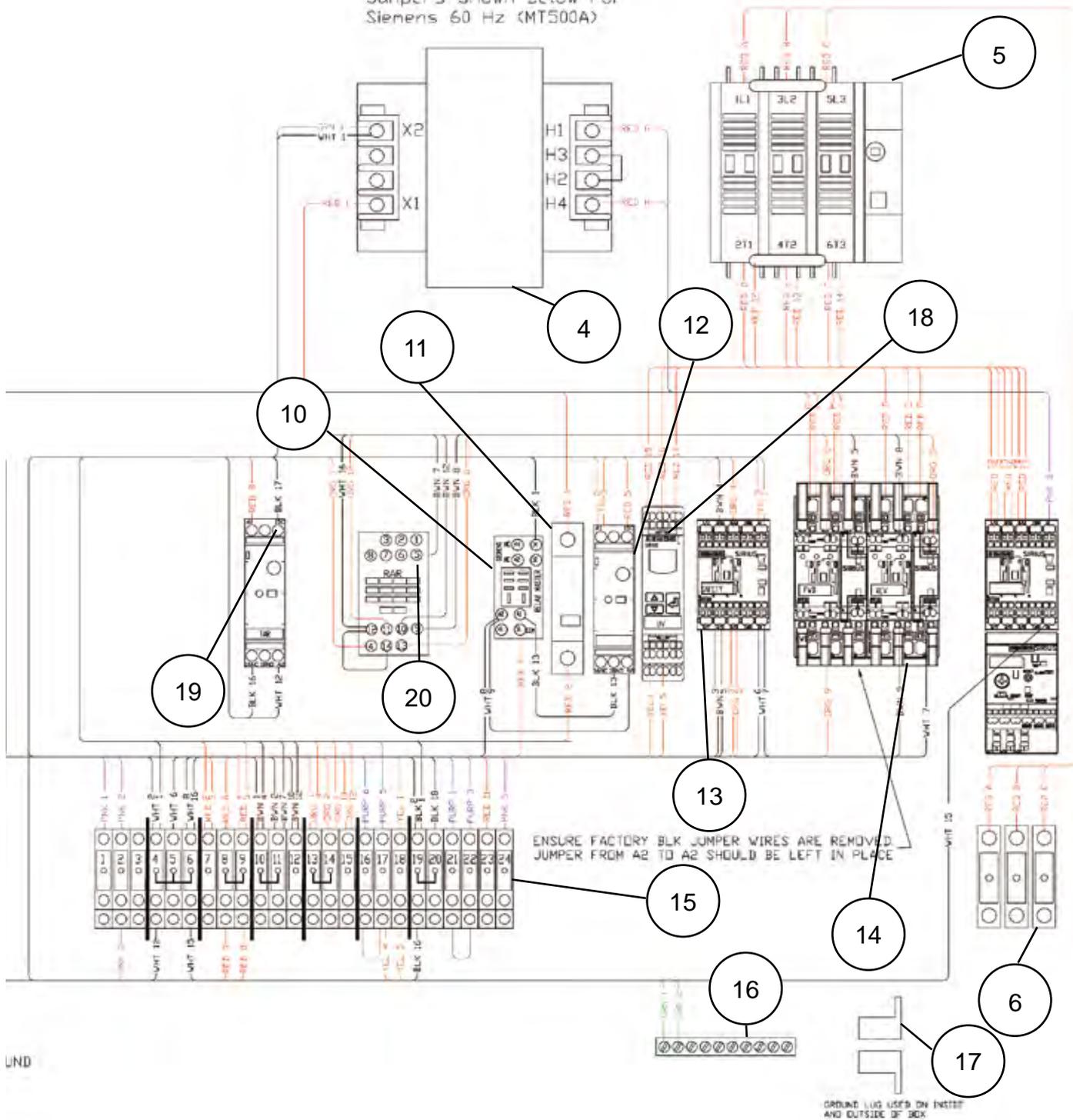
When a generator is used as a power source, it should also be grounded, and ground rod driven at both generator and pivot.



Note: Field Wiring-Use Copper or Aluminum conductors for at least 60° C. Recommended screw tightening torque is 4.4 lb-in (0.5 Nm).



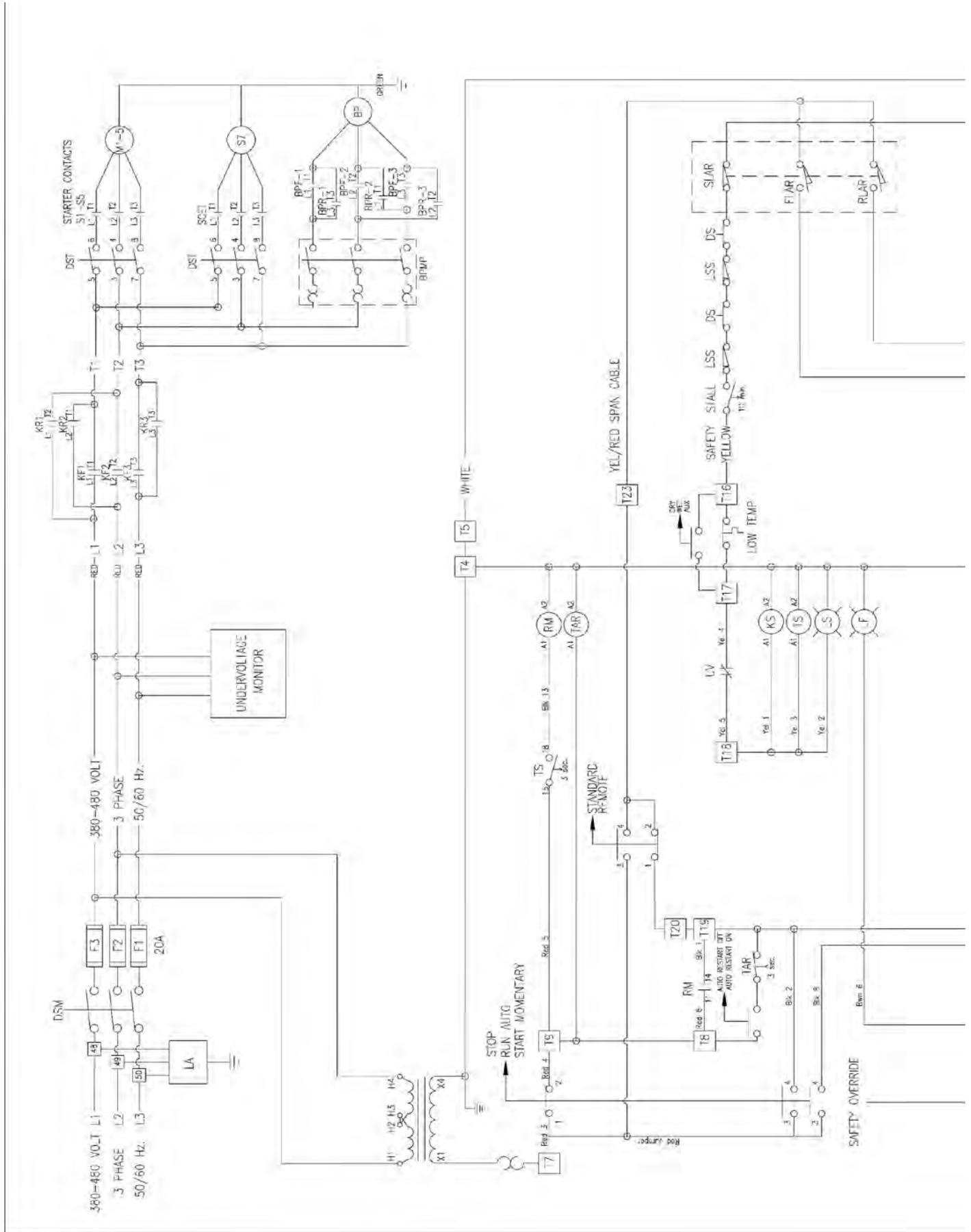
Verify Transformer Type  
And Jumper Locations.  
Jumpers Shown Below For  
Siemens 60 Hz (MT500A)

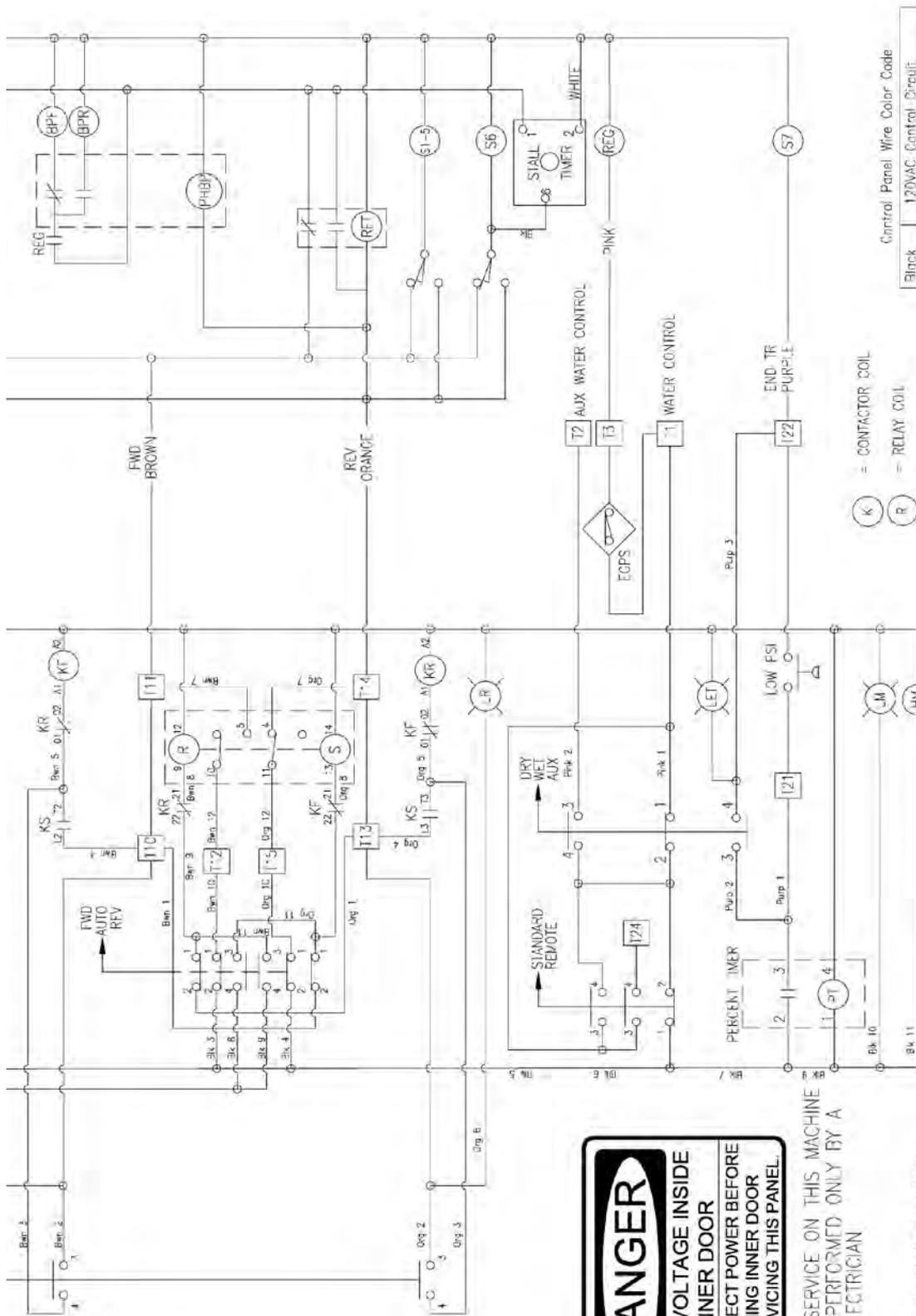


Item	Part #	QTY	Description
1	12-869014	1	AC/DC HOUR METER, THREE HOLES CASE 1/4" MODEL 3410-1000; TRUMETER; 8826948 (ALT. 95.41010)
2	12-95.40089	1	VOLTMETER, 600V
3	12-401044	1	PERCENTAGE TIMER 60 SEC., MACROMATIC
4	12-860144	1	TRANSFORMER, INPUT: 380/400/415VAC, OUTPUT: 120VAC, 50Hz : SIEMENS : MT05001
5	12-860154	1	SWITCH DISCONNECT, SINGLE THROW, 30AF, 50KAIC : SIEMENS : CFS361J5
6	12-823005	3	TERMINAL BLOCK, PUSH-IN, 10MM
*	12-02613-01	5	INDICATOR LIGHT AMBER 1/4"
8	12-860141	24	CONTACT BLOCK NO : SIEMENS : 3SU1400-1AA10-3BA0
9	12-860142	11	CONTACT BLOCK NC : SIEMENS : 3SU1400-1AA10-3CA0
10	12-860145	1	PLUG-IN RELAY with BASE, PUSH-IN TERMINAL, 115VAC, 4C/O : SIEMENS: LZS:PT5D5S15
11	12-860153	1	MINICIRCUIT BREAKER, 6A, 1P, 230/400V, 6kA : SIEMENS : 5SY4106-6
12	12-860158	1	TIMER DELAY SAFETY : SIEMENS : 3RP2540-2AW30
13	12-860131	1	CONTACTOR FWD/REV : SIEMENS : 3RA2326-8XB30-2AK6
14	12-860132	1	CONTACTOR 18A 120VAC : SIEMENS : 3RT2015-2AK61
15	12-860157	25	MINI TERMINAL BLOCK, PUSH-IN, 2.5MM, 3-POINTS, GRAY, TE : SIEMENS : 8WH2003-0AF00
16	12-95.43031	1	NUTERAL BAR 10 HOLE
17	2202-01	2	Ground lug
18	12-860146	1	RELAY, PHASE SEQ/FAILURE/UV, PUSH-IN TERMINAL : SIEMENS : 3UG4614-2BR20
19	12-860159	1	TIMER DELAY AUTO RESTART : SIEMENS : 3RP2511-2AW30
20	12-0910119	1	SWITCH, PLUG-IN RELAY, LATCHING, AR, 120VAC : OMRON : MY2K-US-AC120
20	12-0910120	1	RELAY BASE, SWITCH, : OMRON : PYF-14A-E
*			
*			
*			
*			
*			
<b>* Not shown</b>			

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Control Panel Wire Color Code

Black	120VAC Control Circuit
Brown	120VAC Forward Circuit
Green	Earth Ground
Orange	120VAC Reverse Circuit
Pink	120VAC Water Control Circuit
Purple	120VAC End Tower Circuit
Red	Ungrounded AC Power Circuit
White	Grounded AC Power Circuit
Yellow	120VAC Safety Circuit

- (K) = CONTACTOR COIL
- (R) = RELAY COIL
- (S#) = STARTER COIL
- (T) = TIMER COIL
- (S) = SET COIL
- (R) = RESET COIL
- (L) = LIGHT
- (T) = TERMINAL BLOCK

WITH THE FOLLOWING OPTIONS:  
 AUTO RESTART ON POWER  
 LOW PRESSURE SWITCH

- LSS = LIMIT SWITCH ALIGNMENT SAFETY
- PT = PERCENT TIMER
- RAR = RELAY AUTO REVERSE SEQUENCER
- RAS = RELAY AUTO STOP
- REG = RELAY END GUN
- RET = RELAY END TOWER
- RM = RELAY MAIN
- RP = RELAY PRESSURE
- TAR = TIMER AUTO RESTART PULSE TIMER
- TS = TIMER SAFETY 3 SEC. DELAY OFF
- ST1.5 = STARTER FIRST THRU FIFTH TOWER
- S6 = STARTER SECOND TO LAST TOWER
- S7 = STARTER END TOWER

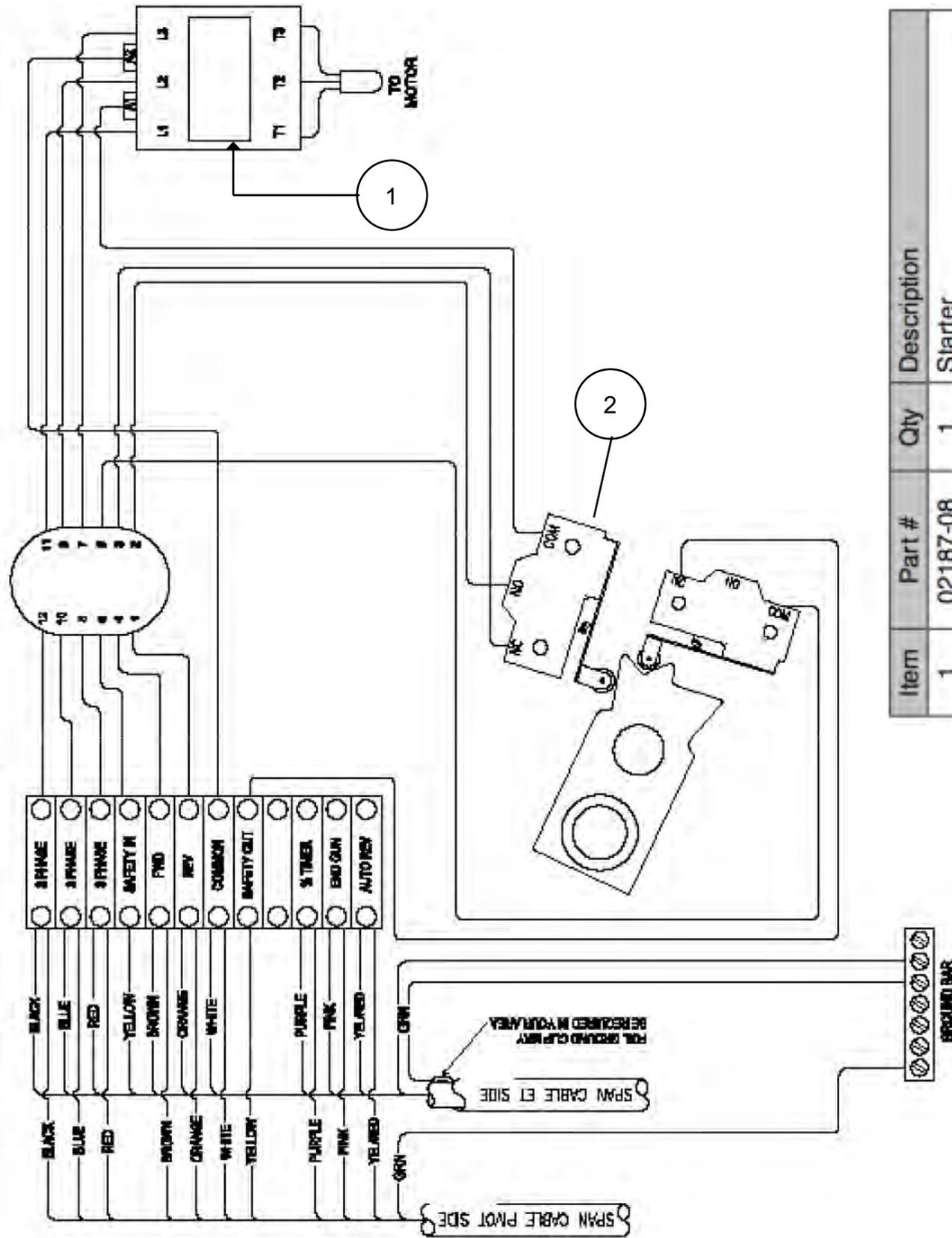
## DANGER

HIGH VOLTAGE INSIDE  
INNER DOOR

DISCONNECT POWER BEFORE  
OPENING INNER DOOR  
OR SERVICING THIS PANEL.

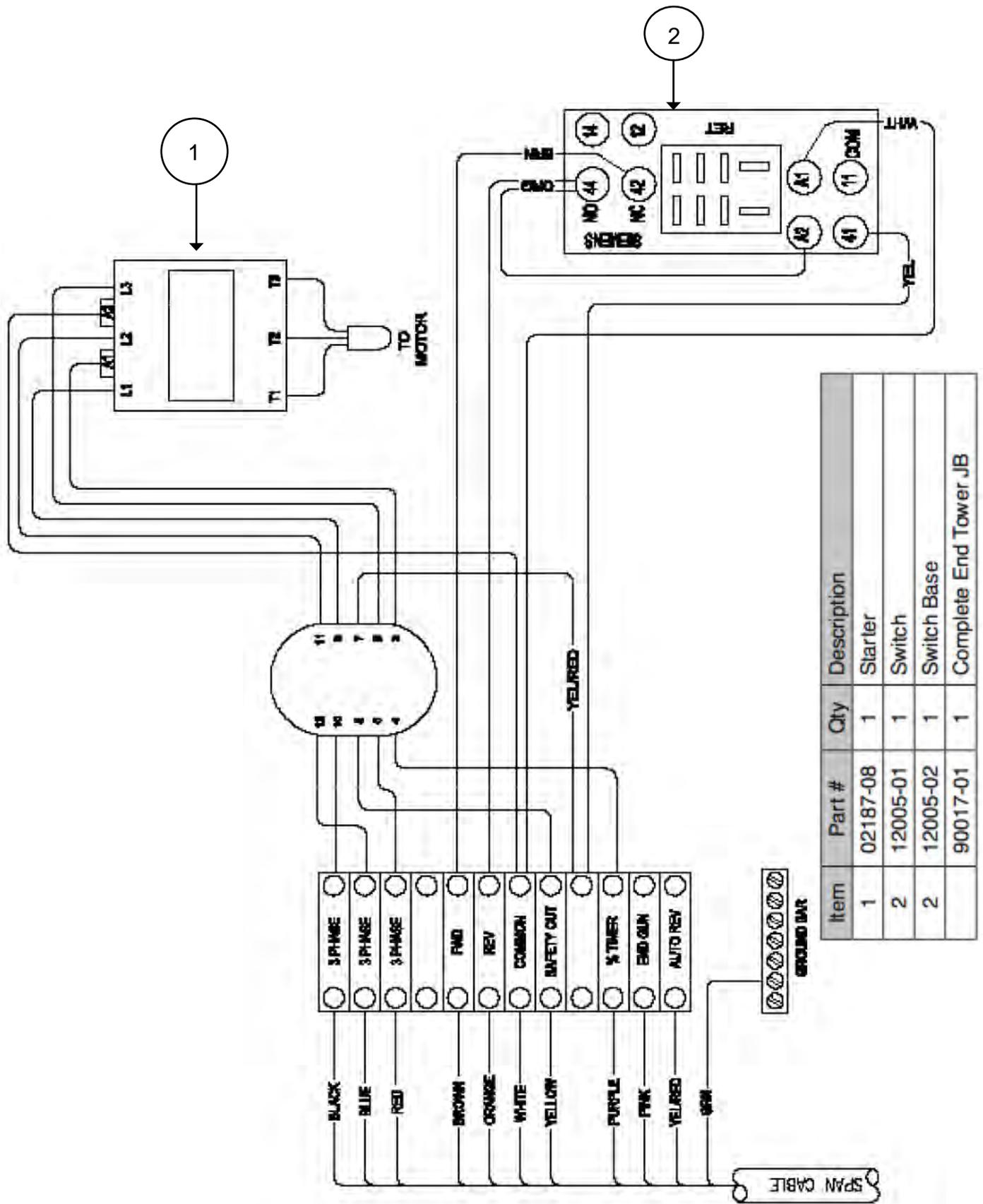
ELECTRICAL SERVICE ON THIS MACHINE SHOULD BE PERFORMED ONLY BY A QUALIFIED ELECTRICIAN  
 90200-41

- DS = TOWER DISCONNECT SWITCH
- EQPS = END GUN PROX SWITCH
- KF = CONTACTOR FORWARD
- KR = CONTACTOR REVERSE
- KS = CONTACTOR SAFETY
- LEF = LIGHT FORWARD
- LF = LIGHT REVERSE
- LM = LIGHT MAIN POWER
- LR = LIGHT RETURN
- LSAR = SAFETY LIMIT AUTO REVERSE
- PLAR = REV LIMIT AUTO REVERSE
- RLAR = REV LIMIT AUTO REVERSE
- HM = HOUR METER

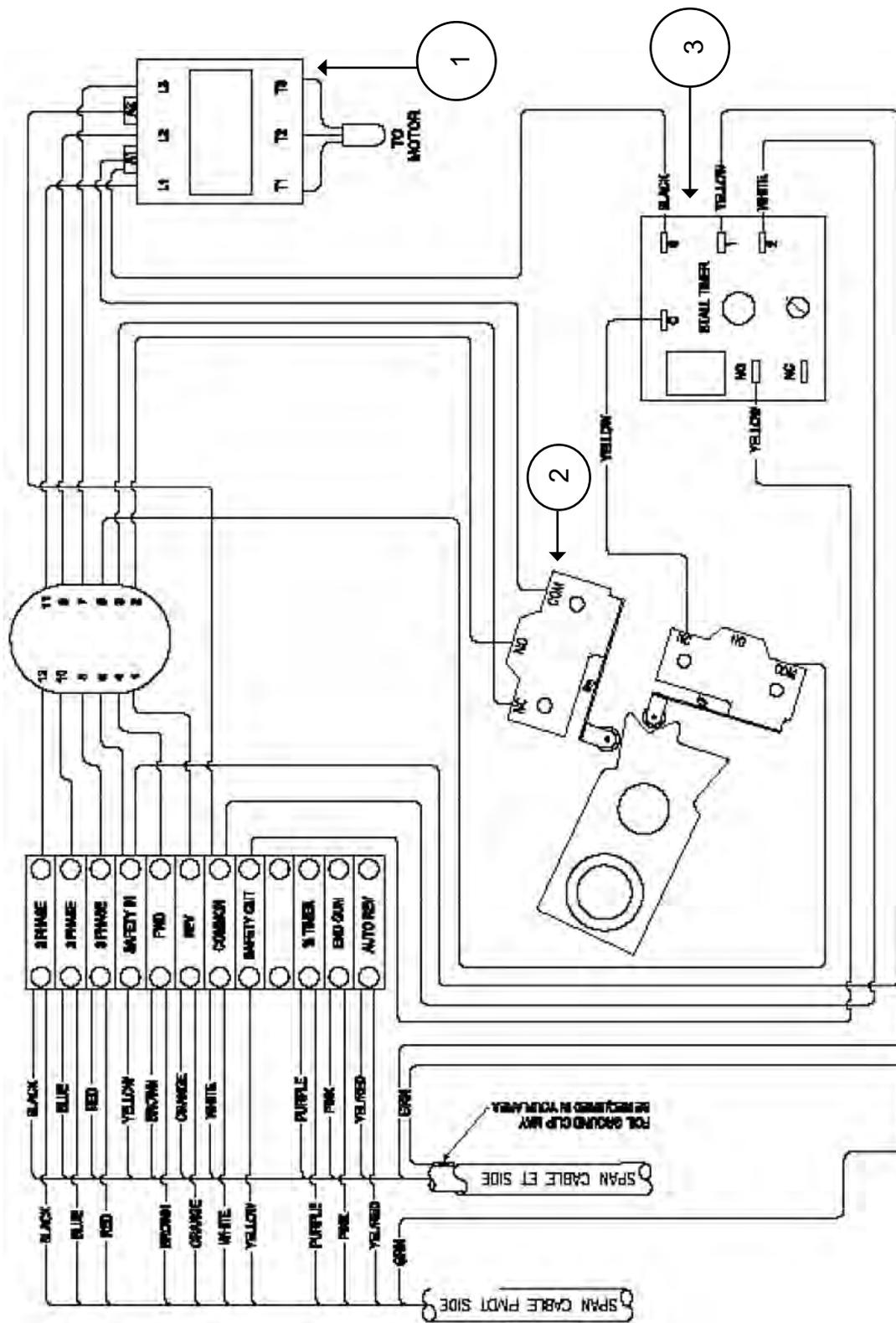


Item	Part #	Qty	Description
1	02187-08	1	Starter
2	02224-06	2	Micro Switch
	10142-01	1	Complete Int. Tower JB

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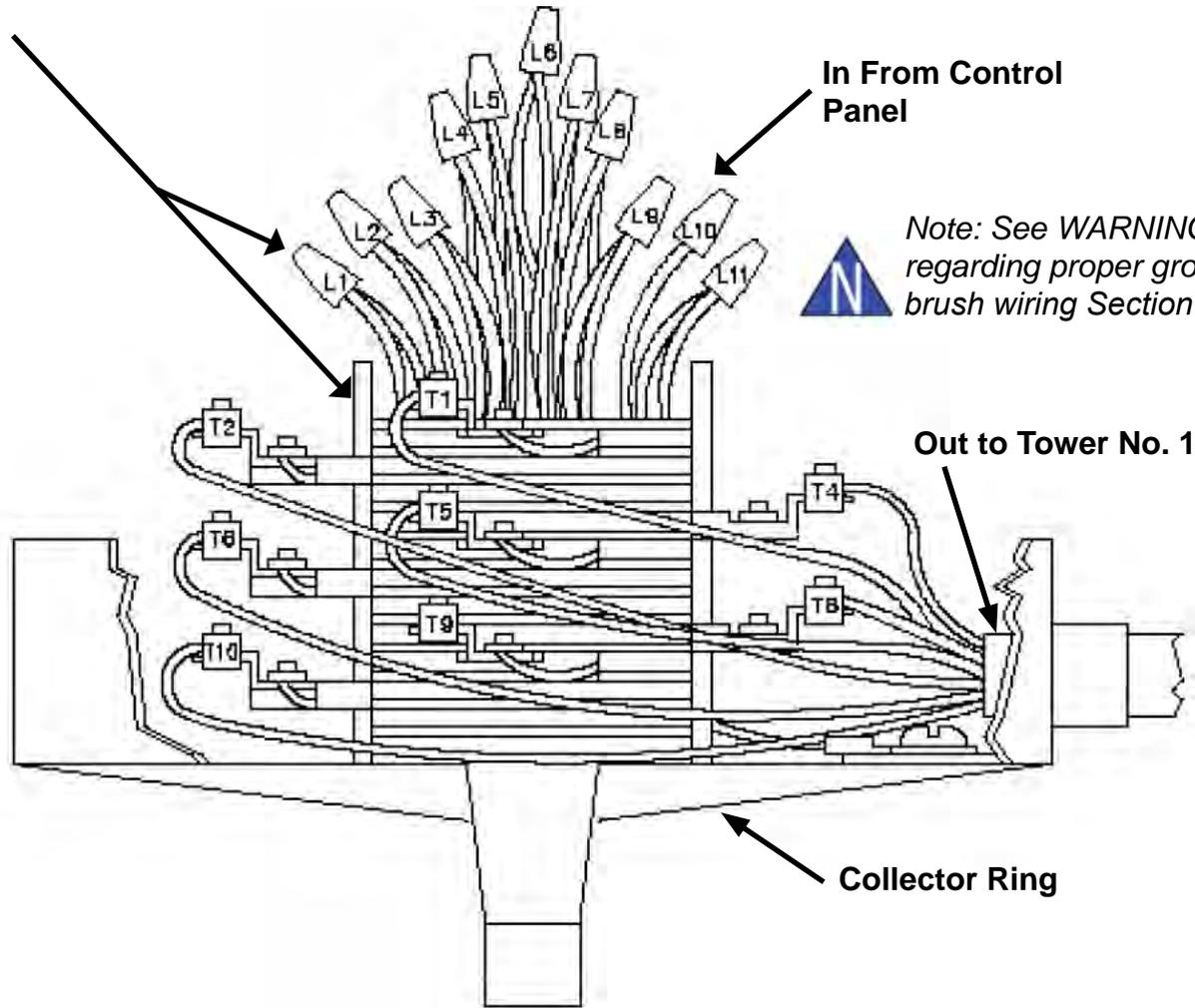
Item	Part #	Qty	Description
1	02187-08	1	Starter
2	12005-01	1	Switch
2	12005-02	1	Switch Base
	90017-01	1	Complete End Tower JB



Item	Part #	Qty	Description
1	02187-08	1	Starter
2	02224-06	2	Micro Switch
3	02296-08	1	Stall Timer
	90016-01	1	Complete Stall JB



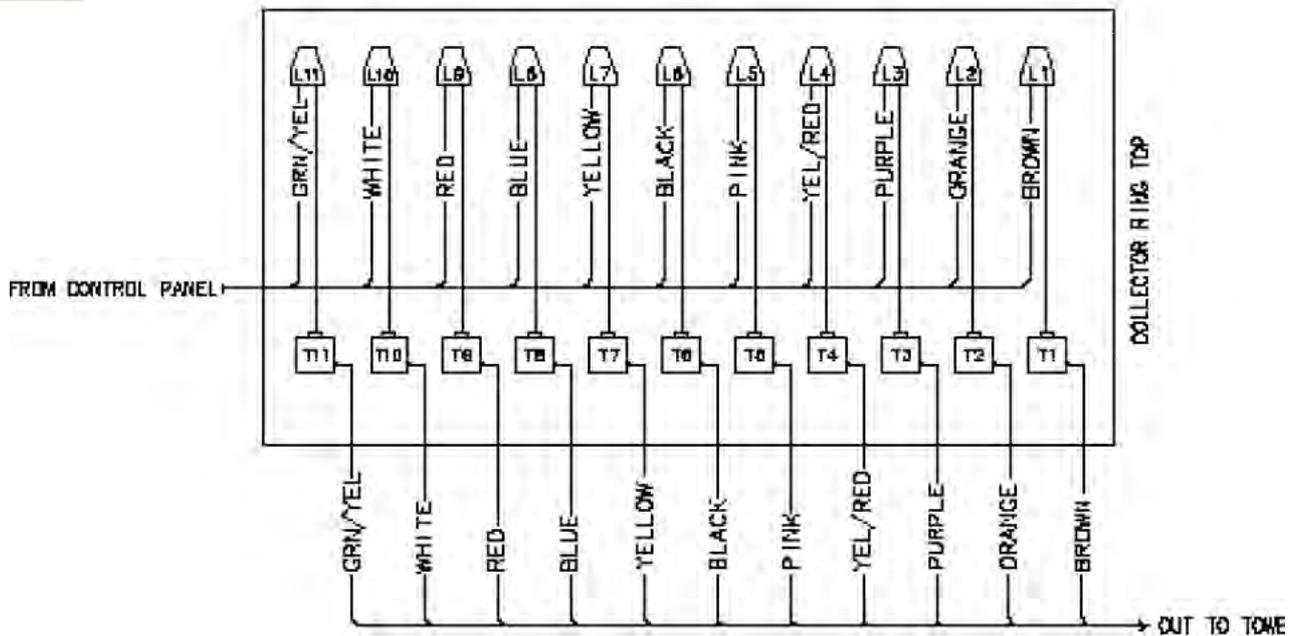
**WARNING! MAKE SURE WIRES CLEAR BRUSH POSTS WHEN MACHINE ROTATES**



Note: See WARNING! regarding proper ground brush wiring Section 5-23.



**WARNING! DO NOT CONNECT #6 WIRE TO #9 WIRE.**



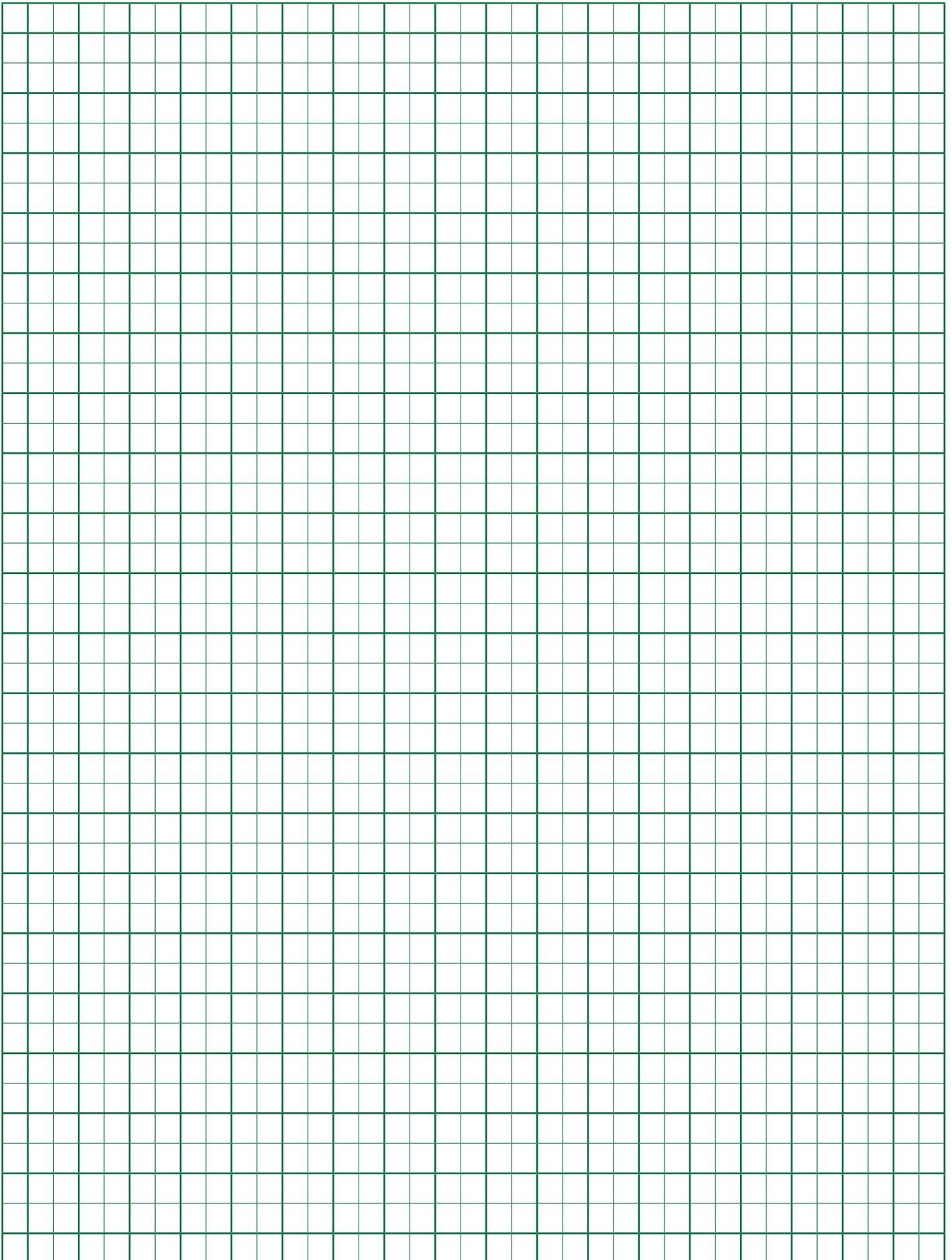


**WARNING! GREEN IS GROUND. MAKE SURE GREEN WIRE IS CONNECTED TO L11 RACEWAY BRUSH. THE RACEWAY BRUSH IS GROUNDED TO THE COLLECTOR RING BASE. FAILURE TO PROPERLY GROUND YOUR PIVOT WILL RESULT IN SERIOUS INJURY OR POSSIBLE DEATH.**



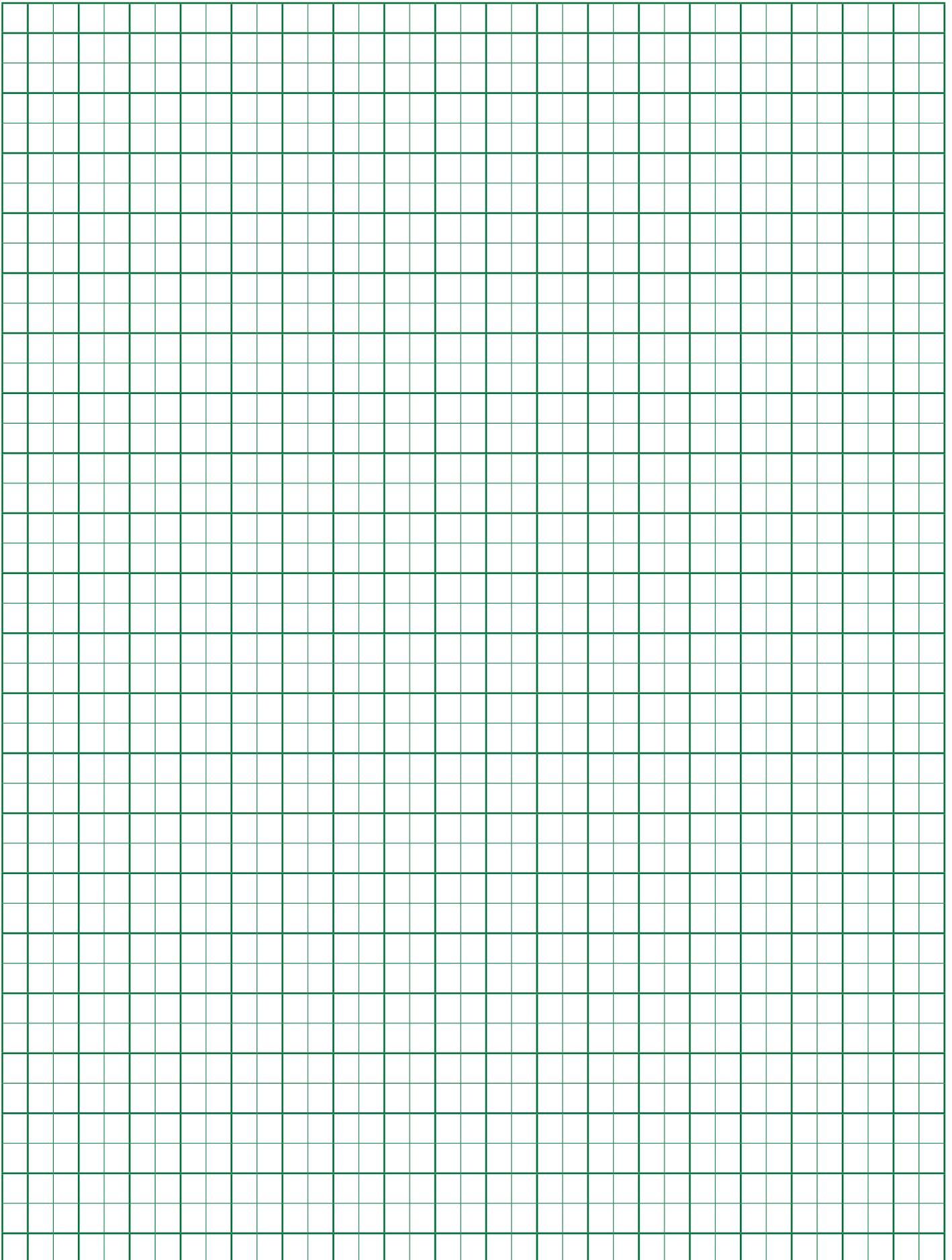
*Note: Wire color in Span Cable is subject to change without notice. Reference will be made here on out to yel/red wire. Depending upon purchase date, your Span Cable may be equipped with tan; yellow/red replaces tan.*

A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.



A large grid of graph paper for taking notes, consisting of 20 columns and 30 rows of small squares.

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