



**VFlex™ Corner Sequencing  
Control Panel  
Owner's Manual**

**0999114\_C**



# Table of Contents

<b>EC Declaration of Conformity</b> .....	5
<b>Electrical Safety Statement</b> .....	6
<b>Installation Of The Valley Electric Irrigation Machine - European Union Only</b> .....	6
<b>About This Manual</b> .....	6
<b>Ancillary Equipment Warranty</b> .....	6
<b>Safety</b> .....	7
Recognize Safety Information.....	7
Safety Messages.....	7
Information Messages.....	7
Use Of Personal Protective Equipment .....	8
Conductive Materials And Equipment .....	8
Fall Protection.....	8
Minimum Working Clearance.....	9
Qualified Person .....	9
Irrigation Equipment near Airports and Crop Dusting Aircraft .....	9
Overhead Power Lines .....	10
Minimal Lockout / Tagout Procedure.....	11
Sequence of Lockout.....	11
Restoring Equipment to Service.....	11
<b>Safety</b> .....	12
Operate Safely.....	12
Safety Decals .....	14
<b>Overview</b> .....	17
VCS Control Panel .....	17
Term Definitions.....	17
Corner Identification .....	18
Standard (Trailing) Corner .....	18
Inverted (Leading) Corner .....	18
Main Status Menu.....	19
Time .....	19
Corner Angle (CANGLE).....	19
Error Code (Exx) .....	19
Speed.....	19
Date.....	19
Machine Angle (MANGLE).....	19
Adjusted Speed .....	19
SOL# .....	19
TEN+ .....	19
Function Keys.....	20
Home Key.....	20
Diagnostics Key.....	20
Program Key .....	20
Options Key.....	20
Pressure .....	20
Direction .....	20
End Gun (EG).....	20
Solenoid Numbers.....	20
Modes.....	20
Numeric Entry Keys.....	21
Decimal Point Key .....	21
Minus Sign Key.....	21
Escape Key .....	21

# Table of Contents

---

Number Keys.....	21
Navigation Arrow Keys .....	21
Up Arrow Key .....	21
Left Arrow Key .....	21
Right Arrow Key .....	21
Down Arrow Key .....	21
Enter Key.....	21
Symbols and Conventions.....	22
Command Prompt .....	22
Exiting Screens .....	22
Screen Delays.....	22
Illustrations .....	22
<b>Operation.....</b>	<b>23</b>
Starting the VFlex Sequencing Control Panel .....	23
Corner Applications.....	23
Boot Splash Screen.....	23
VCS Computer Boot Up Screen.....	23
Acquiring Satellites Screen .....	23
Programs Key .....	24
Irr/Chem .....	24
Seq Overrides .....	24
Crnr Angle Mode .....	24
Position Mode .....	24
Corner Angles.....	25
Machine Angles .....	26
Retracted PSI .....	27
<b>Diagnostics .....</b>	<b>29</b>
Diagnostics Screen.....	29
System Faults.....	29
Viewing System Faults.....	29
Status Screen Diagnostics .....	29
Error Code Summary .....	30
Error Logs.....	31
Viewing An Error Log .....	31
Resetting An Error Log To Zero.....	31
System Review Log.....	32
Reviewing Status Changes and Errors.....	32
IO.....	33
A/D - Analog to Digital Voltages .....	33
Reviewing A/D .....	33
Modules.....	34
Reviewing Modules.....	34
GPS.....	34
Reviewing GPS.....	34
<b>Troubleshooting.....</b>	<b>35</b>
System Faults.....	36
Error Codes .....	36
Troubleshooting List .....	38
Hard Reset .....	38
Executing A Hard Reset.....	38

# EC Declaration of Conformity



We: **Valmont Industries, Inc.**  
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Serial Number:

Purchase Order:

declare under our sole responsibility that the product,

## **Crop Irrigation System**

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

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

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

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

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

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

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

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

Person Authorized to Compile the Technical File in Europe:  
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# Electrical Safety Statement

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## Installation Of The Valley Electric Irrigation Machine - European Union Only

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

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

Good grounding of the Valley irrigation machine is required.

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

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

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

- The resistance between the irrigation machine and the generator must be substantially below 80 ohms.

## About This Manual

Information contained in this manual applies to the VFlex Corner Sequencing (VCS) Control Panel with software version 1.01.

For proper operation of the irrigation machine, the VCS Control Panel Owner's Manual, the machine Control Panel Owner's Manual and Irrigation Machine Owner's Manual must be used together.

The Control Panel Owner's Manual includes safety guidelines and explains the basic operation of the machine control panel itself.

The Irrigation Machine Owner's Manual includes safety guidelines and explains the operation of the irrigation machine.

All owner's, operators and maintenance personnel MUST read and understand the VCS Control Panel Owner's Manual, the machine Control Panel Owner's Manual and Irrigation Machine Owner's Manual.

Specifications, descriptions and illustrative material contained herein were as accurate as known at the time this publication was approved for printing. Valmont Industries Inc., reserves the right to change specification or design without incurring obligation. Specifications are applicable to machines sold in the United States and may vary outside the United States.

## Ancillary Equipment Warranty

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

## Recognize Safety Information

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

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

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

## Safety Messages

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



This HAZARD SYMBOL is used to alert you to information about unsafe actions or situations, and may be followed by the word danger, warning, or caution.

## **DANGER**

The HAZARD SYMBOL used with the word DANGER, will describe immediate hazards that may result in severe personal injury or death.

## **WARNING**

The HAZARD SYMBOL used with the word WARNING, will describe unsafe actions or situations that may cause severe injury, death and/or major equipment or property damage.

## **CAUTION**

The HAZARD SYMBOL used with the word CAUTION, will describe unsafe actions or situations that may cause injury, and/or minor equipment or property damage.

## Information Messages

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

## **NOTE**

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

# Safety

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## Use Of Personal Protective Equipment

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

## Conductive Materials And Equipment

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

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

## Fall Protection

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

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



## Minimum Working Clearance

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

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

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

## Qualified Person

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

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

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

## Irrigation Equipment near Airports and Crop Dusting Aircraft

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

This document is available at: [www.ecfr.gov](http://www.ecfr.gov)

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

Available here: [www.faa.gov/regulations\\_policies/advisory\\_circulars](http://www.faa.gov/regulations_policies/advisory_circulars)

- For irrigation machines near private or unregulated airfields, including farm-based airstrips, Valley strongly recommends complying with the same standards and requirements as Civil airports as shown in Part 77.
- Regulations vary by country, contact your local aviation authority for guidance.

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

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

# Safety

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## Overhead Power Lines

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

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

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

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

## Minimal Lockout / Tagout Procedure

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

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

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

## Sequence of Lockout

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



### **CAUTION**

- RETURN OPERATING CONTROL(S) TO NEUTRAL OR “OFF” POSITION AFTER VERIFYING THE ISOLATION OF THE EQUIPMENT.

8. The machine or equipment is now locked out.



### **DANGER**

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

## Restoring Equipment to Service

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

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

# Safety

## Operate Safely

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

### ⚠ CAUTION

- DO NOT operate this machine without first reading the Owner's Manuals for the machine.
- Read all safety messages in this manual and safety signs on the machine.
- DO NOT let anyone operate this machine without proper instructions.
- Unauthorized modifications may impair the function and/or safety of the machine.
- If you do not understand any part of this manual, contact your Valley dealer.

### EMPLOYEE INSTRUCTION ON SAFETY

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

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

### EMERGENCY STOPPING

The machine can be stopped at any time at any tower by turning the disconnect switch, located underneath the tower box, to the OFF position. See Figure 12-1.

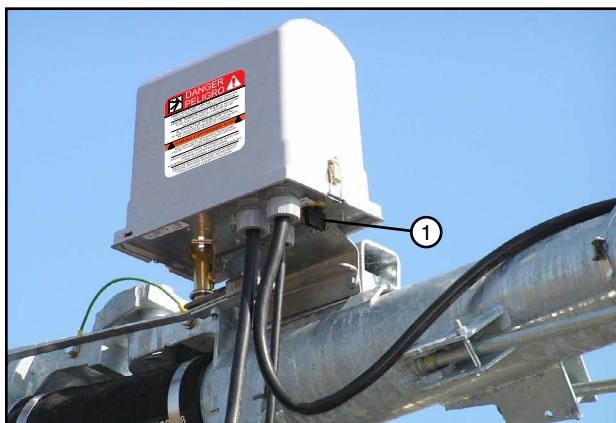


Figure 12-1 1. Disconnect Switch

### ⚠ DANGER

#### DISCONNECT POWER WHEN SERVICING

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

If you are going to perform maintenance on the machine, **YOU MUST** shut off and lock the main power disconnect as shown below. See Figure 12-2.



Figure 12-2 1. Main Power Disconnect  
2. Lock

The blue (OSHA safety color code) tag shown below should also be filled out and attached to the disconnect after locking. See Figure 12-3.

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



Figure 12-3

## Operate Safely (continued)

### CAUTION

#### QUALIFIED SERVICE PERSONNEL

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

### CAUTION

#### GUARD ALL POWER TAKE-OFF DRIVES

This includes all belt and power line drives.

Replace any guards and shields removed for maintenance.

### WARNING

#### SUSPECTED SHORT CIRCUITS

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

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

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

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

### WARNING

#### LIGHTNING AND THE MACHINE

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

### CAUTION

#### DO NOT OVERSIZE FUSES

Fuses are sized for the protection of a specific machine.

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

### CAUTION

#### PLUG - IN CONNECTORS

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

### DANGER

#### DRIVE SHAFTS START WITHOUT WARNING

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

- DO NOT touch rotating drive shaft or shield, clothing or limbs may become entangled, resulting in severe injury.
- DO NOT service the machine until the main disconnect is locked in the OFF position.
- ALWAYS replace drive shaft shields after servicing.
- DRIVE SHAFT SHIELDS MUST ALWAYS BE IN PLACE WHEN OPERATING THE MACHINE.

### CAUTION

#### CHECK WHEEL TRACKS BEFORE STARTING

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

### CAUTION

#### KEEP CHILDREN AWAY

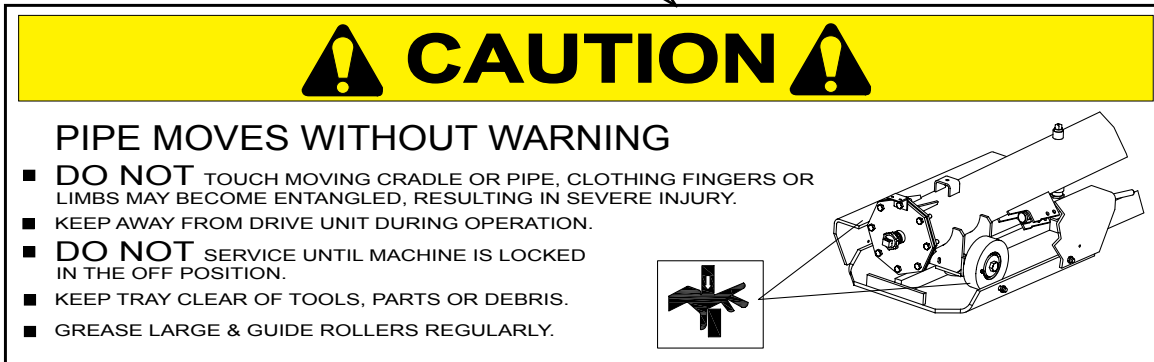
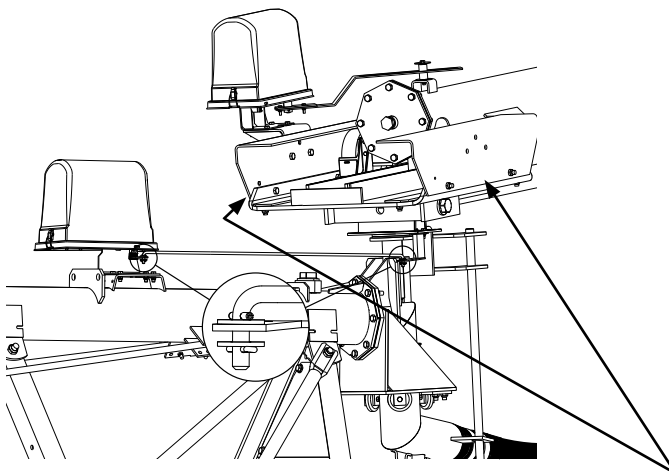
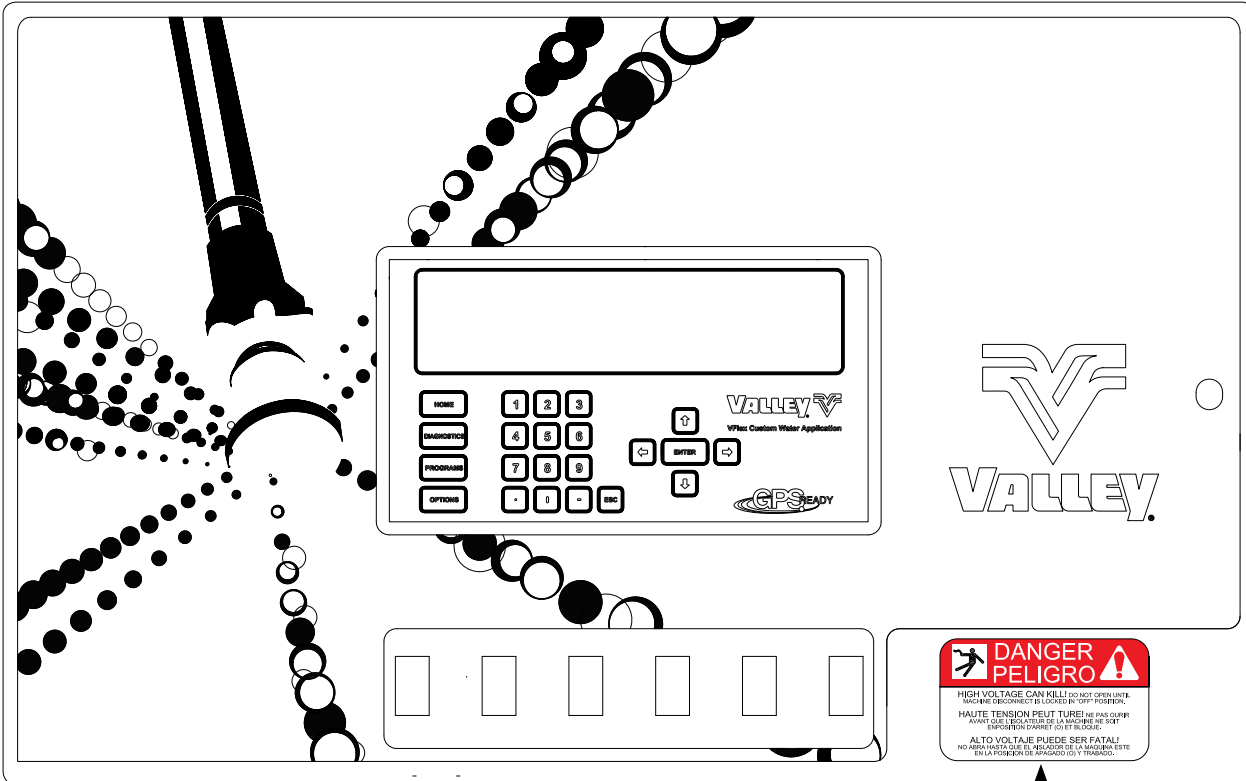
Irrigation machines are NOT playground equipment.

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

# Safety

## Safety Decals

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

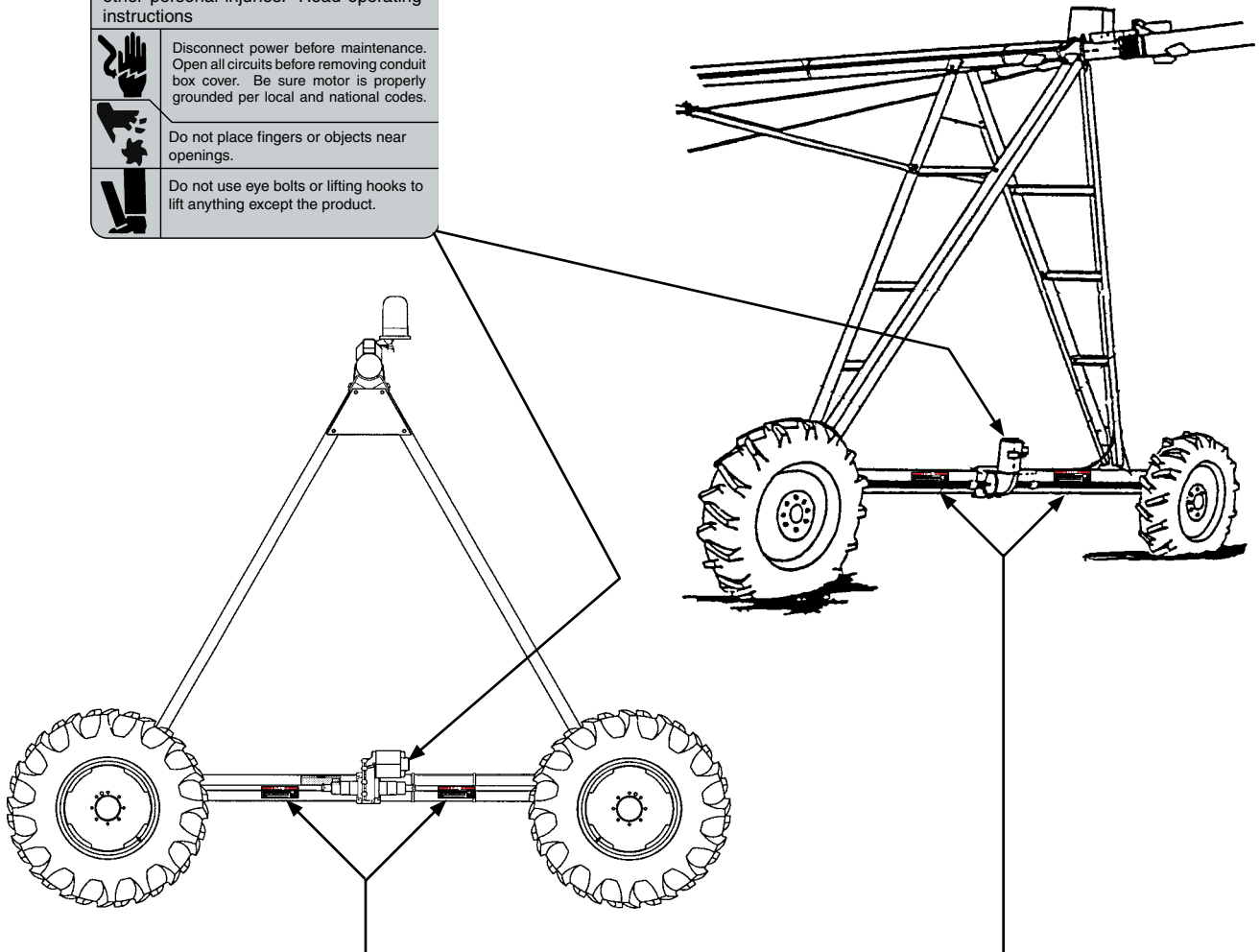


## Safety Decals (continued)

**⚠ WARNING**

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

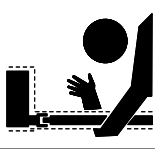
	Disconnect power before maintenance. Open all circuits before removing conduit box cover. Be sure motor is properly grounded per local and national codes.
	Do not place fingers or objects near openings.
	Do not use eye bolts or lifting hooks to lift anything except the product.



**⚠ DANGER ⚠**

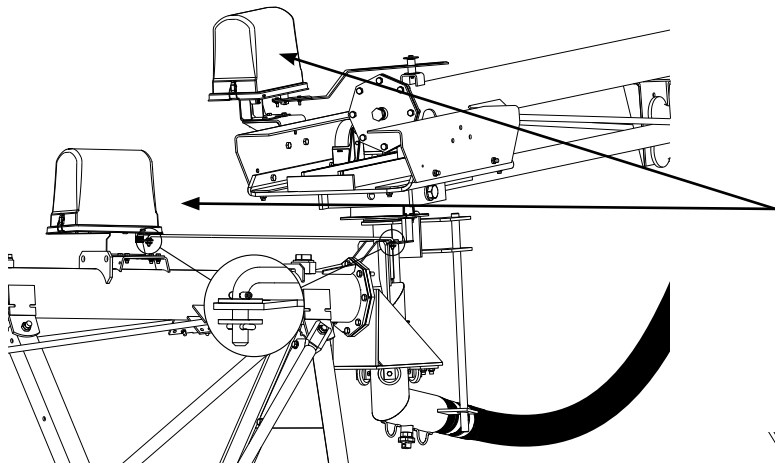
**Drive Shaft Starts Without Warning!**

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



# Safety

## Safety Decals (continued)



**DANGER**
 **PELIGRO**

HIGH VOLTAGE CAN KILL! DO NOT OPEN UNTIL MACHINE DISCONNECT IS LOCKED IN "OFF" POSITION.  
 HAUTE TENSION PEUT TUER! NE PAS OUVRIR AVANT QUE L'ISOLATEUR DE LA MACHINE NE SOIT EN POSITION D'ARRÊT (O) ET BLOQUÉ.

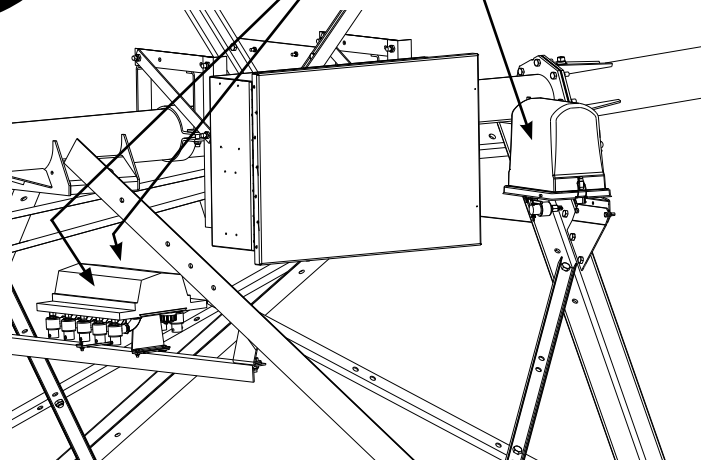
ALTO VOLTAJE PUEDE SER FATAL! NO ABRA HASTA QUE EL AISLADOR DE LA MÁQUINA ESTE EN LA POSICIÓN DE APAGADO (O) Y TRABADO.

WARNING
 AVERTISSEMENT
 AVISO

ARC FLASH HAZARD. APPROPRIATE PPE REQUIRED. FAILURE TO COMPLY CAN RESULT IN DEATH OR INJURY. REFER TO NFPA 70 E.

RISQUE D'ARC ÉLECTRIQUE. ÉQUIPEMENT DE PROTECTION INDIVIDUELLE APPROPRIÉ NÉCESSAIRE. NON-RESPECT PEUT ENTRAÎNER LA MORT OU DES BLESSURES.

RIESGO DE ARCO ELÉCTRICO. EQUIPO DE PROTECCIÓN PERSONAL ADECUADO NECESARIO. INCUMPLIMIENTO PUEDE OCASIONAR LA MUERTE O UNA LESIÓN.



**DANGER**

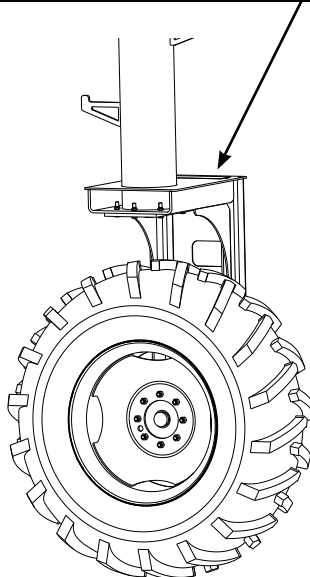
BE CAREFUL!

WATCH OUT FOR THESE PINCH POINTS!

**CAUTION**

LOOK UP!

OVERHEAD OBSTRUCTION PRESENT!





This section briefly describes of the VFlex Corner Sequencing (VCS) Control Panel components and controls.

## VCS Control Panel

The VCS control panel is mounted on the Steerable Drive Unit (SDU) above the swing tower box with platform for access to panel. See Figure 17-1.

### NOTE

- The VCS uses a different sprinkler sequencing box and a non-adjustable sequencing rod. See Figure 17-2.

## Term Definitions

Below are terms that are used throughout the instruction.

**VCS:** VFlex Corner Sequencing Control Panel

**Corner:** The swing arm portion of an irrigation machine

**EEPROM:** Electronically Erasable Programmable Read Only Memory

**FLASH:** Reprogrammable read only memory

**SDU:** Steerable Drive Unit

**LRDU:** Last Regular Drive Unit

**Pivot Point:** The center of an irrigation system

**STB:** Smart Tower Board

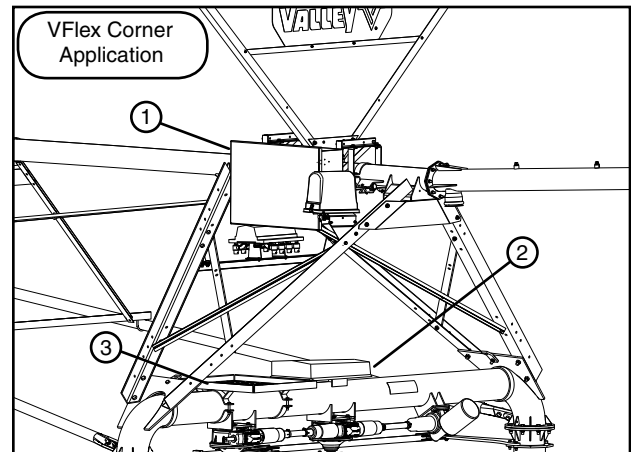


Figure 17-1 1. VCS Control Panel  
2. Swing Tower Box  
3. Platform

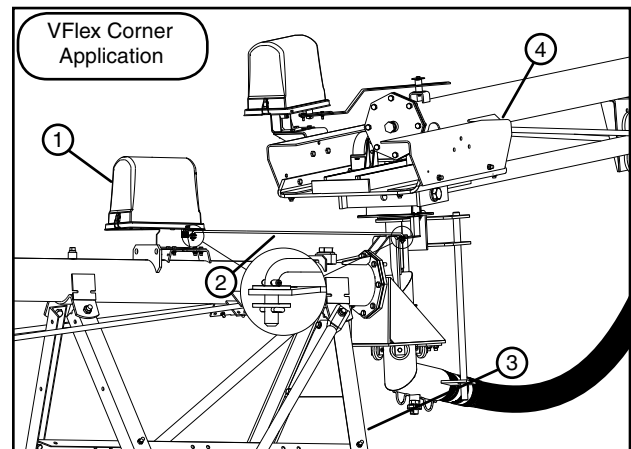


Figure 17-2 1. Angle Sensor Box  
2. Non-Adjustable Sequencing Rod  
3. LRDU  
4. Track and Roller

# Overview

## Corner Identification

This section briefly describes the possible VFlex Corner Sequencing component configurations for standard (trailing) and inverted (leading) corners.

### Standard (Trailing) Corner

**Orientation for all figures is based on standing at the pivot point looking towards the LRDU or standing at the cradle looking towards the SDU.**

The Standard (Trailing) corner can use either the fixed or swivel inlet and either the mechanical sequencing box or the angle sensor box. See Figures 18-1 and 18-2.

**Inlet Option:** Both the fixed inlet and swivel inlet can be used with the standard (trailing) corner. See Figures 18-1 and 18-2.

**Sprinkler Rod T-Bar Mount:** Mounted on the right side of the cradle when standing at the LRDU looking towards the SDU. See Figures 18-1 and 18-2.

**Mechanical Sequencing Box:** Used only with a standard (trailing) corner. Sequencing box control arm will be on the right side of the pipe at the LRDU. **An adjustable control rod is used with the mechanical sequencing box.** See Figure 18-1.

**Angle Sensor Box:** Box is mounted with the control rod on the right side of the pipe at the LRDU. **An fixed control rod is used with the Angle Sensor Box.** See Figure 18-2.

**Run Cycle Box:** Mounted on the left side of the cradle. See Figure 18-2.

### Inverted (Leading) Corner

**Orientation for all figures is based on standing at the pivot point looking towards the LRDU or standing at the cradle looking towards the SDU.**

The Inverted (Leading) corner can use **ONLY** the **swivel inlet** and the **angle sensor box**.

**Inlet Option:** The swivel inlet option can only be used with the inverted (leading) corner. See Figure 18-3.

**Sprinkler Rod T-Bar Mount:** Mounted on the left side of the t-bar. See Figure 18-3.

**Angle Sensor Box:** Mounted with control arm on the left side of the pipe. **The fixed control rod must be used with the Angle Sensor Box.** See Figure 18-3.

**Run Cycle Box:** Mounted on the right side of the cradle. See Figure 18-3.

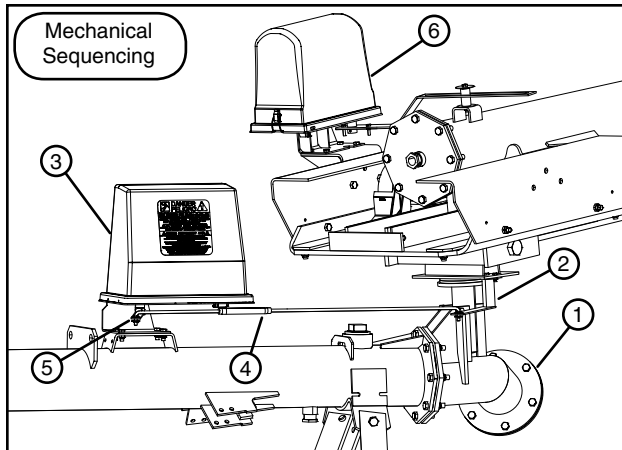


Figure 18-1 1. Fixed Inlet 2. Sprinkler Rod T-bar Mount 3. Mechanical Sequencing Box 4. Adjustable Seq Rod 5. Control Rod Mount 6. Run Cycle Box

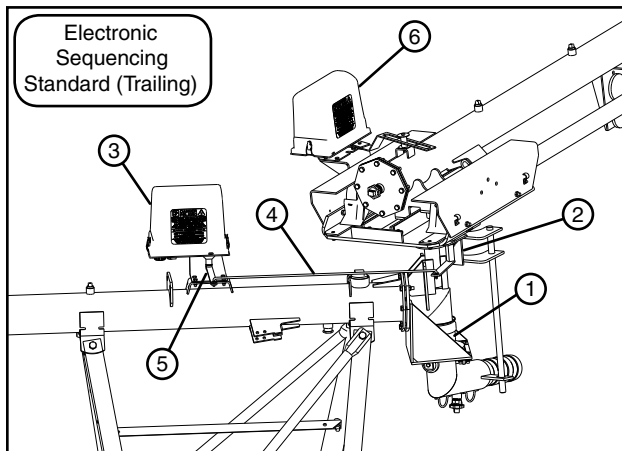


Figure 18-2 1. Swivel Inlet 2. Sprinkler Rod T-bar Mount 3. Angle Sensor Box 4. Fixed Seq Rod 5. Control Rod Mount 6. Run Cycle Box

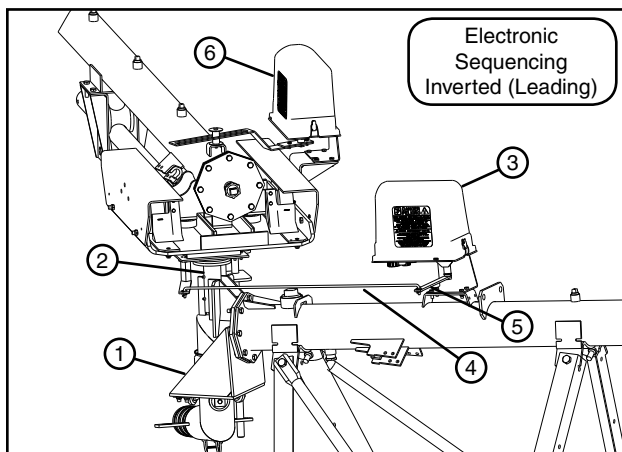
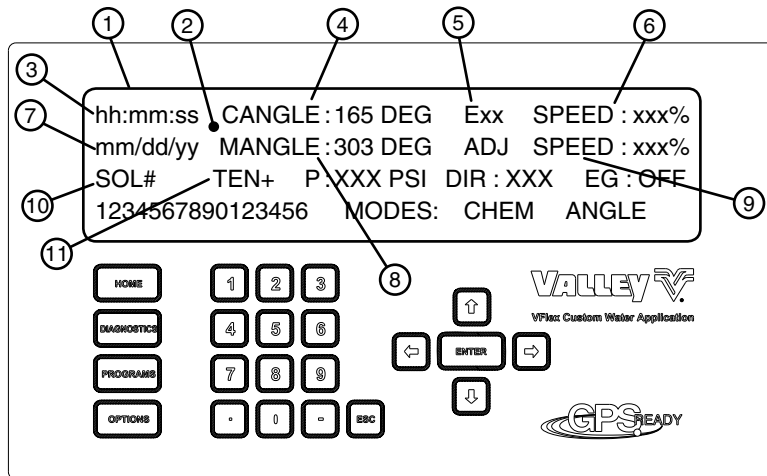


Figure 18-3 1. Swivel Inlet 2. Sprinkler Rod T-bar Mount 3. Angle Sensor Box 4. Fixed Seq Rod 5. Control Rod Mount 6. Run Cycle Box

## Main Status Menu

The VCS control panel display is used to show current status and information for programming and selecting functions. When the control panel main disconnect is turned on and at all other times when the operator is not programming the control panel, the control panel display shows the current machine status on the status screen. See Figure 19-1. A short explanation of the status screen elements is given below and on the following pages.



## NOTE

• This status screen example illustrates the operating conditions of a typical irrigation machine. The status screen of your machine will show different conditions.

Figure 19-1 1. Control Panel Display 5. Error Code (Exx) 9. ADJ Speed:xxx%  
 2. Default Status Screen 6. Speed:xxx% 10. SOL#  
 3. Time 7. Date 11. TEN+  
 4. Corner Angle 8. Machine Angle

### Time

Displays the current time according to the clock in the VCS computer.

If the current time is 1:45:00 P.M., it appears on the screen in the 24-hour format as 13:45:00 (hh:mm:ss). See Figure 19-1.

### Corner Angle (CANGLE)

Displays the current corner angle (CANGLE) as measured by the corner angle sensor, in degrees.

### Error Code (Exx)

This field displays any currently active error codes. The error code field (Exx) appears only when a system error has occurred. If multiple errors occur the error codes will cycle on the display once every two seconds. Error codes E03-E13 will not appear. See Figure 19-1.

Active error codes can be acknowledged and cleared from the status screen by viewing them in the Diagnostics Screen.

### Speed

Displays the current measured percent timer setting (SPEED:xxx%) from the smart tower board in the VCS control panel. See Figure 19-1.

### Date

Displays the current date according to the clock in the VCS computer.

If the current date is August 18, 2013, it appears on the screen as 08/18/13 (mm/dd/yy). See Figure 19-1.

### Machine Angle (MANGLE)

Displays the current machine angle calculated from the GPS position. If the machine angle is not valid, "---" will be displayed. If GPS is not enabled, " " will be displayed. See Figure 19-1.

### Adjusted Speed

Displays the adjusted speed being sent to the Last Regular Drive Unit (LRDU) when the pressure or chemigate mode are selected.

### SOL#

Displays active solenoids 1-9 on row 4.

### TEN+

Displays active solenoids 10-16 on row 4.

# Overview

## Main Status Menu (continued)

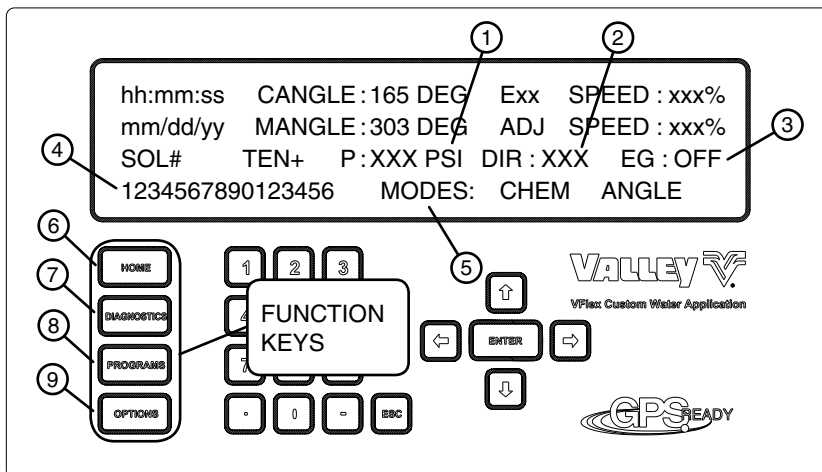


Figure 20-1 1. Pressure 2. Direction of Machine 3. End Gun Control 4. ON Solenoids Displayed 5. Mode Selection 6. Home Key 7. Diagnostics Key 8. Program Key 9. Options Key

### Pressure

Displays the current water pressure (P : XXX PSI) as measured by the pressure transducer connected to the VCS Control Panel.

### Direction

Displays the direction of machine travel (DIR:XXX) either Forward: FWD, Reverse: REV or Stopped: STP.

### NOTE

•When used on and Inverted Corner the direction of the machine travel will be the opposite of the direction displayed on the screen.

### End Gun (EG)

Displays the current end gun function: ON or OFF.

### Solenoid Numbers

Displays the number of each solenoid (SOL# TEN+1234567890123456) when it is on. Numbers are not displayed when solenoids are off.

For example: when solenoids 1, 2, 3, 11 and 12 are on the display would look as below.

123            12

### Modes

Displays the current sprinkler mode and active override/sprinkler tables.

The sprinkler modes will be displayed as follows:

Chemigate: CHEM

Irrigate: IRR

The override/sprinkler tables will be displayed as follows with the top being the highest priority:

Location: LOC

Angle: ANGLE

Area: AREA

### Function Keys

The function keys are located on the far left side of the keypad. See Figure 20-1.

The function keys are used to program the panel, view data and select options not frequently used. Following are explanations of each function key.

**HOME** **Home Key**

Press this key to return to the Status screen from the screen you are currently on. See Figure 20-1.

**DIAGNOSTICS** **Diagnostics Key**

Press this key to determine the cause of an unplanned machine shutdown or potential problem situation. See Figure 20-1. Refer to page 29.

**PROGRAM** **Program Key**

Press this key to choose the program for irrigation, chemigation, set sequence overrides and retracted PSI. See Figure 20-1. Refer to page 24.

**OPTIONS** **Options Key**

This key is used by your Valley dealer to configure the VCS control panel during installation. See Figure 20-1.

## Numeric Entry Keys

The numeric entry keypad is used to input values, such as percentage timer setting, water application depth, SIS setting, etc. and is also used for programming the panel. The functions of these keys are explained below:

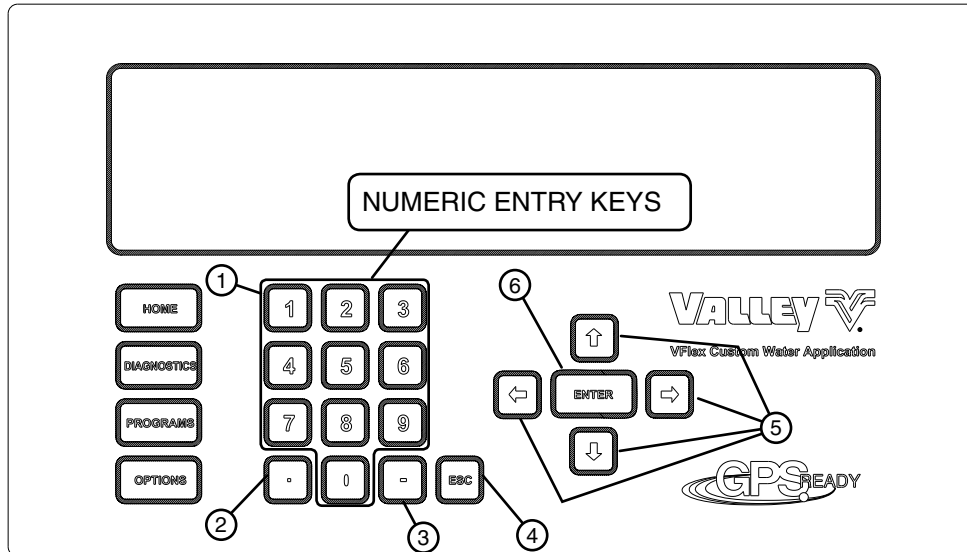
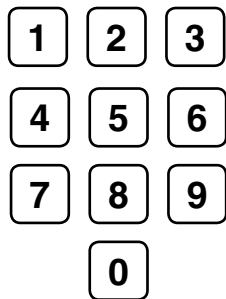


Figure 21-1 1. Number Keys  
2. Decimal Point Key  
3. Minus Sign Key  
4. Escape Key  
5. Navigation Arrow Keys  
6. Enter Key



### Number Keys

Use these keys to select menu options and enter values. See Figure 21-1.



### Decimal Point Key

Use to input numerical values in decimal form. See Figure 21-1.

Example: 1.75 inches (44.45 mm).



### Minus Sign Key

Use to input negative values (generally not used). See Figure 21-1.



### Escape Key

Use to step backward from the current screen to a previous screen without performing any changes. See Figure 21-1.

Repeatedly pressing the Escape key will step backward from the current screen, through previous screens until the status screen is displayed.

### Navigation Arrow Keys



### Up Arrow Key

Press this key to increase contrast or make the characters darker. See Figure 21-1.



### Left Arrow Key

Press this key to navigate the menu screen. See Figure 21-1.



### Right Arrow Key

Press this key to navigate the menu screen. See Figure 21-1.



### Down Arrow Key

Press this key to decrease contrast or make the characters lighter. See Figure 21-1.



### Enter Key

Use at the end of a numerical value entry or programming sequence. See Figure 21-1.

# Overview

## Symbols and Conventions

This manual uses a few symbols and conventions which are explained below:

### Command Prompt

Any command which requires the operator to input data will show a command prompt on the bottom line of the screen.

The command prompt is always identified by > in the bottom line of the screen. See Figure 22-1.

### NOTE

- The value shown in parenthesis indicates the current value being used by the control module.

### Exiting Screens

Press **0** or **ESC** one time to step backward from the current screen to the previous screen.

Press **0** or **ESC** repeatedly to step backward from the current screen, through previous screens until the Status screen is displayed.

### Screen Delays

Any screen that is left for more than five minutes without pressing a key will revert back to the previously displayed screen. The Status screen will eventually be displayed.

### Illustrations

The descriptions of procedures throughout this manual consist of instructions illustrating the key or series of keys to press followed by the screen that appears. This convention is used throughout the manual. Below is an example.

Press **DIAGNOSTICS**, **4**, and **1** to access the A/D screen. See Figure 22-2.

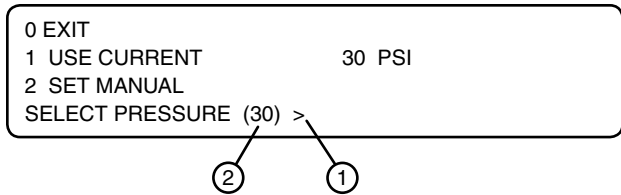


Figure 22-1 1. Command Prompt  
2. Default Value

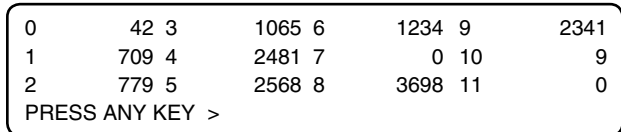
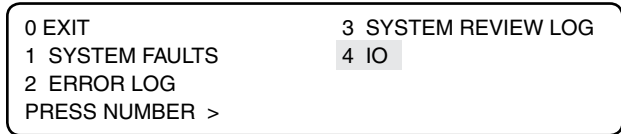


Figure 22-2

## Starting the VFlex Sequencing Control Panel

Power to the VCS control panel is provided by the machine control panel.

### Corner Applications

The VCS control panel is also ON when the following conditions are met:

- Power is supplied to the pivot.
- The Electronic Sequencing Box disconnect is ON.
- The machine is in service mode or started or running.

### Boot Splash Screen

Figure 23-1 shows the splash screen that appears while the GPS Guidance System is booting up. (GPS is optional.)

- mm/dd/yy – the month, day, and year of the software release
- Ver x.xx – the software version number

### VCS Computer Boot Up Screen

Figure 23-2 shows the screen that appears while the system waits for the VCS computer to boot up.

The remaining wait time is displayed in minutes:seconds format. The VCS computer will stay on this screen until communication with the Smart Tower Board (STB) is established.

### Acquiring Satellites Screen

Figure 23-3 shows the screen that appears while the system waits for the GPS Receiver to acquire signals from the satellites if equipped.

The mm:ss field displays how much time (minutes:seconds) has passed while waiting for sufficient signal information from the GPS Receiver. If the time expires and the VCS Computer has yet to receive sufficient signal information from the GPS Receiver, the system will open the safety for ten seconds.

The system displays the message shown in Figure 23-4 until the GPS Receiver finishes acquiring the signals from the satellites.

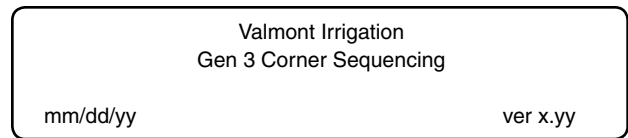


Figure 23-1 Splash Screen

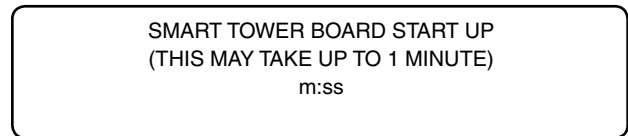


Figure 23-2 Startup Screen

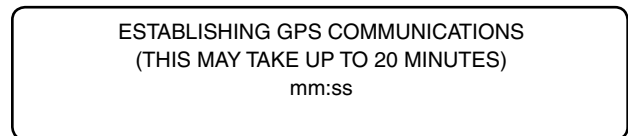


Figure 23-3

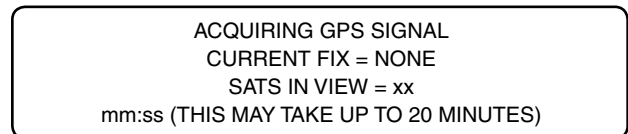


Figure 23-4

# Operation

## Programs Key

Press this key to choose the programs for irrigation, chemigation, set sequence overrides, and retracted psi. To view the program menu, do the following:

1. From the home screen, press **PROGRAMS** to display programs main menu. See Figure 24-1.

### NOTE

- The pressure regulators can be selected or not during setup. The Figure 24-1 screen shows as it would if the regulators were selected.
- If the regulator setup needs to change, please contact your Valley dealer.

## Irr/Chem

2. Press **PROGRAMS** and **1** to display IRR/CHEM screen. This screen allows selection of irrigate or chemigate mode. Irrigate mode is the DEFAULT setting. See Figure 24-2.
3. Press **1** to select IRRIGATE or press **2** to select CHEMIGATE. Press **ESC** to exit to the main or home screen. See Figure 24-3.

## Seq Overrides

To view the Seq Overrides screen, do the following:

4. Press **PROGRAMS** and **2** to display the SEQ OVERRIDES screen. This screen allows changes to be made in the following options screens: Corner Angle Mode, Position Mode, Corner Angles, and Machine Angles. See Figure 24-4.

## Crrn Angle Mode

5. Press **PROGRAMS**, **2**, and **1** to select the CRNR ANGLE mode option. See Figure 24-5.
  - Press **1** to Enable.
  - Press **0** to Disable.
6. Press **ESC** to return to the previous screen.

## Position Mode

7. Press **PROGRAMS**, **2**, and **2** to select the Position mode option. See Figure 24-6.
  - Press **1** to Enable position overrides.
  - Press **0** to Disable position overrides.
8. Press **ESC** to return to the previous screen.

```
0 EXIT                               3 RETRACTED PSI
1 IRR/CHEM
2 SEQ OVERRIDES
PRESS NUMBER >
```

Figure 24-1

```
0 EXIT                               3 RETRACTED PSI
1 IRR/CHEM
2 SEQ OVERRIDES
PRESS NUMBER >
```

Figure 24-2

```
0 EXIT
1 IRRIGATE
2 CHEMIGATE
SELECT MODE (IRR) >
```

Figure 24-3

```
0 EXIT
1 CRNR ANGLE DISABLED    3 CORNER ANGLES
2 POSITION ENABLED        4 MACHINE ANGLES
PRESS NUMBER >
```

Figure 24-4

```
0 EXIT
1 CRNR ANGLE DISABLED    3 CORNER ANGLES
2 POSITION ENABLED        4 MACHINE ANGLES
ANGLE MODE 1 . ENABLE 0 . DISABLE (1) >
```

Figure 24-5

```
0 EXIT
1 CRNR ANGLE DISABLED    3 CORNER ANGLES
2 POSITION ENABLED        4 MACHINE ANGLES
POS MODE 1 . ENABLE 0 . DISABLE (1) >
```

Figure 24-6



## Corner Angles

This table allows the user to make changes that control each solenoid valve allowing different functions during different corner angles.

9. Press **PROGRAMS**, **2**, and **3** to display the Corner Angles table.
  - (Retrying) will only be displayed as shown in Figure 25-1 if reading the table failed and is being retried.
10. After the table has been read from the STB Figure 25-2 will be displayed.
  - The entry closest to the current corner angle will be the selected entry.
  - "█" is the cursor position it will blink allowing the user to see the data being covered.
  - The **←** and **→** arrow keys will move the cursor to the next or previous field.
  - The **↑** and **↓** arrow keys will scroll the list up or down.
11. Press **ENTER** with cursor located in the CSTART column to enter start angle. See Figure 25-3.
  - Enter start angle: input 60 to 180.
12. Press **ENTER** with cursor located in the END column to enter end angle. See Figure 25-4.
  - Enter end angle: input 60 to 180.
13. Press **ENTER** with cursor located in the STATE column to enter corner state. See Figure 25-5.
  - Press **1** to select Extension. (EXT)
  - Press **2** to select Retraction. (RET)
  - Press **3** to select No Change. (NOC)
14. Press **ENTER** to select the 1/0 column. 1/0 is used to override sequences in the list on (1) or off (0). See Figure 25-6.
  - Press **1** to turn ON.
  - Press **2** to turn OFF.
15. Press **ENTER** with cursor located in the SOL# column to toggle solenoids. See Figure 25-7.
  - Press number to toggle Solenoids that are ON (1-9). Solenoids shown are ON.

READING TABLE FROM SMART TOWER BOARD (RETRYING) 100%					
--	--	--	--	--	--

Figure 25-1

CSTART	END	STATE	1/0	SOL#	TEN+
136.5	138.2	EXT	1	123456	1
140.█	145.2	EXT	1	1234567	12
139.7	135.0	EXT	0	34	3

Figure 25-2

CSTART	END	STATE	1/0	SOL#	TEN+
136.5	138.2	EXT	1	123456	1
140.█	145.2	EXT	1	1234567	12
ENTER START ANGLE >					

Figure 25-3

CSTART	END	STATE	1/0	SOL#	TEN+
136.5	138.2	EXT	1	123456	1
140.0	145.█	EXT	1	1234567	12
ENTER END ANGLE >					

Figure 25-4

CSTART	END	STATE	1/0	SOL#	TEN+
136.5	138.2	EXT	1	123456	1
140.0	145.2	EX█	1	1234567	12
PRESS 1 .. EXT 2 .. RET 3 .. NOC >					

Figure 25-5

CSTART	END	STATE	1/0	SOL#	TEN+
136.5	138.2	EXT	1	123456	1
140.0	145.2	EXT	█	1234567	12
PRESS 1 .. ON 2 .. OFF >					

Figure 25-6

CSTART	END	STATE	1/0	SOL#	TEN+
136.5	138.2	EXT	1	123456	1
140.0	145.2	EXT	1	1234567	█ 12
PRESS NUMBER TO TOGGLE >					

Figure 25-7

# Operation

## Corner Angles (continued)

- Press **ENTER** with cursor located in the TEN+ column to toggle solenoids. See Figure 26-1.
  - Press number to toggle Solenoids displayed (10-16). Solenoids shown are ON.

### NOTE

•When solenoid numbers are not displayed they will be OFF.

- Press **ESC** to leave this menu, if any changes have occurred the new table will be saved to the STB. See Figure 26-2.

## Machine Angles

This table allows the user to make changes that control each solenoid valve allowing different functions during different machine angles. This option requires GPS Position information at the VCS panel from either GGS or a GPS antenna.

- Press **PROGRAMS**, **2**, and **4** to display the Machine Angles table.
  - (Retrying) will only be displayed as shown in Figure 26-3 if reading the table failed and is being retried.
- After the table has been read from the STB Figure 26-4 will be displayed.
  - The entry closest to the current corner angle will be the selected entry.
  - "█" is the cursor position it will blink allowing the user to see the data being covered.
  - The **←** and **→** arrow keys will move the cursor to the next or previous field.
  - The **↑** and **↓** arrow keys will scroll the list up or down.
- Press **ENTER** with cursor located in the MSTART column to enter start angle. See Figure 26-5.
  - Enter start angle: input 0 to 360.
  - Press **ENTER** to confirm angle.
- Press **ENTER** with cursor located in the END column to enter end angle. See Figure 26-6.
  - Enter end angle: input 0 to 360.
  - Press **ENTER** to confirm angle.

CSTART	END	STATE	1/0	SOL#	TEN+
136.5	138.2	EXT	1	123456	1
140.0	145.2	EXT	1	1234567	12 █
PRESS NUMBER TO TOGGLE >					

Figure 26-1

WRITING TABLE TO SMART TOWER BOARD  
(RETRYING)  
100%

Figure 26-2

READING TABLE FROM SMART TOWER BOARD  
(RETRYING)  
100%

Figure 26-3

MSTART	END	1/0	SOL#	TEN+
136.5	138.2	1	123456	1
140.█	145.2	1	1234567	12
0.0	0.0	0	34	3

Figure 26-4

MSTART	END	1/0	SOL#	TEN+
136.5	138.2	1	123456	1
140.█	145.2	1	1234567	12
PRESS START ANGLE >				

Figure 26-5

MSTART	END	1/0	SOL#	TEN+
136.5	138.2	1	123456	1
140.	145.█	1	1234567	12
PRESS END ANGLE >				

Figure 26-6

## Machine Angles (continued)

22. Press **ENTER** to select the 1/0 column. 1/0 is used to override sequences in the list on (1) or off (0). See Figure 27-1.
  - Press **1** to turn ON.
  - Press **2** to turn OFF.
23. Press **ENTER** with cursor located in the SOL# column to toggle solenoids. See Figure 27-2.
  - Press number to toggle Solenoids that are ON (1-9). Solenoids shown are ON.
24. Press **ENTER** with cursor located in the TEN+ column to toggle solenoids. See Figure 27-3.
  - Press number to toggle Solenoids displayed (10-16). Solenoids shown are ON.
25. Press **ESC** to leave this menu, if any changes have occurred the new table will be saved to the STB. See Figure 27-4.

## Retracted PSI

This menu is only functional when pressure regulators are not selected. Contact your Valley dealer if the menu isn't functional. See Figure 27-5.

26. Press **PROGRAMS** and **3** to display the retracted psi screen. See Figure 27-6.
  - Press **1** to use current PSI setting.
  - Press **2** to set PSI setting manually. Min. 5 PSI to Max. 150 PSI.
  - Press **ENTER** to confirm entered data.
27. Press **0** or **ESC** to leave this menu.

MSTART	END	1/0	SOL#	TEN+
136.5	138.2	1	123456	1
140.	145.2	■	1234567	12
PRESS 1 .. ON 2 .. OFF >				

Figure 27-1

MSTART	END	1/0	SOL#	TEN+
136.5	138.2	1	123456	1
140.	145.2	1	1234567	■ 12
PRESS NUMBER TO TOGGLE >				

Figure 27-2

MSTART	END	1/0	SOL#	TEN+
136.5	138.2	1	123456	1
140.	145.2	1	1234567	12 ■
PRESS NUMBER TO TOGGLE >				

Figure 27-3

WRITING TABLE TO SMART TOWER BOARD  
(RETRYING)  
100%

Figure 27-4

0 EXIT  
1 USE CURRENT                    30 PSI  
2 SET MANUAL  
PRESS NUMBER >

Figure 27-5

0 EXIT  
1 USE CURRENT                    30 PSI  
2 SET MANUAL  
SELECT PRESSURE (30) >


Figure 27-6

# Operation

---

## Diagnostics Screen

The Diagnostics section provides an overview of using the diagnostic features incorporated into the VCS Control Panel. Diagnostics aid in identifying VCS failures, troubleshooting, and correcting problems.

Press the Diagnostics button  to view the Diagnostics Screen. See Figure 29-1.

```

0 EXIT                3 SYSTEM REVIEW LOG
1 SYSTEM FAULTS      4 IO
2 ERROR LOG
PRESS ENTER >
    
```

Figure 29-1



## System Faults

System Faults are failures that shut the machine down. Any item showing FAULT on the System Fault screen is the reason why the machine had shut down. See the Troubleshooting section for possible causes and corrective action. See Figure 29-2.

FAULT – STB FLASH	Smart Tower Board flash checksum failed
FAULT – STB EEPROM	STB EEPROM checksum failed
FAULT – STB SOFTWARE	STB and VCS software versions are not compatible

Figure 29-2

## Viewing System Faults

Press  and then  to display the System Faults screen. When a recognized fault causes the machine to shut down, FAULT appears next to the item responsible for the shut down. FAULT is automatically cleared the next time the machine runs successfully. See Figure 29-3.

This screen will be skipped if there is an active fault. Instead, the submenu with the highest priority active faults will be displayed like in the examples. See Figure 29-4.

```

0 EXIT                3 SYSTEM REVIEW LOG
1 SYSTEM FAULTS      4 IO
2 ERROR LOG
PRESS ENTER >
    
```

Figure 29-3

```

1 STB FLASH          OK
2 STB EEPROM         FAULT
3 STB SW             OK
PRESS 0..EXIT       NUMBER..MORE INFO
    
```

Figure 29-4

## Status Screen Diagnostics

If a failure occurs, an error code appears on the Main Display screen. If multiple errors have occurred, those errors will appear in a sequence every second. Only error codes 1, 2, 4, 6, 11, 12, 15, 16, 17, 18, 19, and 20 will appear. See Figure 29-5.

```

hh:mm:ss  CANGLE: 165 DEG  E01  SPEED: xxx%
mm/dd/yy  MANGLE: 303 DEG  ADJ  SPEED: xxx%
SOL#      TEN+  P: 100 PSI  DIR:FWD  EG:OFF
123       12    MODES:  CHEM  ANGLE
    
```

Figure 29-5

# Diagnosics

## Error Code Summary

A list of possible error codes appears below in Figure 30-1. See the Troubleshooting section for possible causes and corrective actions. Refer to Error Codes on page 36 for corrective actions.

E01 – BATTERY BACKED RAM – CHECKSUM FAILED AT POWER UP	A BBRAM memory error has occurred in the Control Panel Module.
E02 – EEPROM – CHECKSUM FAILED AT POWER UP	A EEPROM memory error has occurred in the Control Panel Module.
E03 – UNIT RESETS – THIS IS LOGGED WHEN THE SOFTWARE RESETS	The machine has reset for some reason.
E04 – KEYPAD – POSSIBLE KEY STUCK, CHECK KEYPAD CONNECTION	A key on the keypad is stuck and has been sending a continuous signal to the machine for at least 10 minutes.
E06 – STB COMMUNICATIONS	STB communications error.
E11 – STB FLASH – CHECKSUM FAILED AT POWER UP	The flash memory in the STB is corrupt.
E12 – STB EEPROM – CHECKSUM FAILED AT POWER UP	EEPROM memory in the STB is corrupt, a loss of power while saving machine configuration parameters or runtime data.
E13 – STB UNIT RESETS – THIS IS LOGGED WHEN THE SOFTWARE RESETS	STB reset unexpectedly, there are a number of possible causes for this error.
E15 – STB SOFTWARE ERROR – STB AND VCS SOFTWARE VERSION ARE NOT COMPATIBLE	Software that is running on the panel module and the STB are not compatible.
E16 – STB SENSOR REFERENCE ERROR	The 5 VDC that supplies power to the system sensors is out of tolerance.
E17 – STB GPS ERROR – CHECK STB AND GPS CABLE CONNECTIONS	No data coming from the GPS receiver or GPS guidance system.
E18 – STB PRESSURE ERROR – PRESSURE SENSOR READING IS OUT OF RANGE	The pressure transducer input for the system is outside normal operating limits.
E19 – STB ANGLE ERROR – PRESSURE ANGLE SENSOR READING IS OUT OF RANGE	Angle sensor input for the system is outside its normal operating limits. This error can result in an E12.
E20 – OVERRIDE TABLE – CHECKSUM FAILED AT POWER UP	The storage area that contains the override tables is corrupt.

Figure 30-1

## Error Logs





For each error code there is an error log. Each entry in the log records the following information about the error:

- The time and date when it first occurred
- The time and date when it last occurred
- The total number of occurrences

See Figure 31-1.

## Viewing An Error Log

To view an Error Log, do the following:







1. From the Status screen, press  and  to display Error Log screen. See Figure 31-2. This will allow you to navigate through logged errors.
2. To view a different System Review Log screen, press  to search backward toward screen 99 or  to search forward toward screen 01. See Figure 31-3.

### NOTE

- Viewing the Error Log screen clears the error codes from the Main Display screen until a new error is recorded.

## Resetting An Error Log To Zero

To reset an Error Log to zero, do the following:

1. Press the Diagnostics button , , and  to display the E01 Error Log screen. See Figure 31-4.
2. Locate the desired error log screen to reset. See Figure 31-5.
  - Press  to search backward through the Error Logs.
  - Press  to search forward through the Error Logs.
3. Press the Back Arrow key  two times. The count is reset to zero and the first and last occurrences are set to the current time and date. See Figure 31-6.

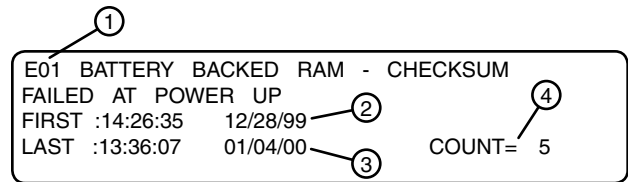


Figure 31-1 1. Error Code  
2. First Occurrence Time and Date  
3. Last Occurrence Time and Date  
4. Total Occurrences

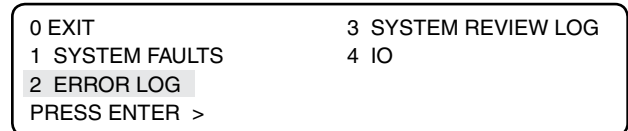


Figure 31-2

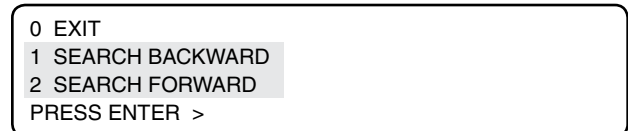


Figure 31-3

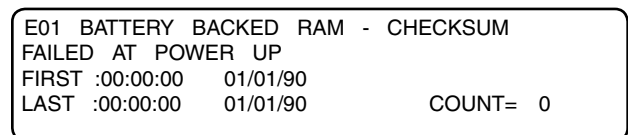


Figure 31-4

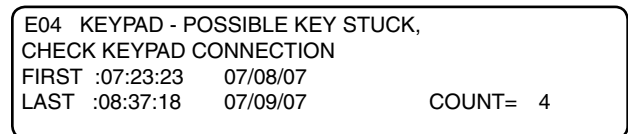


Figure 31-5 Selected Error Log

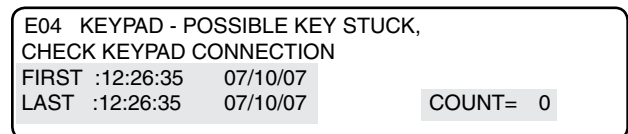


Figure 31-6







# Diagnostics

## System Review Log

The System Review Log contains a record of up to 99 of the most recent machine operation status changes. Review 01 is the newest status change and Review 99 is the oldest status change. The review screen number appears in the lower left-hand corner.

You can analyze a status change further by displaying a record of all its related error codes. Reading from left to right, error codes E20 through E01 are represented by a 0 placeholder. If an error occurred, the placeholder representing the error code changes from 0 to 1.



## Reviewing Status Changes and Errors

1. From the Status screen, press , , and  to display System Review Log screen 01. See Figure 32-1.
2. To view a different System Review Log screen, press  to search backward toward screen 99 or  to search forward toward screen 01. Press  to exit to diagnostics screen. See Figure 32-2.

### Example review screen:

Review.xx is the review screen being viewed, xx = 01 to 99.

Review.01 is the most recently logged review screen. See Figure 32-3.

3. While in the desired System Review Log screen, press  to display the Error Review screen. See Figure 32-4.
4. Press  again to return to the System Review Log screen.

Error codes (xxxxxxxxxxxxxxxxxxxx) is the recently logged error codes logged with the review screen in binary format where the right most digit is E01.

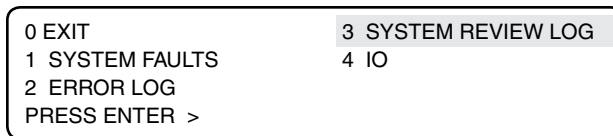


Figure 32-1

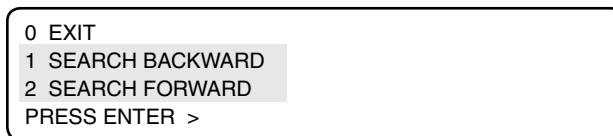


Figure 32-2

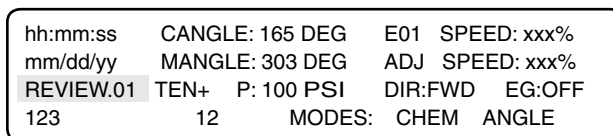


Figure 32-3

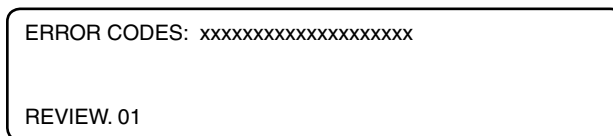




Figure 32-4



## IO

IO is used to review machine information collected by the control panel. The following data types are currently available:

- A/D - Review analog voltages for troubleshooting.
- Modules - Review the status of selected relays. A relay is considered a module.
- GPS - Review a machine's current location and heading.




From the main screen, press  and  to display the IO screen. See Figure 33-1.

### A/D - Analog to Digital Voltages

A/D is used to review analog voltages. There are twelve analog channels (0 through 11) available for monitoring voltage feedback. Below is a description of each channel.

- Channel 0 monitors voltage from the pressure transducer. An acceptable range is between 1000 and 15 mV.
- Channel 1 monitors voltage from the angle sensor. For more information, see the Angle Setup section beginning on page 25.
- Channels 2 through 7 are not used. Ignore any random values that might appear.
- Channel 8 monitors voltage from the 5 VDC power supply. An acceptable range is between 4750 and 5000 mV.
- Channels 9 through 11 are not used. Ignore any random values that might appear.

### Reviewing A/D

To review analog voltages, start from the Status screen and press , , and  to display the A/D screen. See Figure 33-2.

Press any key to exit this screen.



Figure 33-1

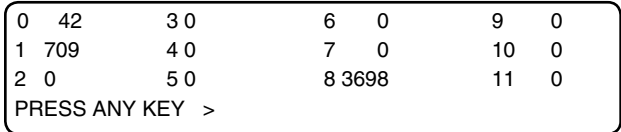


Figure 33-2

# Diagnostics

## Modules

Module is another name for a relay. The machine is monitored and controlled by a series of relays located in the control panel. Each relay will be closed (ON) or open (OFF) as the machine is operating.

Enter a module number in the Review Modules screen and the module number and its status appear in the upper right-hand corner of the Modules screen.

A list of the module numbers and their corresponding relays is shown in Figure 34-1.

## Reviewing Modules

To review module relays, do the following:

1. From the Status screen, press **DIAGNOSTICS**, **4**, and **2** to display the Modules screen.
2. From the Modules screen, press **1** to display the Modules Request screen. See Figure 34-2.
3. From the Modules Request screen, press the desired module number and **ENTER** to display the selected module ("22" in this example) in the upper right-hand corner. See Figures 34-3 and 34-4.
4. Repeat steps 2 and 3 to display other module relays or press **0** or **ESC** to exit this screen.

## GPS

The Navigation screens inform you of the machine's current position and how far it has deviated from its intended path. This read-only information is in degrees and meters. You can not adjust a machine's path with these screens.

## Reviewing GPS

From the Status screen, press **DIAGNOSTICS**, **2**, and **3** to display the GPS screen. See Figures 34-5 and 34-6.

Press any key to exit this screen.

MODULE NUMBER	RELAY NUMBER	FUNCTION DESCRIPTION	RELAY BOARD TERMINAL
0	K1	Safety Out	J5-1
1	K2	LRDU Enable	J5-2
5	K9	12 VDC for GGS Computer and GPS	J6-1, 2, 3
6	K12	Steer In Output	J7-1, 2
7	K13	Steer Out Output	J7-3, 4
19	K15	Reverse Sense	J7-7, 8
20	K14	Steer Enable Input	J7-5, 6
23	K5	Safety Input Sense	J5-7

Figure 34-1



Figure 34-2

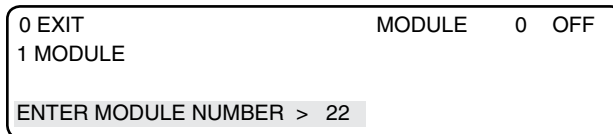


Figure 34-3



Figure 34-4

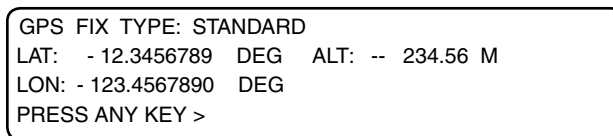


Figure 34-5 With GPS Screen

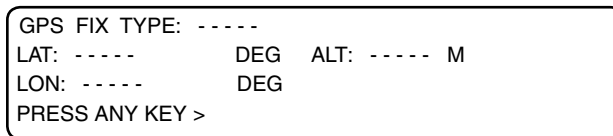


Figure 34-6 Without GPS Screen

# Troubleshooting

Use this section with the machine owner's manual to diagnose and troubleshoot problems with the machine and/or control panel. Keep in mind the following precautions:

- Always perform service or maintenance safely.
- Use personal protection equipment when required.
- Maintain a minimum working clearance around the control panel and other equipment.
- Use fall protection when required.
- Always use at least the minimal lockout/tagout procedure when maintaining or servicing the machine.

## **WARNING**

- **TO REDUCE THE POSSIBILITY OF SEVERE INJURY OR DEATH:**
- **TROUBLESHOOTING OR REPAIRING ELECTRICAL PROBLEMS SHOULD ONLY BE PERFORMED BY A QUALIFIED VALLEY DEALER.**
- **ALWAYS CONTACT YOUR LOCAL VALLEY DEALER TO TROUBLESHOOT OR CORRECT ANY ELECTRICAL PROBLEMS ON OR ASSOCIATED WITH THE CONTROL PANEL OR MACHINE. NEVER ATTEMPT TO TROUBLESHOOT OR CORRECT ELECTRICAL PROBLEMS ON YOUR OWN.**
- **USE PERSONAL PROTECTION EQUIPMENT WHEN REQUIRED.**
- **MAINTAIN A MINIMUM WORKING DISTANCE AROUND THE CONTROL PANEL AND OTHER EQUIPMENT.**
- **USE FALL PROTECTION WHEN REQUIRED.**
- **BEFORE SERVICING OR PERFORMING MAINTENANCE ON THE MACHINE, ALWAYS SHUT OFF ALL ELECTRICAL POWER TO THE CONTROL PANEL AND MACHINE, THEN USE THE MINIMAL LOCKOUT/TAGOUT PROCEDURE ON THE SERVICE DISCONNECT AND CONTROL PANEL.**

For more information see the Safety section.

# Troubleshooting

## System Faults

Figure 36-1 is a table that lists and describes possible system faults, possible cause(s), whether the machine shuts down when the error occurs, and corrective action(s) to take.

SYSTEM FAULT	DESCRIPTION WITH POSSIBLE CAUSES	SHUTDOWN	CORRECTIVE ACTION
STB FLASH FAULT	The memory area containing the currently running software is corrupt. Causes: <ul style="list-style-type: none"> <li>• Static discharge to the board.</li> <li>• Damaged flash memory on the board.</li> </ul>	YES	Contact your Valley Dealer.
STB EEPROM FAULT	The memory area containing runtime parameters and machine configuration is corrupt. Causes: <ul style="list-style-type: none"> <li>• STB powered off while the system was writing information to this area of memory.</li> <li>• EEPROM on board could be damaged.</li> </ul> Fixes: <ul style="list-style-type: none"> <li>• Hard reset may fix this error.</li> </ul>	YES	Contact your Valley Dealer.
STB SOFTWARE	The STB was restarted unexpectedly. Causes: <ul style="list-style-type: none"> <li>• Poor power or power connection to the STB.</li> <li>• Static discharge to the board.</li> <li>• Excessive electrical noise in the panel.</li> </ul>	YES	Contact your Valley Dealer.

Figure 36-1

## Error Codes

The following table lists all the possible error codes, with their descriptions, the threshold for the error to occur, whether the machine shuts down due to the error, and possible causes or corrective actions to take. See Figure 36-2 below and Figure 37-1 on the next page.

ERROR	DESCRIPTION	THRESHOLD	SYSTEM FAULT SHUT DOWN	POSSIBLE CAUSES or CORRECTIVE ACTION	SHOWN ON SCREEN
E01	BATTERY BACKED RAM – CHECKSUM FAILED AT POWER UP		YES	CheckSum incorrect in BBRAM section of memory. Weak batteries in Real-time Clock (BBRAM) can cause error. The batteries can last up to 10 years. Replace Real-time Clock if this error occurs. Contact your Valley Dealer.	YES
E02	EEPROM – CHECKSUM FAILED AT POWER UP	One of the blocks failed	YES	CheckSum incorrect in EEPROM section of memory. Error can occur when power is lost while entering constants, which can also result in loss of data. Try to Hard Reset Module. Contact your Valley Dealer.	YES
E03	UNIT RESETS – THIS IS LOGGED WHEN THE SOFTWARE RESETS		NO	Records software resets caused by power cycles or electrical switching noise that disturbs the computer processor.	NO
E04	KEYPAD – POSSIBLE KEY STUCK, CHECK KEYPAD CONNECTION	10 minutes	YES	Keypad failure or key stuck. A key that is logged as stuck is ignored until the power is cycled on the Control Panel Module. Contact your Valley Dealer.	YES

Figure 36-2

# Troubleshooting

## Error Codes (continued)

ERROR	DESCRIPTION	THRESHOLD	SYSTEM FAULT SHUT DOWN	POSSIBLE CAUSES or CORRECTIVE ACTION	SHOWN ON SCREEN
E06	STB COMMUNICATIONS ERROR, CHECK STB AND CABLE CONNECTIONS	1 second	YES	Communications with the relay board is lost.	YES
				Communications lost with the STB.	
				Contact your Valley Dealer.	
E11	STB FLASH – CHECKSUM FAILS AT POWER UP		YES	STB flash memory is corrupt.	YES
				Contact your Valley Dealer.	
E12	STB EEPROM – CHECKSUM FAILED AT POWER UP		YES	EEPROM memory is corrupt, loss of power while saving machine configuration parameters or runtime data.	YES
				If error 19 occurred previously, verify proper wiring and calibration of angle sensor. Then hard reset the module.	
				Contact your Valley Dealer.	
E13	STB UNIT RESETS – THIS IS LOGGED WITH THE SOFTWARE RESETS		NO	STB has rebooted during normal operation. Caused by low power supply voltage or loose connection.	NO
				Contact your Valley Dealer.	
E15	STB SOFTWARE ERROR – STB AND VCS SOFTWARE VERSION ARE NOT COMPATIBLE			The versions of software running on the STB and panel module are not compatible.	YES
				Board or module was replaced or firmware was updated in only one part of the system.	
				Contact your Valley Dealer.	
E16	STB SENSOR REFERENCE ERROR	10 seconds	NO	Power Supply to the system sensors is not within the acceptable range.	YES
				Short in sensor cabling.	
				Sensor malfunction or board malfunction.	
E17	STB GPS ERROR – CHECK STB AND GPS CABLE CONNECTIONS		NO	There is not any location data coming from the GPS receiver or GPS guidance system.	YES
				This could be due to an obstructed view of the sky or a cabling failure.	
				Contact your Valley Dealer.	
E18	STB PRESSURE ERROR – PRESSURE SENSOR READING IS OUT OF RANGE	< 0 PSI	NO	The pressure transducer input the system is outside its normal operating limits.	YES
				This could be due to ice in the transducer, damaged cable, or a malfunctioning transducer.	
				Contact your Valley Dealer.	
E19	STB ANGLE ERROR – ANGLE SENSOR READING IS OUT OF RANGE	+/- .25 VDC of the corner angle entered into the VCS panel. Refer to the install manual for instructions on setting corner angle.	NO	The angle sensor input for the system is outside its normal operating limits.	YES
				This could be due to over extension or over retraction of the corner, damaged cable, or malfunctioning angle sensor.	
E20	OVERRIDE TABLE – CHECKSUM FAILED AT POWER UP		NO	The storage area that contains the override tables is corrupt. This may have been caused by the removal of power while the system was saving the table to memory. This can be repaired by conforming.	YES

Figure 37-1

# Troubleshooting

## Troubleshooting List

The following table shows the various problems with the description, possible causes or corrective action to take. See Figure 38-1 below.

PROBLEM	POSSIBLE CAUSE OR CORRECTIVE ACTION
No display	The adjusted contrast is too light or too dark
	No Display
	Machine is not started
	Machine in service mode
	Contact your Valley Dealer
Screen cycles on and off	Erratic incoming power
	Low voltage
	Contact your Valley Dealer
Screen is dark	The contrast is set too high or too low
	Adjust contrast by pressing the home key to get to the status screen and pressing the up or down arrow keys to adjust
	Contact your Valley Dealer

Figure 38-1

## Hard Reset

A Hard Reset has the following effects to the Electrically Erasable Programmable Read-Only Memory (EEPROM).

- Resets Current Status to factory settings.
- Clears Review history.
- Clears Error Log history.

## Executing A Hard Reset

Below are the steps for executing a hard reset:

1. Turn the control panel disconnect to OFF.
2. While turning the control panel disconnect ON, press and hold the Escape key **ESC** until the Re-set screen appears. See Figure 38-2.
3. Press one of the following keys:
  - ① = Reset
  - ② = Skip the reset function

If no selection is made within 60 seconds, the reset function skips.

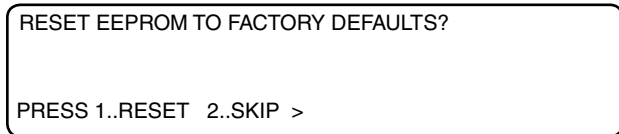


Figure 38-2 EEPROM RESET SCREEN