PRO CONTROL PANEL
SOFTWARE VERSION
7.1.5 AND 7.2.5

OWNERS MANUAL

0997502_A

www.valleyirrigation.com

EC DECLARATION OF CONFORMITY

CE

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

Serial Number:

Purchase Order:

declare under our sole responsibility that the product,

Crop Irrigation System

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

Machinery Directive 2006/42/EC
Low Voltage Directive 2006/95/EC
Electromagnetic Compatibility Directive 2004/108/EC

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

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

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

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

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

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

Person Authorized to Compile the Technical File in Europe:
Relevant information will be transmitted via e-mail
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Place of Issue: Valley, NE 68064

QUICK REFERENCE GUIDE

cams PRO

To run the machine with water:

1) Press WATER ON key

2) Select direction of travel (Forward or Reverse)

3) Set water application

NOTE: • *DEPTH selects water application in inches*
• *PERCENT selects percentage timer setting*

– Press DEPTH or PERCENT

– Select depth of water in inches or percent timer setting.

– Press ENTER to retain previous setting.

4) Press START key

5) To stop press STOP

To run the machine without water:

1) Press WATER OFF key

2) Select direction of travel and percent timer setting.

3) Press START key

4) To stop press STOP

QUICK REFERENCE TO GENERAL OPERATING COMMANDS

Controlling Auxiliary Relays:

1) Press OPTIONS
2) Select “1” or “2” for AUX1 or AUX2.
3) Press “1” for ON or “0” for OFF.

Selecting Stop-in-Slot On/Off:

1) Press SIS ON to enable the stop-in-slot.
2) Press SIS OFF to by-pass stop-in-slot location.

To set the stop-in-slot position:

1) Press SYSTEM
2) “1” for CONSTANTS
3) “3” for SIS
4) Enter desired stop-in-slot position in degrees and press ENTER.

Turning power and pressure restart on:

1) Press OPTIONS
2) “8” for AUTORESTART
3) “1” to turn ON or “0” to turn OFF.

NOTE: Please refer to the section in the manual entitled “Automatic Restart Option” for more information.

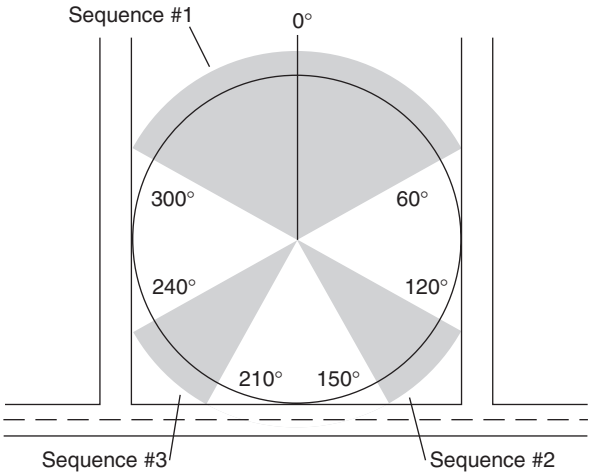
Selecting Auto Reverse or Auto Stop:

1) Press OPTIONS
2) “7” for AUTOREVERSE
3) “1” for AUTOREVERSE or “0” for AUTOSTOP

NOTE: Only applicable with drive unit mounted end-of-field stop/auto-reverse hardware.

AR/AS must be ON (System 1, 8, 8, 2, 1)

Setting the end-gun:



SEQUENCE	LEFT ANGLE	RIGHT ANGLE
1	300°	60°
2	120°	150°
3	210°	240°

1) Press SYSTEM
2) "1" for CONSTANTS
3) "4" for END-GUN
4) Select sequence (#1 - 9) you wish to work with.
5) Enter left angle (end-gun on) and press ENTER.
6) Enter right angle (end-gun off) and press ENTER. Select another sequence or press ESCAPE to exit.

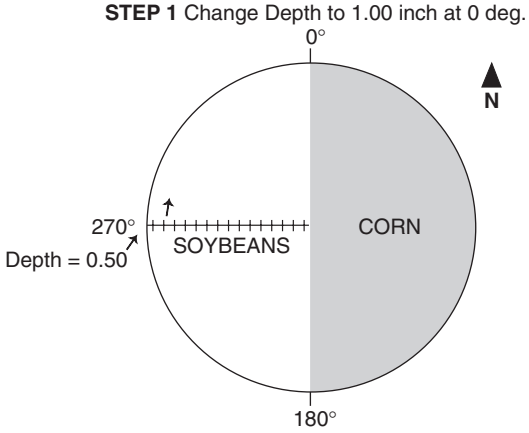
PROGRAMMING EXAMPLE

Current Conditions:

- Machine running forward at 270 degrees
- 0.50 inches water application

Program Machine to:

- Change water depth to 1.00 inch at 0 degrees
- Change water depth back to 0.50 inches at 180 degrees



STEP 1 Change Depth to 1.00 inch at 0 deg.

STEP 2 Change Depth to 0.50 inches at 180 deg.

1) Press PROGRAM
2) "2" for CREATE NEW Program

Program Step 1

3) "2" for POSITION
4) "0" for 0 degrees and ENTER
5) Press DEPTH, input 1.00 inch and press ENTER
6) Press ENTER since finished

Program Step 2

7) Select "2" for NEXT STEP
8) "2" for POSITION
9) "180" for 180 degrees and ENTER
10) Press DEPTH, input 0.50 inches and press ENTER
11) Press ENTER since finished
12) Select "1" for PROGRAM FINISHED
13) Either SAVE PROGRAM or SAVE PROGRAM and RUN.

SAFETY

The Valley center pivot irrigation machine is designed with electrical and mechanical 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 first read and understand.

⚠ RECOGNIZE SAFETY INFORMATION

This is the safety alert symbol. If you see this symbol on your machine or in this manual, be alerted there is the potential for personal injury.

Read and follow recommended precautions and safe operating practices.

⚠ SIGNAL WORDS – UNDERSTAND AND RESPECT THEM

The following words:
DANGER
WARNING
CAUTION
are used in conjunction with the safety alert symbol to alert the operator of potential hazards. DANGER poses the most serious threat to the operator and in some conditions can lead to death if ignored.

⚠ DANGER

⚠ WARNING

⚠ CAUTION

DANGER or WARNING safety signs identify and locate specific hazards. CAUTION signs list specific safety precaution instructions.

⚠ READ THIS OWNER/OPERATORS MANUAL AND FOLLOW SAFETY INSTRUCTIONS

⚠ It is essential you, maintenance personnel or any other operator of the machine read and understand this manual before operating this equipment. Carefully read all safety messages in this manual and safety signs on your machine.

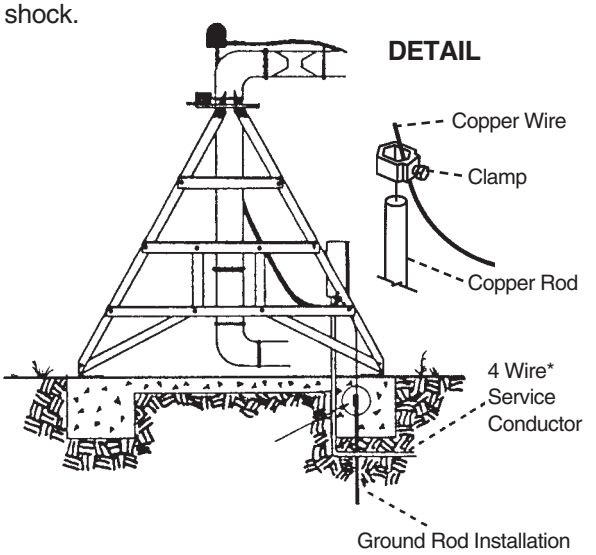
⚠ Do NOT let anyone operate this equipment without proper instructions.

⚠ Keep your machine in proper working condition. Unauthorized modifications may impair the function and/or safety of the machine.

⚠ If you do not understand any part of these safety guidelines or any other part of this manual and need further assistance, contact your Valley dealer.

⚠ PROPER GROUNDING

Do NOT attempt to start the center pivot until the electrical service is properly installed and grounded by a qualified electrician as per the electrical standards. As with any electrical machinery, if the power supplied to the center pivot is not grounded properly, severe injury or death can result should an electrical malfunction occur. It is your responsibility to ensure that your power supplier and/or electrical contractor has grounded the irrigation machine as required by the National Electrical Code and by applicable local electrical codes. If a machine is properly grounded and fuse sizing is correct, there is extremely low probability of an individual being injured by electrical shock.



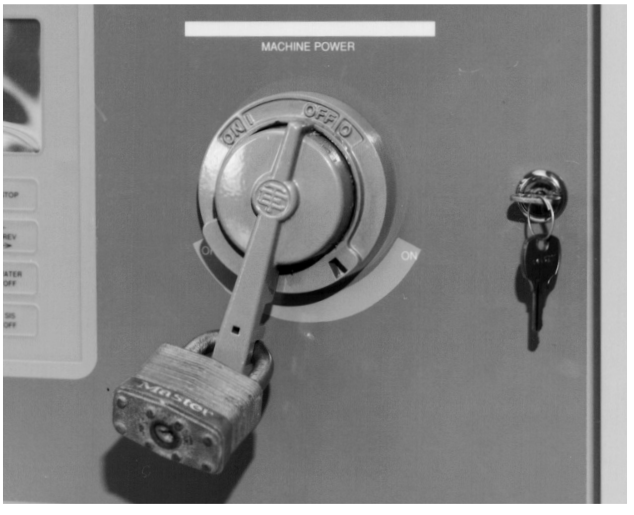
*** IMPORTANT: All 480 volt AC power supply services MUST be a 4 conductor service. Three 480 Volt AC power lines and one ground conductor which is as large as the power carrying conductors for that service.**

IMPORTANT: Each time a towable machine is moved, the ground wire MUST be re-attached to the ground rod and checked for electrical integrity before restarting the machine.

REMEMBER – Safety First – Operate Safely

⚠ DISCONNECT POWER WHEN SERVICING

ALWAYS disconnect electrical power before servicing or performing maintenance to the machine. If you are going to perform maintenance to the machine, YOU MUST shut off and lock the main power disconnect as shown below.

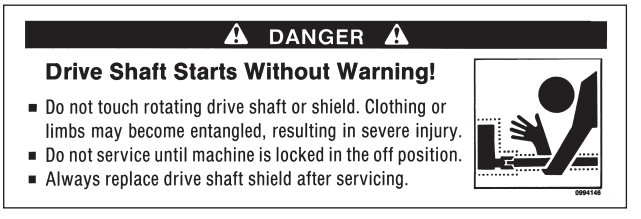


Don't trust someone else to turn the power off for you. DO IT YOURSELF and take the keys with you!

The blue (OSHA safety color code) tag shown below should also be filled out and attached to the disconnect after locking. The tag should reveal the name of a person to contact before restoring power to the machine.

⚠ 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. The Danger decal illustrated below is placed on each drive tower to warn the operator of this Danger!



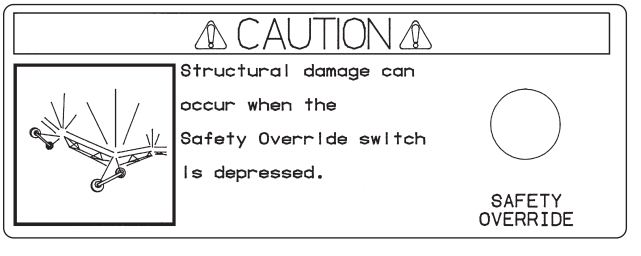
IMPORTANT: DRIVE SHAFT SHIELDS MUST ALWAYS BE IN PLACE WHEN OPERATING THE MACHINE.

⚠ DO NOT OVERSIZE FUSES

Fuses are sized for the protection of a specific machine. Be certain you have the proper fuse sizes in place before initial start-up and when replacing fuses.

⚠ PROPER USE OF THE SAFETY OVERRIDE

Caution MUST be taken by the operator when this button is depressed as it will by-pass or disable all of the machine's automatic safety shutdown circuits. NEVER depress this button for more than 3 to 5 seconds. If the machine is not in full view by the operator, do not use the Safety Override switch.



NEVER depress the override button longer than 3 to 5 seconds. The operator MUST inspect the entire machine between each start attempt. Repeated override start attempts can cause severe structural damage. Call the local Valley dealer should the machine fail to start.

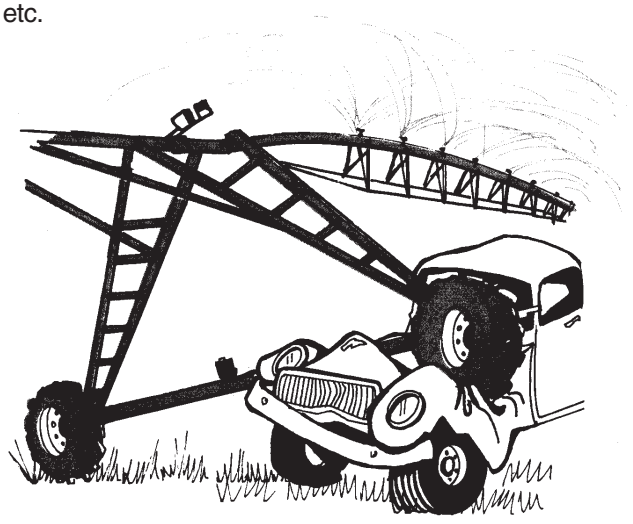
REMEMBER – Safety First – Operate Safely

⚠ LIGHTNING AND YOUR MACHINE

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

⚠ CHECK WHEEL TRACKS BEFORE STARTING

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



⚠ AVOID CHEMICALS

Avoid exposure to machine spray while chemicals are being injected into the water.

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

Use of protective clothing is recommended when handling chemicals. Safety glasses, gloves and protective outerwear should be available.

⚠ CAUTION ⚠

Contamination of the water supply may occur if effective safety devices are not installed/used in connection with injection equipment for chemigation.

Read EPA Label Improvement Program (PR Notice 87-1) and all instructions for chemical applications.

⚠ KEEP CHILDREN AWAY

Center pivots 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.

REMEMBER – Safety First – Operate Safely

CHECK MACHINE DIRECTION WHEN OPERATING
DO NOT operate the center pivot if it moves in the direction opposite to that which was chosen. Forward should be clockwise and reverse counter-clockwise.

FORWARD

REVERSE

AVOID HIGH PRESSURE WATER STREAMS
Avoid body contact with high pressure water streams, such as end guns. DO NOT crawl out on machine overhangs to service end guns. The added weight of your body to the overhang may cause serious injury if it fails or you fall. Do not attempt to adjust an end gun as it operates.

PLUG – IN CONNECTORS
Disconnect power before connecting or disconnecting any plug-in connectors.

TOWING SAFETY
Avoid ditches, rough terrain, overhead power lines, etc. when towing a pivot from field to field. The ground wire MUST be re-attached to the ground rod and checked for electrical integrity each time the machine is towed and before restarting the machine.

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.

SUSPECTED SHORT CIRCUITS

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

DO NOT touch the machine if you suspect a short-circuit situation.

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

DO NOT OPERATE AT FREEZING TEMPERATURES
Spraying water has a cooling effect and water will freeze even though the air temperature is slightly above freezing. Shut the machine down at 40 degrees Fahrenheit (4.5 degrees Celsius).

⚠ CAUTION ⚠

Do not operate system when temperature is below 40°F(4.5C).

Read and understand the Valley operator manual before operating this equipment.

CAUTION: Your Valley machine is NOT equipped with a cold weather shut-off!

Cold weather shut-off controls are available from other vendor sources which will cause machine shutdown when the air temperature reaches 40 F. Installation of these types of shut down controls should not take the place of regular checks by the operator when the machine must operate during marginally cold weather (40-50 F).

WARNING: Damage to equipment resulting from freeze-up is NOT covered under warranty. It is important to make sure all pipe drains function properly to prevent pipe line freeze-up during cold weather.

Replace any guards and shields removed for maintenance.

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

Do NOT deep rip in a circle at the drive unit. The deep chisel track will cause severe stresses on the structure. If you do deep rip your field, run the machine at full speed for the first revolution.

REMEMBER – Safety First – Operate Safely

⚠ EMERGENCY STOPPING

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

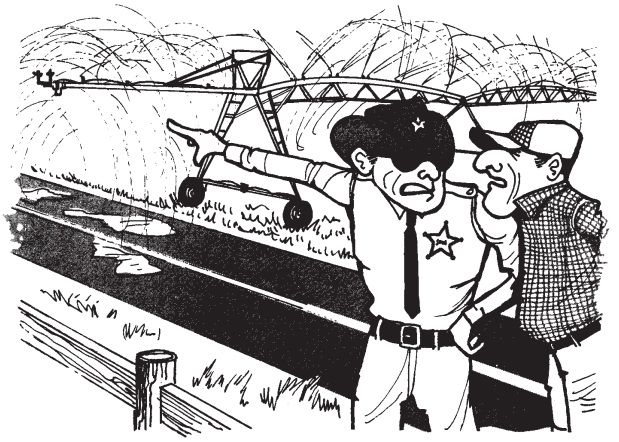
Stop the machine at any tower by turning the disconnect to the "OFF" position.

⚠ KEEP WATER OFF ROADWAYS

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

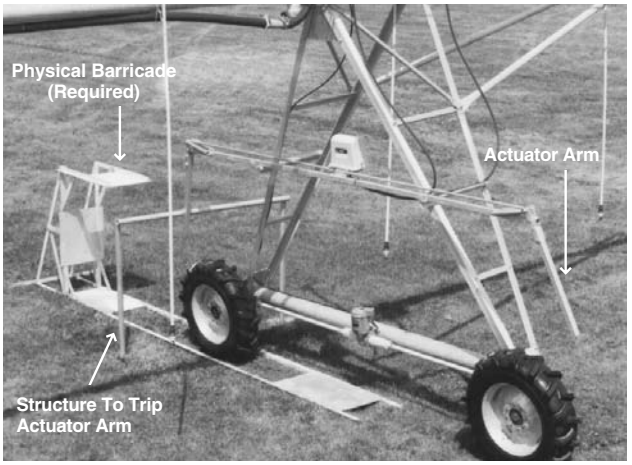
If end guns are used, make sure you read and understand the correct procedures for setting the on and off positions to avoid watering the roadways.

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



⚠ PART CIRCLE OPERATION SAFETY

If your center pivot reverses direction at a roadway or a physical object such as a building, tree line, etc., then **you MUST provide some backup device to stop the machine if the reversing mechanism were to fail.** Contact your Valley dealer for more information concerning physical barricades for machines under these circumstances.



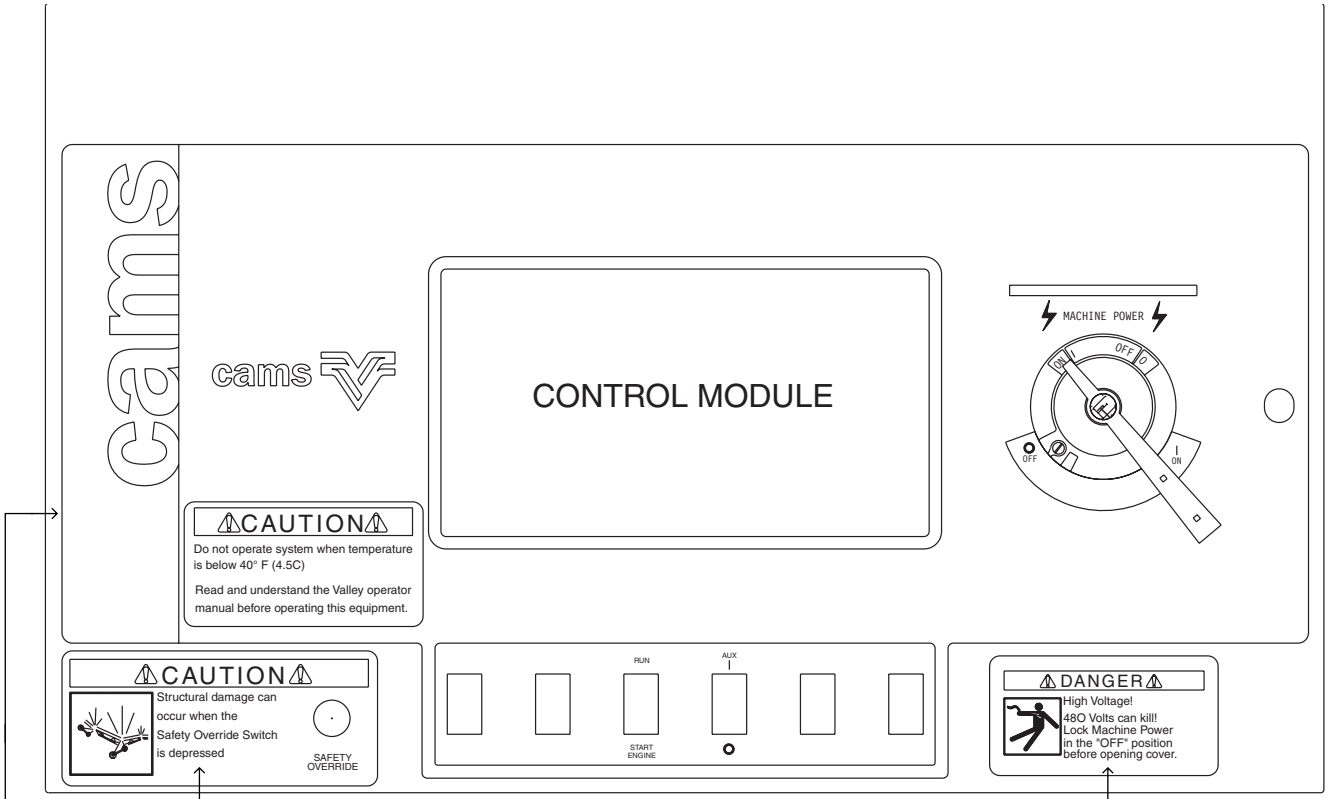
Drive Unit Mounted
Auto Reverse/Auto Stop Option

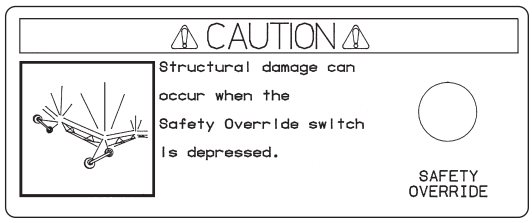
⚠ EMPLOYEE INSTRUCTION ON SAFETY

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

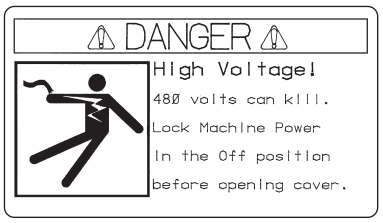
SAFETY DECALS

These Warning, Danger and Caution decals appear in various locations on your Valley Center Pivot. You **must** familiarize yourself and other operators with these safety decals. For replacement of any decal, contact your local Valley dealer.

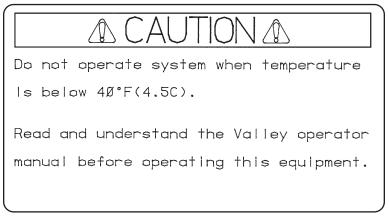




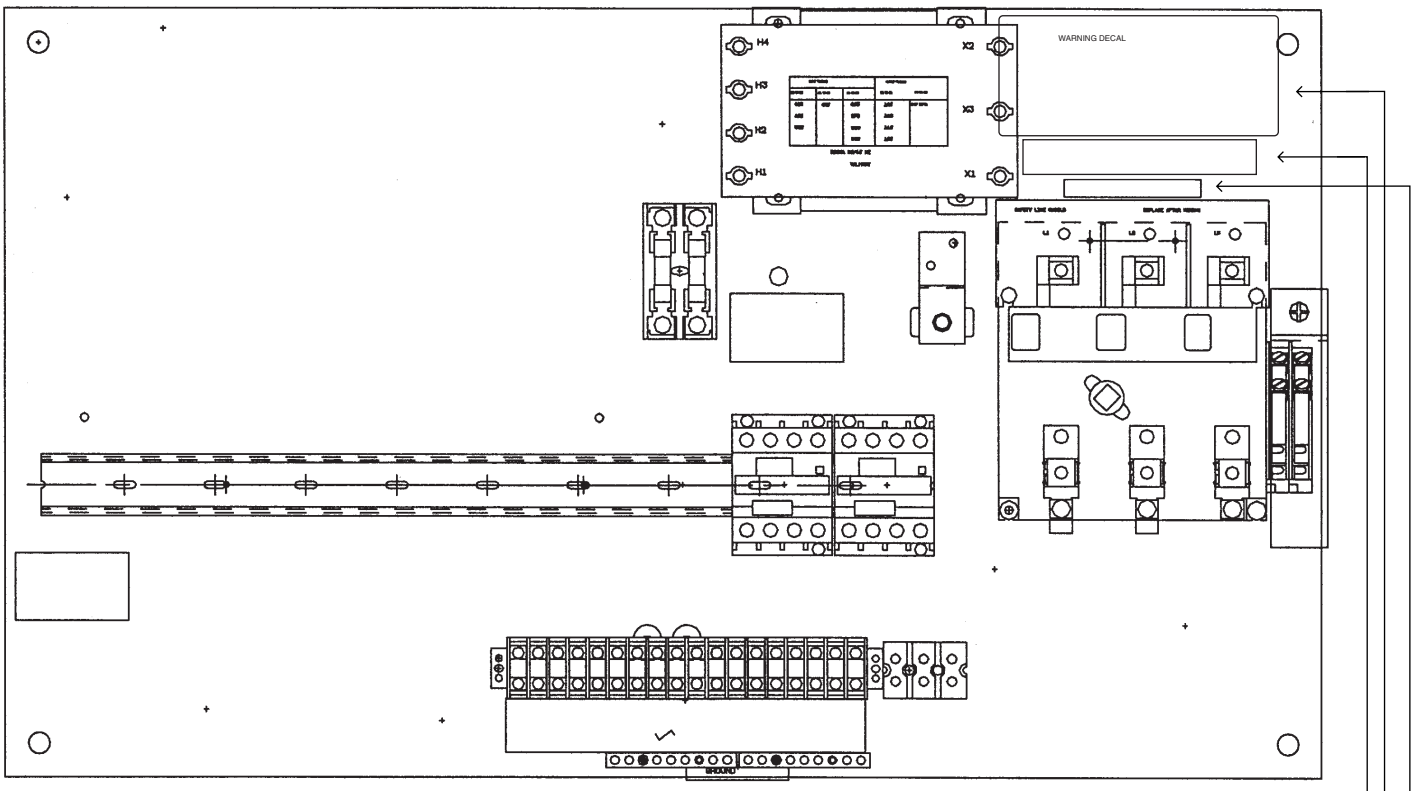
Location: Control Panel



Location: Control Panel



Location: Control Panel



WARNING

REPLACE SAFETY LINE SHIELDS AFTER WIRING

IMPROPER INSTALLATION WIRING OF THIS IRRIGATION MACHINE MAY CAUSE INJURY TO PERSONNEL OR EQUIPMENT FAILURE. THIS IRRIGATION MACHINE MUST BE CONNECTED TO A FOUR WIRE GROUNDED ELECTRICAL SERVICE. THIS IRRIGATION MACHINE MUST BE GROUNDED AS REQUIRED BY THE "NATIONAL ELECTRICAL CODE" AND APPLICABLE LOCAL CODES. THE VALLEY OWNERS MANUAL CONTAINS THE STANDARD FOR ELECTRICAL SERVICE AND EQUIPMENT FOR IRRIGATION.

#0315928
Location: Back panel inside control panel above fused disconnect.

MAIN DISCONNECT FUSE
FUSE TYPE: FRS-R, FLSR, IDSR
FUSE RATING: 600 VAC, 30 AMP MAXIMUM

#0994835
Location: Back panel inside control panel above fused disconnect.

"USE COPPER WIRE ONLY"

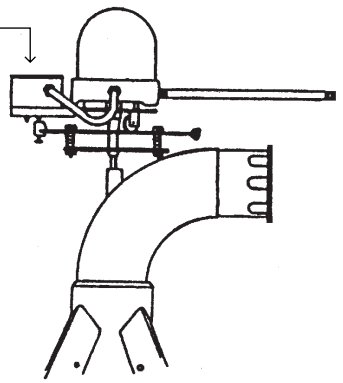
#03E0308
Location: Back panel inside control panel above fused disconnect.

WARNING

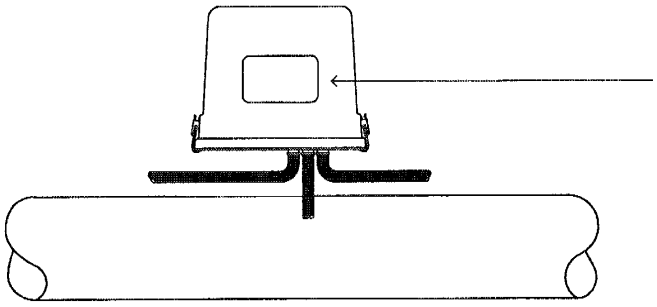
HIGH VOLTAGE

DO NOT OPEN UNLESS PIVOT DISCONNECT SWITCH IS IN THE "OFF" POSITION

#0991148
Location: End gun shut off/stop in slot box.



REMEMBER – Safety First – Operate Safely



DANGER

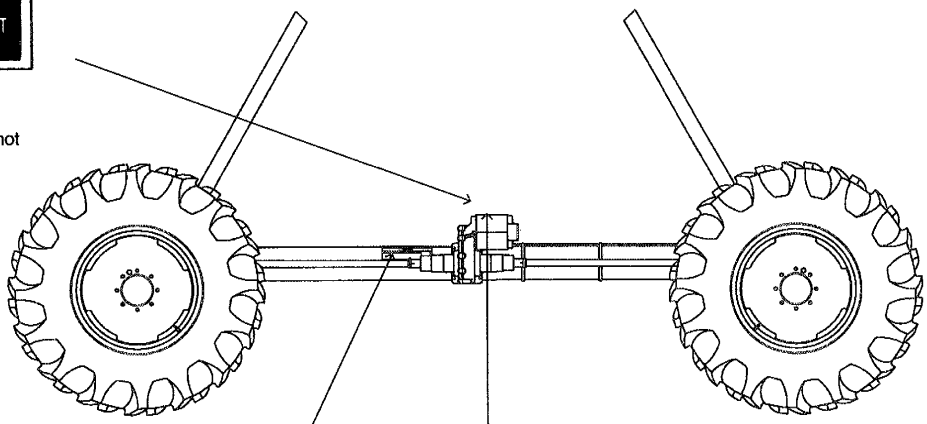
480 VOLTS DO NOT OPEN UNTIL SERVICE DISCONNECT IS IN "OFF" POSITION AND LOCKED

#0991261
Location: Electrical control boxes on towers and booster transformer enclosures.

CAUTION

THIS MOTOR MAY START AUTOMATICALLY. DO NOT SERVICE DRIVE SYSTEM UNTIL TOWER DISCONNECT IS IN "OFF" POSITION

#0991520
Location: Center drive motor covers and 1/1.5 HP motors not thermally protected.



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.

#0994146
Location: All base beams next to drive shaft shields.

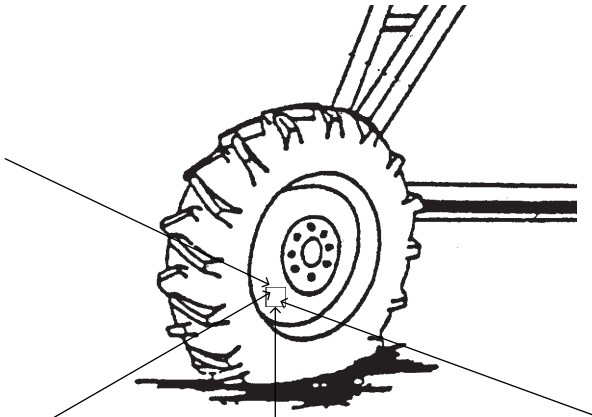
WARNING

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

	Disconnect power before maintenance. Be sure motor is properly grounded per local and national codes.
	Do not place fingers or objects near openings.
	Do not use eyebolts or lifting hooks to lift anything except the product.

931900

#0931900
Location: Center drive motors.



WARNING

ADJUST TO 34 PSI BEFORE USE

THIS TIRE AND RIM FOR CENTER PIVOT USE ONLY

INFLATE TO 34 PSI (2.3 BAR)

VALLEY®

#0996109
Location: 11.2 X 24 New Tires

WARNING

ADJUST TO 22 PSI BEFORE USE

THIS TIRE AND RIM FOR CENTER PIVOT USE ONLY

INFLATE TO 22 PSI (1.5 BAR)

VALLEY®

#0991593
Location: 11.2 X 38 New Tires

WARNING

ADJUST TO 30 PSI BEFORE USE

THIS TIRE AND RIM FOR CENTER PIVOT USE ONLY

INFLATE TO 30 PSI (2.1 BAR)

VALLEY®

#0991366
Location: 9 X 20 Retread Tires
10R X 22.5 Retread Tires
11R X 22.5 Retread Tires
11R X 24.5 Retread Tires
12.5 X 22.5 Retread Tires

WARNING

ADJUST TO 18 PSI BEFORE USE

THIS TIRE AND RIM FOR CENTER PIVOT USE ONLY

INFLATE TO 18 PSI (1.2 BAR)

VALLEY®

#0991532
Location: 14.9 X 24 High Float Tires
16.9 X 24 Maxi-Float Tires

CAUTION

THIS MACHINE MAY START AUTOMATICALLY. DO NOT SERVICE UNTIL MACHINE DISCONNECT IS IN OFF POSITION AND LOCKED.

#0992221
Location: Automatic Restart Option

CAUTION

SAFETY SWITCH MUST BE IN THE "OFF" POSITION WHEN HANDLING PLUG OR CABLE

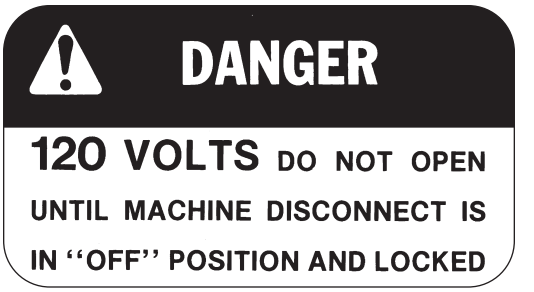
#0992748
Location: Remote public power package.

DANGER

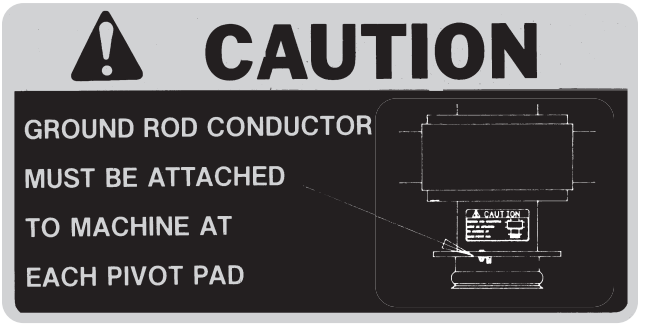
480 VOLTS

#0992749
Location: Remote public power installations.

#0992750
Location: Remote public power installations.

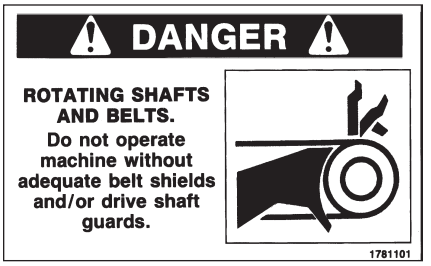


#0992519
Location: Oscillator enclosure box.



#0992767
Location: EZ Tow Remote Power Hardware

#0992751
Location: Auto Linear Switching Mechanism



#1781101
Location: Hydraulic Pumping Unit

Section 1 – General Information

INTRODUCTION

A Valley Pro control panel is designed to provide you with all of the standard features plus allow computer aided management of your machine. Your pivot can be programmed using the easy step-by-step instructions to perform functions based on dates/times, position in the field or other conditions. Utilizing the Valley Pro control panel will enhance your field management capabilities.

ABOUT THIS MANUAL

Your machine is equipped with a Valley Pro control panel. The first step in understanding your new panel is to understand the operation of the center pivot itself. It is recommended and assumed, that you read and understand the "Pivot Operators Manual" for the Valley 8000, or the appropriate operators manual for your center pivot irrigation machine. The operators manual for your center pivot will cover important areas such as safety, maintenance and trouble-shooting not covered in this manual.

SECTION IDENTIFICATION

This manual has been divided into six sections which explain the following:

SECTION 1 – General Information
Explains the controls and components of the Valley Pro control panel.

SECTION 2 – Operating Your Panel
Instructs you how to use the panel without programming future events. The basic functions such as START/STOP, SELECTING DEPTH OF WATER, AUXILIARY RELAY CONTROLS, etc. are explained.

SECTION 3 – Programming – A Quick View
This section provides an overview of the programming features and explains some of the terms used when programming.

SECTION 4 – Programming – Learning the Basics
Explains how to program your panel to execute future commands based upon selected conditions. Several examples are included with easy to follow step-by-step instructions.

SECTION 5 – Repeat Programming
Instructs on different methods of repeating programs. Includes information for repeating commands continuously, a certain number of times or using a daily operations feature.

SECTION 6 – Troubleshooting/Miscellaneous Data Review
Guides in using the Diagnostics Screen and other available options to perform some basic troubleshooting procedures and view pertinent data.
Advanced programming techniques and miscellaneous information is included in the appendices.

TABLE OF CONTENTS

CONTROLS AND COMPONENTS

The Valley Pro control panel uses a key pad for execution of operator commands. For example, instead of dialing in the desired speed of your pivot on a standard percentage timer, the speed is simply entered in as a number with the key pad. The key pad works in conjunction with the display screen on your panel. This screen provides valuable information to the operator. Following is a brief description of each component and control of the Valley Pro control panel. Refer to Figure 1.1 for an illustration of the panel's controls and components.

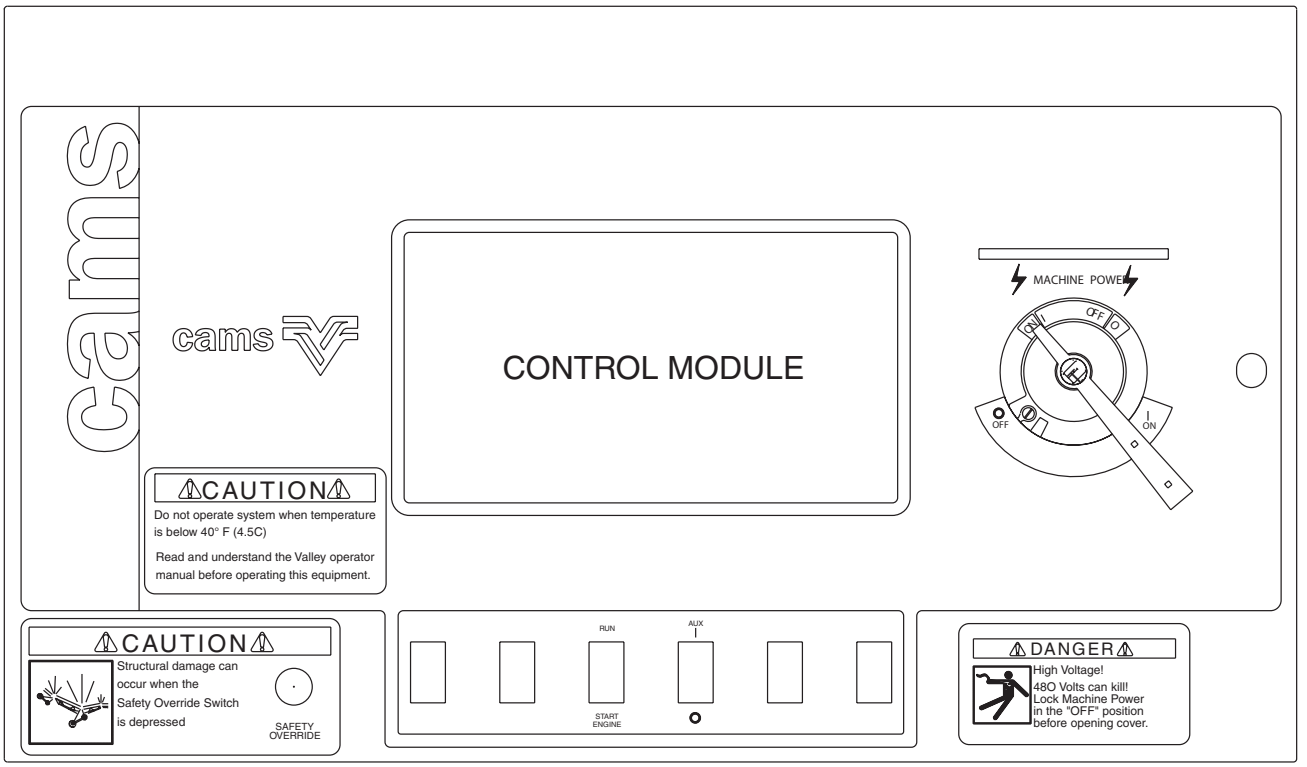


Figure 1.1

Main Disconnect

This switch disconnects all power to the machine except at the incoming (upper) terminals on the Main Disconnect Switch inside the control panel. The function of the disconnect is to turn the power ON or OFF.

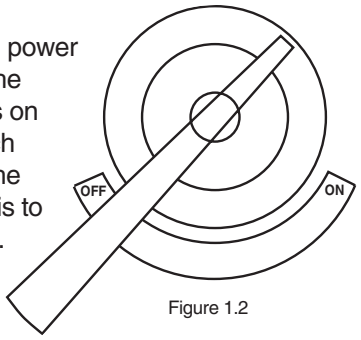


Figure 1.2

3 Second Auto Restart

A three second auto restart is standard equipment built into the circuitry of the Valley system. In the event of a momentary power loss or voltage drop, the system will automatically restart, if power is returned within three seconds.

⚠CAUTION

TO REDUCE THE POSSIBLITY OF DAMAGE TO AN AUTOMATICALLY CONTROLLED ELECTRIC PUMP DUE TO A MOMENTARY POWER LOSS OF 3 SECONDS OR LESS, A PUMP RESTART DELAY IS REQUIRED IN THE PUMP CIRCUIT BETWEEN THE PIVOT CONTROL PANEL AND THE PUMP.

Safety Override Switch

The machine's safety circuit can be overridden by depressing this switch in conjunction with the start key.

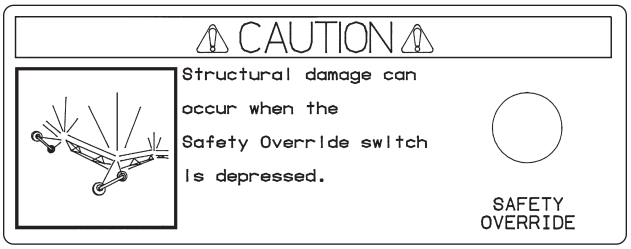


Figure 1.3

WARNING: Under no circumstances should this switch be depressed longer than three seconds at any time. Safety override can cause serious structural damage. Call your local Valley dealer, should your machine fail to start.

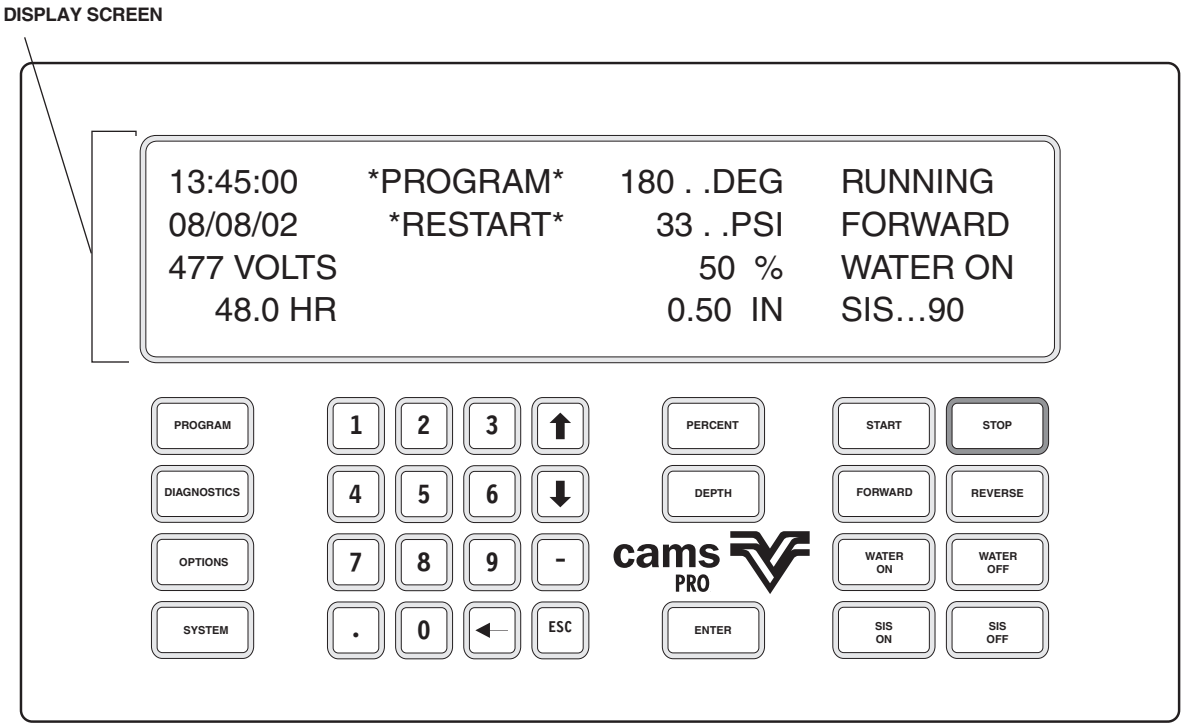


Figure 1.4

NOTE: Remember the Status Screen in Figure 1.4 illustrates example operating conditions only. The Status screen for your machine will illustrate different conditions depending on how you operate your machine.

Display Screen

The display screen normally indicates how the machine is currently operating. The screen is also used to display information for programming the machine and selecting items such as auxiliary relays on/off, autorestart and other pivot functions.

Normally the screen displays the status of the machine and will be referred to as the Status screen. Figure 1.4 illustrates a Status screen for a typical irrigation machine. This type of information is displayed when the main disconnect is turned on and at all other times when the operator is not programming the panel.

The status of the screen is:

RUNNING Irrigation machine is on or running. If the machine is off, STOPPED will be displayed. If the machine is waiting for pressure, WAITING will be displayed.

FORWARD Machine is moving in the clockwise direction.

WATER.ON Indicates the machine is applying water by either opening a valve, starting a pump or both.

SIS...90 The machine will be stopped at a preset field position of 90 degrees. SIS OFF will be displayed if the Stop-In-Slot is disabled.

180..DEG The pivot is pointing in a direction 180 degrees clockwise from the field reference point. North is generally defined as the 0 degree reference point, but any convenient point can be specified.

33..PSI Indicates the water pressure in pounds per square inch at the location of the pressure gauge (transducer).

50% Timer percentage setting is 50%. This means that the end tower runs 30 seconds out of each minute.

0.50 IN. The gross amount of water which will be applied at a percentage timer setting of 50% on this machine is 0.50 inches.

13:45:00 Current time is 1:45:00 P.M. It should be noted that a 24 hour clock is used with noon being 12:00:00. Therefore, 1:45 P.M. is displayed as 13:45:00 on the screen.

08/08/02 Date is indicated as August 8, 2002.

477 VOLTS Current operating voltage is 477 volts. The machine shuts down if the voltage should ever drop below 440 volts.

48.0 HR The number of hours to make a revolution at the speed setting of 50% is 48 hours.

PROGRAM A program has been loaded and is waiting to be executed. If no programs are loaded this message will not appear.

RESTART Indicates either or both AUTORESTART is ON or DAILY OPS is/are ON.

- If the machine stops due to a power loss, AUTORESTART will start the machine when power returns.
- If the machine stops due to a pressure loss, AUTORESTART will start the machine when pressure returns.

- If the machine was stopped by the DAILY OPS program or another program, DAILY OPS will start the machine when the ON DATE and TIME occur.
- If the machine was commanded to stop by the operator or had a machine FAULT, i.e.; SAFETY, DAILY OPS will not restart the machine.

E05 Is an ERROR CODE and indicates an input status deviation has been detected. Error history can be reviewed on the Diagnostics screen.

AUX1.ON Indicates the AUXILIARY #1 output is ON (AUX2 is not displayed).

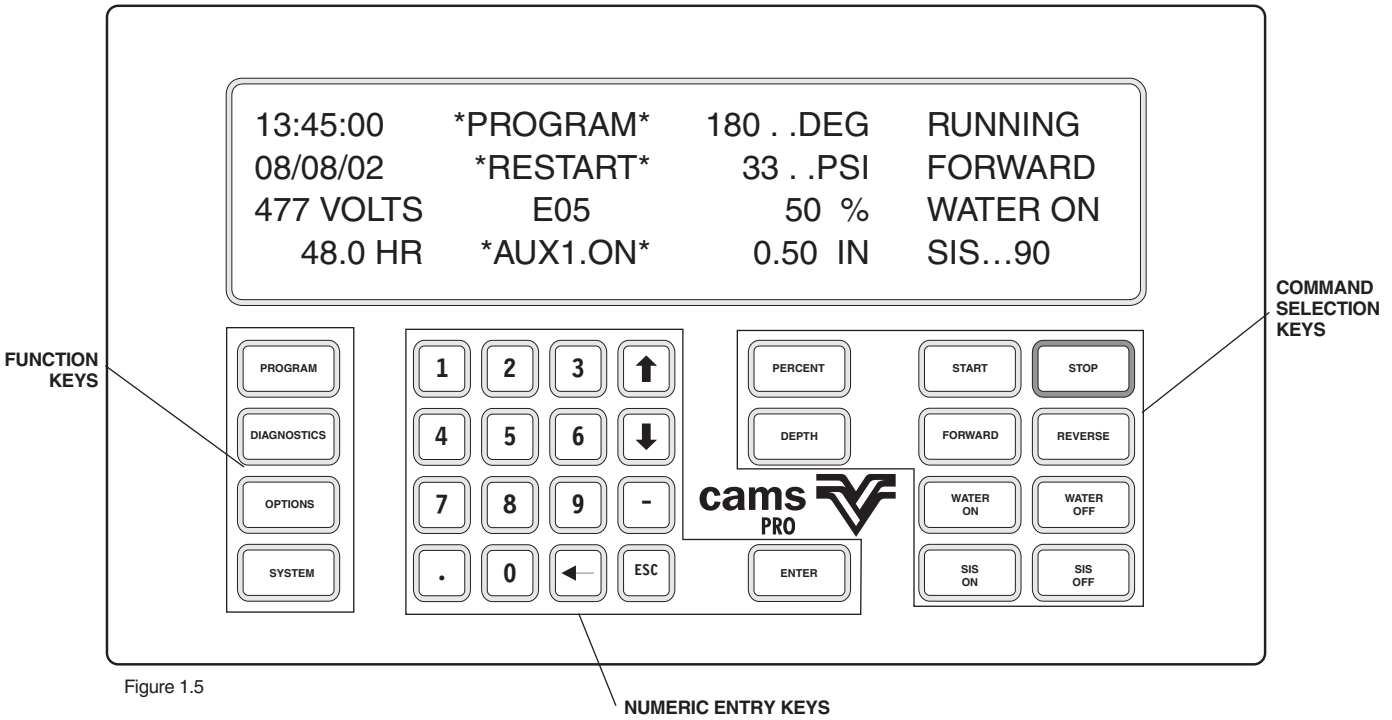


Figure 1.5

Command Selection Keys

These keys (illustrated in Figure 1.5) are used for general operation of the irrigation machine.

A short explanation of each command key is given below:

START — Enables the operator to start the machine assuming safety circuits are operating correctly. The machine has a time delay that will not allow it to be restarted by pressing the Start key within five seconds after being stopped.

STOP — Halts machine movement and shuts pump off/closes water valve.

FOR — Commands machine movement in the forward (clockwise) direction.

REV — Commands machine movement in the reverse (counter-clockwise) direction.

WATER ON — Commands pump to turn on, valve to open (or both) when machine is started. A pre-programmed pressure switch delay is automatically recalled to allow sufficient time for pressure to build up in the machine.

WATER OFF — Shuts down pump and/or closes water valve.

SIS ON — Activates the stop-in-slot feature. Stops machine at a preset location in the field selected by the operator

SIS OFF — Bypasses or disables the Stop-In-Slot feature.

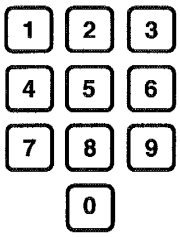
PERCENT — Controls the machine run/pause ratio which regulates the depth of water applied. The percent timer indicates the percentage of a minute which the end tower runs.

DEPTH — Controls the depth of water applied. Percent timer setting is automatically recalculated and set to apply the depth of water selected.

Numeric Entry Keys

The numeric entry keypad (highlighted in Figure 1.5), 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:



Input numerical values and select programming options.

Contrast Darker key increases the contrast of the text on the display.

Contrast Lighter key decreases the contrast of the text on the display.

Input negative values (generally not used)

Select numerical values in decimal form. Example...1.75 inches

The back arrow is the symbol for the back space key. This key deletes the previous number or symbol.

Refer back to a previous screen without performing any changes.

Indicates the end of a numerical value entry or programming sequence. The ENTER key will be more fully explained in later sections.

Function Keys

The function keys are located on the far left side of the keypad as illustrated in Figure 1.5.

Unlike the command selection keys, the function keys do not execute commands immediately. They are used to program the panel, view pertinent data and select options not frequently used. Following are explanations of each function key and an illustration of the screen which appears when the key is pressed.

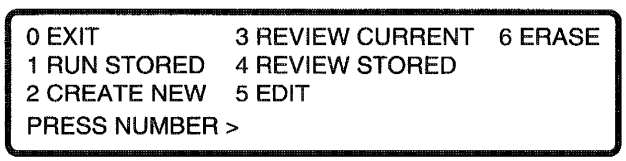


Figure 1.6

PROGRAM is selected to either write or execute programs. A unique feature of this panel is that it enables the operator to execute commands in the future based upon conditions such as date/time and position in the field. This is accomplished by writing programs.

The PROGRAM function key allows the following:

0) Exit or return to the status screen.
1) Run stored programs.
2) Create (or write) new programs.
3) Review current programs which are loaded and ready to be executed.
4) Review programs which are stored and can be recalled for execution.
5) Edit stored programs.
6) Erase stored programs.

Figure 1.7

DIAGNOSTICS is used to assist the operator in determining the cause of an unplanned machine shutdown or potential problem situation.

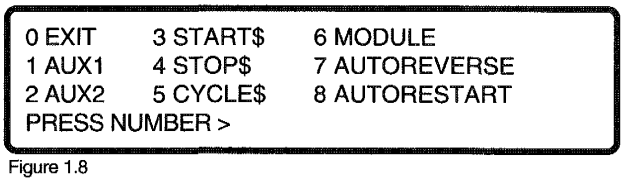


Figure 1.8

This key is used to control options not frequently used by the operator. For example, selection #1 is labeled AUX1 which represents auxiliary relay #1. Selecting AUX1 allows you to turn AUX1 on or off which may in turn control a piece of auxiliary equipment. Figure 1.8 illustrates the different options which can be selected. These will be fully explained in later sections.

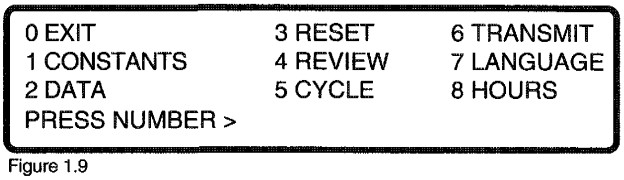


Figure 1.9

SYSTEM is used to input characteristics about the irrigation machine which generally do not change and only need to be entered once. These are identified as Constants and are labeled selection 1 in Figure 1.9. Selections 2, 3, 4, 5, 6, 7 and 8 are used to reset all values and view machine operating data.

SYMBOLS AND CONVENTIONS

This manual uses a few symbols and conventions which are explained in this section.

Prompts and Defaults

Any command which requires you to input data will show a prompt on the bottom line of the display. Figure 1.10 illustrates how a Status screen may appear after the DEPTH key is pressed.

```
13:45:00      *PROGRAM*   180..DEG   RUNNING
08/08/02      *RESTART*    33..PSI   FORWARD
477 VOLTS                    50  %    WATER ON
ENTER APPLICATION (0.50) >
```

Figure 1.10

A prompt simply means that the panel is waiting for you to input information. As you use the panel, you will notice that the prompt is always identified by ">" as shown in the bottom line of Figure 1.10. To the left of the prompt, the screen will display the current value (in parentheses) which is entered. The value in parentheses is referred to as the default* value. If the value in parentheses is what you want to enter, simply press the ENTER key and this value will be entered. Otherwise, input the desired value. You will notice in Figure 1.10 the current (or default) value for the water application depth is (0.50) inches.

**NOTE: The term "default value" means a fixed number (value) is stored in memory and unless the operator enters a different value, the program will use the fixed number (default value) in executing a command.*

Screen Delays

Any screen which is left for more than 60 seconds without pressing a key, will revert back to the previous screen which was displayed. The status screen will eventually be displayed.

Exit

Please refer to Figure 1.8. Notice each selection is numbered 0-8. The number "0" has been reserved for the EXIT option **on all screens**. Pressing "0" will exit you from the current screen and will display the Status screen.

Escape

The ESCAPE key is used to bring up previous screens. The different screens which are shown can be compared to the pages in a book.

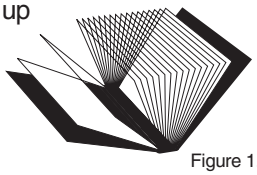


Figure 1.11

For example, page 1 can be considered as the main screen or the status screen. This is the screen normally displayed when the panel door is opened. Then, if you press the PROGRAM key the following screen will be displayed.

```
0 EXIT              3 REVIEW CURRENT   6 ERASE
1 RUN STORED        4 REVIEW STORED
2 CREATE NEW        5 EDIT
PRESS NUMBER >
```

Figure 1.12

You have, in effect, turned the page to look at a different screen. To display the previous screen (Status screen) or turn the page back to number 1, simply press the ESCAPE key.

Pivot Position

The position of the pivot will always be shown on the screen in degrees. A complete circle pivot will display position from 0-359 degrees. Figure 2.1 displays a circle pivot located at 45 degrees. This example illustrates that the direction North corresponds to 0 degrees, however, 0 degrees could also be designated as due West or South. For more information concerning setting the current position, see "Entering System Constants – Current Position of the Pivot".

Illustrations

As you read through this manual, you will notice illustrations of different display screens immediately below a key or series of keys. An example is shown in Figure 1.13.

1. PROGRAM


```
0 EXIT              3 REVIEW CURRENT   6 ERASE
1 RUN STORED        4 REVIEW STORED
2 CREATE NEW        5 EDIT
PRESS NUMBER >
```

Figure 1.13

Figure 1.13 indicates step #1 is to press the PROGRAM key and immediately the screen which would appear on the actual panel is illustrated below the key. This convention will be used throughout the manual.

INTRODUCTION

This section covers how to initially set up the Pro Panel before operation and the general operating procedures which includes the commands not requiring programming. Areas, such as entering the language and units of measure to be displayed on the screen, along with entering machine constants, starting, stopping, changing water application depth, and other frequently used commands will also be covered. All programming instructions are covered in Sections III, IV and V.

LANGUAGE & UNITS OF MEASURE

The operator can select the language and the units of measure to be used in operating the machine by performing the following steps:

1. Press SYSTEM

SYSTEM

```
0 EXIT          3 RESET       6 TRANSMIT
1 CONSTANTS     4 REVIEW      7 LANGUAGE
2 DATA          5 CYCLE       8 HOURS
PRESS NUMBER >
```

Figure 2A

2. To access the language menu, press "7" for LANGUAGE. The module will display the following:

7

```
0 EXIT          3 FRANCAIS
1 ENGLISH       4 ITALIANO
2 ESPANOL       5 PORTUGUESE
PRESS NUMBER >
```

Figure 2B

3. Press the number key that corresponds with the desired display.

```
0 EXIT          3 FRANCAIS
1 ENGLISH       4 ITALIANO
2 ESPANOL       5 PORTUGUESE
0..IN   1..MM  (0)   >
```

Figure 2C

The value shown in parenthesis indicates the current unit of measurement being used by the module (U.S. MEASUREMENT - INCHES). The application rate will be displayed in *inches,* the pressure in pounds per square inch or *psi,* the date by *month/day/year* and the flow readout in gallons per minute *(gpm)* and *millions of gallons*.

4. The operator can select metric measurement units by pressing "1" for application rate in *millimeters,* pressure in *KPA,* date by *day/month/year,* and flow readout in *liters per second* and *cubic meters.* To return to U.S. measurements, repeat steps 1-4.

PRO PANEL SETUP SYSTEM 1 CONSTANTS

The SETUP procedure consists of entering values which are unique to each individual center pivot when the machine and panel are first installed. Typically these values will be entered by the Valley serviceman. You need to be aware of these values and how to change them if needed. These values are in three separate groups as illustrated below.

SETUP #1	SETUP #2	SETUP #3	SETUP #4
TIME	MIN APP	WIND	PRES CAL
DATE	HRS/REV	AR/AS	PRES TRANS
SIS	VOLTAGE	PERCENT TIMER	
END-GUN	WIDE BND	LOW VOLTAGE	
POSITION	FLOWMETER	DIR OFFSET	
PRES DLY	RTUID	ENGINE/PUMP	
LOW PRES	DAILY OPS	BAUD	
OTHER	OTHER	OTHER	

Your Valley dealer may have already entered these constants, in which case you could skip this section, but you should still read and understand the instructions for entering the constants since you may want to review or change what has already been entered. The form entitled "Machine Constants", located in Appendix A, should be filled out by you and your Valley dealer. Keep this form as a record in the event that the constants would need to be re-entered.

Figure 2.1 illustrates a field with a set of constants. These will be used as an example to explain how the constants are entered.

ENTERING MACHINE CONSTANTS

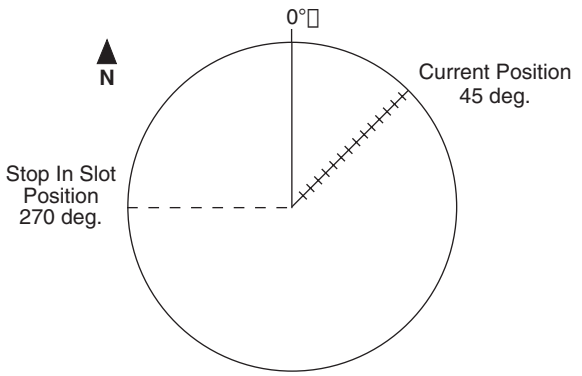


Figure 2.1

Current Time	13:45:08
Current Date	08/08/02
SIS Position	270 deg.
Current Position	45 deg.
Pressure Delay	180 seconds
Low Pressure Limit	20 psi
Minimum Water Application	0.15 inches at 100%
Hours per Revolution	12 hours at 100%
Machine Voltage	491 volts

To access the machine constants, follow these steps:

1. SYSTEM

SYSTEM

0 EXIT	3 RESET	6 TRANSMIT
1 CONSTANTS	4 REVIEW	7 LANGUAGE
2 DATA	5 CYCLE	8 HOURS
PRESS NUMBER >		

Figure 2.2

2.“1” for CONSTANTS

1

0 EXIT	3 SIS	6 PRES DLY
1 TIME	4 END-GUN	7 LOW PRES
2 DATE	5 POSITION	8 OTHER
PRESS NUMBER >		

Figure 2.3

You are now ready to start entering the constants illustrated in fig. 2.1.

Current Time

To set the time of day, follow these steps:

1. "1" for TIME

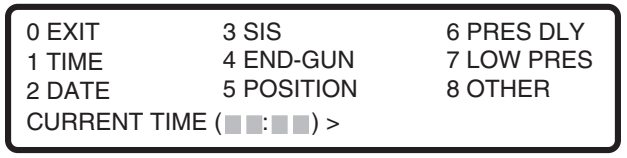


Figure 2.4

NOTE: A time will be displayed in parentheses where the shaded area is located. Enter the correct time if necessary. Seconds can be entered but are not necessary.

2. "1345" for 1:45 P.M. (24 hour clock)

3. ENTER to retain previous time

NOTE: The screen illustrated in fig. 2.3 will now be displayed. You are ready to select another constant to enter. If you wish to look at the time again to confirm that it was entered correct, then select "1" for TIME and verify the current time in parentheses.

Current Date

To set the current date, follow these steps:

1. “2” for DATE

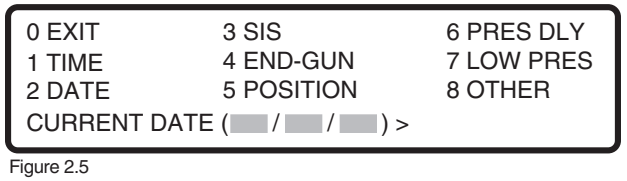


Figure 2.5

NOTE: A date will be displayed in the parentheses where the shaded area is shown in fig. 2.5. If this is not correct, enter the current date.

2. "080802" for August 8, 2002

3. ENTER to retain previous date

Stop-In-Slot (SIS) Position

The stop-in-slot feature allows you to stop the pivot at a set position such as a field road. If SIS is ON, the pivot will stop at this location every time. In this example, SIS will be set at 270 degrees.

To set the SIS position, follow these steps:

1. "3" for SIS

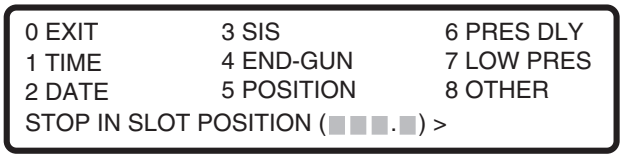


Figure 2.6

NOTE: A SIS position will be displayed in the parentheses in fig. 2.6. Enter your correct SIS position. The position can be entered in tenths of a degree (e.g. 270.5 degrees). The value in parentheses is the default value.

2. "270" for 270 degrees

3. ENTER to retain 270 degrees

NOTE: SIS...270 will be displayed in the lower right-hand corner of the main status screen if the SIS feature is ON. This indicates the position of the SIS. SIS...OFF will be displayed if the feature is OFF.

IMPORTANT: If a machine shuts down because the stop-in-slot was ON, the SIS does NOT need to be turned off before the machine is started again. The machine will automatically disengage the SIS feature for 2 degrees of machine travel and will then reactivate the SIS feature. The machine will shut down again when it reaches the SIS position.

End-Gun Shut-Off Settings

Figure 2.7 illustrates an example end-gun on/off arrangement which will be used to demonstrate how end-gun settings are entered. This field is bordered on three sides by roads but the end-gun will be on the entire time on the North side.

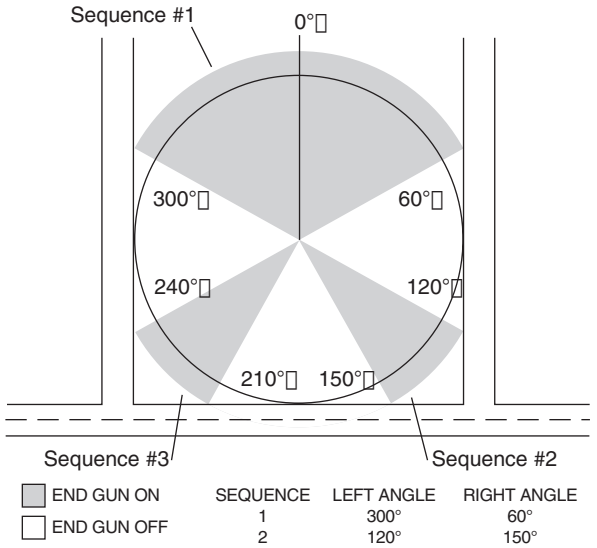


Figure 2.7

To enter these end-gun settings, follow the steps below:

1. "4" for END-GUN

Figure 2.8

NOTE: Examine the screen displayed in fig. 2.8. Notice that there is a request for you to "ENTER SEQUENCE TO CHANGE >". The end-gun program has been designed so that the operator selects a sequence (1-9) for the end-gun to be ON. Each sequence will consist of a left angle and a right angle. Another way of looking at the left/right angles is to define the left angle as the counter-clockwise angle and the right angle as the clockwise angle of the sector. The wedge between the left and right angle is where the end-gun will be turned on.

This example requires three sequences to be entered. The order in which they are entered does not affect how the end-gun turns on/off. For example, in fig. 2.7, sequence #1 could be entered as left angle -120 degrees/right angle - 150 degrees and sequence #2 as left angle - 300 degrees/right angle - 60 degrees. The end-gun on/off pattern will not be affected.

The end-gun sequences will operate the same whether or not the machine is running in the forward or reverse direction. For example, sequence #1 consists of a left angle of 300 degrees and a right angle of 60 degrees. If the pivot is travelling in the forward direction approaching 300 degrees, the end-gun will turn on at 300 degrees and shut off at 60 degrees. Now let's assume the pivot is moving in the reverse direction approaching 60 degrees. The end-gun will turn on at 60 degrees and shut off at 300 degrees.

The angles entered for end-gun settings can be input in tenths of a degree. For example, an angle can be input as 300.6 degrees, however it will be displayed as 300 on the screen. This allows end-gun settings to be "fine-tuned" if the operator desires.

Now enter the end-gun sequences as illustrated in fig. 2.7:

2. "1" for sequence #1

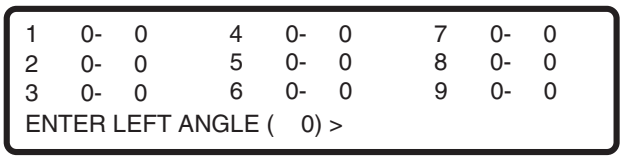


Figure 2.9

3. "300" for left angle = 300 degrees

4. ENTER to retain 300 degrees

Figure 2.10

NOTE: Your screen should now appear as in fig. 2.10. You are being requested to enter the right angle for sequence #1. In this example, that position is 60 degrees.

5. "60" for right angle = 60 degrees

6. ENTER to retain 60 degrees

Figure 2.11

NOTE: Notice in fig. 2.11 that sequence #1 has been entered. You are now being requested to select the next sequence to enter.

7. Repeat previous steps #2 through #6 utilizing the data listed below for the remaining sequences 2 and 3.

Sequence	Left Angle	Right Angle
2	120	150
3	210	240

Figure 2.12

NOTE: After you have finished entering sequences 2 and 3, the screen will be displayed as in fig. 2.12. These settings are now stored in memory and the ESC key can be pressed to get back to the previous screen.

Refer to Appendix A for a chart containing some typical end-gun settings for different size fields and types of end-guns.

Current Position of the Pivot

The computer needs to know the location of the pivot in the field. The position is defined as a degree location between 0 and 359. Therefore, you have the flexibility to designate at which degree setting the pivot is located. In our example (fig. 2.1), we have determined that due North will be designated as 0 degrees. Therefore, since the pivot is at 45 degrees clockwise from North, this value will be entered as the current position.

Let's assume a road is located where the pivot is at in fig. 2.1 and you want to define this position as 0 degrees. You could achieve this by entering "0 degrees" for the current position instead of 45 degrees.

NOTE: Changing the current position will affect the location in the field where end gun, wide boundary, stop-in-slot and programs will be controlled.

To set the current position of the pivot, follow these steps:

1. "5" for POSITION

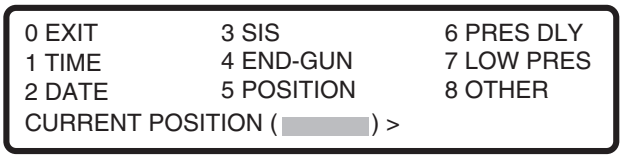


Figure 2.13

2. "45" for 45 degrees

NOTE: The current position can be entered in tenths of a degree.

3. ENTER to retain 45 degrees

Pressure Delay

Your pivot is equipped with a pressure transducer. This device displays the pressure readings in (psi) on the screen and is used to shut the pivot down if pressure drops below a set low pressure point. The pressure delay is the amount of time required (in seconds) for your machine to build pressure above the low pressure point after the pump has been started. If the pressure has not reached the low pressure point after the specified number of seconds entered in the pressure delay, the pivot will shut down due to low pressure. In summary, the pressure delay constant by-passes the pressure transducer for a specified amount of time to allow sufficient water pressure to develop in the machine.

Pressure Dropout Timer

After the pressure delay time has expired, a built-in low pressure timer keeps the machine running during pressure drops for up to 30 seconds.

To set the pressure delay, follow these steps:

1. "6" for PRES DLY

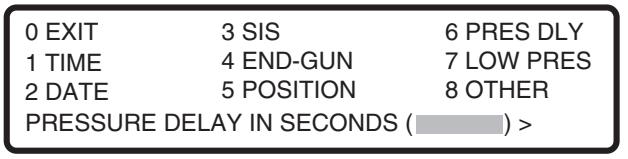


Figure 2.14

2. “180” for 180 seconds

3. ENTER to retain 180 seconds

NOTE: If a Valley Pro control panel is retrofitted to an older machine, a mechanical pressure switch may already be installed. A mechanical switch will work with this panel, but the pressure reading will not be displayed on the screen. The pressure delay constant will need to be entered, as the amount of time required for the low pressure switch to close.

Low Pressure Limit

The pressure transducer requires a low pressure limit to be set. If the pressure in the machine falls below the low pressure limit settings, the machine will shut down due to low pressure. For example, assume the low pressure limit is set at 20 psi. If the pressure at the transducer drops below 20 psi, the machine and water supply will be shut down.

NOTE: If a mechanical pressure switch is used, set the PRO LOW PRES to 100 psi (or maximum range of the mechanical switch). The switch should be adjusted manually and indicates either an open condition (low pressure) or a closed condition (sufficient pressure).

To set the low pressure limit, follow these steps:

1. “7” for LOW PRES

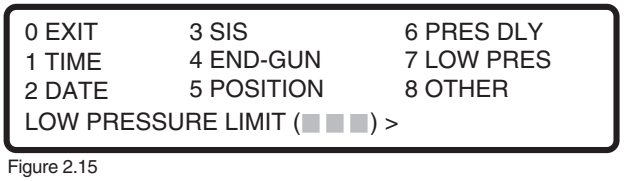


Figure 2.15

2. “20” for 20 psi

3. ENTER to retain 20 psi

NOTE: You are now ready to enter the remaining constants.

To view the OTHER constants available, select option #8:

1.“8” for OTHER constants

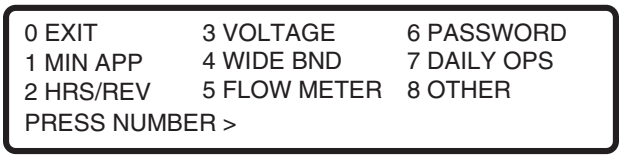


Figure 2.16

Minimum Water Application

The minimum application is the depth of water applied at a percentage timer setting of 100 percent. This value is important because it is used to calculate water applications at different machine speeds. Your Valley dealer will be able to supply this information.

To set the minimum water application, follow these steps:

1. “1” for MIN APP

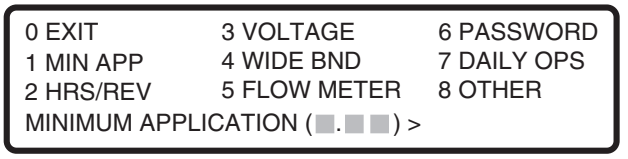


Figure 2.17

2. “.15” for .15 inches

3. ENTER to retain .15 inches

Hours/Revolution

Hours/revolution is the number of hours required for the pivot to make 1 complete revolution at a percentage timer setting of 100 percent. This is used to calculate hours per revolution for different percentage timer settings and is displayed on the status screen.

To set hours/revolution, follow these steps:

1. “2” for HRS/REV

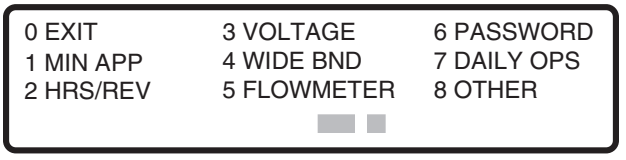


Figure 2.18

2. “12” for 12 hours

3. ENTER to retain 12 hours

Machine Voltage

The incoming voltage to the panel will be measured with a meter by your Valley dealer. This value will be entered as the VOLTAGE constant and calibrates the volt meter so the voltage can be monitored correctly.

NOTE: The low voltage shut down point is set as 440 volts from the factory. If the panel’s volt meter senses that the voltage is below 440 volts, the machine will be shut down and the Diagnostics screen will display a FAULT for machine power. A low voltage setting lower or higher than 440 volts can be entered by the operator. To enter a low voltage setting other than 440 volts, refer to Section 6 – “Low Voltage Shutdown Setting”.

CAUTION: Low voltage (less than 440 volts) will damage the drive motors and the problem should be corrected before resuming operation.

To set the machine voltage, follow these steps:

1. “3” for VOLTAGE

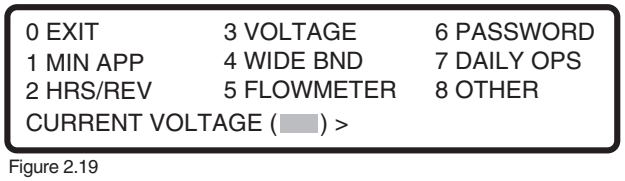


Figure 2.19

2. “491” for 491 volts

3. ENTER to retain 491 volts

Wide Boundary Constants

This option, “WIDE BND”, has been designed for corner machines which are extended on one or more sides. A sprinkler sequence can be turned on at these locations to provide uniform water application in the wide boundary areas.

Irrigating a Wide Boundary With a Corn

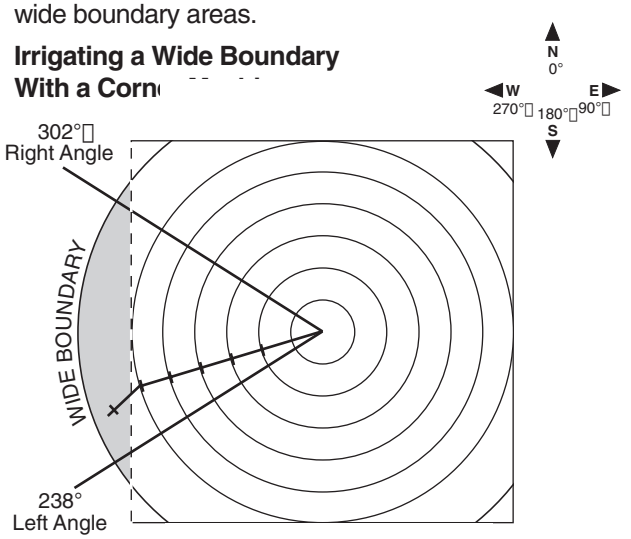


Figure 2.20

Figure 2.20 illustrates a field with a wide boundary. The sprinkler sequence which waters the West side needs to be turned on between 238 and 302 degrees.

To enter the wide boundary settings, follow these steps:

1. “4” for WIDE BND

Figure 2.21

2. “1” for sequence #1

3. “238” for left angle

4. ENTER to retain 238 degrees

5. “302” for right angle

6. ENTER to retain 302 degrees

ENTER

```
1  238- 302        4    0-   0        7    0-   0
2    0-   0        5    0-   0        8    0-   0
3    0-   0        6    0-   0        9    0-   0
ENTER SEQUENCE TO CHANGE >
```

Figure 2.22

NOTE: The procedure for entering the wide boundary settings is the same as entering end-gun shut-off sequences.

The wide boundary package can also be used to control a second end-gun, a span of sprinklers or other electrically controlled devices. Contact your Valley dealer for further information about the wide boundary package and special requirements such as 12 wire span cable.

NOTE: Pressing the "ESC" key will exit you from the constants screen. A message will be displayed indicating "CONSTANTS SAVED".

Flowmeter

Option #5 (FLOWMETER) is used if an optional electric flowmeter is to be installed on the machine. The flowmeter will display the rate of flow in either gallons per minute (GPM) or liters per minute depending on the measurement units selected.

If the electrical flowmeter is installed, the module must be calibrated for the flow rate by completing the following steps:

1. Press SYSTEM then "1" for CONSTANTS, "8" for OTHER, and "5" for FLOWMETER. The following will be displayed:

```
0 EXIT          3 VOLTAGE      6 PASSWORD
1 TIME          4 END-GUN      7 LOW PRES
2 HRS/REV       5 FLOWMETER    8 OTHER
FLOWMETER  GAL/PUL  (  1.25)  >
```

Figure 2.22A

2. Enter the Gallons Per Pulse Multiplier Value based on the flowmeter manufacturer's specifications.

ENTER

The display will return to the screen shown in Figure 2.22A.

RTUID

Option #6 (RTUID) is used only with the remote telemetry option. Entering RTUID numbers will be covered in the Remote Link Telemetry Control Owners Manual.

GETTING STARTED – USING THE COMMAND SELECTION KEYS

This sub-section will instruct you in using the command selection keys outlined in Figure 2.23.

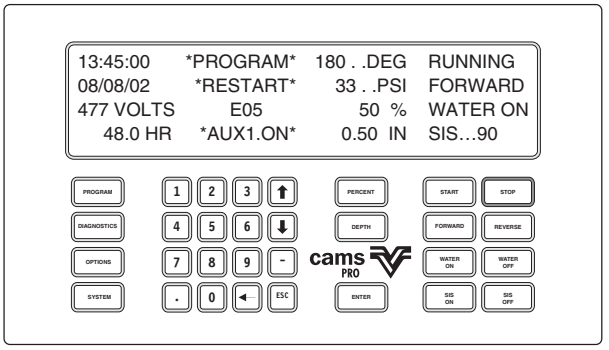


Figure 2.23

Setting PERCENT

Percent is used to set the percentage timer setting. This is the percent of one minute which the end tower will move. The depth of water applied at the selected percent setting will be automatically calculated and displayed on the status screen.

To set the percent to 75 (as an example), follow these steps:

1. PERCENT

PERCENT

```
13:45:08    *PROGRAM*  180. . DEG   RUNNING
08/08/02    *RESTART*   33. . PSI   FORWARD
477 VOLTS                 50   %    WATER. ON
ENTER PERCENT (  50) >
```

Figure 2.24

2. “75” for 75 percent

7 5

```
13:45:08     *PROGRAM*  180. . DEG   RUNNING
08/08/02     *RESTART*   33. . PSI   FORWARD
477 VOLTS                  50   %    WATER. ON
ENTER PERCENT (  50) > 75
```

Figure 2.25

3. ENTER to retain 75 percent

ENTER

```
13:45:08     *PROGRAM*  180. . DEG   RUNNING
08/08/02     *RESTART*   33. . PSI   FORWARD
477 VOLTS                  75   %    WATER. ON
  32.0 HR                  0.33 IN   SIS. . . OFF
```

Figure 2.26

Setting DEPTH

Depth is used to select an amount of water (in inches) which you want to apply. The percent timer setting is automatically adjusted to apply the selected amount of water.

To set the depth to 1.25 inches (as an example) follow these steps:

1. DEPTH

DEPTH

```
13:45:08     *PROGRAM*  180. . DEG   RUNNING
08/08/02     *RESTART*   33. . PSI   FORWARD
477 VOLTS                  75   %    WATER. ON
ENTER APPLICATION (  0.33) >
```

Figure 2.27

2. “1.25” for 1.25 inches

1 . 2 5

```
13:45:08     *PROGRAM*  180. . DEG   RUNNING
08/08/02     *RESTART*   33. . PSI   FORWARD
477 VOLTS                  75   %    WATER. ON
ENTER APPLICATION (  0.33) > 1.25
```

Figure 2.28

3. ENTER to retain 1.25 inches

ENTER

```
13:45:08     *PROGRAM*  180. . DEG   RUNNING
08/08/02     *RESTART*   33. . PSI   FORWARD
477 VOLTS                  20   %    WATER. ON
  120.0 HR                 1.25 IN   SIS. . . 90
```

Figure 2.29

Stop-In-Slot Selection (SIS)

SIS ON

1. Press SIS ON to make the stop-in-slot feature active.

SIS OFF

2. Press SIS OFF to make the stop-in-slot feature inactive.

NOTE: The stop-in-slot feature (if active) will shut the machine down at a predetermined point (degree setting) in the field. The SIS setting is entered in the SYSTEM CONSTANTS. Notice in the lower right-hand corner of Figure 2.29 that SIS... 90 is displayed. This indicates that the stop-in-slot is on and set at 90 degrees. If the stop-in-slot is OFF, “SIS...OFF” will be displayed.

Water On/Off Selection

WATER ON

1. Press WATER ON to run the machine wet or with water.

WATER OFF

2. Press WATER OFF to run the machine dry or without water.

NOTE: If the machine is running and applying water and WATER OFF is selected, the machine will continue to run with the water supply turned off and the percent timer will automatically be set to the last percentage timer setting the machine ran when WATER OFF was selected previously. (The Pro panel will automatically use 100 percent if there was no other previous settings by the operator.) If WATER ON is then selected, the water application depth will automatically be set to the last known setting when WATER ON was previously selected. The Pro panel remembers the last known percentage timer settings and applies them when the operator switches between WATER OFF and WATER ON.

Selecting FORWARD/REVERSE Direction

FOR

1. Press FORWARD to run the machine in the clockwise direction.

REV

2. Press REVERSE to run the machine in the counter-clockwise direction.

Starting/Stopping the Machine

START

1. Press start to start the machine.

NOTE: The machine will start if the safety circuit is complete. Remember, if WATER ON was previously selected, the machine will not actually start moving until the pressure is above the low pressure limit point or the mechanical pressure switch is closed. The machine will wait for pressure and a message "WAITING" will be displayed on the status screen where "RUNNING" is located in figure 2.29. When the pressure builds above the low pressure point, the forward or reverse contactor will be pulled in and "RUNNING" will be displayed. If the water pressure does not reach this set point in the amount of time specified in the pressure delay constant, then the pump will shut down due to low pressure. If WATER OFF was selected, the machine will start moving when START is pressed and the pump will not start.

STOP

2. Press stop to stop the machine.

NOTE: The machine and pump will both be shut down. The water valve will close if one is installed.

GETTING STARTED - USING OPTIONS

Pressing the OPTIONS key will display the screen in fig. 2.30.

OPTIONS

```
0 EXIT      3 START$      6 MODULE
1 AUX1      4 STOP$       7 AUTOREVERSE
2 AUX2      5 CYCLE$      8 AUTORESTART
PRESS NUMBER >
```

Figure 2.30

OPTIONS allows you to control the following:
- Auxiliary relays #1 and #2 - On/Off (Selections 1 and 2)
- Auto-reverse/Auto-stop (Selection 7)
- Auto-restart On/Off (Selection 8)

*NOTE: Selection *3 (START$), 4 (STOP$) and 5 (CYCLE$) will be explained in Section V "Repeat Programming". Selection 6 will be used/explained in SECTION VI, "Troubleshooting/Miscellaneous Data Review".*

*Selection 3 (START$) is used to program for Auto-restart and is also used in "Repeat Programming".

Controlling Auxiliary Relays #1 and #2

Two relays (AUX1 and AUX2) are standard with a Valley Pro control panel. AUX1 and AUX2 can be commanded On/Closed or Off/Open. A closed condition will supply 120 Volts AC to control a contactor, solenoid, or other control device. If Auxiliary relay #1 is on, it will be displayed on the main status screen. Auxiliary relay #2 will not be displayed on the status screen. Contact your Valley dealer to wire the auxiliary relays.

IMPORTANT: Auxiliaries are intended for irrigation equipment only. Other external uses may cause interference or excessive load on the transformer. Consult with your Valley dealer before using auxiliaries.

IMPORTANT: If auxiliary relays #1 or #2 are used to control an injector pump, the schematic on the inside of the panel door MUST be followed when wiring. This will ensure operation of the injector pump only with sufficient water pressure.

To control auxiliary relays (AUX1 and AUX2) On/Off, follow these steps:

1. OPTIONS

OPTIONS

2. "1" or "2" to control AUX1 or AUX2

1 or 2

EXAMPLE: Press "1" for AUX1

```
0 EXIT      3 START$      6 MODULE
1 AUX1      4 STOP$       7 AUTOREVERSE
2 AUX2      5 CYCLE$      8 AUTORESTART
AUX 1  1. . ON  0. . OFF (OFF) >
```

Figure 2.31

NOTE: AUX1 is currently Off (Closed) as indicated in parentheses in fig. 2.31.

3. "1" for ON or "0" for OFF

1 ON or 0 OFF

Automatic Reverse/Automatic Stop Option

This option will be used if your pivot is equipped with drive unit mounted end-of-field stop/auto-reverse. It allows you to choose whether or not the pivot stops or reverses direction when the actuator arm is tripped.

You must also enable the Auto reverse/stop option to the "on" mode. Refer to Section 6 – "AR/AS (Auto Reverse/Stop) Enable/Disable Feature" for information on enabling this feature. If you do not enable this feature, the message "AUTO REVERSE (DISABLED) >" will be displayed on the bottom line of Figure 2.33.

If your pivot is not equipped with drive unit mounted end-of-field stop/auto-reverse, then ignore this option as it will not affect the operation of the pivot. If you need to change directions of the pivot and end-of-field stop/auto-reverse hardware has not been installed, then the panel should be programmed to change directions. Please note the IMPORTANT message below.

IMPORTANT: It is REQUIRED that if the pivot needs to reverse around an obstacle (such as a tree line, building, etc.) that drive unit mounted end-of-field stop/auto-reverse be installed with physical barriers as a safety back-up. See your Valley dealer for more information concerning this matter.

To select Auto-Reverse/Auto-Stop, follow these steps:

1. OPTIONS

OPTIONS

```
0 EXIT      3 START$      6 MODULE
1 AUX1      4 STOP$       7 AUTOREVERSE
2 AUX2      5 CYCLE$      8 AUTORESTART
PRESS NUMBER >
```

Figure 2.32

2. "7" for AUTOREVERSE

7

```
0 EXIT      3 START$      6 MODULE
1 AUX1      4 STOP$       7 AUTOREVERSE
2 AUX2      5 CYCLE$      8 AUTORESTART
AUTOREVERSE  1. . AR  0. . AS (AS) >
```

Figure 2.33

NOTE: Notice "AS" in parentheses. This indicates that the machine is currently set-up to auto-stop when the actuator arm is tripped. "AR" would indicate an auto-reverse condition.

3. "1" for AUTOREVERSE or "0" for AUTOSTOP

1 (AR) or 0 (AS)

Automatic Restart Option

AUTORESTART provides the option to restart a machine automatically after a loss of power or pressure as described below:

Pressure Restart: Machine will restart when pressure is regained and reaches the Low Pressure Limit Point. If a machine restarts due to pressure, it will start with the same running conditions as when it previously lost pressure.

Power Restart: Machine will run the START$ program when power is restored. The START$ program must contain all commands required to restart the machine to the desired status (including the START command). This is especially important when a pump restart delay is required after a momentary loss of power resulting in a shutdown.

IMPORTANT: Machine will only restart if it was last shut down because of a loss of power or pressure. For example, if a machine was shut down by ARAS, SIS, pressing the stop key or by a programmed shut down, it would NOT power restart by turning the power disconnect off and on (loss of power), because the initial shut down was not caused by loss of power.

IMPORTANT: Pressure restart does NOT use a start-up command as power restart does. If a machine restarts with pressure, it will restart with the current conditions as if START was pressed.

To select auto-restart On/Off, follow these steps:

1. OPTIONS

OPTIONS

```
0 EXIT      3 START$      6 MODULE
1 AUX1      4 STOP$       7 AUTOREVERSE
2 AUX2      5 CYCLE$      8 AUTORESTART
PRESS NUMBER >
```

Figure 2.34

2. "8" for AUTO-RESTART

8

```
0 EXIT      3 START$      6 MODULE
1 AUX1      4 STOP$       7 AUTOREVERSE
2 AUX2      5 CYCLE$      8 AUTORESTART
AUTORESTART 1. . ON  0. . OFF (OFF) >
```

Figure 2.35

NOTE: OFF (in parentheses) indicates the auto-restart feature is disengaged. ON indicates auto-restart is engaged or active.

3. "1" for AUTORESTART ON or "0" for OFF

[1] ON or [0] OFF

*NOTE: The *RESTART* message is also shown by the DAILY OPS features. You must verify that AUTORESTART is ON to use RESTART for power and pressure. If Auto-restart is ON, a *RESTART* message (refer to fig. 2.36) will be displayed on the Status Screen to remind you the machine is programmed to restart automatically. If the machine is shut down by pressing the stop key, the stop-in-slot or by a programmed shut down, the *RESTART* message will disappear. This eliminates the situation that if someone stops the machine by pressing the stop key, it can't be restarted by someone turning the power disconnect off and on from a remote location until the restart feature is reactivated from the panel. If the operator starts the machine again by pressing the START key or by a programmed start, the *RESTART* message will appear again and power/pressure restart will be active again.*

```
13:45:08     *PROGRAM*  180. . DEG   RUNNING
08/08/02     *RESTART*   33. . PSI   FORWARD
477 VOLTS                  50   %     WATER. ON
   48.0 HR                 0.50 IN    SIS. . . OFF
```

Figure 2.36

REMEMBER: You MUST enter a Start-Up procedure using the START$ program for the power restart feature. If this is not entered, power restart will not operate correctly, even though you have selected auto-restart on. Refer to the following sub-section entitled "Entering the Power Restart Start-Up Procedure" for instructions on how to enter the Start-Up procedure.

Entering the Power Restart Start-Up Procedure

This sub-section explains how to program the machine to restart when power is regained.

The start-up procedure is entered using the START$ command. This is identified as selection #3 in the OPTIONS screen. Refer to Section V entitled "Repeat Programming" for further information about the START$ command and how it can be used in other situations besides power restart.

Two examples will be used to explain the process of entering the start-up procedure:

EXAMPLE 2.1 - Power Restart

An operator wants to have a machine restart in the following manner when a power failure occurs:

- 3 minute time delay from the time of power being restored to start-up of machine/pump.
- Select START

NOTE: A ten second time delay is standard or "built in". Therefore, if no time delay is entered, ten seconds will expire between the time of power being restored and start-up of the machine and pump. Therefore, in this example, 170 seconds will be entered as the time delay. One hundred seventy (170) seconds will be added to the standard ten seconds delay to give a total delay for restart of the machine/pump of three minutes.

To program Example 2.1, follow these steps:

1. OPTIONS

[OPTIONS]

2. "3" for START$

[3]

```
START$
0 EXIT          2 WRITE
1 REVIEW        3 EXECUTE
PRESS NUMBER >
```

Figure 2.37

3. "2" for WRITE

[2]

```
WRITE START$,


ENTER COMMANDS, FINISHED. . PRESS ENTER
```

Figure 2.38

4. ENTER

[ENTER]

```
0 EXIT
1 PROGRAM FINISHED
2 NEXT STEP
PRESS NUMBER >
```

Figure 2.39

5. "2" for NEXT STEP

[2]

```
STEP 1 PROGRAM BY:
0 EXIT     2 POSITION     4 DELAY      6 OTHER
1 TIME     3 PRESSURE     5 FOR/REV
PRESS NUMBER >
```

Figure 2.40

6. "4" for DELAY

4

```
STEP 1  PROGRAM BY: DELAY


DELAY 0. . SECONDS 1. . MINUTES >
```

Figure 2.41

NOTE: You have the opportunity to program a Delay in either minutes or seconds. In this example, select "0" for SECONDS.

7. "0" for SECONDS

0

```
STEP 1  PROGRAM BY: DELAY


ENTER DELAY IN SECONDS >
```

Figure 2.42

8. "170" for 170 seconds

1 7 0

9. ENTER to retain 170 seconds

ENTER

```
STEP 1 AT: 170 SECONDS DELAY,


ENTER COMMANDS, FINISHED. . PRESS ENTER
```

Figure 2.43

NOTE: You are now being requested to enter the commands to execute after 170 seconds +10 second standard time delay. In this example we only need to START the machine. Machine direction, percent/depth and WATER ON/WATER OFF will remain the same as when the machine was last shut down due to pressure/power.

10. START

START

```
STEP 1 AT: 170 SECONDS DELAY, START ,


ENTER COMMANDS, FINISHED. . PRESS ENTER
```

Figure 2.44

11. ENTER since finished

ENTER

```
0 EXIT
1 PROGRAM FINISHED
2 NEXT STEP
PRESS NUMBER >
```

Figure 2.45

12. "1" for PROGRAM FINISHED

1

```
0 EXIT      3 START$    6 MODULE
1 AUX1      4 STOP$     7 AUTOREVERSE
2 AUX2      5 CYCLE$    8 AUTORESTART
PRESS NUMBER >
```

Figure 2.46

13. To review the program entered, press "3" for START$

3

```
START$
0 EXIT          2 WRITE
1 REVIEW        3 EXECUTE
PRESS NUMBER >
```

Figure 2.47

14. "1" to REVIEW

1

```
STEP 1 AT: 170 SECONDS DELAY, START,


PRESS ANY KEY >
```

Figure 2.48

15. Press any key to exit review

or

16. "0" to exit to Status Screen

0

NOTE: The start-up procedure has been entered for Example 2.1. If power was lost and restored while this machine was running, the machine and pump will start after 3 minutes from the time power was restored.

EXAMPLE 2.2 - Power Restart

An operator wants to have a machine restart in the following manner when a power failure occurs:

- No time delay (except for ten second standard)
- Select START

*NOTE: This example would be typical if the operator wanted to turn the disconnect on and off at a remote location to start the machine. The machine will start after only ten seconds. REMEMBER – *RESTART* must be on if the operator wishes to do this.*

To program Example 2.2, follow these steps:

1. OPTIONS

2. "3" for START$

Figure 2.49

3. "2" for WRITE

Figure 2.50

NOTE: In this example, you can immediately select the commands you want to execute. This is a little different than Example 2.1, because we are not required to enter a time delay. To enter the time delay, we were required to press ENTER at this point and then select NEXT STEP.

4. START

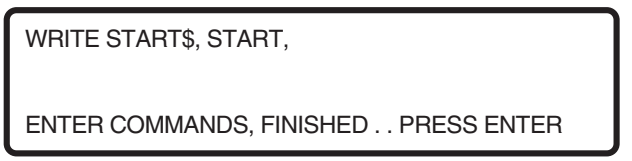


Figure 2.51

5. ENTER since finished

Figure 2.52

6. "1" for PROGRAM FINISHED

7. “0” to exit to Status Screen

NOTE: The start-up procedure has been entered for Example 2.2. If power was lost and restored while this machine was running, the machine and pump will start 10 seconds from the time power was restored (standard ten second delay).

READING THE HOUR METER

The C:A:M:S panel will display the cumulative hours of machine operation by selecting option #8 on the SYSTEM display screen. To access the hour meter, follow these steps:

1. SYSTEM

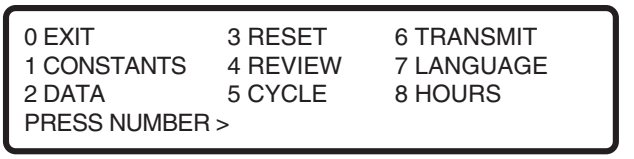


Figure 2.53

2. “8” for HOURS

Figure 2.53A

TOTAL HOURS - displays the cumulative hours, wet and dry, the machine was operated.
HOURS WET - displays only the hours the machine has operated with water or wet.

3. Changing the Hours

The operator can change the hours by doing the following:

TOTAL HOURS can be changed by pressing “1” for TOTAL HOURS and then keying in the new value by using the numerical key pad. Once the new value has been keyed in, press ENTER to save the change. **(NOTE: only an increase in hours will be accepted!)**

1

```
0 EXIT
1 TOTAL HOURS ... 9000.0
2 HOURS WET ..... 8000.0
PRESS NUMBER  (9000)  >
```

Figure 2.53B

HOURS WET can be changed by pressing “2” for HOURS WET and then keying in the new value by using the numerical key pad. Once the new value has been keyed in, press ENTER to save the change. (**NOTE:** the hours can be increased or decreased.)

2

```
0 EXIT
1 TOTAL HOURS ... 9000.0
2 HOURS WET ..... 8000.0
PRESS NUMBER  (8000)  >  0
```

Figure 2.53C

(In this example the operator has set the HOURS WET back to 0 for the start of a new irrigation season.)

If the operator were to press SYSTEM and then HOURS the new screen would show the following:

```
0 EXIT
1 TOTAL HOURS ... 9000.0
2 HOURS WET ..... 0.0
PRESS NUMBER  >
```

Figure 2.53D

4. Press “0” for EXIT to return to the main screen.

INTRODUCTION

Your control panel has the unique feature of being programmable. This means you can instruct your pivot to execute commands without being there. For example, you may want to program your machine to start at midnight when electricity is less expensive or change the water application depth for different crops in the same field. These types of commands can be programmed easily with your Valley Pro control panel.

This section will provide an overview of the programming features of this panel and will explain some of the terms used when programming.

THE PROGRAM FUNCTION

The PROGRAM function key is used for features such as creating, running and reviewing programs. Pressing the PROGRAM function key will display the following screen in fig. 3.1.

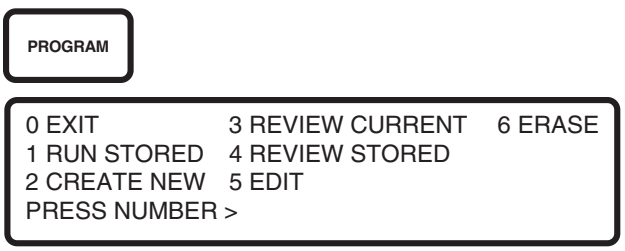


Figure 3.1

Following is a brief description of each option which is available to you:

1. RUN STORED
Run/execute programs from permanent storage.

2. CREATE NEW
Create programs. These programs are stored permanently.

3. REVIEW CURRENT
Review and delete current programs. The current programs are those that will be executed as soon as their conditions are met.

4. REVIEW STORED
Review programs in permanent storage to determine what each stored program consists of.

5. EDIT
Edit programs in permanent storage. This allows you to make changes without re-writing the entire program.

6. ERASE
Erase programs in permanent storage. You have the option to erase/delete any programs which are stored.

UNDERSTANDING THE PROGRAM FUNCTION

A program is a list of instructions that are executed in order.

A program must be run (activated) before the instructions can be executed.

Program #18, #19, and #20 are specifically used for the START$, STOP$, and CYCLE$ programs.

The block of memory where programs are stored can be compared to a music CD or album with a collection of songs. They remain on the CD (album) while they are played; they are not removed while they are played. Like the songs, the programs remain in memory after they are run. Programs can be run repeatedly as many times as needed. They can also remain inactive until they are needed.

Each program consists of a list of instructions that are grouped into steps. Each step has a condition that must be met before the instructions can be executed. The machine will wait until the condition is satisfied, then the instructions are executed in order until all of the instructions in the step have been completed. If it is not the last step of the program, the next step is read, beginning with the condition that must be met. After the last step is complete, the program is reset to non-active. A distinct feature is the ability of the machine to run as many programs as necessary, simultaneously.

PROGRAMS AND STEPS

WHAT IS A PROGRAM?

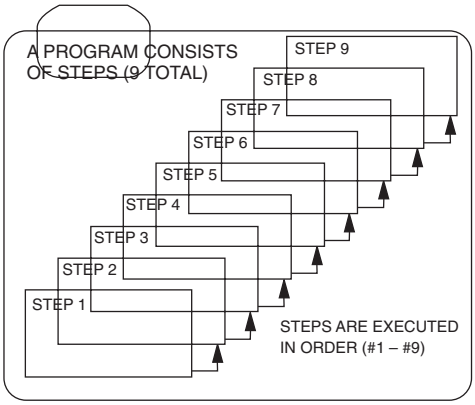


Figure 3.2

WHAT IS A STEP?

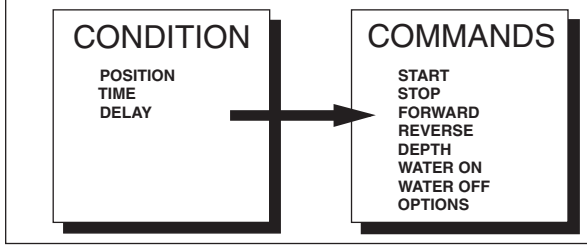


Figure 3.3

A program consists of steps (up to nine total). A condition must be included with each step. The condition tells the computer when it should execute commands. For example, should the command be executed at a position in the field, a date/time or after a specified amount of time (delay). Commands are then assigned to each condition. You can select only one command or several. Some of the different commands you can select are listed in fig. 3.3.

HOW ARE PROGRAMS EXECUTED?

It is very important to remember steps are executed in order. Step #1 must be executed before step #2, step #2 before step #3 and so on.

PROGRAMS RUNNING SIMULTANEOUSLY

Previously, we had discussed that up to 20 programs can be run or be current at the same time. If more than one program is current, the computer continuously scans all of the current programs and looks for a step with a condition which is met. If two or more conditions are met at the same time, the step associated with the program which was entered last will be executed.

CURRENT PROGRAMS

Program #	Condition	Command
1	08/08/02 at 6:00:00	Forward
2	180 degrees	Depth = 1.00 inches
3	180 degrees	Depth = 0.50 inches

Figure 3.4

For example, assume you had created the following three programs illustrated in fig. 3.4. Notice that in this example, each program consists of only one step.

Let's assume that August 8, 2002 at 6:00 P.M. occurs before the machine is at 180 degrees. The machine will then change direction to forward on 8/8/02 at 6:00 P.M. The next condition which will be met is 180 degrees. Both depth commands will now be executed simultaneously, but a depth of 0.50 inches will be the accepted command since it was entered after program #2. When you review current programs they are not labeled with a program number, however, the order in which they appear is the order in which they were entered.

Now that you have a better understanding of how programs are created and executed, you are ready to actually start learning how to create and run your own programs in Section IV "Programming - Learning the Basics".

USING THE SIX BASIC PROGRAM FUNCTIONS

The PROGRAM function key allows you to do the following:

- CREATE (or write) NEW programs
- REVIEW STORED programs which can be recalled for execution
- EDIT stored programs
- RUN STORED programs
- REVIEW CURRENT programs
- ERASE programs which have been stored

The following example explains how to use each of the above Program functions. This irrigation equipment will be programmed to change application depths over an area of the field.

Current Conditions:

- Machine running forward at 270 degrees
- 0.50 inches water application

Program Machine to:

- Change water depth to 1.00 inch at 0 degrees
- Change water depth back to 0.50 inches at 180 degrees

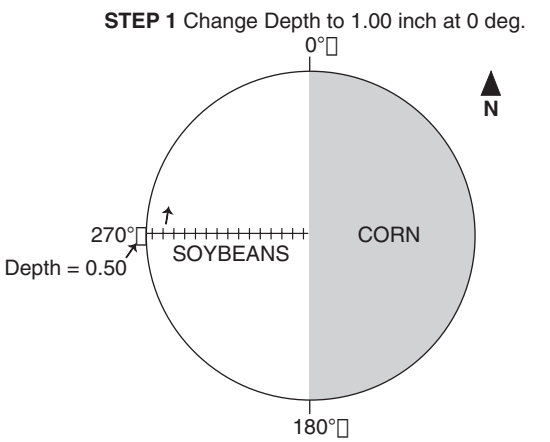


Figure 4.1

CREATE NEW Programs

CREATE NEW is selected to write programs. To create the program in fig. 4.1, follow these instructions:

1. PROGRAM

PROGRAM

```
0 EXIT              3 REVIEW CURRENT   6 ERASE
1 RUN STORED        4 REVIEW STORED
2 CREATE NEW        5 EDIT
PRESS NUMBER >
```

Figure 4.2

2. "2" for CREATE NEW

2

```
STEP 1 PROGRAM BY:
0 EXIT    2 POSITON      4 DELAY      6 OTHER
1 TIME    3 PRESSURE     5 FOR/REV
PRESS NUMBER >
```

Figure 4.3

NOTE: You are now requested to select a condition to program by. Our example requires that the water depth be changed from 0.50 inches to 1.00 inch at a position of 0 degrees. Therefore, you should select position as the condition for step #1.

3. "2" for POSITION

2

```
STEP 1 PROGRAM BY: POSITION


ENTER POSITION (    270) >
```

Figure 4.4

4. "0" FOR 0 degrees

0

5. ENTER to retain 0 degrees

ENTER

```
STEP 1 AT: 0 DEGREES,


ENTER COMMANDS, FINISHED. . PRESS ENTER
```

Figure 4.5

NOTE: You are now prompted to enter the commands which need to be executed at 0 degrees. Our example requires that the DEPTH of water application be changed.

6. DEPTH

DEPTH

```
STEP 1 AT: 0 DEGREES,


ENTER APPLICATION (    0.50) >
```

Figure 4.6

7. "1" for 1 inch

1

8. ENTER to retain 1 inch

ENTER

```
STEP 1 AT: 0 DEGREES,  DEPTH 1.00,


ENTER COMMANDS, FINISHED. . PRESS ENTER
```

Figure 4.7

NOTE: You are now finished entering commands to occur at 0 degrees.

9. ENTER since finished

ENTER

```
0 EXIT
1 PROGRAM FINISHED
2 NEXT STEP
PRESS NUMBER >
```

Figure 4.8

NOTE: You are now ready to program step #2. Step 2 will consist of changing the water depth back to 0.50 inches at 180 degrees.

10. "2" for NEXT STEP

2

```
STEP 2      PROGRAM BY:
0 EXIT    2 POSITION      4 DELAY       6 OTHER
1 TIME    3 PRESSURE      5 FOR/REV
PRESS NUMBER >
```

Figure 4.9

11. "2" for POSITION

2

12. "180" for 180 degrees.

1 8 0

13. ENTER to retain 180 degrees

ENTER

14. DEPTH

DEPTH

15. ".5" for .5 inches

. 5

16. ENTER to retain .5 inches

ENTER

17. ENTER since finished

ENTER

```
0 EXIT
1 PROGRAM FINISHED
2 NEXT STEP
PRESS NUMBER >
```

Figure 4.10

NOTE: Steps 1 and 2 of this program have now been entered. Select option 1 to indicate that the program is finished.

18. "1" for PROGRAM FINISHED

1

```
0 EXIT                    3 CANCEL PROGRAM
1 SAVE PROGRAM
2 SAVE PROGRAM AND RUN
PRESS NUMBER >
```

Figure 4.11

NOTE: You have 3 choices for this program:

1) SAVE PROGRAM - permanently saved and can be recalled at any time.
2) SAVE PROGRAM AND RUN - the program will be saved and activated.
3) CANCEL PROGRAM - program will not be saved or executed.

For this example, choose option 1 - SAVE PROGRAM.

19. "1" to SAVE PROGRAM

1

```
STORED PROGRAMS

PRESS NUMBER FROM 1 TO 17 TO SAVE.
PRESS ANY OTHER KEY TO DELETE.
```

Figure 4.12

NOTE: Figure 4.12 indicates there are no programs stored. This program will be identified as program #1 by pressing "1". If some programs had already been stored, they would be listed to the right of STORED PROGRAMS in fig. 4.12.

20. "1" to save as program #1, then “ENTER” to confirm program #1.

1

ENTER

```
PROGRAM 1 SAVED

PRESS ANY KEY >
```

Figure 4.13

21. Press any key to exit

or

REVIEW STORED Programs

The REVIEW STORED option is used to view programs which have already been created and stored. This is helpful if you forget what a particular program does. To demonstrate this function, we will review program #1 which was just created.

1. PROGRAM

PROGRAM

```
0 EXIT          3 REVIEW CURRENT   6 ERASE
1 RUN STORED    4 REVIEW STORED
2 CREATE NEW    5 EDIT
PRESS NUMBER >
```

Figure 4.14

2. "4" for REVIEW STORED

4

```
STORED PROGRAMS 1,

ENTER PROGRAM NUMBER >
```

Figure 4.15

3. "1" to review program #1, then “ENTER” to confirm program #1.

1

ENTER

```
STEP 1 AT: 0 DEGREES,  DEPTH 1.00,

PRESS ANY KEY >
```

Figure 4.16

NOTE: Step #1 of program 1 is displayed. To view the next step, press any key.

4. Press any key to view next step

or

```
STEP 2 AT: 180 DEGREES , DEPTH 0.50,

PRESS ANY KEY >
```

Figure 4.17

5. Press any key to continue the review process

or

```
0 EXIT              3 REVIEW CURRENT   6 ERASE
1 RUN STORED        4 REVIEW STORED
2 CREATE NEW        5 EDIT
PRESS NUMBER >
```

Figure 4.18

NOTE: Notice that the program screen is displayed to select programming options.

6. "0" to EXIT

0

EDIT Stored Programs - Changing a Program

The edit function allows you to make changes to programs which have already been saved or stored. This eliminates rewriting an entire program.

The following is a typical existing program followed by changes the operator wants to make to the program. In this example, steps within a program will be changed.

Current Conditions:

Program #1

- Machine Off at 0 degrees; Forward; 50 percent; Water on.
- Current date is 08/08/02 for this example

Machine Currently Programmed To *(see Figure 4.19.1):*

Step #1 08/08/02; 3:00 A.M.; Forward; Water On; 1:00 Inch; Start
Step #2 180 degrees; 100 percent; Water Off
Step #3 225 Degrees; 0.75 Inches; Water On
Step #4 0 degrees; Stop

Even though it is typically not recommended to store programs incorporating a start date and time, it is sometimes easier to edit an existing program rather than writing a new program. Due to extremely dry and windy weather, the operator wants to start irrigation on August 12th and increase the amount applied to the corn. He wants to leave the set aside acres and the soybeans under the existing program parameters.

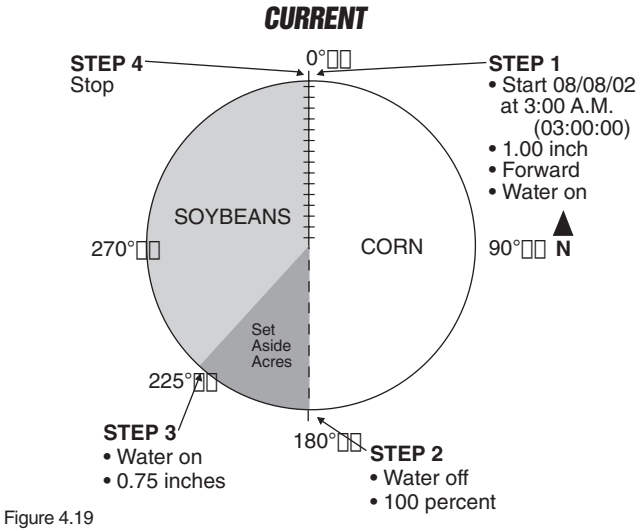


Figure 4.19

Edit Program #1 to *(see Figure 4.20):*

Step #1 08/08/02; 6:P.M (18:00); Forward; Water On; 1.25 Inches; Start
Step #2 180 degrees; 100 percent; Water Off
Step #3 225 Degrees; 0.75 Inches; Water On
Step #4 0 degrees; Stop

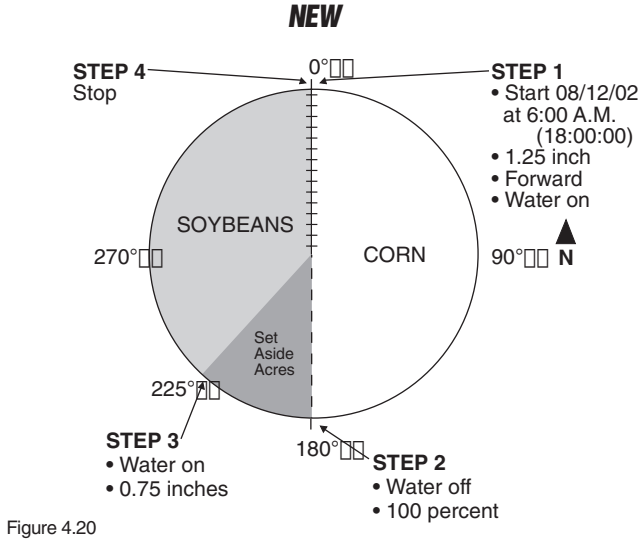


Figure 4.20

Follow these Steps to Edit Program #1:

1. Press “PROGRAM”

PROGRAM

```
0 EXIT              3 REVIEW CURRENT   6 ERASE
1 RUN STORED        4 REVIEW STORED
2 CREATE NEW        5 EDIT
PRESS NUMBER >
```

Figure 4.21

2. "**5**" for EDIT

5

```
STORED PROGRAMS 1,2,3,4,5,7,9


ENTER PROGRAM NUMBER >
```

Figure 4.22

3. "**1**" to edit Program #1, then "ENTER" to confirm program #1.

1

ENTER

```
STEP 1 AT: 08/08/02 03:00:00, FORWARD,
  WATER ON, DEPTH 1.00, STAR T

ENTER..ACCEPT BS..CURSOR-..DEL >
```

Figure 4.23

Note the blinking cursor (■) at the end of the last command in the step.

Editing Choices

The lower portion of the screen indicates three choices the operator can select from. These are as follows:

Choices - First Screen

ENTER..ACCEPT: Pressing the ENTER key will maintain this step (Step 1) and move you to the next screen which has two additional choices (See Choices - Second Screen).

BS..CURSOR: If a command is to be changed in the step, the " ← " key (BS - Back Space) can be depressed to move the blinking cursor (■) back to the step to be changed.

-..DEL: Pressing the DEL (delete) key will delete or erase the command or condition associated with the command the cursor is positioned at. A new command can then be added or other appropriate programming done. If desired, the complete step can be deleted by continuing to press the "←" (BS - Back Space) key.

Choices - Second Screen

1..INSERT STEP: Pressing number "1" on the numeral key allows you to insert a step between the step shown on the screen and the next step (between Step 1 and STEP 2 in this example).

0..DISPLAY NEXT STEP: Pressing the "**0**" key move you to the next step in the program. Here again, you have the choice to edit the commands and associated this step or accept the step and move to the next screen to insert a step(s) or move to the following step.

ENTER..ACCEPT: Pressing the ENTER key will maintain this step (Step 1) and move you to the next screen which has two additional choices.

BS..CURSOR: If a command is to be changed in the step, the " ← " key (BS - Back Space) can be depressed to move the cursor (■) back to the step to be changed.

In this example, the editing of STEP 1 is shown.

4. "←" (BS - Back Space) to move cursor (■) back to 8/08/02

←

```
STEP 1 AT: 08/08/02 03:00:00, FORWARD,
  WATER ON, DEPTH 1.00, START

ENTER..ACCEPT BS..CURSOR -..DEL >
```

Figure 4.24

NOTE: When the cursor (■) reaches the date, the screen in Figure 4.25 will appear.

5. "**081202**" for Start Date

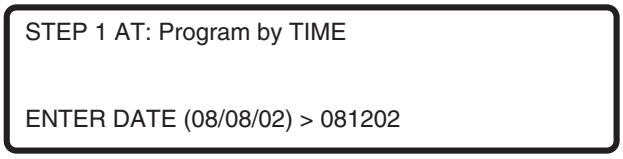


Figure 4.25

6. "**ENTER**" to retain date

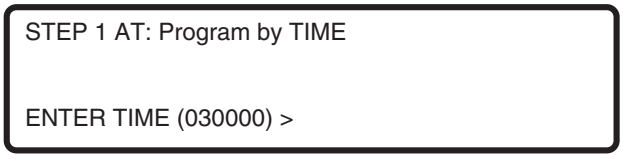


Figure 4.26

7. "**180000**" (6:00 P.M.) to establish start time

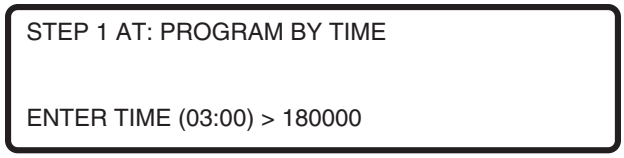


Figure 4.27

8. "**ENTER**" to retain time

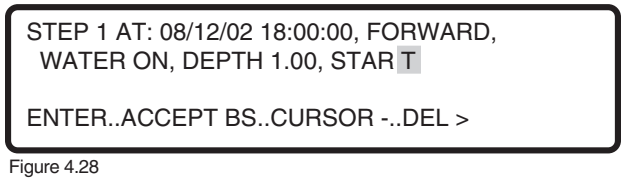


Figure 4.28

9. "← " (BS - Back Space) to move cursor ( ) back to DEPTH 1.00

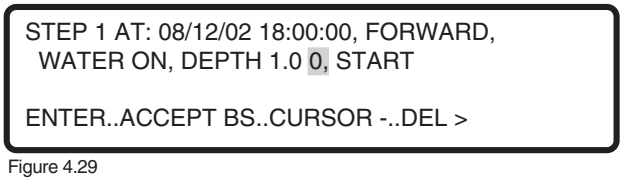


Figure 4.29

10. Press "**-**" to delete 1.00

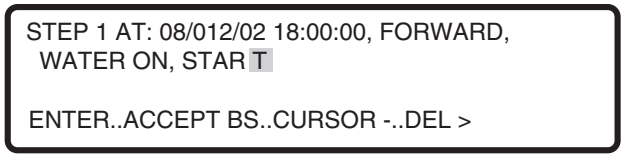


Figure 4.30

11. "← " (BS - Back Space) to move cursor ( ) back to WATER ON

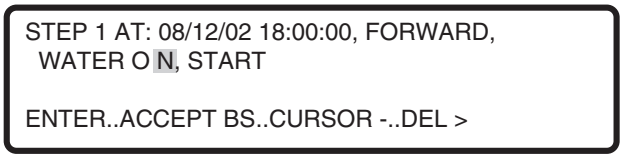


Figure 4.31

12. Press "**DEPTH**" to add/insert application amount of 1.25 inches

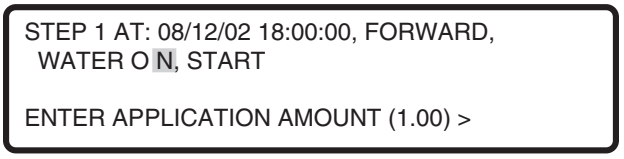


Figure 4.32

13. "**1.25**" for 1.25 inches

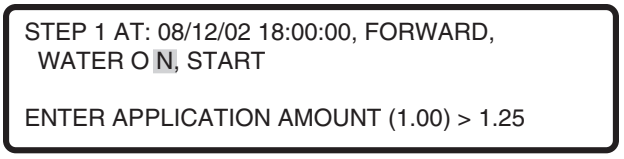


Figure 4.33

14. "**ENTER**" to retain 1.25 inches

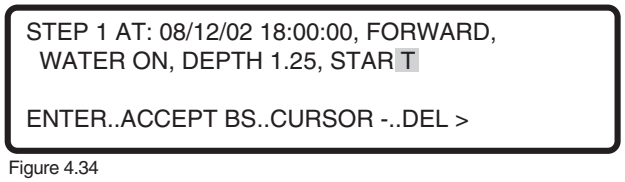


Figure 4.34

15. Press "**ENTER**" for additional selections.

ENTER

```
STEP 1 AT: 08/12/02 18:00:00, FORWARD,
 WATER ON, DEPTH 1.25, STAR T

1..INSERT STEP 0..DISPLAY NEXT STEP >
```

Figure 4.35

16. Continue to press "**ENTER**" thru the remaining steps until the screen in Figure 2.18 is displayed.

ENTER

ENTER

```
0 EXIT                    3 CANCEL PROGRAM
1 SAVE PROGRAM
2 SAVE PROGRAM AND RUN
PRESS NUMBER
```

Figure 4.36

17. Press "**1, 2 or 3**" depending if you want to save, run or cancel the edited program.

0, 1, 2 or 3

```
0 EXIT                    3 CANCEL PROGRAM
1 SAVE PROGRAM
2 SAVE PROGRAM AND RUN
PRESS NUMBER
```

Figure 4.37

0 EXIT:
NOT USED

1 SAVE *EDITED* **PROGRAM:**
The *edited program* can be saved as Program #1 which will erase or eliminate the original Program #1. The *edited Program #1* can be saved as a *new program* allowing the existing Program #1 to still be available.

2 SAVE *EDITED* **PROGRAM AND RUN:**
Selecting option 2 saves the program and activates it.

3 CANCEL *EDITED* **PROGRAM:**
Pressing 3 will *cancel the program:* the program will not be saved or executed. Canceling *will not* affect the original Program #1.

EDIT Stored Programs

The edit function allows you to insert steps into existing programs, which have already been saved or stored. This eliminates rewriting an entire program.

The following is a typical program followed by changes the operator wants to make to the program. In this example, steps will be inserted.

Current Conditions:

Program #1

- Machine running at 90 degrees; Forward; 50 percent; Water on.
- The machine is equipped with end-of-field stop/ auto reverse hardware. Barriers are located at 90 and 270 degrees to trip the arms and change the direction of the machine.

Machine Currently Programmed To *(see Figure 14.19.20):*

Step #1 80 percent timer setting at 180 degrees
Step #2 0 percent timer setting when machine reverses at 270 degrees
Step #3 50 percent timer setting after 600 seconds (10 minute time delay to improve water application uniformity at reverse point)
Step #4 80 percent timer setting at 180 degrees (machine will be traveling in reverse direction)
Step #5 0 percent when machine changes to forward direction at 90 degrees
Step #6 Stop (shut off) machine after 10-minute time delay

The field in the example has a low area that does not need the same application amount as the other parts of the field. This area is between 225 and 235 degrees. To prevent potential traction and/or tracking difficulties in the future the operator wants to maintain the same program but shut off the water and increase the speed of the machine across this area of the field as he makes the first pass (forward direction). Once across the area, he wants to resume operating at 80 percent and irrigate. On the return pass (reverse), he

wants to maintain the 50 percent setting and irrigate across this area. To accomplish this, STEPS must be added (inserted) between the original Step1 and Step 2 (new steps shown in **BOLD**).

Edit Program #1 to (see Figure 4.39):

Step #1 80 percent timer setting at 180 degrees
Step #2 100 percent at 225 degrees; Water off
Step #3 80 percent at 235 degrees; Water on
Step #4 0 percent timer setting when machine reverses at 270 degrees
Step #5 50 percent timer setting after 600 seconds (10 minute time delay to improve water application uniformity at reverse point)
Step #6 80 percent timer setting at 180 degrees (machine will be traveling in reverse direction)
Step #7 0 percent when machine changes to forward direction at 90 degrees
Step #8 Stop (shut off) machine after 10-minute time delay

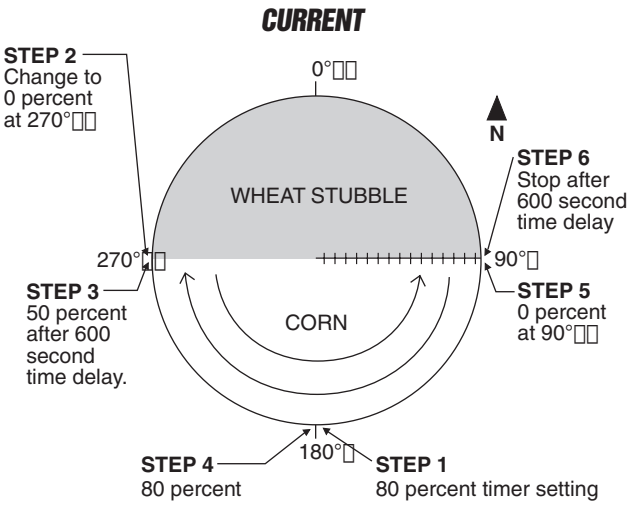


Figure 4.38

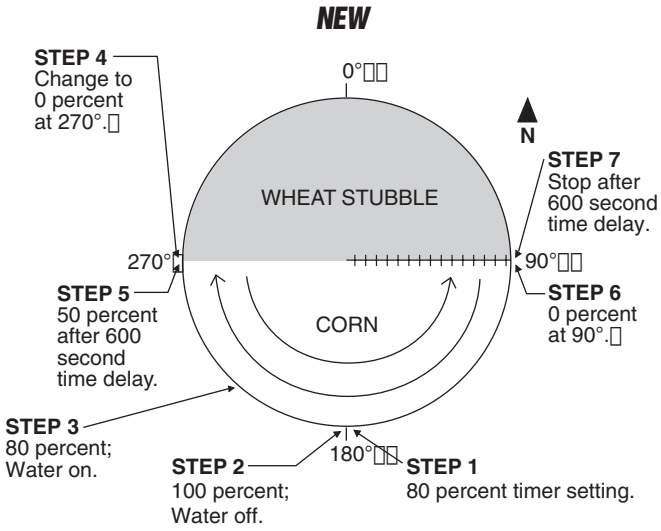


Figure 4.39

Follow these Steps to Edit Program #1:

1. Press "**PROGRAM**"

PROGRAM

```
0 EXIT              3 REVIEW CURRENT   6 ERASE
1 RUN STORED        4 REVIEW STORED
2 CREATE NEW        5 EDIT
PRESS NUMBER >
```

Figure 4.40

2. "**5**" for EDIT

5

```
STORED PROGRAMS 1,2,3,4,5,7,9


ENTER PROGRAM NUMBER >
```

Figure 4.41

3. "**1**" to edit Program #1 and press "ENTER" to verify Program #1.

1

ENTER

```
STEP 1 AT: 180 DEGREES, PERCENT 8 0


ENTER..ACCEPT BS..CURSOR-..DEL >
```

Figure 4.42

Note the blinking cursor ■ at the end of the last command.

4. Press "**ENTER**" to maintain Step #1 and move to other editing choices.

ENTER

```
STEP 1 AT: 180 DEGREES, PERCENT 80

1..INSERT STEP 0..DISPLAY NEXT STEP >
```

Figure 4.43

5. "**1**" to INSERT STEP

1

```
STEP 2 PROGRAM BY:
0 EXIT   2 POSITION    4 DELAY      6 OTHER
1 TIME   3 PRESSURE    5 FOR/REV
PRESS NUMBER >
```

Figure 4.44

6. "**2**" for POSITION

2

```
STEP 2 PROGRAM BY: POSITION

ENTER POSITION (   185.0) >
```

Figure 4.45

7. "**225**" for 225 degrees

2 2 5

```
STEP 2 PROGRAM BY: POSITION

ENTER POSITION (  185.0) > 225
```

Figure 4.46

8. Press "**ENTER**" to retain 225 degrees

ENTER

```
STEP 2 AT: 225 DEGREES,

ENTER COMMANDS, FINISHED..PRESS ENTER
```

Figure 4.47

9. "**PERCENT**" to input new machine speed

PERCENT

```
STEP 2 AT: 225 DEGREES,

ENTER PERCENT ( 0) >
```

Figure 4.48

10. "**100**" for 100 percent

1 0 0

```
STEP 2 AT: 225 DEGREES,

ENTER PERCENT (  0) > 100
```

Figure 4.49

11. "**ENTER**" to retain 100 percent

ENTER

```
STEP 2 AT: 225 DEGREES, PERCENT 100,

ENTER COMMANDS, FINISHED..PRESS ENTER
```

Figure 4.50

12. Press "**WATER OFF**" to end irrigation

WATER OFF

```
STEP 2 AT: 225 DEGREES, PERCENT 100,
  WATER OFF,

ENTER COMMANDS, FINISHED..PRESS ENTER
```

Figure 4.51

13. "**ENTER**" for finished with this step

ENTER

```
STEP 2 AT: 225 DEGREES, PERCENT 100,
  WATER OF F

ENTER..ACCEPT BS..CURSOR-..DEL >
```

Figure 4.52

14. "**ENTER**" for next selection/choice

ENTER

```
STEP 2 AT: 225 DEGREES, PERCENT 100,
  WATER OF F

1..INSERT STEP 0..DISPLAY NEXT STEP >
```

Figure 4.53

15. "**1**" for INSERT next step

1

```
STEP 3 PROGRAM BY:
0 EXIT   2 POSITION    4 DELAY      6 OTHER
1 TIME   3 PRESSURE    5 FOR/REV
PRESS NUMBER >
```

Figure 4.54

16. "**2**" for program by position

2

```
STEP 3 PROGRAM BY:
0 EXIT   2 POSITION    4 DELAY      6 OTHER
1 TIME   3 PRESSURE    5 FOR/REV
PRESS NUMBER > 2
```

Figure 4.55

17. "**235**" for 235 degrees

2 3 5

```
STEP 3 PROGRAM BY: POSITION


ENTER POSITION (  185.0) > 235
```

Figure 4.56

18. "**ENTER**" to retain 235 degrees

ENTER

```
STEP 3 AT: 235 DEGREES,


ENTER COMMANDS, FINISHED..PRESS ENTER
```

Figure 4.57

19. Press "**PERCENT**" to set speed

PERCENT

```
STEP 3 AT: 235 DEGREES,


ENTER PERCENT ( 0) >
```

Figure 4.58

20. "**80**" for 80 percent

8 0

```
STEP 3 AT: 235 DEGREES,


ENTER PERCENT ( 0) > 80
```

Figure 4.59

21. "**ENTER**" to retain 80 percent

ENTER

```
STEP 3 AT: 235 DEGREES, PERCENT 80,


ENTER COMMANDS, FINISHED..PRESS ENTER
```

Figure 4.60

22. "**WATER ON**" to begin irrigating

WATER ON

```
STEP 3 AT: 235 DEGREES, PERCENT 100,
WATER ON,

ENTER COMMANDS, FINISHED..PRESS ENTER
```

Figure 4.61

23. "**ENTER**" for next selection/choice

ENTER

```
STEP 3 AT: 225 DEGREES, PERCENT 100,
WATER O N,

1..INSERT STEP 0..DISPLAY NEXT STEP >
```

Figure 4.62

24. Step 3 was the last step to insert into the program. Continue to press "**ENTER**" to move through the remaining steps until the "**EXIT/SAVE/RUN/ CANCEL**" screen is displayed.

ENTER

```
STEP 4 AT: 225 DEGREES, PERCENT 0,
WATER O N,

ENTER COMMANDS, FINISHED..PRESS ENTER
```

Figure 4.63

ENTER (Continue to Press "ENTER" until the screen in Figure 3.27 appears)

25. Press "**1, 2 or 3**" depending if you want to save, run or cancel the edited program.

0, 1, 2 or 3

```
0 EXIT                    3 CANCEL PROGRAM
1 SAVE PROGRAM
2 SAVE PROGRAM AND RUN
PRESS NUMBER
```

Figure 4.64

RUN STORED Programs

This option allows you to execute a program which you have written and stored. The program is transferred from permanent storage to current programs. If a program is current, this means that it will be executed.

To run stored program #1 in our example, follow these steps:

1. PROGRAM

PROGRAM

```
0 EXIT          3 REVIEW CURRENT   6 ERASE
1 RUN STORED    4 REVIEW STORED
2 CREATE NEW    5 EDIT
PRESS NUMBER >
```

Figure 4.65

2. "1" for RUN STORED

1

```
STORED PROGRAMS 1,


ENTER PROGRAM NUMBER >
```

Figure 4.66

3. "1" to run program #1, then press “ENTER” to confirm program #1.

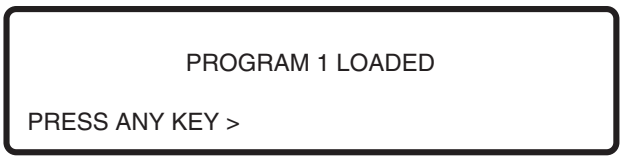


Figure 4.67

4. Press any key to exit to program screen.

*NOTE: A *PROGRAM* message will now appear on the status screen as illustrated in fig. 4.68. This indicates that a program has been loaded and is current (will be executed). The water depth will now be changed from 0.50 to 0.75 inches (step 1 of program #1) as soon as the position of the pivot reaches 0 degrees.*

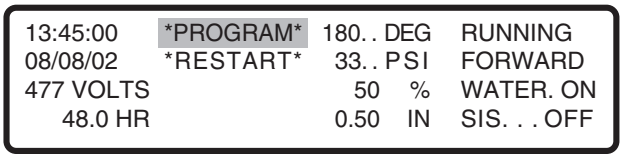


Figure 4.68

REVIEW CURRENT Programs

Review Current allows you to view programs which are current or will be executed as soon as their conditions are met. Now that you have run program #1, you can review it as a current program.

While reviewing Current Programs, the * character is shown before the PRESS ANY KEY prompt to show which step will be executed next. Each active program will have an * to indicate the current step. To review the current program, follow these steps:

1. PROGRAM

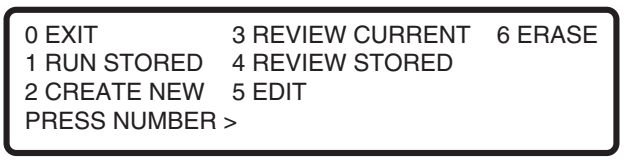


Figure 4.69

2. "3" for REVIEW CURRENT

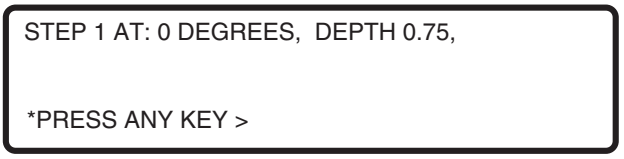


Figure 4.70

*NOTE: The * indicates this is the active step in this program. Only one step is active in a Current Program.*

3. Press any key for next step.

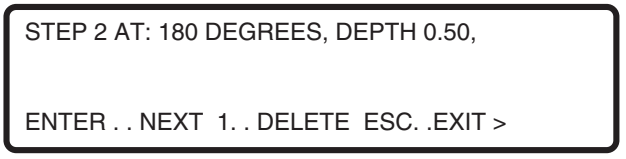


Figure 4.71

NOTE: Several options are available for the program just reviewed.

1) Press ENTER to review the next program.
2) Press “1” to delete the program just reviewed.
3) Press the Escape key to exit.

4. Press the Enter key to view the next program.

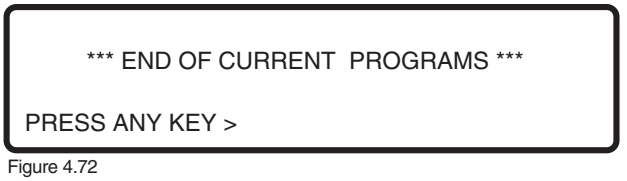


Figure 4.72

NOTE: Figure 4.72 indicates there are no more current programs in memory.

5. Press any key to exit to Program Screen

```
0 EXIT              3 REVIEW CURRENT   6 ERASE
1 RUN STORED        4 REVIEW STORED
2 CREATE NEW        5 EDIT
PRESS NUMBER >
```

Figure 4.73

Deleting Current Programs

Current programs can be easily deleted. To demonstrate this, delete program #1 which is now current. Deleting a current program only deactivates it. Deleting a current program does not erase it from the stored program memory.

1. Follow steps #1-3 under the REVIEW CURRENT section. Figure 4.74 will be displayed.

```
STEP 2 AT: 180 DEGREES DEPTH 0.50,


ENTER . . NEXT    1. . DELETE    ESC. . EXIT >
```

Figure 4.74

2. "1" to DELETE program

```
      *** END OF CURRENT  PROGRAMS ***

PRESS ANY KEY >
```

Figure 4.75

3. Press any key to exit.

*NOTE: The *PROGRAM* message on the status screen will now disappear and if you review current programs again you will see what is displayed in fig. 4.76, indicating no programs will be executed.*

```
      *** END OF CURRENT  PROGRAMS ***

PRESS ANY KEY >
```

Figure 4.76

NOTE: Up to 20 different current programs can be run at the same time. When reviewing current programs, you have the choice of deleting any program you want. You would press ENTER to view the next program, look at the different steps in that program, and then determine if you want to delete it or not. The option to delete is always displayed with the last step of the program you are reviewing.

ERASE Programs

This option is only used to erase programs which have been stored permanently. To delete current programs, you must use the REVIEW CURRENT option as discussed previously.

To demonstrate the use of the ERASE option, we will erase stored program #1 in our example. Remember - this option is only used to erase STORED programs.

1. PROGRAM


```
0 EXIT              3 REVIEW CURRENT   6 ERASE
1 RUN STORED        4 REVIEW STORED
2 CREATE NEW        5 EDIT
PRESS NUMBER >
```

Figure 4.77

2. "6" for ERASE

```
STORED PROGRAMS 1,


ENTER PROGRAM NUMBER >
```

Figure 4.78

3. "1" to erase program #1, then press “ENTER” to confirm program #1.

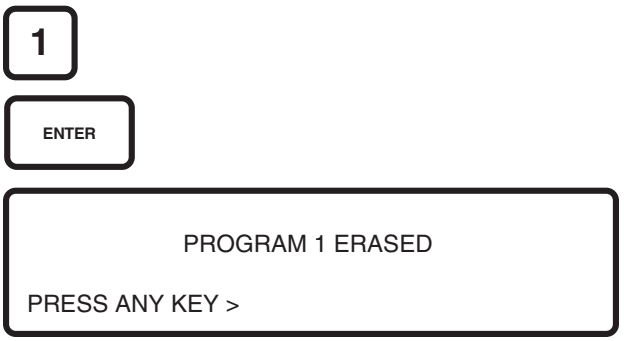


Figure 4.79

4. Press any key to return to Program Screen

NOTE: If you were to review stored programs again, you would find that program #1 no longer exists.

You are now familiar with the six basic programming functions. Following are sections pertaining to designing your own programs which will apply what you have learned so far.

DESIGNING YOUR PROGRAMS

A program is simply a list of events which need to occur in a specified order. In this case, the events are irrigation equipment commands. Putting a little thought into your programs will make the process of writing them easy. The program design form illustrated in Fig. 4.81 has been provided so you can easily think through your programs in a step-by-step fashion.

Figure 4.80 illustrates an example which we will use to outline the program using the form. The actual step-by-step process of entering this program will be explained in the next section “Programming Examples”. For now, we will concentrate on filling out the design form to accomplish the following:

Current Conditions:
- Machine off at 0 degrees

Program Machine To:
- Start on 08/08/02; 3:00 A.M.; Forward; Water On; 1.00 inch
- Water Off at 180 degrees; 100 percent
- Water On at 225 degrees; 0.75 inches
- Stop machine at 0 degrees

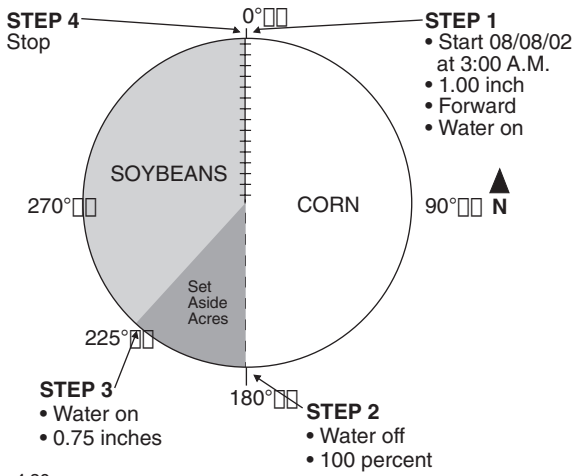


Figure 4.80

The form in Fig. 4.81 has been filled out to reflect our example program. Follow these steps as a guide when thinking about programs you want to write:

1) Make a sketch of the field. Identify what you want the irrigation machine to do.
2) Determine what must happen first. This will be step #1. (ex. Start on 08/08/02 at 3:00 A.M.)
3) Identify the condition. Will step #1 occur at a position in the field, a date/time, a specified time delay or other conditions? (ex. 08/08/02 at 3:00 A.M.)
4) Identify what commands need to occur for step #1. (ex. WATER ON, FORWARD, START, 1.00 inch DEPTH)
5) Determine conditions and commands for all other steps.

REMEMBER - STEPS WILL ALL BE EXECUTED IN A SEQUENTIAL ORDER!

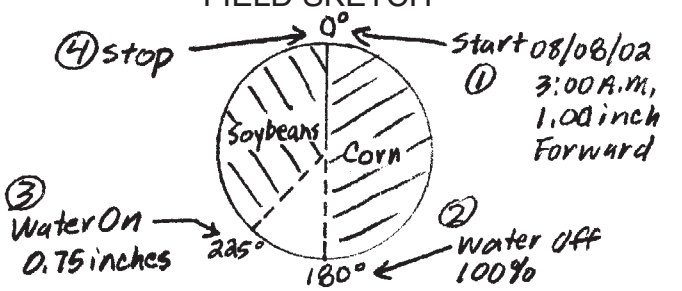
If you complete these forms, it makes entering the program very easy because you simply follow each column down and enter the correct information. Several blank design forms have been provided in Appendix A. These can be used to make copies for your use.

PROGRAM DESIGN FORM

PROGRAM # 2

FIELD ID 000004

FIELD SKETCH



STEP #	1	2	3	4	5	6	7	8	9
CONDITION									
Position		180	225	0					
Time	8/8/02 3:00A.M.								
Delay									
Pressure									
For/Rev									
COMMANDS									
Water On	X		X						
Water Off		X							
Forward	X								
Reverse									
Start	X								
Stop				X					
Percent		100							
Depth	1.00		0.75						
SIS On									
SIS Off									
AUX 1 On									
AUX 1 Off									
AUX 2 On									
AUX 2 Off									
Others									

Figure 4.81

PROGRAMMING EXAMPLES

EXAMPLE 4.1

Programming Using Time and Position as Conditions

Current Conditions:

• Machine off at 0 degrees

Program Machine To:

• Start on 08/08/02; 3:00 A.M.; Forward; Water On; 1.00 inch
• Water Off at 180 degrees; 100 percent
• Water On at 225 degrees; 0.75 inches
• Stop machine at 0 degrees

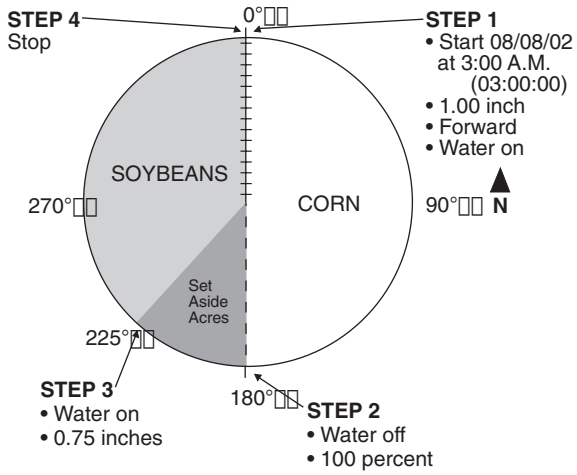


Figure 4.82

Follow These Steps To Program:

1. PROGRAM

PROGRAM

2. "2" for CREATE NEW

2

STEP 1 - EXAMPLE 4.1

3. "1" for TIME

1

4. "080802" for August 8, 2002

0 8 0 8 0 2

5. ENTER to retain previous date

ENTER

6. "030000" for 3:00 A.M.

0 3 0 0 0 0

7. ENTER to retain previous time

ENTER

NOTE: You are now ready to enter in the commands to execute on 08/08/02 at 3:00 A.M.

8. WATER ON

WATER ON

9. FORWARD

FOR

10. DEPTH

DEPTH

11. "1" for 1 inch

1

12. ENTER to retain 1 inch

ENTER

13. START

START

```
STEP 1 AT: 08/08/02 03:00:00, WATER ON,
FORWARD, DEPTH  1.00, START

ENTER COMMANDS, FINISHED. . PRESS ENTER
```

Figure 4.83

NOTE: The screen will appear as in fig. 4.83. Press ENTER to program step #2.

NOTE: The time to execute the commands is displayed as "03:00:00". The extra zeros (03:00:<u>00</u>) display seconds. Seconds can be entered for the time, but the operator is not required to do so. If seconds are <u>not</u> entered, zeros will be displayed as in fig. 4.83.

14. ENTER since finished

ENTER

STEP 2 - EXAMPLE 4.1

15. "2" for NEXT STEP

2

16. "2" for POSITION

2

17. "180" for 180 degrees

1 8 0

18. ENTER to retain 180 degrees

ENTER

19. WATER OFF

WATER OFF

20. PERCENT

PERCENT

21. "100" for 100 percent

1 0 0

22. ENTER to retain 100 percent

ENTER

STEP 2 AT: 180 DEGREES, WATER OFF,
PERCENT 100,

ENTER COMMANDS, FINISHED. . PRESS ENTER

Figure 4.84

NOTE: The screen will now appear as in fig. 4.84. Press ENTER to program step #3.

23. ENTER since finished

ENTER

STEP 3 - EXAMPLE 4.1

24. "2" for NEXT STEP

2

25. "2" for POSITION

2

26. "225" for 225 degrees

2 2 5

27. ENTER to retain 225 degrees

ENTER

28. WATER ON

WATER ON

29. DEPTH

DEPTH

30. ".75" for .75 inches

. 7 5

31. ENTER to retain .75 inches

ENTER

STEP 3 AT: 225 DEGREES, WATER ON,
DEPTH 0.75,

ENTER COMMANDS, FINISHED. . PRESS ENTER

Figure 4.85

NOTE: The screen will now appear as in fig. 4.85. Press ENTER to program step #4.

32. ENTER since finished

ENTER

STEP 4 - EXAMPLE 4.1

33. "2" for NEXT STEP

2

34. "2" for POSITION

2

35. "0" for 0 degrees

0

36. ENTER to retain 0 degrees

ENTER

37. STOP

STOP

STEP 4 AT: 0 DEGREES, STOP,

ENTER COMMANDS, FINISHED. . PRESS ENTER

Figure 4.86

NOTE: The screen will now appear as in fig. 4.86. Press ENTER since finished.

38. ENTER since finished

ENTER

39. "1" for PROGRAM FINISHED

1

40. Select one of the following options for this program:

1) SAVE PROGRAM
2) SAVE PROGRAM AND RUN
3) CANCEL PROGRAM

EXAMPLE 4.2

Programming Using Time and Position as Conditions

Current Conditions:

- Machine off at 90 degrees
- SIS is currently OFF and is set at 90 degrees

Program Machine To:

- Start on 08/08/02; 3:00:00 A.M.; Forward; Water On; 0.75 inches
- Auxiliary relay #1 ON at 180 degrees; 100 percent
- Auxiliary relay #1 OFF at 0 degrees; 0.75 inches; turn SIS ON (machine will stop at the stop-in-slot position of 90 degrees.)

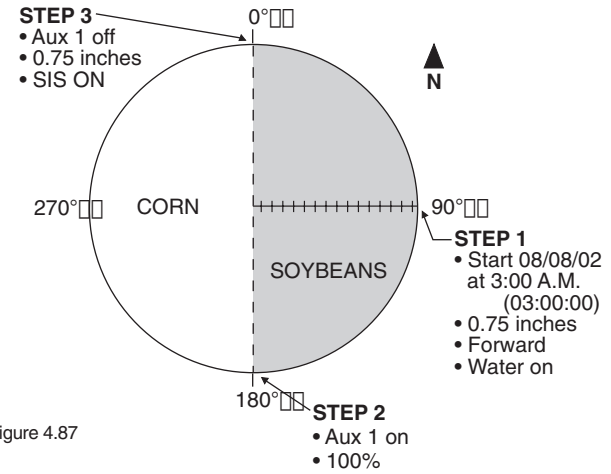


Figure 4.87

Follow These Steps To Program:

1. PROGRAM

PROGRAM

2. "2" for CREATE NEW

2

STEP 1 – EXAMPLE 4.2

3. "1" for TIME

1

4. "080802" for August 8, 2002

0 8 0 8 0 2

5. ENTER to retain previous date

ENTER

6. "030000" for 3:00 A.M.

0 3 0 0 0 0

NOTE: REMEMBER – Seconds can be entered if desired.

7. ENTER to retain previous time

ENTER

8. WATER ON

WATER ON

9. FORWARD

FOR

10. DEPTH

DEPTH

11. ".75" for .75 inches

. 7 5

12. ENTER to retain .75 inches

ENTER

13. START

START

STEP 1 AT: 08/08/02 03:00:00, WATER ON,
FORWARD, DEPTH 0.75, START,

ENTER COMMANDS, FINISHED. . PRESS ENTER

Figure 4.88

14. ENTER since finished

ENTER

STEP 2 – EXAMPLE 4.2

15. "2" for NEXT STEP

2

16. "2" for POSITION

2

17. "180" for 180 degrees

1 8 0

18. ENTER to retain 180 degrees

ENTER

19. OPTIONS

OPTIONS

20. "1" for AUX1

1

21. "1" for AUX1 ON

1

22. PERCENT

PERCENT

23. "100" for 100 percent

1 0 0

24. ENTER to retain 100 percent

ENTER

STEP 2 AT: 180 DEGREES, AUXOUT1 ON,
PERCENT 100,

ENTER COMMANDS, FINISHED. . PRESS ENTER

Figure 4.89

NOTE: The screen will appear as in fig. 4.89. Press ENTER to program step #3.

25. ENTER since finished

ENTER

STEP 3 - EXAMPLE 4.2

26. "2" for NEXT STEP

2

27. "2" for POSITION

2

28. "0" for 0 degrees

0

29. ENTER to retain 0 degrees

ENTER

30. OPTIONS

OPTIONS

31. "1" for AUX1

1

32. "0" for AUX1 OFF

0

33. DEPTH

DEPTH

34. ".75" for .75 inches

. 7 5

35. ENTER to retain .75 inches

ENTER

36. SIS ON

SIS ON

STEP 3 AT: 0 DEGREES, AUXOUT1 OFF,
DEPTH 0.75, SIS ON,

ENTER COMMANDS, FINISHED. . PRESS ENTER

Figure 4.90

NOTE: The screen will appear as in fig. 4.90

37. ENTER since finished

ENTER

38. "1" for PROGRAM FINISHED

1

39. Select one of the following options for this program:

1) SAVE PROGRAM
2) SAVE PROGRAM AND RUN
3) CANCEL PROGRAM

EXAMPLE 4.3

Programming Using Position and Delay as Conditions

Current Conditions:

- Machine running at 90 degrees; Forward; 50 percent; Water On

Program Machine To:

- 80 percent timer setting at 180 degrees
- Reverse at 270 degrees; 0 percent
- 50 percent timer setting after 600 seconds (10 minute time delay to improve water uniformity at reverse point)
- 80 percent timer setting at 180 degrees (machine will be travelling in the reverse direction)
- 0 percent timer setting at 90 degrees
- Stop machine after a 600 second time delay

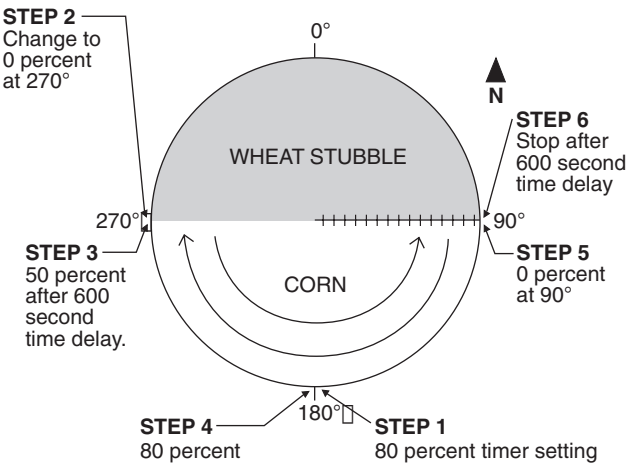


Figure 4.91

In this example, the machine is being programmed to reverse at 270° and stop at 90°. End of field stop/auto-reverse is not being used since we have no physical obstacles in the field. Example 4.4 will explain how to program when end of field stop/auto-reverse hardware is being used to reverse or stop the machine.

Follow These Steps To Program:

1. PROGRAM

PROGRAM

2. "2" for CREATE NEW

2

STEP 1 - EXAMPLE 4.3

3. "2" for POSITION

2

4. "180" for 180 degrees

1 8 0

5. ENTER to retain 180 degrees

ENTER

6. PERCENT

PERCENT

7. "80" for 80 percent

8 0

8. ENTER to retain 80 percent

ENTER

STEP 1 AT: 180 DEGREES, PERCENT 80,

ENTER COMMANDS, FINISHED. . PRESS ENTER

Figure 4.92

NOTE: The screen will appear as in fig. 4.92. Press ENTER to program step #2.

9. ENTER since finished

ENTER

STEP 2 - EXAMPLE 4.3

10. "2" for NEXT STEP

2

11. "2" for POSITION

2

12. "270" for 270 degrees

2 7 0

13. ENTER to retain 270 degrees

ENTER

14. REVERSE

REV

15. PERCENT

PERCENT

16. "0" for 0 percent

0

17. ENTER to retain 0 percent

ENTER

```
STEP 2 AT: 270 DEGREES,  REVERSE,
PERCENT 0,

ENTER COMMANDS, FINISHED. . PRESS ENTER
```

Figure 4.93

NOTE: The screen will appear as in fig. 4.93. Press enter to program step #3.

18. ENTER since finished

ENTER

STEP 3 - EXAMPLE 4.3

19. "2" for NEXT STEP

2

20. "4" for DELAY

4

```
STEP 3 PROGRAM BY: DELAY


DELAY 0. . SECONDS  1. . MINUTES >
```

Figure 4.94

NOTE: You are being requested to select a delay in either seconds or minutes. In this example press "0" for seconds.

21. "0" for SECONDS

0

```
STEP 3 PROGRAM BY: DELAY


ENTER DELAY IN SECONDS >
```

Figure 4.95

22. "600" for 600 seconds (10 minutes)

6 0 0

23. ENTER to retain 600 seconds

ENTER

24. PERCENT

PERCENT

25. "50" for 50 percent

5 0

26. ENTER to retain 50 percent

ENTER

```
STEP 3 AT: 600 SECONDS DELAY,
PERCENT 50,

ENTER COMMANDS, FINISHED. . PRESS ENTER
```

Figure 4.96

NOTE: The screen will appear as in Fig. 4.96. Press ENTER to program step #4.

27. ENTER since finished.

ENTER

STEP 4 - EXAMPLE 4.3

28. "2" for NEXT STEP

2

29. "2" for POSITION

[2]

30. "180" for 180 degrees

[1] [8] [0]

31. ENTER to retain 180 degrees

[ENTER]

32. PERCENT

[PERCENT]

33. "80" for 80 percent

[8] [0]

34. ENTER to retain 80 percent

[ENTER]

```
STEP 4 AT: 180 DEGREES,  PERCENT 80,


ENTER COMMANDS, FINISHED. . PRESS ENTER
```

Figure 4.97

NOTE: The screen will appear as in Fig. 4.97. Press ENTER to program step #5.

35. ENTER since finished

[ENTER]

STEP 5 - EXAMPLE 4.3

36. "2" for NEXT STEP

[2]

37. "2" for POSITION

[2]

38. "90" for 90 degrees

[9] [0]

39. ENTER to retain 90 degrees

[ENTER]

40. PERCENT

[PERCENT]

41. "0" for 0 percent

[0]

42. ENTER to retain 0 percent

[ENTER]

```
STEP 5 AT: 90 DEGREES,  PERCENT 0,


ENTER COMMANDS, FINISHED. . PRESS ENTER
```

Figure 4.98

NOTE: The screen will appear as in Fig. 4.98. Press enter to program step #6.

43. ENTER since finished

[ENTER]

STEP 6 - EXAMPLE 4.3

44. "2" for NEXT STEP

[2]

45. "4" for DELAY

[4]

46. “0” to Program Delay in SECONDS

[0]

47. "600" for 600 seconds (10 minutes)

6 0 0

48. ENTER to retain 600 seconds

ENTER

49. STOP

STOP

STEP 6 AT: 600 SECONDS DELAY, STOP,

ENTER COMMANDS, FINISHED. . PRESS ENTER

Figure 4.99

NOTE: The screen will appear as in fig. 4.99.

50. ENTER since finished

ENTER

51. "1" for PROGRAM FINISHED

1

52. Select one of the following options for this program:

1) SAVE PROGRAM
2) SAVE PROGRAM AND RUN
3) CANCEL PROGRAM

EXAMPLE 4.4

Programming Using Position, Delay and Direction as Conditions

Current Conditions:

- Machine running at 90 degrees; Forward; 50 percent; Water on
- The machine is equipped with end-of-field stop/auto reverse hardware. Barriers are located at 90 and 270 degrees to trip the arms and change machine direction.

Program Machine To:

- 80 percent timer setting at 180 degrees
- 0 percent when machine reverses at 270 degrees (Remember-the arm will trip and reverse the machine)
- 50 percent timer setting after 600 seconds (10 minute time delay to improve water application uniformity at reverse point)
- 80 percent timer setting at 180 degrees (machine will be travelling in the reverse direction)
- 0 percent when machine changes direction to forward at 90 degrees
- Stop machine after a 10 minute time delay

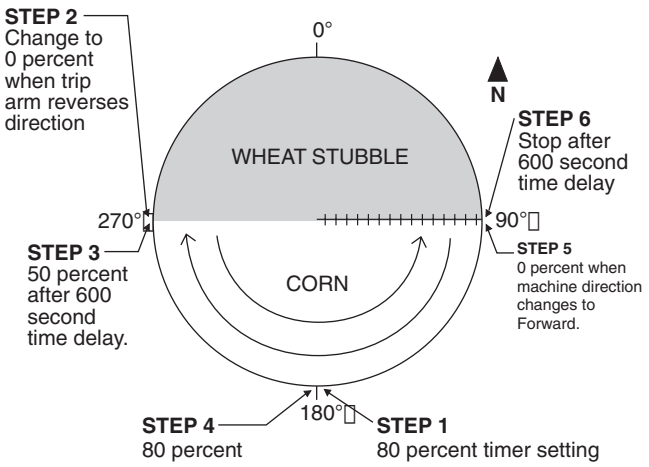


Figure 4.100

NOTE: This example is very similar to EXAMPLE 4.3 except that end of field stop/auto-reverse hardware is being used to reverse the machine at 270 and 90 degrees. In this example, the percent timer will be programmed to 0 when the actuator arms are tripped at 270 and 90 degrees. Allowing the end-of field stop/auto-reverse hardware to reverse the machine will provide more accuracy than programming in a reverse point as in EXAMPLE 4.3.

Follow these steps to program:

1. PROGRAM

PROGRAM

2. "2" for CREATE NEW

2

STEP 1 - EXAMPLE 4.4

3. "2" for POSITION

2

4. "180" for 180 degrees

1 8 0

5. ENTER to retain 180 degrees

ENTER

6. PERCENT

PERCENT

7. "80" for 80 percent

8 0

8. ENTER to retain 80 percent

ENTER

STEP 1 AT: 180 DEGREES, PERCENT 80,

ENTER COMMANDS, FINISHED. . PRESS ENTER

Figure 4.101

9. ENTER since finished

ENTER

STEP 2 - EXAMPLE 4.4

10. "2" for NEXT STEP

2

STEP 2 PROGRAM BY:
0 EXIT 2 POSITION 4 DELAY 6 OTHER
1 TIME 3 PRESSURE 5 FOR/REV
PRESS NUMBER >

Figure 4.102

NOTE: Step #2 requires that the percentage timer be set at 0 when the machine changes direction from forward to reverse. Remember - the trip or actuator arm mounted on the drive unit will cause the direction change. Item #5 in Figure 4.102 is identified as FOR/REV. This will be the condition used for step #2. In our example, the machine is moving in the forward direction as it approaches 270 degrees. When the actuator arm is tripped, the direction will immediately change to reverse. Therefore, we will tell the machine that when the direction changes to reverse, then set the percent timer to 0 percent.

11. "5" for FOR/REV

5

STEP 2 PROGRAM BY: DIRECTION

DIRECTION 0. . FORWARD 1. . REVERSE >

Figure 4.103

NOTE: The operator is now required to choose either a forward or reverse direction change. In this example, press "1" for a direction change to reverse. (If you are required to select forward, press "0".)

12. "1" for REVERSE

1

STEP 2 AT: REVERSE,

ENTER COMMANDS, FINISHED. . PRESS ENTER

Figure 4.104

NOTE: You are now being requested to enter the commands to occur when the direction changes from forward to reverse. In this example, set the percent timer to 0 percent.

13. PERCENT

PERCENT

14. "0" for 0 percent

0

15. ENTER to retain 0 percent

ENTER

STEP 2 AT: REVERSE, PERCENT 0,

ENTER COMMANDS, FINISHED. . PRESS ENTER

Figure 4.105

16. ENTER since finished

ENTER

STEP 3 - EXAMPLE 4.4

17. “2” for NEXT STEP

2

NOTE: The 10 minute delay needs to be set so the percentage timer setting will change to 50 percent.

18. “4” for DELAY

4

STEP 3 PROGRAM BY: DELAY

DIRECTION 0. . SECONDS 1. . MINUTES >

Figure 4.106

NOTE: You are now being requested to select the delay time in either minutes or seconds. In this example, select “1” for minutes.

19. “1” for MINUTES

1

STEP 3 PROGRAM BY: DELAY

ENTER DELAY IN MINUTES >

Figure 4.107

20. “10” for 10 minutes DELAY

1 0

STEP 3 PROGRAM BY: DELAY

ENTER DELAY IN MINUTES > 10

Figure 4.108

21. ENTER to retain 10 minutes

ENTER

STEP 3 AT: 10 MINUTES DELAY,

ENTER COMMANDS, FINISHED. . PRESS ENTER

Figure 4.109

22. PERCENT

PERCENT

23. “50” for 50 percent

5 0

24. ENTER to retain 50 percent

ENTER

STEP 3 AT: 10 MINUTES DELAY,
PERCENT 50,

ENTER COMMANDS, FINISHED. . PRESS ENTER

Figure 4.110

25. ENTER since finished

ENTER

STEP 4 - EXAMPLE 4.4

26. “2” for NEXT STEP

2

NOTE: The next step is to set the percentage timer setting to 80 percent at 180 degrees.

27. “2” for POSITION

2

28. “180” for 180 degrees

1 8 0

29. ENTER to retain 180 degrees

ENTER

30. PERCENT

PERCENT

31. “80” for 80 percent

8 0

32. ENTER to retain 80 percent

ENTER

```
STEP 4 AT: 180 DEGREES, PERCENT 80,

ENTER COMMANDS, FINISHED. . PRESS ENTER
```

Figure 4.111

33. ENTER since finished

ENTER

STEP 5 - EXAMPLE 4.4

34. “2” for NEXT STEP

2

```
STEP 5 PROGRAM BY:
0 EXIT     2 POSITION     4 DELAY      6 OTHER
1 TIME     3 PRESSURE     5 FOR/REV
PRESS NUMBER >
```

Figure 4.112

NOTE: Step #5 requires that the percentage timer be set at 0 when the machine changes direction from reverse to forward. Remember - the trip or actuator arm mounted on the drive unit will cause the direction change. In our example, the machine is moving in the reverse direction as it approaches 90 degrees. When the actuator arm is tripped, the direction will immediately change to forward. Therefore, we will tell the machine that when the direction changes to forward, then set the percent timer to 0 percent. The machine will now water in place until it is told to stop, move forward or the overwatering timer shuts it down.

35. “5” for FOR/REV

5

```
STEP 5 PROGRAM BY: DIRECTION

DIRECTION 0. . FORWARD 1. . REVERSE >
```

Figure 4.113

NOTE: The operator is now required to choose either a forward or reverse direction change. In this example, press “0” for a direction change to forward.

36. “0” for FORWARD

0

```
STEP 5 AT: FORWARD,

ENTER COMMANDS, FINISHED. . PRESS ENTER
```

Figure 4.114

NOTE: You are now being requested to enter the commands to occur when the direction changes from reverse to forward. In this example, set the percent timer to 0 percent.

37. PERCENT

PERCENT

38. “0” for 0 percent

0

39. ENTER to retain 0 percent

ENTER

```
STEP 5 AT: FORWARD, PERCENT 0,

ENTER COMMANDS, FINISHED. . PRESS ENTER
```

Figure 4.115

40. ENTER since finished

ENTER

STEP 6 - EXAMPLE 4.4

41. “2” for NEXT STEP

2

NOTE: The final step of this program is to stop the machine after a 10 minute time delay.

42. “4” for DELAY

4

43. “1” for MINUTES

1

44. “10” for 10 minutes DELAY

1 0

45. ENTER to retain 10 minutes

ENTER

46. STOP

STOP

STEP 6 AT: 10 MINUTES DELAY, STOP

ENTER COMMANDS, FINISHED. . PRESS ENTER

Figure 4.116

47. ENTER since finished

ENTER

48. “1” for PROGRAM FINISHED

1

49. Press “1” to SAVE PROGRAM or “2” to SAVE PROGRAM AND RUN.

1 or 2

EXAMPLE 4.5

Pressure as the Condition

Current Conditions:

- Machine is operating at 33 psi water pressure.
- After 4-5 hours, the draw-down of the well will increase, causing the pressure to drop approximately 8 psi.

Program Machine To:

- Slow the machine down from a 50 percent timer setting to 44 percent when the pressure drops below 25 psi. This may help compensate for the reduced flow rate due to a drop in pressure.

IMPORTANT: Valmont Irrigation is attempting to assist you in handling this type of unfortunate situation by giving you the opportunity to program based on machine pressure. Several variables are involved when trying to determine an adjustment to machine speed based on the operating pressure. Several of these include field elevations and the use of pressure regulators. Valmont Irrigation is not responsible for a degradation of water uniformity caused by adjusting the speed of the machine based on pressure readings at the pivot. Contact your local Valley dealer for further information regarding this subject.

Follow These Steps to Program:

1. PROGRAM

PROGRAM

2. “2” for CREATE NEW

2

NOTE: This program will only require one step.

STEP 1

3. “3” for PRESSURE

3

STEP 1 PROGRAM BY: PRESSURE

ENTER PRESSURE (33) >

Figure 4.117

NOTE: You are now being requested to enter the pressure (in psi) at which the percent timer setting should change to 44 percent. This value was determined to be approximately 25 psi. Notice the current pressure reading is displayed in parentheses.

4. “25” for 25 psi

2 5

STEP 1 PROGRAM BY: PRESSURE

ENTER PRESSURE (33) > 25

Figure 4.118

5. ENTER to retain 25 psi

ENTER

STEP 1 PROGRAM BY: PRESSURE

1. . HIGHER 0. . LOWER >

Figure 4.119

NOTE: The bottom line of the screen in Figure 4.119 is asking you if the commands you choose (in this example, percent = 44) should happen at a pressure higher than or lower than 25 psi. In this example, when the pressure drops lower than 25 psi, the percent timer should change to 44 percent. Therefore, select “0” for LOWER.

6. “0” for LOWER than 25 psi

0

STEP 1 AT: PRESSURE LESS THAN 25,

ENTER COMMANDS, FINISHED. . PRESS ENTER

Figure 4.120

NOTE: You are now being requested to enter the command(s) that should occur when the pressure is lower than 25 psi. In this example, select PERCENT and enter 44 percent.

7. PERCENT

PERCENT

8. “44” for 44 percent

4 4

9. ENTER to retain 44 percent

ENTER

STEP 1 AT: PRESSURE LESS THAN 25,
PERCENT 44,

ENTER COMMANDS, FINISHED. . PRESS ENTER

Figure 4.121

NOTE: The screen will now appear as in Figure 4.121. Press enter since finished.

10. ENTER since finished

ENTER

11. “1” for PROGRAM FINISHED

1

12. Select one of the following options for this program:

1) SAVE PROGRAM
2) SAVE PROGRAM AND RUN
3) CANCEL PROGRAM

IMPORTANT: In this example, the program must be loaded with the pressure reading on the screen greater than 25 psi. Otherwise, the program would execute immediately as soon as it was run.

In this example, the program will run only one time. If the pressure returns to 33 psi, the machine will still continue to run at 44 percent. A second program can be created that looks for a pressure higher than 30 psi and sets the machine back to 50 percent.

See the Repeat Programming section to learn how to continuously run programs.

The Valley Pro control panel has the capability of executing a program continuously or a specified number of times. Section IV covered programs written for one time execution. They were designed to execute only once and then the operator would load the program again.

Some situations require a program to be repeated on a continuous basis, a specified number of times or on a daily schedule. The programming flexibility of the Valley Pro control panel offers you these features.

This section will cover the following areas:
1) Repeating Programs - Continuously
2) Repeating Programs - A Specified Number of Times
3) Developing an Irrigation Schedule

REPEATING PROGRAMS - CONTINUOUSLY

A program can be continuously repeated by instructing the program to reload itself after it executes its last command. Therefore, the program will continue to repeat until it is deleted from current programs by the operator.

The following two examples will be used to explain this programming method and how it can be applied. It is important to remember that any program can be repeated. Examples 5.1 and 5.2 are only two programs which are set up to repeat continuously. The same process described in the examples can be used to repeat any program you want.

EXAMPLE 5.1 - Programming Auto Reverse

Current Conditions:
- Operator manually starts machine; WATER ON; FORWARD; 1.00 inch

Program Machine To:
- Reverse at 270 degrees
- Forward at 90 degrees; Reload program so the machine will reverse again at 270 degrees.

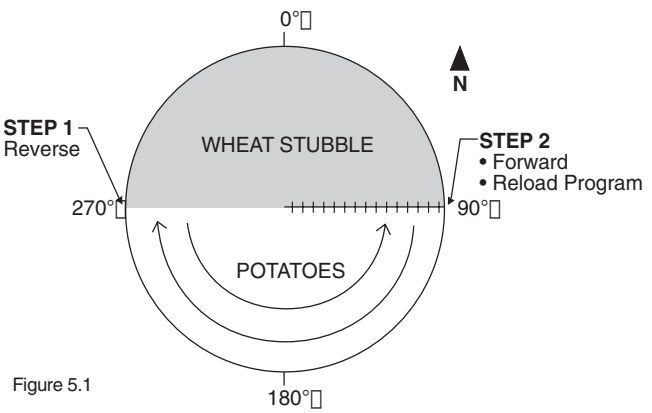


Figure 5.1

The process of programming will be very similar to the instructions in Section IV. The following outline will be used to program this example:

1) CREATE the program
2) STORE the program
3) EDIT the program to reload
4) RUN the program

To program Example 5.1, follow these steps:

IMPORTANT: If the pivot needs to reverse around an obstacle (such as a tree line, buildings, etc.), drive unit mounted end-of-field stop/auto-reverse must be installed with physical barriers as a safety back-up. This program should only be used for auto-reversing in open field conditions (no obstacles present).

CREATE NEW PROGRAM

1. PROGRAM

PROGRAM

2. "2" for CREATE NEW

2

```
STEP 1 PROGRAM BY:
0 EXIT     2 POSITION     4 DELAY      6 OTHER
1 TIME     3 PRESSURE     5 FOR/REV
PRESS NUMBER >
```

Figure 5.2

NOTE: You are being requested to select the condition for step #1. The machine will be started manually at 90 degrees. The first command which must occur is to reverse at 270 degrees which will be step #1.

3. "2" for POSITION

2

4. "270" for 270 degrees

2 7 0

5. ENTER to retain 270 degrees

ENTER

6. REVERSE

REV

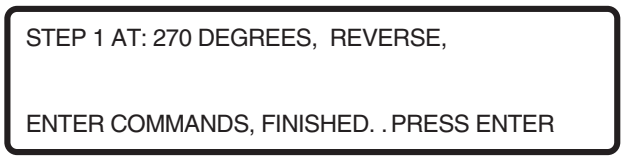


Figure 5.3

7. ENTER since finished

ENTER

8. "2" for NEXT STEP

2

9. "2" for POSITION

2

10. "90" for 90 degrees

9 0

11. ENTER to retain 90 degrees

ENTER

12. FORWARD

FOR

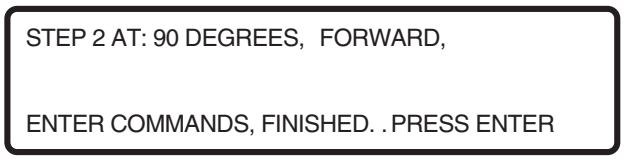


Figure 5.4

13. PROGRAM to reload programs

PROGRAM

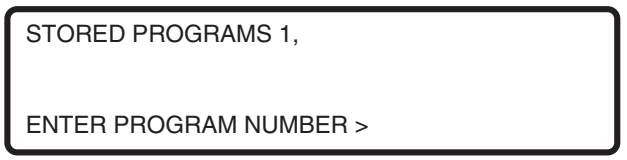


Figure 5.5

14. "1" to reload program #1

1

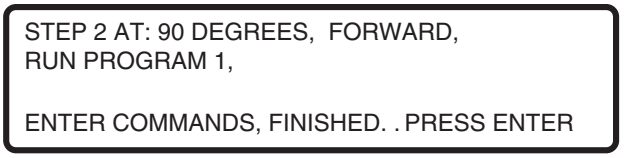


Figure 5.6

NOTE: Figure 5.6 indicates Program #1 will be reloaded immediately after the machine direction changes to forward. The next step to execute is reverse at 270 degrees.

15. ENTER since finished

ENTER

16. "1" for PROGRAM FINISHED

1

SAVE PROGRAM

17. "1" to SAVE PROGRAM

1

18. Select Number From 1 to 9 to Save

1

NOTE: Program would be saved as the same program number entered in Step 13.

19. Press any key to exit.

or

NOTE: The program screen will be displayed. Press "0" to exit to the Status Screen.

NOTE: The program has now been created and stored as program #1.

RUN PROGRAM
To run this program or make it current, follow these steps:

20. PROGRAM

PROGRAM

21. "1" for RUN STORED

1

22. "1" for Program #1

1

23. Press any key to exit

or

NOTE: This program is now current or ready to be executed and will continue to operate until it is deleted from current programs. It is important to note that this program could run simultaneously with other programs. Its only purpose is to change machine direction at 90 and 270 degrees. Another program may be running which starts the machine at a certain date/time or changes water application depth.

IMPORTANT: If the operator decides to change direction of travel for some reason, the program will need to be re-written. Remember that step #1 must always be executed before step #2. Therefore, let's examine what would happen if the direction of the pivot was changed from forward to reverse before step #1 was executed. (Refer to fig. 5.7) The pivot would travel past 90 degrees in the reverse direction to 270 degrees. Step #1 would be executed but the direction of the pivot would not change because it would already be travelling in the reverse direction. Step #2 would then be executed normally at 90 degrees. However, the pivot would have travelled from 90 to 270 degrees in the reverse direction, which was not desired.

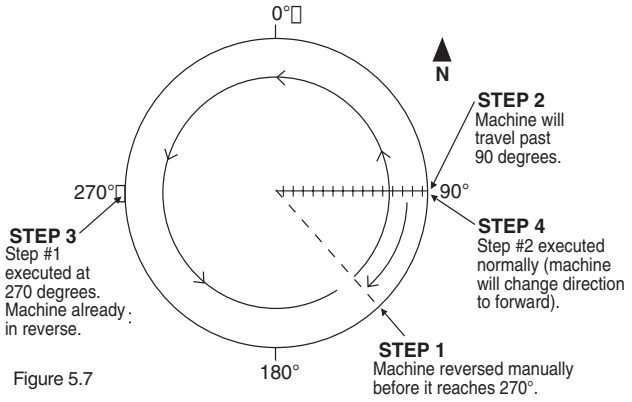


Figure 5.7

EXAMPLE 5.2 - WET Area/WATER OFF Sector Programming

This example explains how to turn the water off and change percentage setting to 100 at 90 degrees and then turn the water back on and change percentage setting to 50 at 105 degrees. This causes the machine to travel without water at 100 percent over a wet area. The example also explains how this program can be repeated continously which is desirable in many instances.

Current Conditions:

- Operator manually starts machine; WATER ON; FORWARD; 50 percent

Program Machine To:

- WATER OFF at 90 degrees; 100 percent
- WATER ON at 105 degrees; 50 percent; Reload program to turn water off and change to 100 percent again at 90 degrees

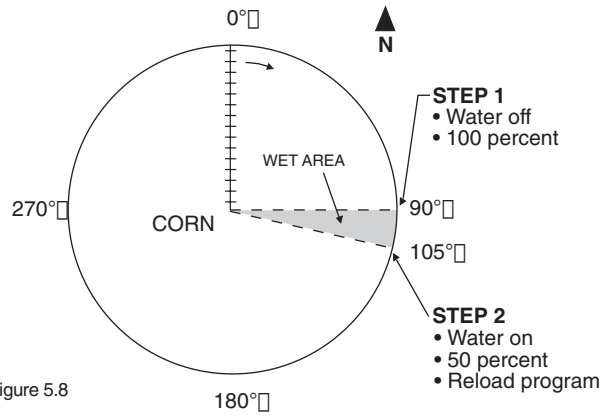


Figure 5.8

To program Example 5.2, follow these steps:

CREATE NEW PROGRAM

1. PROGRAM

PROGRAM

2. “2” for CREATE NEW

2

3. “2” for POSITION

2

4. “90” for 90 degrees

9 0

5. ENTER to retain 90 degrees

ENTER

6. WATER OFF

WATER OFF

7. PERCENT

PERCENT

8. “100” for 100 percent

1 0 0

9. ENTER to retain 100 percent

ENTER

```
STEP 1 AT: 90 DEGREES,  WATER OFF,
PERCENT 100,

ENTER COMMANDS, FINISHED. . PRESS ENTER
```

Figure 5.9

10. ENTER since finished

ENTER

11. “2” for NEXT STEP

2

12. “2” for POSITION

2

13. “105” for 105 degrees

1 0 5

14. ENTER to retain 105 degrees

ENTER

15. WATER ON

WATER ON

16. PERCENT

PERCENT

17. “50” for 50 percent

5 0

18. ENTER to retain 50 percent

ENTER

```
STEP 2 AT: 105 DEGREES,  WATER ON,
PERCENT 50,

ENTER  COMMANDS, FINISHED. . PRESS ENTER
```

Figure 5.10

19. PROGRAM to reload program

PROGRAM

```
STORED PROGRAMS 1,


ENTER  PROGRAM NUMBER >
```

Figure 5.11

NOTE: The stored programs are now listed in figure 5.11. In this example, there is one stored program identified as "1". At this point decide which number (1-9) this program will be saved as and press that number. Select Program #2 for this example.

20. "2" to reload program #2

2

STEP 2 AT: 105 DEGREES, WATER ON,
PERCENT 50, RUN PROGRAM 2,

ENTER COMMANDS, FINISHED. . PRESS ENTER

Figure 5.12

21. ENTER since finished

ENTER

22. "1" for Program Finished

1

23. "1" to Save Program

1

24. "2" to save as Program #2

2

NOTE: Since the program was reloaded as #2 in step #20, it MUST be saved as Program #2 in step #24.

25. Press any key to exit

or

NOTE: Press "0" to exit to Status screen

RUN PROGRAM

To run this program or make it current, follow these steps:

26. PROGRAM

PROGRAM

27. "1" for RUN STORED

1

28. "2" for Program #2

2

29. Press any key to exit

or

NOTE: This program is now current or ready to be executed and will continue to operate until it is deleted from current programs.

REPEATING PROGRAMS - A SPECIFIED NUMBER OF TIMES

A continuously repeating program may not always be desirable. Some situations may arise which require the pivot to travel a certain number of complete revolutions (or part circles) and then stop. The Valley Pro control panel can be programmed in several different ways to accomplish this. Two different programming techniques are discussed in the following sections.

TECHNIQUE 1 - RECALLING STORED PROGRAMS

This technique is the easiest to use and the most versatile. Example 5.3 will be utilized to explain this process.

EXAMPLE 5.3

Current Conditions:

- Machine off at 0 degrees

Program Machine To:

- Start on 08/08/02; 3:00:00 A.M.; Forward; Water On; 1.00 inch
- 0.50 inches at 180 degrees
- 1.00 inch at 0 degrees
- Execute 2 complete revolutions (cycles) and stop at 0 degrees

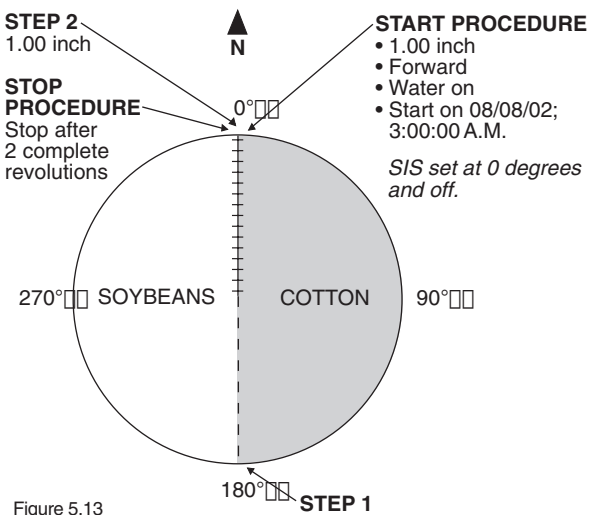


Figure 5.13

Two programs will be written for this example. The first program will start the machine at 3:00 A.M. on 08/08/02, change the water application to 0.50 inches at 180 degrees, change the water application to 1.00 inch at 0 degrees and load the second program. The second program will then change the water application to 0.50 inches at 180 degrees and stop the machine at 0 degrees which will complete the second cycle.

To program, follow these steps:

1. PROGRAM

PROGRAM

2. “2” for CREATE NEW

2

STEP 1 - EXAMPLE 5.3

3. “1” for TIME

1

4. “08/08/02” for August 8, 2002

0 8 0 9 0 2

5. ENTER to retain 08/09/02

ENTER

6. “30000” for 3:00 A. M.

3 0 0 0 0 0

7. ENTER to retain 3:00 A.M.

ENTER

8. DEPTH

DEPTH

9. “1” for 1 inch

1

10. ENTER to retain 1 inch

ENTER

11. FORWARD

FOR

12. WATER ON

WATER ON

13. START

START

STEP 1 AT: 08/08/02 03:00:00,
DEPTH 1.00, FOWARD, WATER ON, START,

ENTER COMMANDS, FINISHED. . PRESS ENTER

Figure 5.14

14. ENTER since finished

ENTER

STEP 2 EXAMPLE 5.3

15. “2” for NEXT STEP

2

16. “2” for POSITION

2

17. “180” for 180 degrees

1 8 0

18. ENTER to retain 180 degrees

ENTER

19. DEPTH

DEPTH

20. ".5" for .5 inches

[.] [5]

21. ENTER to retain .5 inches

[ENTER]

```
STEP 2 AT: 180 DEGREES, DEPTH 0.50,


ENTER COMMANDS, FINISHED. . PRESS ENTER
```

Figure 5.15

22. ENTER since finished

[ENTER]

STEP 3 EXAMPLE 5.3

23. "2" for NEXT STEP

[2]

24. "2" for POSITION

[2]

25. "0" for 0 degrees

[0]

26. ENTER to retain 0 degrees

[ENTER]

27. DEPTH

[DEPTH]

28. "1" for 1 inch

[1]

29. ENTER to retain 1 inch

[ENTER]

```
STEP 3 AT: 0 DEGREES, DEPTH 1.00,


ENTER COMMANDS, FINISHED. . PRESS ENTER
```

Figure 5.16

30. PROGRAM to load the second program

[PROGRAM]

```
STORED PROGRAMS 1, 2,


ENTER PROGRAM NUMBER >
```

Figure 5.17

NOTE: Figure 5.17 indicates that 2 programs have already been stored (#1 and #2). In this example, program #3 will be loaded in step #3 even though it hasn't yet been created.

31. "3" for Program #3

[3]

```
STEP 3 AT: 0 DEGREES,  DEPTH 1.00,
  RUN PROGRAM 3,

ENTER COMMANDS, FINISHED. . PRESS ENTER >
```

Figure 5.18

32. ENTER since finished

[ENTER]

33. "1" for PROGRAM FINISHED

[1]

34. "2" for SAVE PROGRAM AND RUN

[2]

34A. “3”, “ENTER”, “ENTER” to save as program #3.

3

ENTER

ENTER

Program #4 now has to be created. This is a simple program with 2 steps. Step #1 will change the water application to 0.50 inches at 180 degrees and step #2 will stop the machine at 0 degrees.

35. PROGRAM

PROGRAM

36. “2” for CREATE NEW

2

STEP 1 EXAMPLE 5.3

37. “2” for POSITION

2

38. “180” for 180 degrees

1 8 0

39. ENTER to retain 180 degrees

ENTER

40. DEPTH

DEPTH

41. “.5” for .5 inches

. 5

42. ENTER to retain .5 inches

ENTER

STEP 1 AT: 180 DEGREES, DEPTH 0.50,

ENTER COMMANDS, FINISHED. . PRESS ENTER >

Figure 5.19

43. ENTER since finished

ENTER

STEP 2 - EXAMPLE 5.3

44. “2” for NEXT STEP

2

45. “2” for POSITION

2

46. “0” for 0 degrees

0

47. ENTER to retain 0 degrees

ENTER

48. STOP

STOP

STEP 2 AT: 0 DEGREES, STOP,

ENTER COMMANDS, FINISHED. . PRESS ENTER >

Figure 5.20

49. ENTER since finished

ENTER

50. “1” for PROGRAM FINISHED

1

51. “1” to SAVE PROGRAM

[1]

```
STORED PROGRAMS 1, 2, 3

PRESS NUMBER FROM 1 TO 17 TO SAVE.
PRESS ANY OTHER KEY TO DELETE.
```

Figure 5.21

52. “4” to SAVE as Program #4

[4]

[ENTER]

53. Press any key to exit.

[ ] or [ ]

54. Press ESC to get to main status screen

[ESC]

NOTE: The programming has now been completed. The machine will start on 08/08/02 at 3:00 A.M., change water application to 0.50 inches at 180 degrees, change water application to 1.00 inch at 0 degrees and then load program #4. Program #4 will then change the water application to 0.50 inches at 180 degrees and stop the machine at 0 degrees.

It is important to note that this sequence of events could have been programmed all in one program by adding steps 4 and 5 in the first program. However, this example was used to illustrate (with a simple application) how one program could load another and how it can be applied.

You could have 17 stored programs with each one performing a different sequence of events around the circle. These could be run one right after the other by using the technique described in this example.

TECHNIQUE 2 - USING START$, STOP$ AND CYCLE$

Programs can also be repeated a specified number of times by using the following three commands, START$, STOP$ and CYCLE$, which are labeled as 3, 4, and 5 in the OPTIONS screen.

[OPTIONS]

```
0 EXIT     3 START$     6 MODULE
1 AUX1     4 STOP$      7 AUTOREVERSE
2 AUX2     5 CYCLE$     8 AUTORESTART
PRESS NUMBER >
```

Figure 5.22

The CYCLE$ command allows the operator to repeat a sequence of events for an irrigation cycle. A cycle may consist of a full or part circle. The operator commands the equipment to execute a number of cycles. The machine will then immediately start, complete the desired number of cycles and then stop after the last cycle is completed.

The START$, STOP$, and CYCLE$ are special programs (expressed as Start String, Stop String, and Cycle String: a “string” of commands) that do not have a condition for the first step because they are executed immediately when they are commanded, either by another program or a machine function such as the CYCLE$ EXECUTE command, the Power Restart function, or the DAILY OPS functions. Following are explanations of START$, STOP$ and CYCLE$. The CYCLE$ is dependant upon the START$ and STOP$ to begin and end the cycle execution.

Note: The START$, STOP$, and CYCLE$ cannot be edited like a Stored Program. To change them, they must be rewritten.

START$

The START$ can be used in the following situations:

1) Typical Start-Up Procedure: A complete start-up procedure (including water depth, direction, etc.) can be entered and used to start the machine when the CYCLE$ command is executed or DAILY OPS is executed.

2) Power Restart Procedure (Refer to the Section entitled “Entering the Power Restart Start-Up Procedure”): A start-up procedure is entered which allows the user to select exactly how the machine will restart when power is regained after a power failure.

NOTE: The START$ command can only be programmed for one of the two situations previously listed. It is possible that one start-up procedure could be used for both situations but generally the depth of water applied, direction of travel, etc., would not be specified in the start-up procedure for power restart. REMEMBER - if these running conditions are not specified, the previous conditions will automatically be selected when a machine restarts.

IMPORTANT: The START$ program will not automatically start the machine unless the START command is in the START$ program.

If AUTORESTART is enabled, a power restart will run the START$. Avoid using direction or depth controls in the START$ if using the CYCLE$.

STOP$
STOP$ operates much the same way as the START$ command. In this case, the operator programs how the machine should stop after it completes its last cycle. The STOP$ program is executed by the CYCLE$ program and DAILY OPS.

IMPORTANT: The STOP$ program will not automatically stop the machine unless the STOP command is in the STOP$ program.

CYCLE$
The programs created and stored as programs #1 though #17 are executed only one time when run. The CYCLE$ command needs to be instructed how many times to execute. When the operator selects the EXECUTE CYCLE$ option, the operator is prompted for the number of times the CYCLE$ command is to be executed. The first execution starts when the EXECUTE CYCLE$ command is pressed or a stored program step with the SET CYCLE command is executed. Successive executions begin when the machine position is at the SIS degrees.

CYCLE$ requires both the START$ and STOP$ command lines to be entered so that the irrigation equipment knows how to start and stop when an irrigation cycle is executed.

An operator initially inputs the number of cycles that the machine should execute. The machine will immediately start according to the start-up procedure which was programmed with the START$ command. The machine will then complete the desired number of cycles. Each cycle (which may consist of either a full or part circle) executes events according to the program set up with the CYCLE$ command. The machine will then stop according to the stop procedure programmed with the STOP$ command, after the machine completed its cycles.

An internal counter uses the Stop-In-Slot position as a reference point for counting the number of cycles that have executed. Each time the machine advances to the Stop-In-Slot position, the CYCLE$ is executed and the number of times remaining to execute the CYCLE$ is reduced by one. When the machine has advanced to the SIS position and the number of times to execute the CYCLE$ has counted down to zero, the STOP$ command is executed rather than the CYCLE$ command.

The number of cycles remaining to be executed can be reviewed at any time. The number can also be edited to add additional cycles or to reduce the number of cycles remaining.

IMPORTANT: SIS must be OFF or the Stop-In-Slot function will stop the machine.

Since the CYCLE$ command is executed at the SIS degree position, DO NOT use the SIS degree position in a step of a program that is used by the CYCLE$ command. (A step of a program that uses the condition where degrees is the same as the SIS position will not be executed because the CYCLE$ will restart the program back to the first step.)

Following are two examples used to explain how to program using START$, STOP$ and CYCLE$:

EXAMPLE 5.4

Current Conditions:
- Machine off at 0 degrees
- SIS position set for 0 degrees
- SIS OFF

Program Machine To:
- Start; Forward; Water On;
- 1.00 inch
- 0.50 inches at 180 degrees
- 1.00 inch at 0 degrees
- Execute 2 complete revolutions (cycles) and stop at 0 degrees

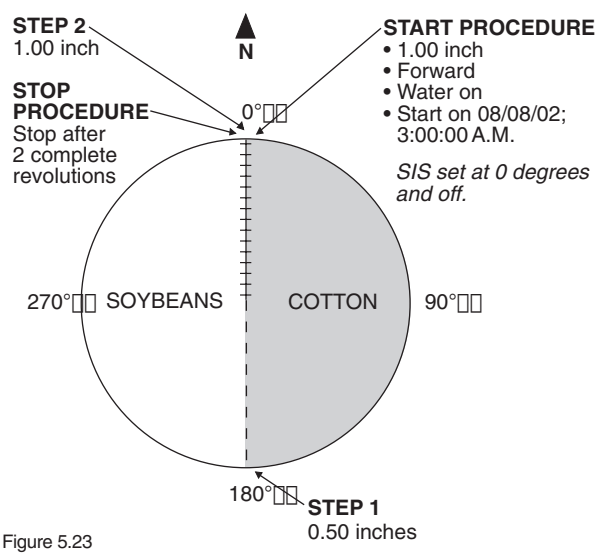


Figure 5.23

IMPORTANT: This example requires that the stop-in-slot be set at 0 degrees, since this is the starting location of the machine.

Programming the START$ Command

The first step is to program how the machine should start. This has been defined as:

- Water On
- Start

To program START$ (Start-up procedure), follow these steps:

1. OPTIONS

OPTIONS

2. “3” for START$

3

3. “2” for WRITE

2

```
START$
0 EXIT          2 WRITE
1 REVIEW        3 EXECUTE
PRESS NUMBER >
```

Figure 5.24

NOTE: You are now ready to enter the commands to start the machine.

4. WATER ON

WATER ON

5. START

START

6. ENTER since finished

ENTER

```
WRITE START$,  FORWARD,
WATER ON, START,

ENTER COMMANDS, FINISHED. . PRESS ENTER
```

Figure 5.25

7. “1” for PROGRAM FINISHED

```
0 EXIT
1 PROGRAM FINISHED
2 NEXT STEP
PRESS NUMBER >
```

Figure 5.26

8. “0” to exit

0

NOTE: The machine has now been instructed how it should start when the CYCLE$ command is executed.

Programming the STOP$ Command

The machine also needs to know how it should stop. In most cases, the STOP command is all that is required as in our example.

To program STOP$ (stop procedure), follow these steps:

1. OPTIONS

OPTIONS

2. “4” for STOP$

4

3. “2” for WRITE

2

```
WRITE STOP$,


ENTER COMMANDS, FINISHED. . PRESS ENTER
```

Figure 5.27

NOTE: You are now ready to enter the commands to stop the machine. This only requires the STOP command.

4. STOP

STOP

5. ENTER since finished

ENTER

6. “1” for PROGRAM FINISHED

1

```
WRITE STOP$, STOP,

ENTER COMMANDS, FINISHED. . PRESS ENTER
```

Figure 5.28

7. “0” to Exit

0

NOTE: The machine has now been instructed how it should stop when the last cycle has been completed.

Programming the CYCLE$ Command

The CYCLE$ command is designed so you can recall previously stored programs and designate how many times you want them to execute. For this example, we will first create a simple CYCLE$ program and set it to execute two times.

To create the program, follow these steps:

1. OPTIONS

OPTIONS

2. “5” for CYCLE$

5

3. “2” for WRITE

2

4. Forward

FOR

5. DEPTH

DEPTH

6. “1” for 1 inch

6

7. ENTER to retain 1 inch

ENTER

8. ENTER to finish

ENTER

```
WRITE CYCLE$, DEPTH 1.00,

ENTER COMMANDS, FINISHED. . PRESS ENTER
```

Figure 5.29

PROGRAM STEP 2

9. “2” for NEXT STEP

5

10. “2” for POSITION

2

11. “180” for 180 degrees

1 8 0

12. ENTER to retain 180 degrees

ENTER

13. DEPTH

DEPTH

14. “.5” for .5 inch

. 5

15. ENTER to retain .5 inch

ENTER

16. “1” for PROGRAM FINISHED

1

17. Press any key to exit and “0” to exit to Status Screen.

NOTE: The CYCLE$ program to change the water depths has now been created and stored. Notice that the procedure is exactly the same as in Section IV “Programming - Learning the Basics.”

The final step is to execute 2 cycles. Two ways are shown for starting the cycle execution. First, is starting the execution immediately; second, is starting the execution at a delayed time.

Immediate start of cycle program:
To start the machine manually and complete 2 cycles, follow these steps:

1. OPTIONS

OPTIONS

2. “5” for CYCLE$

5

3. “3” for EXECUTE

3

4. “2” for 2 cycles

2

```
CYCLE$
0 EXIT          2 WRITE
1 REVIEW        3 EXECUTE
ENTER NUMBER OF CYCLES (0)  >  2
```

Figure 5.30

5. ENTER to retain 2 cycles

ENTER

6. “0” TO EXIT

0

NOTE: The machine would now immediately start and would execute 2 complete cycles before stopping.

Execution of this program will automatically input two cycles to be performed. If the operator were to push the OPTIONS key, select “5” for CYCLE$ and “3” for EXECUTE, the number of cycles is shown that are remaining after the current cycle is complete.

```
CYCLE$
0 EXIT          2 WRITE
1 REVIEW        3 EXECUTE
ENTER NUMBER OF CYCLES (1)  >
```

Figure 5.31

The number in parentheses indicates that one (1) cycle is remaining to be executed.

Delayed start of cycle program:
To start the machine cycle at a predetermined time, the CYCLE$ can be executed by a program that uses the CYCLE$ command.

This example will execute the CYCLE$ the same as just shown in the previous example, except it will begin at the date and time specified by the program condition.

9. PROGRAM

PROGRAM

10. “2” for CREATE NEW

2

11. “1” for TIME

1

12. “08/08/02” for August 8, 2002

0 8 0 8 0 2

13. ENTER to retain 08/08/02

ENTER

14. “0300” for 3:00 A.M.

0 3 0 0

15. ENTER to retain 3:00 A.M.

ENTER

16. OPTIONS

OPTIONS

17. “5” for CYCLE$

5

NOTE: You are being requested to enter the number of cycles (or revolutions) that the machine should execute. This example requires that 2 cycles be executed.

18. “2” for 2 cycles

2

19. ENTER to retain 2 cycles

ENTER

20. ENTER since finished

ENTER

21. “1” for PROGRAM FINISHED

1

22. “2” to SAVE PROGRAM AND RUN

2

Choose an available program number to save the program.

NOTE: The machine will now start on 08/08/02 at 3:00 A.M. according to the start procedure that was programmed. It will complete 2 full revolutions (changing water depths at 180 and 0 degrees) and then stop according to the stop procedure at the Stop-In-Slot position of 0 degrees, even though SIS was off. Remember - the Stop-In-Slot must be off or the machine would shut down after the first cycle. The Stop-In-Slot is used only to count cycles completed and as the position to stop when the last cycle is completed.

NOTE: To change the CYCLE$ command, the entire CYCLE$ must be rewritten. The CYCLE$, START$ and STOP$ commands can’t be edited like the Stored Programs.

IMPORTANT: Using the CYCLE$ with a part circle machine requires that the SIS position be within the boundaries for the part circle.

It is recommended that the CYCLE$ program control the direction changes of the machine. In order to keep the CYCLE$ execution counter matched with the actual machine cycles, SIS must be at one of the angle limits. If SIS is not at one of the angle limits, the CYCLE$ program will be executed and counted while traveling both directions.

If the operator stops the machine during a cycle, it can be restarted. The program will resume and complete the cycle(s) as programmed.

Do not change the machine direction; this could cause the program to work incorrectly.

If the machine is equipped with end-of-field stop/auto-reverse hardware, special consideration will be required for writing and executing the CYCLE$ since the machine must pass the SIS location traveling both directions.

DEVELOPING AN IRRIGATION SCHEDULE

The Valley Pro control panel provides the ability to develop your own irrigation schedules to better manage your irrigation equipment. You can set up schedules to do the following:

1. Set up an electrical load management program to take advantage of lower electrical rates. Some electrical power companies require that the operator not operate the irrigation machine during certain time periods of the day to qualify for less expensive rates. The Valley Pro allows you to start and stop the machine daily or on selected days of the week. The start and stop times only need to be entered once in conjunction with the days of the week this feature should be active.
2. Run a program using time delays in between cycles. For example, the operator may run a program one complete cycle, stop the machine, program a time delay for 2-3 days and then start the machine again. This is a very useful scheduling technique and easy to use.
3. Run a program at specified intervals of time. This option allows the operator to irrigate, for example, every 3 days or every 5 days. The time interval, in days, is specified by the user.

On/Off for Electrical Load Management

This feature is identified as DAILY OPERATIONS (DAILY OPS) and is option #7 in the second constants screen as identified in figure 5.32.

```
0 EXIT          3 VOLTAGE     6 PASSWORD
1 MIN APP       4 WIDE BND    7 DAILY OPS
2 HRS/REV       5 HR METER    8 OTHER
PRESS NUMBER >
```

Figure 5.32

"DAILY OPERATIONS" allows you to activate (or turn on) the load management feature and to select the start and stop times of the machine. DAILY OPS is a programmable lockout of the machine “START” command. The PRO module uses the RESTART feature along with the START$ and the STOP$ for control.

When DAILY OPS is switched on, the machine is allowed to run ONLY after an “ON” time has enabled it to run and before an “OFF” time has disabled it. The machine will run only on days selected. **DAILY OPS will stop the machine if the user attempts to start the machine during the “OFF” time.**

If the machine is stopped, either at the panel or remotely, the RESTART function will not restart the machine at the DAILY OPS “ON” time until the machine has been started again.

The following examples will be used to explain how the load management feature works and how it can be applied to different situations:

EXAMPLE 5.5 - Load Management 7 Days a Week

Program the machine to start/stop according to the schedule outlined below:

	OFF	ON
Sunday	10:00 A.M.	6:00 P.M.
Monday	10:00 A.M.	6:00 P.M.
Tuesday	10:00 A.M.	6:00 P.M.
Wednesday	10:00 A.M.	6:00 P.M.
Thursday	10:00 A.M.	6:00 P.M.
Friday	10:00 A.M.	6:00 P.M.
Saturday	10:00 A.M.	6:00 P.M.

This example required the machine stop at 10:00 A.M. and start again at 6:00 P.M. (18:00 hrs) every day of the week.

Follow these steps to program:

1. SYSTEM

2. "1" for CONSTANTS

3. "8" for OTHER (access 2nd constants screen)


```
0 EXIT          3 VOLTAGE     6 PASSWORD
1 MIN APP       4 WIDE BND    7 DAILY OPS
2 HRS/REV       5 HR METER    8 OTHER
PRESS NUMBER >
```

Figure 5.33

4. "7" for DAILY OPS

7

```
0 EXIT                  3 CYCLE ON/OFF
1 DAILY ON/OFF          4 CYCLE INTERVAL
2 DAILY START/STOP      5 CYCLE START TIME
PRESS NUMBER >
```

Figure 5.34

NOTE: Option #1 (DAILY ON/OFF) is used to activate this feature. It MUST be turned on if the machine is to start and stop at the specified times. Option #2 (DAILY START/STOP) is used to specify the start/stop times of the irrigation machine and to select which days of the week this should work on.

5. “1” for DAILY ON/OFF

1

```
0 EXIT                  3 CYCLE ON/OFF
1 DAILY ON/OFF          4 CYCLE INTERVAL
2 DAILY START/STOP      5 CYCLE START TIME
DAILY OPS (OFF) 1. . ON  0. . OFF >
```

Figure 5.35

NOTE: Figure 5.63 is requesting you to turn the DAILY OPERATIONS feature on or off. The feature is currently off. To turn DAILY OPS ON select the number "1" and to turn off select "0"

6. "1" to turn DAILY OPS on.

1

NOTE: The screen shown in figure 5.64 will now be displayed.

```
0 EXIT                  3 CYCLE ON/OFF
1 DAILY ON/OFF          4 CYCLE INTERVAL
2 DAILY START/STOP      5 CYCLE START TIME
PRESS NUMBER >
```

Figure 5.36

7. Select "2" for DAILY START/STOP

2

```
0 EXIT                  3 CYCLE ON/OFF
1 DAILY ON/OFF          4 CYCLE INTERVAL
2 DAILY START/STOP      5 CYCLE START TIME
ENTER TIME TO START (  :  ) >
```

Figure 5.37

NOTE: You are requested to enter the starting time of the machine each day. This is 6:00 P.M. or 18:00 hours.

8. 180000 for 6:00 P.M.

1 8 0 0 0 0

9. ENTER to retain previous time.

ENTER

```
0 EXIT                  3 CYCLE ON/OFF
1 DAILY ON/OFF          4 CYCLE INTERVAL
2 DAILY START/STOP      5 CYCLE START TIME
ENTER TIME TO STOP (  :  ) >
```

Figure 5.38

NOTE: The stop time of the machine must now be entered. This is 10:00 A.M. or 10:00 hours.

10. 100000 for 10:00 A.M.

1 0 0 0 0 0

11. ENTER to retain previous time.

ENTER

```
0 EXIT          3 TUESDAY       6 FRIDAY
1 SUNDAY        4 WEDNESDAY     7 SATURDAY
2 MONDAY        5 THURSDAY
ENTER DAYS (       ) >
```

Figure 5.39

NOTE: You are being prompted to select the days which you want the daily operations on/off features to be active. This example requires that the daily operations feature be active every day of the week. The machine needs to start and stop every day of the week. Therefore, you would select all seven days of the week (#1-7), even if some of these numbers are already present in the parentheses.

12. PRESS “1”, “2”, “3”, “4”, “5”, “6”, and “7”

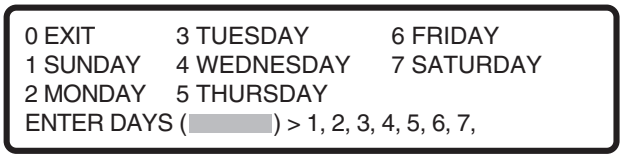


Figure 5.40

13. ENTER to retain previous days selected

NOTE: To examine the days you have input, select "2" again for "DAILY START/STOP", press ENTER for "TIME TO START", and press ENTER for "TIME TO STOP". The screen will be displayed as in figure 5.69 indicating that the daily operations feature will be active on days 1-7 representing Sunday through Saturday. Keep pressing "0" to exit to the status screen.

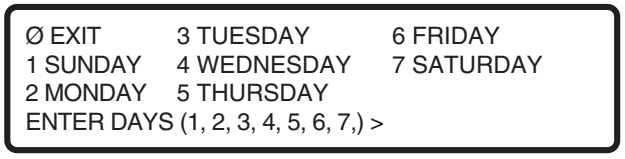


Figure 5.41

IMPORTANT - IMPORTANT - IMPORTANT

Refer to Section 2 under the heading "Entering the Power Restart Start-Up Procedure". The power restart feature will not work unless this start-up procedure is entered. The DAILY OPS feature also requires the start-up procedure to be entered, otherwise this feature will not work. The start-up procedure is entered using the START$ command. This is identified as selection #3 if you press the OPTIONS key. If you have already programmed a start-up procedure for power restart, then this can also be used for the DAILY OPS feature. Only one start-up procedure (START$ command) can be programmed, so it will be used in all cases which require a start-up procedure, such as power restart and DAILY OPS. The START$ command is also used in EXAMPLE 5.4.

You must also enter a stop procedure (STOP$ command). The DAILY OPS feature causes the machine to shut down at certain times of the day. The stop procedure tells the machine how it should stop. In most cases, the STOP command is all that is required. Another example of the STOP$ command being used is given in EXAMPLE 5.4 of Section 5. Refer to the following two sections entitled "Entering the Start-Up Procedure for DAILY OPS" and "Entering the STOP Procedure for DAILY OPS" for instructions on entering these commands.

Entering the Start-Up Procedure for DAILY OPS

Refer to the start-up procedure given in EXAMPLE 2.1 in Section 2. This start-up procedure was programmed for power restart. In this example, if power is lost and restored, 3 minutes will pass before the machine and pump actually start. In power restart situations, a ten second time delay is standard or "built in". Therefore, in this example a time delay of 170 seconds was programmed in the start-up procedure to give a total start-up delay of 180 seconds (10 seconds standard delay plus 170 seconds programmed delay). When the DAILY OPS feature starts the machine, it will use the start-up procedure programmed with the START$ command. It does not add on the standard 10 seconds, however, as it does in a power restart situation. In this case, when the DAILY OPS feature starts the machine, 170 seconds (not 180 seconds) will pass before the machine/pump is actually started. The time delay is important, since the power/pressure restart feature is also active when DAILY OPS is on. Refer to NOTE #3 under "IMPORTANT NOTES ABOUT THIS FEATURE", for more information about DAILY OPS and Power/Pressure restart.

The start-up procedure in this example will be the same as in EXAMPLE 2.1 under "Entering the Power Restart Start-Up Procedure". The start-up procedure (START$ command) will be programmed as follows:

- 170 second time delay
- Start machine/pump after 170 seconds

To program this start-up procedure, follow these steps:

1. OPTIONS

2. "3" for START$

Figure 5.42

3. "2" for WRITE

2

```
WRITE START$,


ENTER COMMANDS, FINISHED. . PRESS ENTER
```

Figure 5.43

4. Press ENTER

ENTER

```
0 EXIT
1 PROGRAM FINISHED
2 NEXT STEP
PRESS NUMBER >
```

Figure 5.44

5. "2" for NEXT STEP

2

```
STEP 1 PROGRAM BY:
0 EXIT     2 POSITION     4 DELAY      6 OTHER
1 TIME     3 PRESSURE     5 FOR/REV
PRESS NUMBER >
```

Figure 5.45

6. "4" for DELAY

4

```
STEP 1  PROGRAM BY: DELAY


DELAY 0. . SECONDS 1. . MINUTES >
```

Figure 5.46

7. “0” for SECONDS

0

8. "170" for 170 seconds

1 7 0

9. ENTER to retain 170 seconds

ENTER

```
STEP 1 AT: 170 SECONDS DELAY,


ENTER COMMANDS, FINISHED. . PRESS ENTER
```

Figure 5.47

NOTE: You are now being requested to enter the commands to execute after 170 seconds. In this example, we only need to START the machine. Machine direction, percent/depth, and water on/water off will remain the same as when the machine was last shut down.

10. START

START

```
STEP 1 AT: 170 SECONDS DELAY, START,


ENTER COMMANDS, FINISHED. . PRESS ENTER
```

Figure 5.48

11. ENTER since finished

ENTER

12. "1" for PROGRAM FINISHED

1

13. "0" to exit to status screen

0

Entering the Stop Procedure for DAILY OPS

The stop procedure is programmed by selecting option #4 (STOP$) from the OPTIONS screen. This command instructs the machine how to stop when the stop time in the DAILY OPS feature is reached. In most cases, this is simply accomplished with the STOP command as in this example.

To program the stop procedure, follow these steps:

1. OPTIONS

OPTIONS

2. "4" for STOP$

4

```
STOP$
0 EXIT          2 WRITE
1 REVIEW        3 EXECUTE
PRESS NUMBER >
```

Figure 5.49

3. "2" for WRITE

2

4. STOP

STOP

```
WRITE STOP$, STOP,


ENTER COMMANDS, FINISHED. . PRESS ENTER
```

Figure 5.50

5. ENTER since finished

ENTER

6. "1" for PROGRAM FINISHED

1

7. "0" to exit to status screen

0

The machine will now stop every day at 10:00 A.M. and will start back up again at 6:03 P.M. (including delay) assuming that you have entered the start-up and stop procedures discussed previously. It is important to note that this feature will work in conjunction with any other program. For example, you may run a program which changes water depths in the field too. The daily operations feature will operate at the same time as a program like this. The daily operations on/off feature is very convenient because the start/stop times and active days of operation are input only once. The machine will start and stop at the selected times every day of the week without any additional programming.

IMPORTANT NOTES ABOUT THIS FEATURE:

1) Turning the "DAILY ON/OFF" feature ON will automatically turn the AUTORESTART feature on. The autorestart feature must be on for "DAILY ON/OFF" to operate correctly.

2) To turn the "DAILY ON/OFF" feature OFF, select DAILY OPS in the second constants screen, select "1" for DAILY ON/OFF and select "0" for DAILY OPS OFF. Notice that the status screen will still display the *RESTART* message. This indicates that the Power/Pressure restart is still active. If you do not want the power/pressure restart feature to be active, you must turn this option off by pressing OPTIONS, selecting "8" for AUTORESTART and "0" for AUTORESTART OFF.

Since the power and pressure restart feature is active when DAILY OPS is on, it is recommended that a time delay be programmed in the start-up procedure. (Refer to "Entering the START-UP Procedure for DAILY OPS") This allows time for the machine to partially drain before the pump is turned on. This is especially important if power is lost and regained in short periods of time, such as 15 or 20 seconds.

EXAMPLE 5.6 - Load Management for Select Days

Example 5.5 addressed seven days a week operation of the DAILY OPS load management program. The following example restricts operation to Monday through Thursday, excluding Friday, Saturday and Sunday:

	OFF	ON
Sunday	———— Off All Day ————	
Monday	9:00 A.M.	7:00 P.M.
Tuesday	9:00 A.M.	7:00 P.M.
Wednesday	9:00 A.M.	7:00 P.M.
Thursday	9:00 A.M.	7:00 P.M.
Friday	———— Off All Day ————	
Saturday	———— Off All Day ————	

Follow these steps to program:

1. SYSTEM

SYSTEM

2. "1" for CONSTANTS

1

3. "8" for OTHER (access 2nd constants screen)

8

4. "7" for DAILY OPS

7

```
0 EXIT                  3 CYCLE ON/OFF
1 DAILY ON/OFF          4 CYCLE INTERVAL
2 DAILY START/STOP      5 CYCLE START TIME
PRESS NUMBER >
```

Figure 5.51

5. "1" for DAILY ON/OFF

1

```
0 EXIT                  3 CYCLE ON/OFF
1 DAILY ON/OFF          4 CYCLE INTERVAL
2 DAILY START/STOP      5 CYCLE START TIME
DAILY OPS (OFF). . 1. . ON  0. . OFF >
```

Figure 5.52

6. "1" to turn DAILY OPS on

1

7. Select "2" for DAILY START/STOP

2

```
0 EXIT                  3 CYCLE ON/OFF
1 DAILY ON/OFF          4 CYCLE INTERVAL
2 DAILY START/STOP      5 CYCLE START TIME
ENTER TIME TO START (  :  )
```

Figure 5.53

NOTE: You are requested to enter the starting time of the machine each day. This is 7:00 P.M. or 19:00 hours. Remember - the time must be entered as 190000.

8. 190000 for 7:00 P.M.

1 9 0 0 0 0

9. ENTER to retain previous time

ENTER

```
0 EXIT                  3 CYCLE ON/OFF
1 DAILY ON/OFF          4 CYCLE INTERVAL
2 DAILY START/STOP      5 CYCLE START TIME
ENTER TIME TO STOP (  :  )
```

Figure 5.54

NOTE: The stop time of the machine must now be entered. This is 9:00 A.M. or 9:00 hours.

10. 090000 for 9:00 A.M.

0 9 0 0 0 0

11. ENTER to retain previous time

ENTER

```
0 EXIT          3 TUESDAY       6 FRIDAY
1 SUNDAY        4 WEDNESDAY     7 SATURDAY
2 MONDAY        5 THURSDAY
ENTER DAYS (       ) >
```

Figure 5.55

NOTE: This example requires that the daily operations feature be active only on Monday through Thursday. DAILY OPS will not allow the machine to be operated on Friday, Saturday and Sunday. Therefore, you would select only days 2, 3, 4 and 5 for the daily operations feature to be active.

12. Press "2", "3", "4" and "5".

2 3 4 and 5

```
Ø EXIT          3 TUESDAY       6 FRIDAY
1 SUNDAY        4 WEDNESDAY     7 SATURDAY
2 MONDAY        5 THURSDAY
ENTER DAYS (       ) > 2, 3, 4, 5,
```

Figure 5.56

13. ENTER to retain previous days selected.

ENTER

14. Keep pressing "0" to exit to status screen.

The machine will operate in the following way:

- Off at 9:00 A.M. and on at 7:00 P.M. (Monday through Thursday)
- Machine will remain on until midnight Thursday. At midnight Thursday, the machine will turn off and remain off until 7:00 P.M. Monday evening.

IMPORTANT - IMPORTANT - IMPORTANT

Remember - the following steps must have occurred for this feature to operate correctly:

1) The DAILY OPS feature must be on.

2) A start-up procedure MUST be entered. (Refer to example 5.5 under "Entering the Start-Up Procedure for DAILY OPS").

3) A stop procedure MUST be entered. (Refer to example 5.5 under "Entering the Stop Procedure for DAILY OPS").

EXAMPLE 5.7 - Load Management for Select Days

Consider the following load management program:

	OFF	ON
Sunday	———— Off All Day ————	
Monday	9:00 A.M.	1:00 A.M.
Tuesday	9:00 A.M.	1:00 A.M.
Wednesday	9:00 A.M.	1:00 A.M.
Thursday	9:00 A.M.	1:00 A.M.
Friday	———— Off All Day ————	
Saturday	———— Off All Day ————	

If this schedule was programmed using the daily operations feature as in examples 5.6 and 5.7, the following information would be entered:

1) Start time = 1:00 A.M.
2) Stop time = 9:00 A.M.
3) Days active = Monday, Tuesday, Wednesday and Thursday (#2, 3, 4 and 5)

The machine will operate in the following way:

- Machine will turn on at 1:00 A.M. and off at 9:00 A.M. Monday through Thursday.
- The machine will remain off on Thursday from 9:00 A.M. until Monday at 1:00 A.M.

Running Programs at Specified Time Intervals

EXAMPLE 5.8 - Running Programs with TIME DELAYS between Cycles

EXAMPLE 5.8

Current Conditions:

- Machine off at 0 degrees

Program Machine To:

- Start on 08/08/02; 3:00 A.M.; Forward; Water On; 1.00 inch
- Water Off at 180 degrees; 100 percent
- Water On at 225 degrees; 0.75 inches
- Stop machine at 0 degrees after 3 complete revolutions with a 2 day delay in between each revolution.

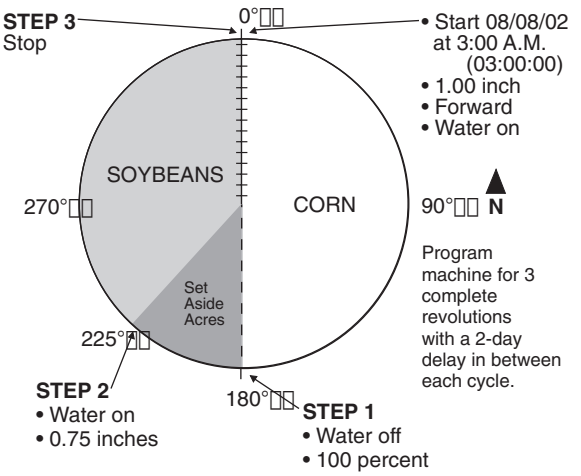


Figure 5.57

This will be accomplished by writing three separate programs and utilizing time delays. The structure of each program will be as follows:

PROGRAM #1:

STEP 1 AT 3:00 A.M. on 08/08/02; Start, 1.00 inch, Forward and Water ON
STEP 2 AT 180 degrees; Water OFF and Percent = 100
STEP 3 AT 225 degrees; Water ON and Depth = 0.75 inches
STEP 4 AT 0 degrees; STOP
STEP 5 AT 2880 Minutes Delay; Start, 1.00 inch, Forward, Water ON and then Run Program #2

PROGRAM #2:

STEP 1 AT 180 degrees; Water OFF and Percent = 100
STEP 2 AT 225 degrees; Water ON and Depth = 0.75 inches
STEP 3 AT 0 degrees; STOP
STEP 4 AT 2880 Minutes Delay; Start, 1.00 inch, Forward, Water ON and then Run Program #3

PROGRAM #3:

STEP 1 AT 180 degrees; Water OFF and Percent = 100
STEP 2 AT 225 degrees; Water ON and Depth = 0.75 inches
STEP 3 AT 0 degrees; STOP

NOTE: Notice that there are 12 steps involved to accomplish what is required. It is therefore necessary to split the entire program up between the 3 programs as explained. If it was not written in this manner, then the number of steps in a single program would exceed the 9 step maximum.

The following procedure should be followed to enter Program #1:

PROGRAM

"2" for CREATE NEW

STEP #s 1-4 EXAMPLE 5.8
Program Steps #1-4 as previously explained in Section 4 "Programming – Learning the Basics". Following is an explanation of the programming procedure for step #5:

STEP 5 – EXAMPLE 5.8
After step #4 has been completed and "2" has been selected for NEXT STEP, then:

1. "4" for DELAY

2. "1" to program in minutes DELAY

Figure 5.58

NOTE: You are being requested to enter in a delay in minutes. In this example, 2 days or (60 minutes x 24 hours x 2 days = 2,880 minutes) will be entered. After this amount of time expires, the machine will start and Program #2 will be instructed to run. (The operator is limited to a time delay of 33,000 minutes.)

3. "2880" for 2,800 minutes (2 days)

4. ENTER to retain 2,880 minutes

5. START

6. FORWARD

7. DEPTH

8. "1" for 1 inch

9. ENTER to retain 1 inch

ENTER

10. WATER ON

WATER ON

```
STEP 5 AT: 2880 MINUTES DELAY, START,
  FORWARD, DEPTH 1.00, WATER ON

ENTER COMMANDS, FINISHED. . PRESS ENTER
```

Figure 5.59

NOTE: The operator must now instruct the program to load Program #2 to run. Program #2 can be instructed to load, even though it has not been written yet.

11. PROGRAM

PROGRAM

```
STORED PROGRAMS


ENTER PROGRAM NUMBER >
```

Figure 5.60

NOTE: Pressing PROGRAM displays all programs currently stored in the panel. In this example, notice there are no programs stored. The program that is being written now will be stored as Program #1. Therefore, the program which will be instructed to run will be identified as Program #2.

12. “2” to load Program #2

2

```
STEP 5 AT: 2880 MINUTES DELAY, START,
  FORWARD, DEPTH 1.00, WATER ON,
  RUN PROGRAM 2,
ENTER COMMANDS, FINISHED. . PRESS ENTER
```

Figure 5.61

13. ENTER since finished

ENTER

14. “1” for PROGRAM finished

1

15. “1” to SAVE PROGRAM

1

16. “1” to SAVE as Program #1

1

NOTE: Programs #2 and #3 must now be created and stored. To execute this series of programs, simply command Program #1 to Run and Programs #2 and #3 will be run automatically as they are called upon.

EXAMPLE 5.9 - Time Interval Programming

This feature allows the operator to run an irrigation program at specified time intervals in days. For example, the operator may want to irrigate every 3 days or 5 days. This feature is found in DAILY OPERATIONS (DAILY OPS) and is identified as option #7 in the second constants screen as identified in figure 5.64.

```
0 EXIT        3 VOLTAGE     6 PASSWORD
1 MIN APP     4 WIDE BND    7 DAILY OPS
2 HRS/REV     5 HR METER    8 OTHER
PRESS NUMBER >
```

Figure 5.62

To use this feature, you must be familiar with using the CYCLE$ command. Refer to "Repeating Programs - A specified Number of Times" in section 5 for a reminder on using the CYCLE$ command to repeat programs.

We will refer to example 5.4 to explain how a program can be run at time intervals.

Current Conditions:
- Machine off at 0 degrees

Program Machine To:
- Start on 08/08/02; 10:00 A.M.; Forward; Water On; 1.00 inch
- 0.50 inches at 180 degrees
- 1.00 inch at 0 degrees
- Execute 1 complete revolution every 3 days

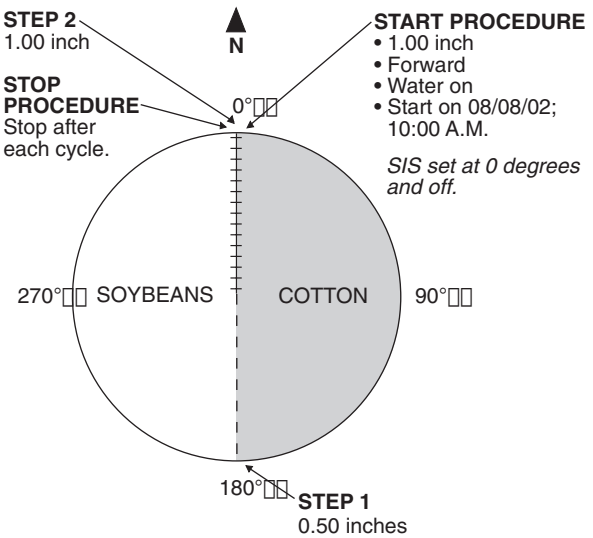


Figure 5.63

Let's review example 5.4:
Three things were required in this example:

1) Program a START$ command (steps #1-12). Remember, this command instructs the machine on how to start. The following START$ command was programmed:
    - 1.00 inch
    - Forward
    - Water On
    - Start
2) Program a STOP$ command (steps #1-7). This command instructs the machine how it should stop. In this case, simply by pressing the STOP key.
3) Program a CYCLE$ command (steps #1-8 on page 57). This command instructs the machine on what it should do as it travels around the circle. The following CYCLE$ command was programmed in example 5.4:
    - Set water depth to 0.50 inches at 180 degrees.
    - Set water depth to 1.00 inch at 0 degrees.

IMPORTANT: Remember that the stop-in-slot is used as a counter to signal to the computer when a cycle has been completed. This feature requires that the machine be at the stop-in-slot location when it is executed. The stop-in-slot must also be off. The example requires that the stop-in-slot be set at 0 degrees since this is the starting location of the machine.

This example (example 5.8) requires that the START$, STOP$ and CYCLE$ commands are programmed as outlined in previous points 1, 2 and 3. You are now ready to continue and program the machine to run the CYCLE$ command at specified time intervals.

Example 5.9 requires that an irrigation occurs every three days. The machine will be started at a specified time and will start according to the START$ command. It will travel in the forward direction and change water depths to 0.50 inches at 180 degrees. The machine will then change water depth back to 1.00 inch and stop at 0 degrees (stop-in-slot location). It will then wait until the time interval expires before it starts again (Waiting period = time interval - time required for 1 cycle). The following step-by-step procedure will instruct you on how to accomplish this:

Access DAILY OPS Feature

1. SYSTEM

SYSTEM

2. "1" for CONSTANTS

1

3. "8" for OTHER (access 2nd constants screen)

8

4. "7" for DAILY OPS

7

```
0 EXIT                  3 CYCLE ON/OFF
1 DAILY ON/OFF          4 CYCLE INTERVAL
2 DAILY START/STOP      5 CYCLE START TIME
PRESS NUMBER >
```

Figure 5.64

NOTE: Options 3, 4 and 5 are used for repeating cycles or programs at specified time intervals.

- *Option #3 (CYCLE ON/OFF)* is used to turn this feature on or off.
- *Option #4 (CYCLE INTERVAL)* is for entering the number of days between irrigations or cycles. (In this example the cycle interval is 3 days)
- *Option #5 (CYCLE START TIME)* is for specifying the time of day when the cycle/irrigation should start. (10:00 A.M. in this example)

Programming CYCLE ON/OFF

5. "3" for CYCLE ON/OFF

3

```
0 EXIT                  3 CYCLE ON/OFF
1 DAILY ON/OFF          4 CYCLE INTERVAL
2 DAILY START/STOP      5 CYCLE START TIME
REPEAT CYCLE (OFF) 1. . ON  0. . OFF >
```

Figure 5.65

*NOTE: Figure 5.65 is requesting you to turn the CYCLE repeat feature on/off. The feature is currently off as indicated in parentheses. To turn it on, select the number "1" and to turn off select "0". Option "3" must be on if this feature is to work. Turning this feature on will also display the *RESTART* message on the screen indicating that the machine can restart at any time. However, this does not automatically cause the power/pressure restart to be active. If you desire the power/pressure restart be active also, it must be turned on manually by pressing OPTIONS, "8" for AUTORESTART and "1" for ON.*

6. "1" to turn REPEAT CYCLE on

1

Programming CYCLE INTERVAL

7. "4" for CYCLE INTERVAL

4

```
0 EXIT                  3 CYCLE ON/OFF
1 DAILY ON/OFF          4 CYCLE INTERVAL
2 DAILY START/STOP      5 CYCLE START TIME
CYCLE INTERVAL (  DAYS) >
```

Figure 5.66

8. "3" for 3 days

3

```
0 EXIT                  3 CYCLE ON/OFF
1 DAILY ON/OFF          4 CYCLE INTERVAL
2 DAILY START/STOP      5 CYCLE START TIME
CYCLE INTERVAL (  DAYS) > 3
```

Figure 5.67

9. ENTER to accept 3 days

ENTER

Programming CYCLE START TIME

The CYCLE START TIME is the time of day which the machine will start. 10:00 A.M. is the start time in this example. This means that if the operator enters the information previously discussed at 9:00 A.M., the machine will start 1 hour later and each cycle will start again every 3 days at 10:00 A.M. If the operator wanted to execute the cycle immediately, a start time would be entered which was a few minutes (2 or 3) past the present time. The machine would then start at that time and every 3 days after that.

10. "5" for CYCLE START TIME

5

```
0 EXIT                  3 CYCLE ON/OFF
1 DAILY ON/OFF          4 CYCLE INTERVAL
2 DAILY START/STOP      5 CYCLE START TIME
ENTER TIME TO START (  :  :  ) >
```

Figure 5.68

11. "100000" for 10:00 A.M.

1 **0** **0** **0** **0** **0**

```
0 EXIT                  3 CYCLE ON/OFF
1 DAILY ON/OFF          4 CYCLE INTERVAL
2 DAILY START/STOP      5 CYCLE START TIME
ENTER TIME TO START (  :  :  ) > 10:00:00
```

Figure 5.69

12. ENTER to retain 10:00 A.M.

ENTER

13. Keep pressing "0" to exit to status screen.

The machine has now been programmed to run at 3 day intervals and would operate in the following way:

START$ 1) Start at 10:00 A.M. on 08/08/02, apply 1.00 inch and run in the forward direction.

CYCLE$ 2) Change water depth to 0.50 inches at 180 degrees.

STOP$ 3) Stop at 0 degrees (SIS position). Assuming the machine requires 26 hours per revolution, the stop date/time would be 08/09/02 at 12:00 noon.

4) The machine would then wait 46 hours (72 hours - 26 hours = 46 hours) and would start again at 10:00 A.M. on 08/11/02 applying 1.00 inch in the forward direction.

5) This process would continue until the cycle repeat feature is turned off.

IMPORTANT NOTES ABOUT CYCLE REPEAT

1) The previous example described a situation in which the machine started at 10:00 A.M. on 08/09/02 at which point an irrigation cycle was executed. The cycle review screen will provide information concerning when the last cycle was executed and when the next cycle will execute. It also reveals if the cycle repeat function is on or off. To look at the cycle review screen, follow these steps:

1. SYSTEM

SYSTEM

```
0 EXIT          3 RESET         6 TRANSMIT
1 CONSTANTS     4 REVIEW        7. LANGUAGE
2 DATA          5 CYCLE         8. HOURS
PRESS NUMBER >
```

Figure 5.70

2. "5" for CYCLE

5

```
CYCLE REPEAT: ON
LAST CYCLE:   08/08/02
NEXT CYCLE:   08/11/02
PRESS ANY KEY >
```

Figure 5.71

2) The machine MUST make a complete circle or 2 partial circles (forward and reverse pass in the case of a windshield wiper machine) in the CYCLE TIME INTERVAL which you input. The time required to complete 1 cycle must be less than the CYCLE INTERVAL. For example, if the CYCLE INTERVAL is 3 days, the machine must complete 1 cycle in less than 3 days.

The following situations will occur if the machine does not complete a cycle in the specified time interval:

Situation #1 - Machine is running, the next cycle date and time is reached and the machine has not completed the full cycle.

In this situation, the machine will continue to run to the stop-in-slot position and will stop. The operator is then required to start the machine manually to resume the irrigation cycle.

Situation #2 - Machine is stopped, the next cycle date and time is reached and the machine has not completed the full cycle.

This situation requires the operator to start the machine. The machine will then run to the stop-in-slot position. It will not stop at the stop-in-slot but will continue its travel. The operator then needs to execute a cycle manually by pressing OPTIONS, "5" for CYCLE$, "3" for EXECUTE, "1" for 1 cycle and ENTER. This enters a cycle and will resume the irrigation schedule.

3) To clear or "reset" the next cycle date, follow these steps (RARELY NEEDED):
   1. Turn the CYCLE REPEAT feature off. (Press SYSTEM, "1" for CONSTANTS, "8" for OTHER, "7" for DAILY OPS, "3" for CYCLE ON/OFF and "0" for off.
   2. Press OPTIONS, "5" for CYCLE$, "3" for EXECUTE, "0" for 0 cycles and ENTER.

4) The DAILY START/STOP feature for load management discussed previously can be used in conjunction with the CYCLE REPEAT function. The machine would only run during the days and times allowed.

Diagnostics

This section will provide an overview of using the diagnostic features incorporated into the Valley C:A:M:S Pro control panel. Troubleshooting will be mentioned as it relates to diagnostics with more in-depth information provided in the Troubleshooting portion. Diagnostics aid in identifying machine failures, troubleshooting and correcting problems.

MAIN SCREEN DIAGNOSTICS

If a failure occurs, an ERROR CODE (Exx) appears on the main screen (see highlighted area in Figure 6.1). It is possible for more than one error to occur. If this should happen, the errors that have occurred will sequence between each other every second.

11:37:10	260...DEGREES	STOPPED
10/12/02	56...PSI	FORWARD
482 VOLTS	E05 0 %	WATER...ON
1645.5 HR	0.78 IN	SIS...OFF

Figure 6.1

Note the screen in Figure 6.1 indicates an E05 Error Code (a machine Safety Fault). This will be covered in more detail later in the Troubleshooting portion of Section 6.

A failure may or may not shut the machine off. Those failures (ERROR CODES) that occur without shutting down the machine are intended to indicate a problem exists which needs to be corrected by a Valley Technician even though the machine will continue to operate.

FAULTS/ERROR CODES

To view faults or errors, you must go to the DIAGNOSTIC screen.

1. Press the "**DIAGNOSTIC**" key

DIAGNOSTIC

```
0  EXIT
1  SYSTEM FAULTS
2  ERROR LOG
PRESS NUMBER >
```

Figure 6.1.1

You have three selections to choose from:

- Pressing "**0**" exits this screen and returns you to the main screen
- Pressing "**1**" displays the SYSTEM FAULTS screen.
- Pressing "**2**" displays the ERROR LOG selection screen.

2. Press "**1**" for SYSTEM FAULTS

1

SYSTEM POWER	OK	SIS	OK
SYSTEM SAFETY	FAULT	WIND	OK
PRESSURE	OK	DAILY OPS	OK
COMMAND	OK	RELAY COM	OK

Figure 6.1.2

NOTE: WIND, DAILY OPS and RELAY COM will only be shown if those items are utilized on the machine.

The screen in this example indicates a "SAFETY FAULT" has occurred. This means somewhere on the machine the return safety has opened causing the machine to shut off. Examples of possible causes include, but are not limited to, a misalignment in the machine due to a flat tire or a failed gearbox on an intermediate drive unit; an inline shutdown due to the end drive unit getting stuck or failure of center drive gearbox, etc.

Below is a list of the Faults that can be indicated on the Fault Screen along with a brief description.

System Power Fault

A system power FAULT is caused by low voltage (less than 440 volts). Check the voltage shown on the Status Screen to determine if the voltage is below 440 volts. If it is below 440 volts, it will not restart. If the voltage is near 480 volts on the Status Screen, it may have temporarily fallen below 440 volts while the machine was running and therefore caused the machine to shut down. **(REMEMBER: The operator has the ability to set a low voltage shut down lower than 440 volts).**

System Safety Fault

A system safety FAULT is caused by a break in the safety return circuit. Check the machine alignment and any other devices that are wired in the machine safety circuit.

Pressure Fault

Pressure FAULT indicates the pressure fell below the low pressure limit or the pressure switch showed an open circuit for more than three seconds.

If the Pressure Delay (Set in Constants) is not a sufficient amount of time to build pressure in the machine after it is started, then the machine/pump will be shut down after the pressure delay time expires and FAULT will be displayed next to Pressure. Increase the pressure delay time to solve this problem.

Command Fault
If "FAULT" is displayed by COMMAND, this indicates that the machine was commanded off by one of the following:

1) The STOP key was pressed
2) An autostop condition occurred at the end-of-field stop.
3) A programmed STOP command was executed

Stop-In-Slot (SIS) Fault
This indicates that the machine was shut down by the Stop-In-Slot. The panel allows you to start the machine at the stop-in-slot location with SIS ON. Stop-in-slot is automatically by-passed when starting the machine.

Wind Fault
A wind speed indicator can be purchased as an option. This device is known as an anemometer and will shut the machine down if the wind speed reaches a high wind limit which can be set by the operator. This option can be turned on/off. If it is turned on, WIND will be displayed on the diagnostics screen as shown in figure 6.2.

SYSTEM POWER	OK	SIS	OK
SYSTEM SAFETY	OK	WIND	OK
PRESSURE	OK		
COMMAND	OK	RELAY COM	OK

Figure 6.2

If the machine shuts down because the wind speed reached the high wind limit, FAULT will be displayed next to WIND. If the wind option is not turned on, WIND will NOT appear on the diagnostics screen.

NOTE: Contact your Valley dealer for more information concerning the wind speed indicator option.

Daily Ops Fault
The daily operations feature allows the operator to start and stop the machine at specified times and on the days of the week the operator desires. This feature is turned on/off from the daily operations screen and is labeled DAILY ON/OFF (refer to page 65, "On/Off for Electrical Load Management"). If this feature is on, DAILY OPS will be displayed as shown in fig. 6.3.

SYSTEM POWER	OK	SIS	OK
SYSTEM SAFETY	OK	WIND	OK
PRESSURE	OK	DAILY OPS	OK
COMMAND	OK	RELAY COM	OK

Figure 6.3

If the machine shuts down because it is not allowed to run between a certain time period, FAULT will be displayed next to DAILY OPS. This indicates the daily operations load management program shut the machine down. If this feature is turned off, DAILY OPS will NOT appear on the diagnostics screen.

Relaycom
Indicates there is either a hardware or software communication problem between the Pro 2 module and the electrical relay board within the control panel. Troubleshooting and correction of this problem must only be completed by a qualified Valley Service Technician.

NOTE: Any item showing "FAULT" on the SYSTEM FAULTS screen will have caused the machine to shut down.

Additional information can be obtained by accessing the ERROR LOG screen.

3. Press "**ESC**" (Escape) to exit the SYSTEM FAULTS screen and return to the Diagnostic screen.

Figure 6.4

4. Press "**2**" on the DIAGNOSTIC screen to access the ERROR LOG screen.

Figure 6.5

You have three selections to choose from:

- Pressing "**0**" (EXIT) returns you to the Diagnostic screen
- Pressing "**1**" (SEARCH BACKWARD) displays the first error log screen
- Pressing "**2**" (SEARCH FORWARD) at this time will have no affect on the screen being displayed. Once you have accessed the second Error Log screen, the Search Forward allows you to return to the previous Error Log screen.

5. Press "**1**" (SEARCH BACKWARD) on the DIAGNOSTICS screen to access the first ERROR LOG screen.

1

```
E01 BATTERY BACKED RAM - CHECKSUM
FAILED AT POWER UP
FIRST: 14:00:00      04/15/00
LAST: 14:00:00       04/15/00                COUNT= 0
```

Figure 6.6

Looking at this screen would seem to indicate the CHECKSUM failed at power up on the BATTERY BACKED RAM. Note the time and date of the first and last failure are the same and the COUNT = 0 (zero). This means there has been no failure of the battery backed RAM. If there had been, the COUNT would have shown "1" or more. If more than one failure had occurred, the "FIRST" and "LAST" time and date would have been different and the count would have been more than "1".

Remember, the Main Screen indicated there was an E05 error of failure. In addition, when you viewed the SYSTEM FAULT screen, it indicated a SYSTEM SAFETY failure. You must step through the other four Error screens to access the E05 screen.

6. Press "**1**" (STEP BACKWARD) four times to access the E05 screen.

1 (4 times)

```
E05 SYSTEM SAFETY - POSSIBLE TOWER
MISALIGNMENT, DRIVE UNIT MAY BE STUCK
FIRST: 14:00:00      04/15/00
LAST: 14:00:00       04/15/00                COUNT= 1
```

Figure 6.7

The E05 screen indicates the following:
- A safety is open on the return safety line.
- A possible cause is a drive unit that's stuck.
- The failure occurred at 14:00:00 (12 PM) on the 15th of April, 2000.
- Only one failure has occurred.

Even though a tower misalignment caused by a tower being stuck is suggested as a possibility, there are a number of other potential causes for a misalignment i.e. mechanical or electrical. Again, the problem and cause of the problem is only a suggestion or possibility.

An in-line shutdown will also cause a safety to open when the over-watering timer times out should there be a problem on the end or last tower. The same Error Code (E05) would appear and the same cause would be indicated (POSSIBLE TOWER MISALIGNMENT, DRIVE UNIT MAY BE STUCK).

NOTE: Any momentary safety dropout will be recorded as an E05 in the Error Log. If the open is for less than three seconds the machine will not shut down but an E05 error will be logged on the count.

You do know a Safety Break or Open SYSTEM SAFETY has occurred but additional troubleshooting will have to be done to isolate the specific problem and correct the cause.

If the cause of the problem turned out to be mechanical (stuck, flat tire, failed gearbox), you could possibly correct the cause to eliminate the problem and restart the machine. If, on the other hand, the problem cannot be determined to be mechanical and you think it may be *electrical*, **DO NOT ATTEMPT** to troubleshoot or correct the problem!

Valley Service Technicians must correct ALL electrical problems or failures!

⚠ WARNING ⚠

NEVER attempt to troubleshoot or correct any *electrical problems* on or associated with the machine!

ALWAYS contact your local Valley Service Department and have their Service Technician troubleshoot and correct any electrical problems! Failure to heed this ! WARNING ! can result in *severe injury* or *death*!!!

ALWAYS shut off all electrical power to the machine (pivot control panel and service panel disconnects) before servicing or performing mechanical maintenance on the machine!

Even though the operator must never attempt to correct electrical problems on a machine or its associated electrical components, providing the information from these screens to the Valley Service Technician can reduce troubleshooting time and service costs.

The **primary purpose** of the ERROR LOG screens is to provide additional information to the Service Technician making it possible to more easily and quickly correct the problem and its cause.

ERROR LOG SCREENS

Below is a list of the Error Codes along with a description and the machine status based on the particular error. Not all errors will cause a machine to sut off.

ERROR CODE	DESCRIPTION	MACHINE STATUS
E01	BATTERY BACKED RAM	Continues to Run
E02	(NOT SHOWN ON MAIN DISPLAY)	N/A
E03	(NOT SHOWN ON MAIN DISPLAY)	N/A
E04	POWER DROP-POWER DROPPED BELOW LOW VOLTAGE LIMIT	Continues to Run
E05	SYSTEM SAFETY-POSSIBLE TOWER MISALIGNMENT	Continues to Run
E06	PUMP SAFETY-PRESSURE TOO LOW AFTER PRESSURE DELAY	Shuts Down
E07	PRESSURE SENSOR-OUT OF RANGE HIGH	Continues to Run
E08	PRESSURE SENSOR-OUT OF RANGE LOW	Continues to Run
E09	PRESSURE HIGH-PUMP OFF	Continues to Run
E10	PRESSURE SENSOR-MECHANICAL SWITCH STUCK	Continues to Run
E11	RESOLVER-ANGLE JUMPING AROUND	Continues to Run
E12	RESOLVER-OUT OF RANGE	Continues to Run
E13	KEYPAD-POSSIBLE KEY STUCK	Continues to Run

Some errors shown on the main screen may not cause a machine to shut off. For example, low voltage below the programmed limit can result in Error 04 (E04) being displayed on the main screen. This error occurs when the machine voltage drops below the LOW VOLTAGE setting. If the voltage drops below the low voltage setting for longer than 15 seconds, the machine will shut off and a system power fault will occur.

MAIN SCREEN

11:37:10		260…DEGREES	STOPPED
11/12/00		56…PSI	FORWARD
482 VOLTS	**E04**	0 %	WATER. .ON
1645.5 HR		0.78 IN	SIS…OFF

Figure 6.8

The Main Screen indicates an Error 04 (E04).

SYSTEM FAULTS SCREEN

SYSTEM POWER	FAULT	SIS	OK
SYSTEM SAFETY	OK	WIND	OK
PRESSURE	OK	DAILY OPS	OK
COMMAND	OK	RELAY COM	OK

Figure 6.9

The System Faults Screen indicates a System Power Fault.

ERROR LOG SCREEN

E04 POWER DROP - POWER DROPPED BELOW LOW VOLTAGE LIMIT
FIRST: 14:00:00 04/15/00
LAST: 14:00:00 04/15/00 COUNT= 1

Figure 6.10

The Error Log Screen shows the VOLTAGE dropped below the programmed low VOLTAGE shutdown level. This error occurs when the machine voltage drops below the LOW VOLTAGE setting.

If more than one power drop had occurred, another time and date would have been shown on “LAST:” and the count would have been more than 1.

Causes for low voltage or voltage drops depend on the type of power supplied to the machine. In the instance of a generator, the belt tightness or the number and type of belts can cause voltage drops if the belts are not adjusted properly or is the wrong type and number are not correct.

Public power voltage drops may occur during peak usage periods of power usage on the utility distribution system. Even though these are rare, it is possible.

The setting of the low voltage limit should also be checked. If this is set too high, nuisance shutdowns can occur.

⚠ **CAUTION! Never set the low voltage limit below 440 Volts. Operation at a voltage less than 440 can cause electrical damage to the drive motors and other electrical components!**

Contact your Valley Service Technician for assistance regard low voltage or any other electrical problem!

CLEARING THE ERROR LOG SCREEN

The Error Log screens can be cleared or reset to return the count to 0.

1. Begin by accessing the Error Log Screen (E04) as previously shown.

```
E04 POWER DROP - POWER DROPPED BELOW LOW
VOLTAGE LIMIT
FIRST: 14:00:00 04/15/00
LAST: 14:00:00 04/15/00                    COUNT= 1
```

Figure 6.11

Once the E04 screen is displayed:

2. Press "←" (**BS - Back Space**) key twice.

[←]

[←]

```
E04 POWER DROP - POWER DROPPED BELOW LOW
VOLTAGE LIMIT
FIRST: 08:00:00 04/16/00
LAST: 08:00:00 04/16/00                    COUNT= 0
```

Figure 6.12

The times, dates and the count have been reset.

3. Press **"ESC" (ESCAPE)** key twice to return to the main screen.

[ESC]

[ESC]

```
11:37:10          260…DEGREES     STOPPED
04/15/00               56…PSI     FORWARD
482 VOLTS                0 %     WATER. .ON
1645.5 HR             0.78 IN     SIS…OFF
```

Figure 6.13

Error 04 (Low Voltage) no longer appears on the main screen date indicating the error (problem) has been corrected and the Error Log Screen has been reset.

ERROR LOG SCREENS

The following are shown on the Error Log Screens.

1. Press "**2**" on the DIAGNOSTICS screen to access the ERROR LOG screen.

[2]

```
0 EXIT
1 SEARCH BACKWARD
2 SEARCH FORWARD
PRESS NUMBER >
```

Figure 6.14

2. Press "**1**" SEARCH BACKWARD to access the ERROR #1 (E01) screen.

NOTE: Each subsequent error screen is accessed by repeatedly pressing "1"

[1]

```
E01 BATTERY BACKED RAM - CHECKSUM
FAILED AT POWER UP
FIRST: 14:00:00 04/15/00
LAST: 14:00:00 04/15/00                    COUNT= 0
```

Figure 6.15

Module self-test of battery-backed memory detected a data error. Weak batteries could cause this. Batteries need to be changed annually. Other problems must be diagnosed by a qualified Valley Service Technician.

3. Press "**1**" SEARCH BACKWARD to access the ERROR #2 (E02) screen.

NOTE: Each subsequent error screen is accessed by repeatedly pressing "1"

[1]

```
E02 EEPROM - CHECKSUM FAILED AT
POWER UP
FIRST: 14:00:00 04/15/00
LAST: 14:00:00 04/15/00                    COUNT= 0
```

Figure 6.16

Module self-test of non-volatile memory detected a data error. Contact a qualified Valley Service Technician for assistance.

This error can occur when power is lost while saving CONSTANTS. The data being saved may be lost.

4. Press "**1**" SEARCH BACKWARD to access the ERROR #3 (E03) screen.

NOTE: Each subsequent error screen is accessed by repeatedly pressing "1"

1

E03 UNIT RESETS - THIS IS LOGGED
WHEN THE SOFTWARE RESETS
FIRST: 14:00:00 04/15/00
LAST: 14:00:00 04/15/00 COUNT= 0

Figure 6.17

Records software resets caused by power cycles or electrical switching noise that disturbs the computer processor. Contact a qualified Valley Service Technician for assistance.

5. Press "**1**" to access the ERROR #04 (E04) screen.

1

E04 POWER DROP - POWER DROPPED BELOW LOW VOLTAGE LIMIT
FIRST: 14:00:00 04/15/00
LAST: 14:00:00 04/15/00 COUNT= 0

Figure 6.18

This error occurs when the machine voltage drops below the LOW VOLTAGE setting.

6. Press "**1**" to access the ERROR #05 (E05) screen.

1

E05 SYSTEM SAFETY - POSSIBLE TOWER MISALIGNMENT, DRIVE UNIT MAY BE STUCK
FIRST: 14:00:00 04/15/00
LAST: 14:00:00 04/15/00 COUNT= 0

Figure 6.19

The machine safety circuit has been interrupted or is open for more than three seconds. This may be due to alignment, guidance, over-watering timer, etc.

7. Press "**1**" to access the ERROR #06 (E06) screen.

1

E06 PUMP SAFETY - PRESSURE TOO LOW AFTER PRESSURE DELAY
FIRST: 14:00:00 04/15/00
LAST: 14:00:00 04/15/00 COUNT= 0

Figure 6.20

The Delay Time Setting or the Low Pressure Setting may not be correct. In addition, the pressure sensor may have failed or there may have been a pump failure.

This error results in a PRESSURE FAULT on the SYSTEM DIAGNOSTICS screen after a 30 second time out/delay. STARTING, WAITING or RUNNING in the wet mode of operation.

NOTE: Water pressure loss below the programmed limit can result in Error #06 (E06) being displayed on the main screen, yet the machine continues to run. The low pressure shutoff feature includes a time delay to maintain machine operation for pressure drops of limited duration (30 seconds or less). If the pressure drops below the programmed level but moves back up above that level within the 30 seconds, the machine will continue to operate. If the pressure stays below the programmed level for over 30 seconds, the machine will shut off. Any time the pressure drops below the preset level, the Main Screen will show a Error #06 fault and the count on the error log screen will increase.

8. Press "**1**" to access the ERROR #7 (E07) screen.

1

E07 PRESSURE SENSOR - OUT OF RANGE HIGH, ELECTRICAL CONNECTION
FIRST: 14:00:00 04/15/00
LAST: 14:00:00 04/15/00 COUNT=0

Figure 6.21

This indicates the pressure sensor has failed. Contact a qualified Valley Service Technician for assistance.

9. Press "**1**" to access the ERROR #8 (E08) screen.

1

E08 PRESSURE SENSOR - OUT OF RANGE LOW, ELECTRICAL CONNECTION
FIRST: 14:00:00 04/15/00
LAST: 14:00:00 04/15/00 COUNT=0

Figure 6.22

Pressure sensor has failed or is not installed in this machine. This causes a PRESSURE FAULT on the SYSTEM DIAGNOSTICS screen.

10. Press “**1**” to access the ERROR #9 (E09) screen.

1

E09 PRESSURE SENSOR - PRESSURE HIGH
WITH PUMP OFF, ELECTRICAL CONNECTION
FIRST: 14:00:00 04/15/00
LAST: 14:00:00 04/15/00 COUNT=0

Figure 6.23

The pressure sensor may have failed or the machine drain may be plugged. This error occurs when the pressure stays above seven PSI for more than five minutes.

11. Press “**1**” to access the ERROR #10 (E10) screen.

1

E10 PRESSURE SENSOR - MECHANICAL
SWITCH COULD BE STUCK
FIRST: 14:00:00 04/15/00
LAST: 14:00:00 04/15/00 COUNT= 0

Figure 6.24

This error indicates the pressure was below the low-pressure setting. The switch may have failed or is stuck. This error occurs after five minutes with the pump off.

12. Press “**1**” to access the ERROR #11 (E11) screen.

1

E11 RESOLVER - ANGLE JUMPING AROUND
LUBE J PIPE
FIRST: 14:00:00 04/15/00
LAST: 14:00:00 04/15/00 COUNT=0

Figure 6.25

Pivot swivel may be sticking and requires lubrication. This error occurs when the swivel jumps/moves 5° or more in one second.

13. Press “**1**” SEARCH BACKWARD to access the ERROR #12 (E12) screen.

NOTE: Each subsequent error screen is accessed by repeatedly pressing “1”

1

E12 RESOLVER OUT OF RANGE HIGH LOOSE OR
SHORTED WIRES
FIRST: 14:00:00 04/15/00
LAST: 14:00:00 04/15/00 COUNT= 0

Figure 6.26

14. Press “**1**” to access the ERROR #13 (E13) screen.

1

E13 KEYPAD - POSSIBLE KEY STUCK,
CHECK KEYPAD CONNECTION
FIRST: 14:00:00 04/15/00
LAST: 14:00:00 04/15/00 COUNT= 0

Figure 6.27

Either the keypad has failed or a key has been depressed for more than seven seconds.

MODULE

MODULE is identified as option #6 from the OPTIONS screen.

```
0 EXIT      3 START$    6 MODULE
1 AUX1      4 STOP$     7 AUTOREVERSE
2 AUX2      5 CYCLE$    8 AUTORESTART
PRESS NUMBER >
```

Figure 6.30

This option can be used to turn individual relays on the relay board on/off. Option #6 (MODULE) should only be used by Valley factory trained technicians.

REVIEWING MACHINE DATA

This feature allows the operator to view operating data from the machine. To review the data screen, follow these steps:

1. SYSTEM

```
SYSTEM
```

```
0 EXIT          3 RESET       6 TRANSMIT
1 CONSTANTS     4 REVIEW      7 LANGUAGE
2 DATA          5 CYCLE       8 HOURS
PRESS NUMBER >
```

Figure 6.31

2. Select "2" for DATA

```
2
```

```
0 EXIT          3 MODULES
1 A/D           4 FLOW/WIND
2 PULSE
PRESS NUMBER >
```

Figure 6.32

The following information can be reviewed from the screen in figure 6.6:

1) A/D - review analog voltages for troubleshooting
2) PULSE - review electrical pulse counters and rates
3) MODULES - review the status of selected relays. A relay is considered a module.
4) FLOW/WIND - displays total flow and flow rate. Requires the purchase of the flowmeter option.

The following sections will address the four areas discussed previously:

A/D - Reviewing Analog Voltages

To view the analog voltages, press "1" for A/D from the data screen displayed in figure 6.32.

```
1
```

```
                ANALOG VOLTAGES
0       517     2 ▒▒▒▒    4 3270      6 ▒▒▒▒
1       - 83    3 1776    5 ▒▒▒▒      7 ▒▒▒▒
PRESS ANY KEY > 0/1 = 6.22-> 359.7
```

Figure 6.33

You will notice 8 channels (#0-7) which voltage feedback can be monitored. Channels #2, 5, 6 and 7 are currently not being used and may display random values which should be ignored. The voltage readings are all displayed in millivolts.

Channels 0 and 1 monitor 2 voltage signals from the resolver in the collector ring. These voltages will change as the pivot moves and they are used to calculate the position of the pivot in degrees. The voltage readings on channel 0 or 1 should be between -1000 and +1000 millivolts

Channel 3 monitors the voltage from the pressure transducer. This voltage varies as the pressure is increased/decreased and is then converted to a pressure reading in (psi) and displayed on the status screen. This voltage will vary between 1000 and 4000 millivolts.

Channel 4 is monitoring the machine voltage. This value will change as the voltage varies for the power source of the pivot.

Reviewing Electrical Pulses

To review the electrical pulse information press "2" from the DATA screen displayed in figure 6.32.

2

```
COUNTER 0      2121505      PULSES  0      505
READING 1        28958      PER     1      210
        2            0      MINUTE  2        0
PRESS ANY KEY >
```

Figure 6.34

Three external pulse counting channels (#'s 0, 1 and 2) are available. COUNTER READING provides a totalized count of electrical pulses. PULSES PER MINUTE provides a rate of pulses.

Channel "0" is used if the flowmeter option is purchased. One revolution of the flowmeter propeller will produce a certain number of electrical pulses (example would be 2 pulses per revolution). Channel "0", under COUNTER READING, would then count and totalize the electrical pulses from the flowmeter.

Channel "0", under PULSES PER MINUTE, will provide the rate of pulses from the flowmeter in pulses per minute. This value is then converted to a flow rate in gallons per minute and is displayed in the FLOW/WIND screen.

Channel “1” is reserved for the wind speed indicator option which must be purchased separately. Two pulses are recorded for each turn of the anemometer. The rate in pulses per minute is then convered to a windspeed in miles per hour.

Channel "2" is for expansion purposes.

MODULES - Auxiliary/Pressure/Relay Status Review

A screen is available which allows the operator to monitor the following:

PRESSURE		ON/OFF
AUXOUT1		ON/OFF
AUXOUT2		ON/OFF
AUXIN1		ON/OFF
AUXIN2		ON/OFF
MODULE#	(RELAY #)	ON/OFF

To view the screen, follow these steps:

1. SYSTEM

SYSTEM

2. "2" for DATA

2

3. "3" for MODULES

3

```
0 EXIT        PRESSURE.ON    MODULE   2 OFF
1 MODULE      AUXOUT1. . ON  AUXIN1. . . . . ON
              AUXOUT2. . OFF AUXIN2. . . . . OFF
PRESS NUMBER >
```

Figure 6.35

Following are explanations of the conditions which are monitored:

PRESSURE

Indicates if the pressure is above or below the low pressure limit. ON indicates a pressure higher than the low pressure limit. OFF indicates a pressure lower than the low pressure limit. If a mechanical pressure switch is used, ON indicates closed and OFF is an open condition.

AUXOUT1/AUXOUT2

Monitors the contacts of the relays that control voltage from the panel to auxiliary equipment. ON indicates the contacts are closed. OFF indicates the contacts are open.

AUXIN1/AUXIN2

Monitors/senses feedback to the panel from auxiliary equipment. These are 120 volt relays and can be wired to monitor AUXOUT1 and AUXOUT2 as shown on the wiring diagram on the panel door.

MODULE

MODULE is another name for a relay. The machine is controlled by a series of relays located on a relay board on the back of the control panel. Each relay will either be closed (ON) or open (OFF) as the machine is operating. If you select "1" for MODULE you can enter a MODULE number and it will be monitored in the upper right hand corner of the screen as indicated in figure 6.9. A list of the modules and their corresponding numbers can be found in Appendix A.

FLOW/WIND - Flowmeter/Wind Speed Information Display

To view the FLOW/WIND display screen, press "4" from the DATA screen displayed in figure 6.32.

4

```
TOTAL GALLONS . (MIL. GAL)        250
FLOWMETER . . . . . (GAL/MIN)     850
WIND SPEED . . . . . (MPH)         18
PRESS ANY KEY >
```

Figure 6.36

- Total flow is displayed in millions of gallons (example = 250 million gallons)
- Flow rate is displayed in gallons per minute (example = 850 gpm)
- Wind speed is displayed in miles per hour (example = 18 mph)

REMEMBER The flowmeter and wind speed indicator are both options purchased separately from the Valley Pro control panel. Contact your Valley dealer for more information concerning these options.

SETTING THE WIND SPEED SHUT DOWN POINT
If the wind speed shut down option is purchased, a wind speed shut down point can be programmed to shut the machine down when the wind speed exceeds the set value. To program the shut down point, follow these steps:

1. SYSTEM

2. “1” for CONSTANTS

3. “8” for OTHER

4. “8” to access the 2nd OTHER Constants screen

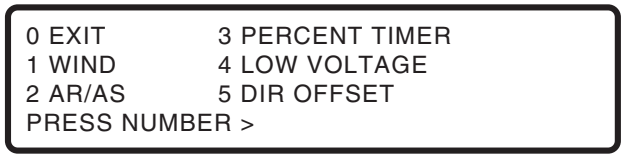


Figure 6.37

5. “1” for WIND

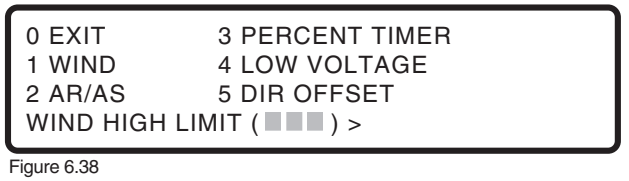


Figure 6.38

NOTE: You are being requested to enter the wind high limit shut down point in miles per hour. In this example, 15 mph will be entered.

6. “15” for 15 mph

7. ENTER to retain 15 mph

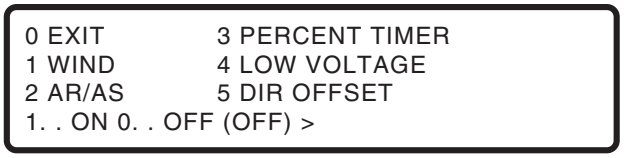


Figure 6.39

NOTE: You are now being requested to turn the wind speed shut down option on/off. It is currently off as indicated in parentheses. Press “1” to turn it ON.

8. “1” to turn wind shut down feature ON

NOTE: The wind speed shut down feature is now active. If the average wind speed for at least 1 minute is in excess of 15 mph, the machine will be shut down and FAULT will be displayed next to WIND in the Diagnostics Screen.

REVIEWING THE RECORD OF MACHINE OPERATION

The REVIEW feature provides you with a complete record of the machine’s operation. Anytime a change occurs in the status of the operation, the Valley Pro control panel, in effect, takes a picture of the previous status screen and stores it where you can review it. The Valley Pro control panel will store up to 50 status changes. As soon as 50 changes have occurred, the earliest changes are deleted to make room for the more recent ones.

EXAMPLE 6.1

The machine is currently running as illustrated in figure 6.40.

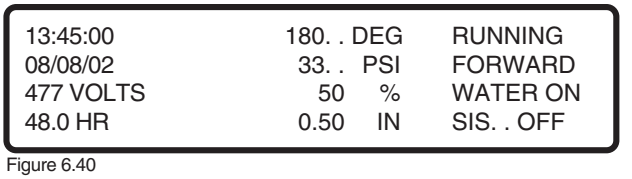


Figure 6.40

The operator wishes to review any changes that have happened to the operation of the machine since 08/08/02.

To examine the REVIEW screen, follow these steps:

1. SYSTEM

Figure 6.41

2. "4" for REVIEW

Figure 6.42

NOTE: The operator has 3 choices:

0 EXIT	*Exits the Review screen.*
1 SEARCH BACKWARD	*Review the most recent changes first.*
2 SEARCH FORWARD	*Reviews the earliest changes first and continues to the most recent ones.*

Pressing "1" or "2" during the review process allows you to view changes to the machine either moving FORWARD or BACKWARD in time.

Each review screen is numbered in the lower left hand corner with REVIEW 1, REVIEW 2, etc. REVIEW 1 is the most recent change of status and REVIEW 50 is the earliest change.

In this example, the operator has SEARCHED BACKWARD by pressing "1" each time to view the "REVIEW 15" screen as illustrated below in figure 6.43.

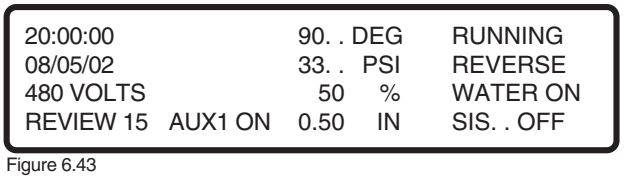


Figure 6.43

Notice that the complete status of the machine on 8/5/02 at 20:00 hours is displayed. To view the next change that occurred, press "2" to search forward.

3. "2" to SEARCH FORWARD (REVIEW 14)

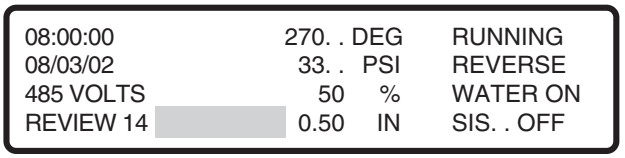


Figure 6.44

Change: On 8/3/02 at 08:00 at 270 degrees, auxiliary relay #1 (AUX1) was turned off.

4. "2" to SEARCH FORWARD (REVIEW 13)

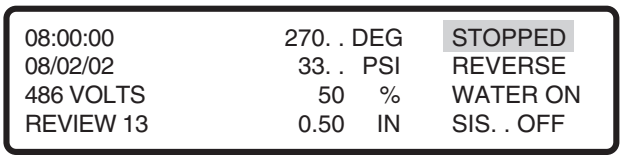


Figure 6.45

Change: On 8/2/02 at 08:00 at 270 degrees, machine stopped.

5. "2" to SEARCH FORWARD (REVIEW 12)

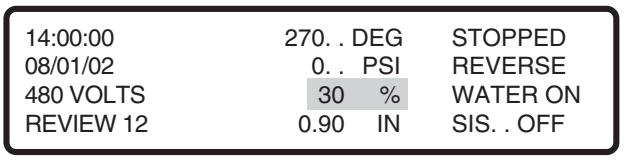


Figure 6.46

Change: On 8/1/02 at 14:00 at 270 degrees, percent timer changed from 50 to 30 percent.

6. "2" to SEARCH FORWARD (REVIEW 11)

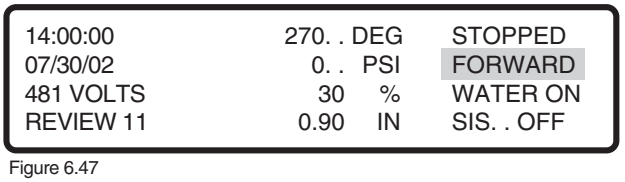


Figure 6.47

Change: On 7/30/02 at 14:00 at 270 degrees, machine direction changed from reverse to forward.

7. “2” to SEARCH FORWARD (REVIEW 10)

2

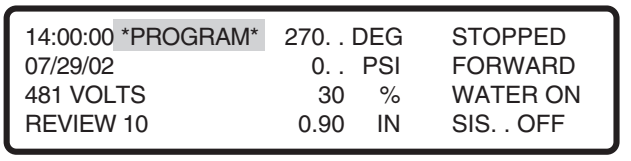


Figure 6.48

Change: On 7/29/02 at 14:00 at 270 degrees, a *Program* was loaded.

8. “2” to SEARCH FORWARD (REVIEW 9)

2

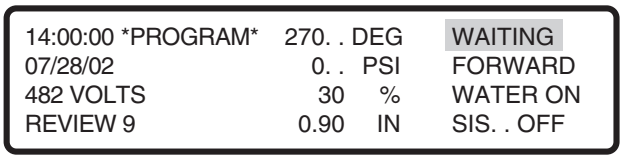


Figure 6.49

Change: On 7/28/02 at 14:00 at 270 degrees, machine is started and is WAITING for water pressure.

9. “2” to SEARCH FORWARD (REVIEW 8)

2

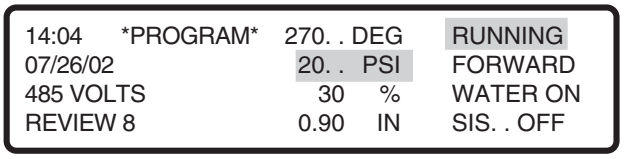


Figure 6.50

Change: On 7/26/02 at 14:04 at 270 degrees, machine changes to RUNNING mode when pressure reaches 20 psi.

10. “2” to SEARCH FORWARD (REVIEW 7)

2

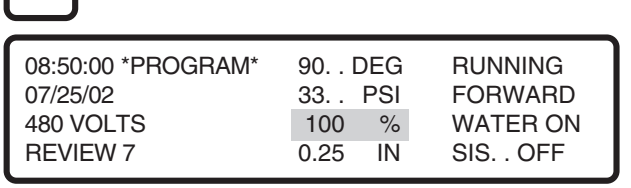


Figure 6.51

Change: On 7/25/02 at 08:50 at 90 degrees, percent timer changed from 30 to 100 percent.

11. “2” to SEARCH FORWARD (REVIEW 6)

2

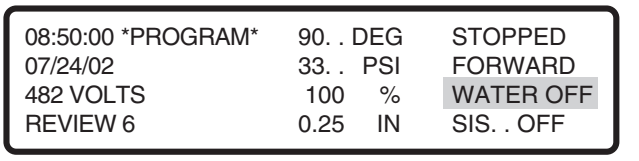


Figure 6.52

Change: On 7/24/02 at 08:50 at 90 degrees, turned WATER OFF.

12. “2” to SEARCH FORWARD (REVIEW 5)

2

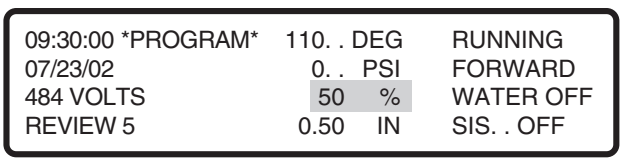


Figure 6.53

Change: On 7/23/02 at 9:30 at 110 degrees, percent timer changed from 100 to 50 percent.

13. “2” to SEARCH FORWARD (REVIEW 4)

2

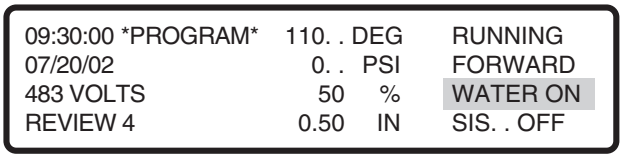


Figure 6.54

Change: On 7/20/02 at 09:30 at 110 degrees, turned WATER ON.

14. “2” to SEARCH FORWARD (REVIEW 3)

2

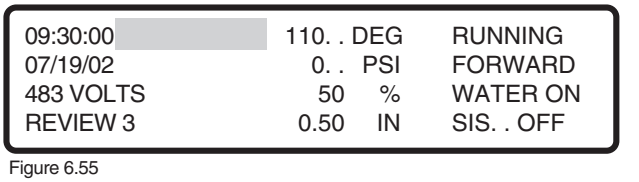


Figure 6.55

Change: On 7/19/02 at 09:30 at 110 degrees, *Program* message disappears indicating the program has finished executing.

15. “2” to SEARCH FORWARD (REVIEW 2)

2

```
09:30:00          110. . DEG    WAITING
07/17/02            0. .  PSI   FORWARD
482 VOLTS            50    %    WATER ON
REVIEW 2           0.50    IN   SIS. . OFF
```

Figure 6.56

Change: On 7/17/02 at 09:30 at 110 degrees, machine is WAITING for water pressure to develop.

16. “2” to SEARCH FORWARD (REVIEW1)

2

```
09:34:00          110. . DEG    RUNNING
07/16/02            20. .  PSI  FORWARD
480 VOLTS            50    %    WATER ON
REVIEW 1           0.50    IN   SIS. . OFF
```

Figure 6.57

Change: On 7/16/02 at 09:34 at 110 degrees, machine changes to RUNNING mode when the pressure reaches 20 psi.

To exit the Review mode, press ESC or any other key except “1” or “2”.

NOTE: The status of auxiliary relay #1 was displayed on REVIEW screen #15 as illustrated in figure 6.32.

```
20:00:00                  90. . DEG    RUNNING
08/05/02                  33. .  PSI   REVERSE
480 VOLTS                  50    %    WATER ON
REVIEW 15   AUX1 ON      0.50    IN   SIS. . OFF
```

Figure 6.58

At this point, you do not know the status of auxiliary relay #2. To view the status of both auxiliary relays (#1 and #2), follow these steps:

1. Press OPTIONS (Can press OPTIONS from any Review Screen #)

OPTIONS

```
AUX 1 OUT. . . OFF          AUX 1 IN . . . OFF
AUX 2 OUT. . . OFF          AUX 2 IN . . . OFF
ERROR CODES   00000000000000
REVIEW 15
```

Figure 6.59

The status of AUX1OUT and AUX2OUT are displayed. These relays control voltage from the panel to auxiliary equipment. ON indicates the contacts are closed. OFF indicates the contacts are open.

The status of AUX1IN and AUX2IN are also displayed. These relays monitor or sense feedback to the panel from auxiliary equipment. These are 120 volt relays and can be wired to monitor AUX1OUT and AUX2OUT.

The ERROR CODES line indicates which error codes were active at the time of the event. “0” indicates the error status is not active; “1” indicates the error status is active. They are arranged in sequence, ordered from left to right with error code #14 on the left through error code #1 on the right. In this example, 00000000010000, error code 5 is active (System Safety).

RESET OPTION

RESET is used to clear the battery backed memory. If RESET is executed, it sets the machine operating conditions to default values such as 50%, FORWARD, SIS OFF, etc. This option is rarely needed.

To reset:

1. SYSTEM

SYSTEM

2. “3” for RESET

3

```
* * * * * * * * * * * * * * * WARNING * * * * * * * * * * * * * * *
THIS WILL RESET MACHINE TO DEFAULTS!
0. . EXIT  1. . RESET
PRESS NUMBER >
```

Figure 6.60

3. Select “0” to EXIT or “1” to RESET

Constants are not erased.

CYCLE REVIEW

Press SYSTEM and notice option #5 (CYCLE). This option provides information concerning when the last and next cycle run dates are when using the cycle repeat. Refer to page 71 under "Important Notes About Cycle Repeat" for more information concerning the CYCLE Review feature.

MISCELLANEOUS CONSTANTS

Entering the "MACHINE CONSTANTS" was discussed in Section 2. Other "Miscellaneous Constants" can also be entered which provide additional options for the user. However, these would not be accessed or changed frequently and are not included in Section 2.

Following is a list of the miscellaneous constants which can be entered:

WIND	Set wind speed shut down points for the machine. Covered in Section 6 under "FLOW/WIND - Flowmeter/Wind Speed Information Display" on page 80.
AR/AS	Enables/Disables the automatic reverse/automatic stop option. Used if your pivot is equipped with drive unit mounted end-of-field stop/auto-reverse.
PERCENT TIMER	Select a 20 - 200 cycle range for the percentage timer. Standard percent timer is 60 seconds from the factory.
LOW VOLTAGE	Select a low voltage limit shut down point higher or lower than 440 volts.
DIR OFFSET	Make adjustments to position accuracy. Refer to appendix C.
ENG/PUMP	Set the pump controls for the type of power unit being used to operate the pump (combustion engine or electric motor).
BAUD	Select the appropriate Baud rate for the type of remote telemetry being used.
MODEL	Set the module for the model of relay board being used in the control panel (6000/8000).

To access the Miscellaneous constants, follow these steps:

1. SYSTEM

SYSTEM

0 EXIT	3 RESET	6 TRANSMIT
1 CONSTANTS	4 REVIEW	7 LANGUAGE
2 DATA	5 CYCLE	8 HOURS
PRESS NUMBER >		

Figure 6.61

2. "1" for CONSTANTS

1

0 EXIT	3 SIS	6 PRES DLY
1 TIME	4 END-GUN	7 LOW PRES
2 DATE	5 POSITION	8 OTHER
PRESS NUMBER >		

Figure 6.62

3. "8" for OTHER constants

8

0 EXIT	3 VOLTAGE	6 PASSWORD
1 MIN APP	4 WIDE BND	7 DAILY OPS
2 HRS/REV	5 FLOW METER	8 OTHER
PRESS NUMBER >		

Figure 6.63

4. "8" for OTHER (access miscellaneous constants screen)

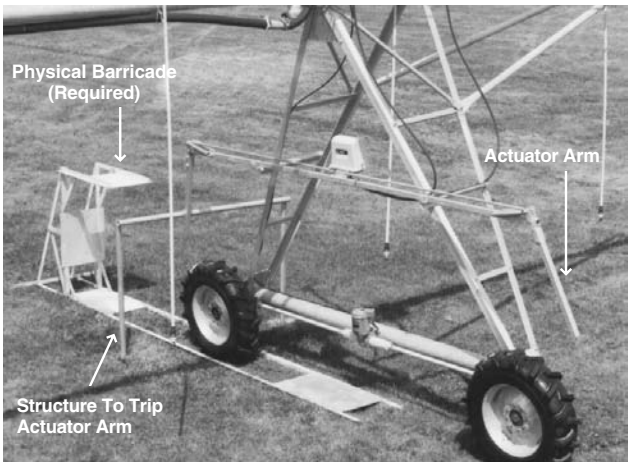
8

0 EXIT	3 PERCENT TIMER	6 ENGINE/PUMP
1 WIND	4 LOW VOLTAGE	7 BAUD
2 AR/AS	5 DIR OFFSET	8 MODEL
PRESS NUMBER >		

Figure 6.64

AR/AS (Auto Reverse/Stop Enable/Disable Feature)

This feature enables or disables the automatic reverse/stop option if your pivot is equipped with drive unit mounted end-of-field stop/auto-reverse. If this feature is not enabled, the machine will stop instead of reversing direction when the actuator arm is tripped.



Drive Unit Mounted Auto Reverse/Auto Stop Option

Figure 6.65

If your pivot is not equipped with drive unit mounted end-of-field stop/auto-reverse, then ignore this option and leave it in the "OFF" mode as it will not affect the operation of the pivot.

To enable AR/AS to the "ON" mode, follow these steps:

1. "2" for AR/AS

2

```
0 EXIT          3 PERCENT TIMER   6 ENGINE/PUMP
1 WIND          4 LOW VOLTAGE     7 BAUD
2 AR/AS         5 DIR OFFSET      8 MODEL
AR/AS 1. . ON 0. . OFF (OFF) >
```

Figure 6.66

NOTE: The default mode for AR/AS is "OFF" as illustrated in parentheses.

2. "1" to turn AR/AS On

1

```
0 EXIT          3 PERCENT TIMER   6 ENGINE/PUMP
1 WIND          4 LOW VOLTAGE     7 BAUD
2 AR/AS         5 DIR OFFSET      8 MODEL
PRESS NUMBER >
```

Figure 6.67

NOTE: You must also select if the machine reverses or stops when the actuator arm is tripped. Refer to "Section 2 - Automatic Reverse/Automatic Stop Option" for information on selecting either a reverse or stop mode.

Percent Timer

The Valley Pro control panel utilizes a standard 60 second cycle percent timer. This means that if the percent timer is set at 50 percent, the end tower will move 30 seconds (or 50%) of each minute. The 60 second cycle for the percent timer can be changed within a range of 20 - 200 seconds. For example, the operator may want to utilize a 30 second cycle percent timer. In this case, the end tower will run 15 seconds out of each 30 seconds at a 50 percent setting. It is recommended that 60 seconds be used as the standard cycle setting.

To change the value of the percent timer cycle from standard 60 seconds, follow these steps:

1. "3" for PERCENT TIMER

3

```
0 EXIT          3 PERCENT TIMER   6 ENGINE/PUMP
1 WIND          4 LOW VOLTAGE     7 BAUD
2 AR/AS         5 DIR OFFSET      8 MODEL
PERCENT TIMER CYCLE IN SEC. (60) >
```

Figure 6.68

CAUTION: Increasing the timer cycle setting over 60 seconds may cause uneven water distribution over your field.

2. "30" for a 30 second cycle percent timer

3 0

```
0 EXIT          3 PERCENT TIMER   6 ENGINE/PUMP
1 WIND          4 LOW VOLTAGE     7 BAUD
2 AR/AS         5 DIR OFFSET      8 MODEL
PERCENT TIMER CYCLE IN SEC. (60) > 30
```

Figure 6.69

3. ENTER to retain 30 seconds

ENTER

```
0 EXIT          3 PERCENT TIMER   6 ENGINE/PUMP
1 WIND          4 LOW VOLTAGE     7 BAUD
2 AR/AS         5 DIR OFFSET      8 MODEL
PRESS NUMBER >
```

Figure 6.70

NOTE: For this example, a 30 second percent timer cycle was entered. The value can range from 20 - 200 seconds.

Low Voltage Shutdown Setting

The Valley Pro control panel is equipped with a standard low voltage shut down feature. Voltage lower than the 440 volts standard setting will shut the machine down. A built-in timer will keep the machine running for 15 seconds after the machine voltage drops below the low voltage shutdown setting. This prevents nuisance shutdowns due to voltage fluctuations.

It is possible to set a low voltage shutdown point lower or higher than 440 volts.

CAUTION: LOW VOLTAGE (LESS THAN 440 VOLTS) WILL DAMAGE THE DRIVE MOTORS AND THE PROBLEM SHOULD BE CORRECTED BEFORE RESUMING OPERATION.

To change the low voltage shut down point (from 440 to 450 volts for example), follow these steps:

1. “4” for LOW VOLTAGE

4

```
0 EXIT          3 PERCENT TIMER   6 ENGINE/PUMP
1 WIND          4 LOW VOLTAGE     7 BAUD
2 AR/AS         5 DIR OFFSET      8 MODEL
LOW VOLTAGE LIMIT (440) >
```

Figure 6.71

2. “450” for a low voltage shut down point of 450 volts

4 5 0

```
0 EXIT          3 PERCENT TIMER   6 ENGINE/PUMP
1 WIND          4 LOW VOLTAGE     7 BAUD
2 AR/AS         5 DIR OFFSET      8 MODEL
LOW VOLTAGE LIMIT (440) > 450
```

Figure 6.72

3. ENTER to retain 450 volts

ENTER

```
0 EXIT          3 PERCENT TIMER   6 ENGINE/PUMP
1 WIND          4 LOW VOLTAGE     7 BAUD
2 AR/AS         5 DIR OFFSET      8 MODEL
PRESS NUMBER >
```

Figure 6.73

4. “0” to EXIT or press ESCAPE

0 or ESC

DIRECTION OFFSET

Direction Offset (DIR OFFSET) is used to enhance or adjust position accuracy of components involved in determining the position of the center pivot within a particular field. Refer to Appendix C for additional information.

ENGINE/PUMP

The ENGINE/PUMP is used to select and control the type of pumping unit that is being used in conjunction with the center pivot. As implied, engine indicates a combustion engine is being used as the power for operating the pump. PUMP designates an electric motor is being used to operate the pumping unit. The PUMP mode will engage the pump “safety” relay when water is turned on and disengage the relay when water is turned off. The ENGINE mode will keep the pump “safety” relay engaged while the machine is running, water on or water off, and disengage the relay when the machine is stopped. The appropriate power source used for the pump can be selected by the following procedure:

1. Press SYSTEM, “1” CONSTANTS, “8” OTHER, “8” OTHER and “6” ENGINE/PUMP.

```
0 EXIT          3 PERCENT TIMER   6 ENGINE/PUMP
1 WIND          4 LOW VOLTAGE     7 BAUD
2 AR/AS         5 DIR OFFSET      8 MODEL
1..ENGINE  0..PUMP  (ENGINE)  >
```

Figure 6.74

The current setting is shown in parenthesis. If it needs to be changed, go on to step 2.

2. Press “1” for engine driven pump or “0” for electrically driven pump.

```
0 EXIT          3 PERCENT TIMER   6 ENGINE/PUMP
1 WIND          4 LOW VOLTAGE     7 BAUD
2 AR/AS         5 DIR OFFSET      8 MODEL
PRESS NUMBER >
```

Figure 6.75

As soon as the “0” selection is made for pump the display will return to the previous screen. Press “0” EXIT four times to return to the main screen.

BAUD

BAUD indicates the rate information is transmitted and/or received by the center pivot and the remote control unit when the remote telemetry option is used in conjunction with the center pivot installation and operation. Three Baud rates are available: 300, 1200 and 9600.

1. Press SYSTEM, “1” CONSTANTS, “8” OTHER, “8” OTHER and “7” BAUD

```
0 EXIT          3 PERCENT TIMER   6 ENGINE/PUMP
1 WIND          4 LOW VOLTAGE     7 BAUD
2 AR/AS         5 DIR OFFSET      8 MODEL
0..300  1..1200  2..9600   (300)  >
```

Figure 6.76

The current setting is shown in parenthesis. If it needs to be changed, go on to step 2.

2. Press “1” for 1200 or “2” for 9600 baud.

```
0 EXIT          3 PERCENT TIMER   6 ENGINE/PUMP
1 WIND          4 LOW VOLTAGE     7 BAUD
2 AR/AS         5 DIR OFFSET      8 MODEL
PRESS NUMBER  >
```

Figure 6.77

As soon as the selection is made the display will return to the previous screen. Press “0” EXIT three times to return to the main screen.

MODEL

Two different relay boards can be connected to the control panel module . . . an 8000 relay board or a 6000 relay board. The module must be set for the relay board being used.

To set up the module for the relay board being used, complete the following steps:

1. Press SYSTEM, "1" CONSTANTS, "8" OTHER, "8" OTHER and "8" MODEL

```
0 EXIT          3 PERCENT TIMER  6 ENGINE/PUMP
1 WIND          4 LOW VOLTAGE    7 BAUD
2 AR/AS         5 DIR OFFSET     8 MODEL
0..8000   1..6000  >
```

Figure 6.78

The current setting is shown in parenthesis. If it needs to be changed, go on to step 2.

2. Press "0" for 8000 or "1" for 6000.

```
0 EXIT          3 PERCENT TIMER  6 ENGINE/PUMP
1 WIND          4 LOW VOLTAGE    7 BAUD
2 AR/AS         5 DIR OFFSET     8 MODEL
PRESS NUMBER (0)  >
```

Figure 6.79

As soon as the selection is made the display will return to the main screen.

Troubleshooting Overview

This manual is a supplement to the Valley Pro Control Panel Manual. The supplement must be used in conjunction with both the Pro Manual and the Valley Center Pivot Manual for Diagnostics and Troubleshooting.

⚠ **WARNING! ELECTRICAL malfunctions should ONLY be corrected by Factory Trained Valley Dealer Service Personnel. The operator should NEVER attempt to correct electrical malfunctions. The trouble-shooting guide provided on the following pages indicates which SYSTEM FAULTS and/or errors in the ERROR LOG screens may be corrected by the operator and which MUST be corrected by the dealer. Even though many of the faults/errors listed can only be corrected by Valley Trained Dealer Service Personnel, it is of benefit for the service person to know the error code indicated when calling for service.**

Valley Service Technicians must correct ALL electrical problems or failures!

⚠ WARNING ⚠

NEVER attempt to troubleshoot or correct any electrical problems on or associated with the machine!

ALWAYS contact your local Valley Service Department for determining and correcting any electrical problems! Failure to heed this !WARNING! can result in *severe injury* or *death*!!!

ALWAYS shut off all electrical power to the machine (pivot control panel and service panel disconnects) before servicing or performing mechanical maintenance on the machine!

FAULT	ERROR EXPLANATION	CORRECTABLE BY
SYSTEM POWER	Power Dropped Below Low Voltage Limit (setting)	
	Programming	Operator or Dealer
	Low Voltage Monitor Set Too Low	
	Electrical	**DEALER ONLY!**
	Mechanical	Operator or Dealer
	Loose or Broken Generator Belts	
	Improperly Matched Belts	
	Too Few Belts for Drive	
	Out of Fuel (Fossil Fuel Power Unit)	
SYSTEM SAFETY	Break (Open) in the Safety Return Circuit	
	In-Line Shutdown	
	Electrical	**DEALER ONLY!**
	Mechanical	Operator or Dealer
	End Tower Stuck	
	Flat Tire on End Tower	
	Defective Wheel or Motor Gearbox	
	End-of-Field Stop	
	Misalignment Shutdown	
	Electrical	**DEALER ONLY!**
	Mechanical	Operator or Dealer
	Intermediate Tower Stuck	
	Flat Tire on Intermediate Drive Unit	
	Defective Wheel or Motor Gearbox	
PRESSURE	Pressure Fell Below Low Pressure Limit	
	Electrical	**DEALER ONLY!**
	Mechanical	Operator or Dealer
	Pump Shut OFF	
	Low Limit Set Too Low	
COMMAND	Machine Intentionally Shut OFF	
	Electrical	**DEALER ONLY!**
	Mechanical	Operator or Dealer
	STOP Key Pressed	
	Automatic Stop Condition Occurred	
	Programmed STOP Condition Executed	
SIS	Stop-in-Slot Shut Machine OFF	
	Electrical	**DEALER ONLY!**
	Programmed or Mechanical	Operator or Dealer
WIND	Wind Speed Exceeded Limit	
	Electrical	**DEALER ONLY!**
	Mechanical	Operator or Dealer
DAILY OPS	Load Management Shut Machine Off	Operator
RELAY COM	Module<> Relay Board Communications Problem	**DEALER ONLY!**

ERROR LOG

ERROR #/ERROR		ERROR EXPLANATION	CORRECTABLE CODE BY
E01	Battery Backed RAM	BATTERIES DEAD OR MEMORY FAILURE	
		Check batteries	Operator or Dealer
E02	EEPROM	NOT SHOWN ON SCREEN	DEALER ONLY!
E03	Unit Resets	NOT SHOWN ON SCREEN	DEALER ONLY!
E04	Power Drop	Power drop below low voltage limit	
		Programming	Operator or Dealer
		Electrical	DEALER ONLY!
E05	System Safety	Possible Tower Misalignment	
		Mechanical	Operator or Dealer
		Electrical	DEALER ONLY!
E06	Pump Safety	Pressure Too Low After Pressure Delay	
		Mechanical	Operator or Dealer
		Programming	Operator or Dealer
		Electrical	DEALER ONLY!
E07	Pressure Sensor	Out of Range - High	DEALER ONLY!
E08	Pressure Sensor	Out of Range - Low	DEALER ONLY!
E09	Pressure Sensor	Out of Range - High With Pump OFF	DEALER ONLY!
E10	Pressure Sensor	Switch Could Be Stuck	
		Electrical	DEALER ONLY!
E11	Resolver	Degrees Jumping Around	
		Mechanical - Packing Too Tight	Operator or Dealer
		Electrical	DEALER ONLY!
E12	Resolver	Electrical Problem	DEALER ONLY!
E13	Keypad	Possible Key Stuck	DEALER ONLY!

PROBLEM	PROBLEM EXPLANATION	CORRECTABLE BY
Machine Auto Reverses/	ARAS Box Not Centered	Operator or Dealer
Auto Stops Before Reaching	Induced Voltage	DEALER ONLY!
The Barricade	Electrical Connection	DEALER ONLY!
Machine Breaks Safety	Barricade Too High On Actuator Arm	Operator or Dealer
At Barricade	(Adjust Barricade)	
	ARAS Needs Adjustment	DEALER ONLY!
	Electrical Connection	DEALER ONLY!
Preasure Transducer	Transducer, Pressure Tube	Operator or Dealer
Reading Incorrect	Or Riser Pipe Drain Plugged	
	Electrical Connection	DEALER ONLY!
No Display	Power To Control Panel OFF	Operator or Dealer
	Electrical	DEALER ONLY!
Control Module Locked Up	Electrical	DEALER ONLY!
Or Two Black Line Across Screen		
Screen Flashing	Electrical	DEALER ONLY!
C:A:M:S VERSION		
End Gun Does Not Shut OFF	End Gun Hardware Failure	Operator or Dealer
Or	Programming	Operator or Dealer
End Gun Does Not turn ON	Incorrect End Gun Entry	
	Constants Not Programmed	
	Electrical	DEALER ONLY!
Clock Has Nonexistant Time	Electrical	DEALER ONLY!
Or Date		

SOFTWARE RESETS

The Pro Panel software can be reset in one of two ways. These are referred to as aSOFT RESET (BBRAM) and a HARD RESET (EEPROM).

The RESETS are independent of one another. To totally clear the software and reset to thefactory default values, execute a HARD RESET followed by a SOFT RESET.

HARD RESET (EEPROM): Hold “ESC” key while turning the power ON>

- Restores machine constants to factory defaults i.e.: minimum applicaton, position calibration, RTU ID., voltage calibration, etc.
- Erases stored programs

SOFT RESET (BBRAM): Press “SYSTEM”, “3”, “1”.

- Clears programs that are running.
- Resets current status to factory defaults i.e.: Stopped, Reverse, Water Off, etc.
- Clears stored Review History.

In addition to the major changes previously covered, a few other enhancement have been incorporated into the Pro software:

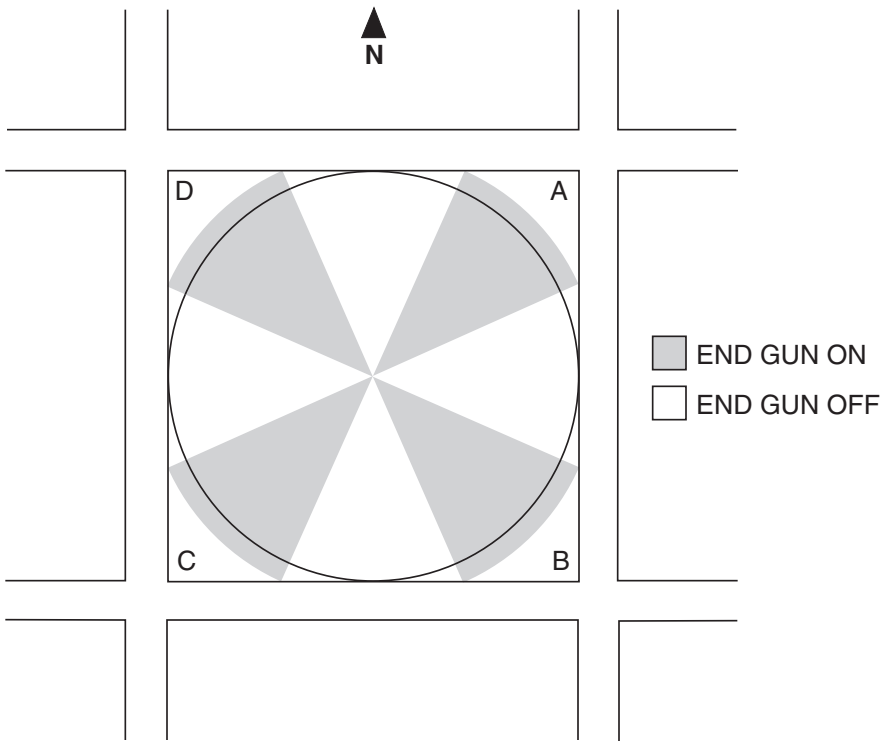
1. **REVIEWING A RUNNING PROGRAM:** All steps in a program can now be reviewed while the program is running. As you review the running program, the current step being executed will have an asterisk (*) located next to it.
2. **DIRECTIONAL OFFSET:** The Direction Offset can now be adjusted between 0° and 10°. Refer to the APPENDIX in the Pro Operators Manual for adjustment procedures.

Appendix A

ERROR LOG

ERROR #/ERROR		ERROR EXPLANATION	CORRECTABLE CODE BY
E01	Battery Backed RAM	BATTERIES DEAD OR MEMORY FAILURE	
		Check batteries	Operator or Dealer
E02	EEPROM	NOT SHOWN ON SCREEN	DEALER ONLY!
E03	Unit Resets	NOT SHOWN ON SCREEN	DEALER ONLY!
E04	Power Drop	Power drop below low voltage limit	
		Programming	Operator or Dealer
		Electrical	DEALER ONLY!
E05	System Safety	Possible Tower Misalignment	
		Mechanical	Operator or Dealer
		Electrical	DEALER ONLY!
E06	Pump Safety	Pressure Too Low After Pressure Delay	
		Mechanical	Operator or Dealer
		Programming	Operator or Dealer
		Electrical	DEALER ONLY!
E07	Pressure Sensor	Out of Range - High	DEALER ONLY!
E08	Pressure Sensor	Out of Range - Low	DEALER ONLY!
E09	Pressure Sensor	Out of Range - High With Pump OFF	DEALER ONLY!
E10	Pressure Sensor	Switch Could Be Stuck	
		Electrical	DEALER ONLY!
E11	Resolver	Degrees Jumping Around	
		Mechanical - Packing Too Tight	Operator or Dealer
		Electrical	DEALER ONLY!
E12	Resolver	Electrical Problem	DEALER ONLY!
E13	Keypad	Possible Key Stuck	DEALER ONLY!

TYPICAL END-GUN SETTINGS



		SECTOR A		SECTOR B		SECTOR C		SECTOR D	
# ACRES	END GUN	LF ANGLE	RT ANGLE	LF ANGLE	RT ANGLE	LF ANGLE	RT ANGLE	LF ANGLE	RT ANGLE
40	Nelson 100	31	59	121	149	211	239	301	329
40	Rainbird 85	27	63	117	153	207	243	297	333
160	Nelson 100	21	69	111	159	201	249	291	339
160	Rainbird 85	18	72	108	162	198	252	288	342
640	Nelson 100	16	74	106	164	196	254	286	344
640	Rainbird 85	13	77	103	167	193	257	283	347

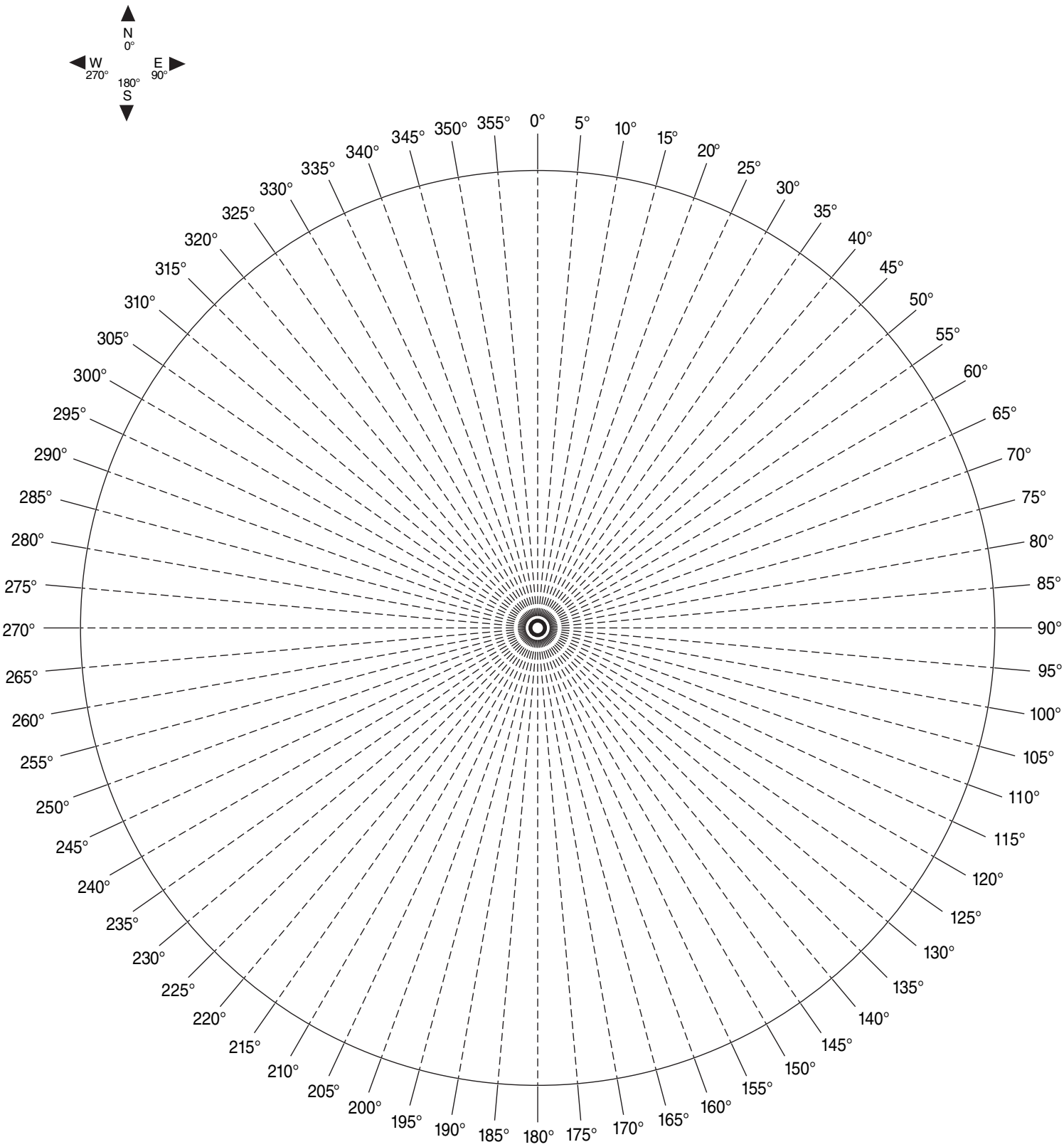
NOTE: These settings are approximate and WILL vary for different fields.

LIST OF MODULE/RELAY NUMBERS

8000 CONTROL PANEL PRO

MODULE NUMBER	MODULE/RELAY DESCRIPTION
0	SAFETY OUT
1	PERCENTAGE TIMER
2	END GUN
3	WIDE BOUNDARY
4	PUMP SAFETY
5	ALARM OUT
6	AUX. RELAY #1 OUT
7	AUX. RELAY #2 OUT
16	REMOTE START/STOP
17	PRESSURE SWITCH
19	AUX. RELAY #2 IN
20	AUX. RELAY #1 IN
21	REVERSE SENSE
22	FORWARD SENSE
23	SAFETY SENSE

NOTE: North is generally defined as 0 degrees.

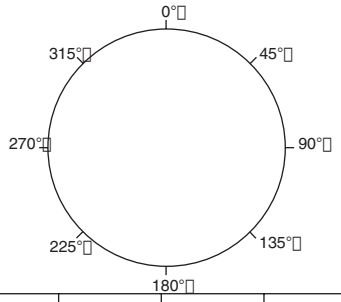


PROGRAM DESIGN FORM

PROGRAM # _____

FIELD ID _____

FIELD SKETCH



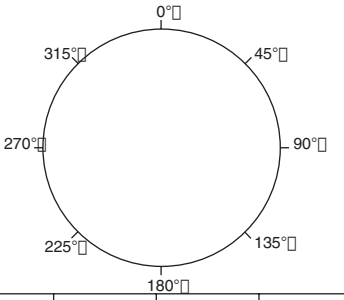
STEP #	1	2	3	4	5	6	7	8	9
CONDITION									
Position									
Time									
Delay									
Pressure									
For/Rev									
COMMANDS									
Water On									
Water Off									
Forward									
Reverse									
Start									
Stop									
Percent									
Depth									
SIS On									
SIS Off									
AUX 1 On									
AUX 1 Off									
AUX 2 On									
AUX 2 Off									
Others									

PROGRAM DESIGN FORM

PROGRAM # _____

FIELD ID _____

FIELD SKETCH



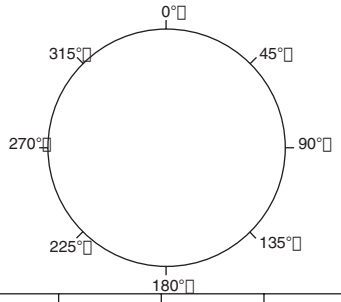
STEP #	1	2	3	4	5	6	7	8	9
CONDITION									
Position									
Time									
Delay									
Pressure									
For/Rev									
COMMANDS									
Water On									
Water Off									
Forward									
Reverse									
Start									
Stop									
Percent									
Depth									
SIS On									
SIS Off									
AUX 1 On									
AUX 1 Off									
AUX 2 On									
AUX 2 Off									
Others									

PROGRAM DESIGN FORM

PROGRAM # _____

FIELD ID _____

FIELD SKETCH



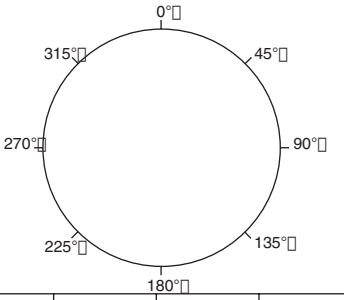
STEP #	1	2	3	4	5	6	7	8	9
CONDITION									
Position									
Time									
Delay									
Pressure									
For/Rev									
COMMANDS									
Water On									
Water Off									
Forward									
Reverse									
Start									
Stop									
Percent									
Depth									
SIS On									
SIS Off									
AUX 1 On									
AUX 1 Off									
AUX 2 On									
AUX 2 Off									
Others									

PROGRAM DESIGN FORM

PROGRAM # _____

FIELD ID _____

FIELD SKETCH



STEP #	1	2	3	4	5	6	7	8	9
CONDITION									
Position									
Time									
Delay									
Pressure									
For/Rev									
COMMANDS									
Water On									
Water Off									
Forward									
Reverse									
Start									
Stop									
Percent									
Depth									
SIS On									
SIS Off									
AUX 1 On									
AUX 1 Off									
AUX 2 On									
AUX 2 Off									
Others									

Appendix B

PROGRAMMING WITH THE "OTHER" OPTION

Option #2 (CREATE NEW) from the program screen will display the screen below in figure B.1.

```
STEP 1   PROGRAM BY:
0 EXIT   2 POSITION     4 DELAY      6 OTHER
1 TIME   3 PRESSURE     5 FOR/REV
PRESS NUMBER >
```

Figure B.1

TIME, POSITION, PRESSURE, DELAY and FOR/REV have been used previously as conditions with which to program by. Selection #6 (OTHER) is reserved for programming conditions which are not frequently used. Selecting option "6" OTHER will display the screen in figure B.2.

6 for OTHER

```
STEP 1   PROGRAM BY:
0 EXIT   1 ANALOG       3 PULSE
         2 MODULE       4 COUNT
PRESS NUMBER >
```

Figure B.2

The following options are available, but rarely used:

1. ANALOG - Program commands based on analog voltages higher/lower than a set value. Only utilized if an external device with an analog voltage output is connected to the Valley Pro control panel.
2. MODULE - Program commands based on the condition of control relays in the panel.
3. PULSE - Program commands based on pulse rates higher/lower than a set value. Only used if a device with a pulse output is connected to the Valley Pro control panel.
4. COUNT - Program commands based on pulse counts higher than a set value. Can only be utilized if a device with a pulse output is connected to the Valley Pro control panel.

MODULE will be explained in this section. Contact your Valley dealer for further information concerning EVAL, ANALOG, PULSE and COUNT.

USING "MODULE" AS A CONDITION

This section will instruct you on how to program with selection #2 (MODULE) as a condition.

Module is another name for a relay. The machine is controlled by a series of relays located on a relay board on the back of the control panel. Each relay will either be closed or open as the machine is operating. You can program your machine to perform commands based on the condition of any one of these relays.

Following is a list of the relays and their associated module/relay number:

0 Safety Out
1 Percentage Timer
2 End Gun
3 Wide Boundary
4 Pump Safety
5 Alarm Out
6 Auxiliary Relay #1 Out
7 Auxiliary Relay #2 Out
16 Remote Start/Stop
17 Pressure Switch
19 Aux. Relay #2 In
20 Aux. Relay #1 In
21 Reverse Sense*
22 Forward Sense*
23 Safety Sense

Relays #21 and #22 (reverse and forward sense) have been designated with an asterisk. These relay/module numbers will be used to demonstrate how MODULE can be used as a condition to program the machine by, as demonstrated in Example B.1.

To demonstrate this concept, consider the following example:

EXAMPLE B.1 Programming With Modules/Relays as Conditions

NOTE: This example is the same as EXAMPLE 4.4 on page 40. However, in this example MODULE is replacing DIRECTION as the condition to program by in steps 2 and 5. Example B.1 only illustrates how MODULE can be used as a condition to program by. This example is easiest to program as explained in Example 4.4 using DIRECTION as the condition.

Current Conditions:

- Machine running at 90 degrees; Forward; 50 percent; Water on
- The machine is equipped with end-of-field stop/auto reverse hardware. Barriers are located at 90 and 270 degrees to trip the arms and change machine direction.

Program Machine To:

- 80 percent timer setting at 180 degrees
- 0 percent when machine reverses at 270 degrees (Remember-the arm will trip and reverse the machine)
- 50 percent timer setting after 600 seconds (10 minute time delay to improve water application uniformity at reverse point)

- 80 percent timer setting at 180 degrees (machine will be travelling in the reverse direction)
- 0 percent when machine changes direction to forward at 90 degrees
- Stop machine after a 600 second time delay

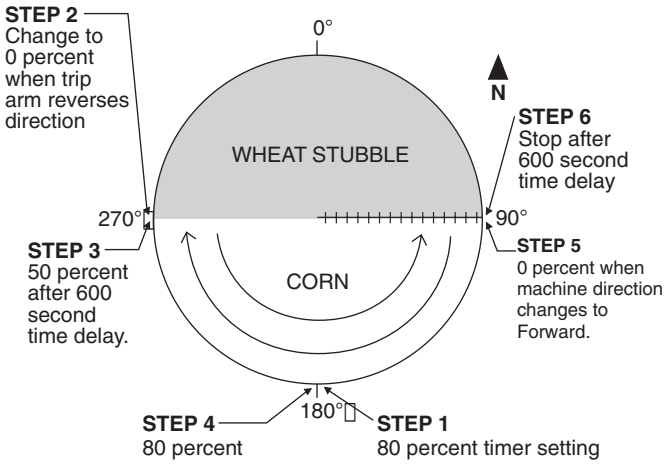


Figure B.3

Follow these steps to program:

1. PROGRAM

PROGRAM

2. "2" for CREATE NEW

2

STEP 1 - EXAMPLE B.1

3. "2" for POSITION

2

4. "180" for 180 degrees

1 8 0

5. ENTER to retain 180 degrees

ENTER

6. PERCENT

PERCENT

7. "80" for 80 percent

8 0

8. ENTER to retain 80 percent

ENTER

```
STEP 1 AT: 180 DEGREES, PERCENT  80,


ENTER COMMANDS, FINISHED. . PRESS ENTER
```

Figure B.4

9. ENTER since finished

ENTER

STEP 2 - EXAMPLE B.1

10. "2" for NEXT STEP

2

NOTE: Step #2 requires the percentage timer be set at 0 when the machine changes direction from forward to reverse. Remember - the trip arm on the end of the machine will cause the direction change. This step will be programmed using module #21 (reverse sense) as the condition. The program will change the percentage timer to 0 percent when module #21 is on or the relay for the reverse sense is on supplying power to engage the reverse sense.

11. "6" for OTHER

6

```
STEP 2   PROGRAM BY:
0 EXIT   1 ANALOG      3 PULSE
         2 MODULE      4 COUNT
PRESS NUMBER >
```

Figure B.5

12. "2" for MODULE

2

```
STEP 2  PROGRAM BY: MODULE


ENTER MODULE NUMBER >
```

Figure B.6

13. "21" for module #21 (reverse sense relay)

7

```
STEP 2  PROGRAM BY: MODULE

ENTER MODULE NUMBER > 21
```

Figure B.7

14. ENTER to retain module #21

ENTER

```
STEP 2  PROGRAM BY: MODULE

MODULE 21   1. . ON  0. . OFF (OFF) >
```

Figure B.8

15. Select "1" for MODULE #21 ON

1

```
STEP 2  AT: MODULE 21  ON,

ENTER COMMANDS, FINISHED. . PRESS ENTER
```

Figure B.9

NOTE: You are now being requested to enter the commands which should occur when module #21 turns on (reverse sense is engaged).

16. PERCENT

PERCENT

17. "0" for 0 percent

0

18. ENTER to retain 0 percent

ENTER

```
STEP 2  AT: MODULE 21 ON, PERCENT   0,

ENTER COMMANDS, FINISHED. . PRESS ENTER
```

Figure B.10

19. ENTER since finished

ENTER

STEP 3 - EXAMPLE B.1

20. "2" for NEXT STEP

2

NOTE: The 600 second delay needs to be set so the percentage timer setting will change to 50 percent.

21. "4" for DELAY

4

22. “0” for SECONDS (or “1” for MINUTES)

0

23. "600" for 600 second delay

6 0 0

24. ENTER to retain 600 seconds

ENTER

25. PERCENT

PERCENT

26. "50" for 50 percent

5 0

27. ENTER to retain 50 percent

ENTER

```
STEP 3  AT: 600 SECONDS DELAY,
PERCENT 50,

ENTER COMMANDS, FINISHED. . PRESS ENTER
```

Figure B.11

28. ENTER since finished

ENTER

STEP 4 - EXAMPLE B.1

29. "2" for NEXT STEP

2

NOTE: The next step is to set the percentage timer setting to 80 percent at 180 degrees

30. "2" for POSITION

2

31. "180" for 180 degrees

1 8 0

32. ENTER to retain 180 degrees

ENTER

33. PERCENT

PERCENT

34. "80" for 80 percent

8 0

35. ENTER to retain 80 percent

ENTER

STEP 4 AT: 180 DEGREES, PERCENT 80,

ENTER COMMANDS, FINISHED. . PRESS ENTER

Figure B.12

36. ENTER since finished

ENTER

STEP 5 - EXAMPLE B.1

37. "2" for NEXT STEP

2

NOTE: Step #5 requires the percentage timer be set at 0 when the machine changes direction from reverse to forward. The trip arm on the end of the machine will cause the direction change. This step will be programmed using module #22 (forward sense) as the condition. This condition will change the percentage timer to 0 percent when module #22 is on or the relay for the forward sense is turned on supplying power to engage the forward sense.

38. “6” for OTHER

6

39. "3" for MODULE

3

40. "22" for module #22 (forward sense relay)

22

41. ENTER to retain module #22

ENTER

42. Select "1" for MODULE #22 ON

1

STEP 5 AT: MODULE 22 ON,

ENTER COMMANDS, FINISHED. . PRESS ENTER

Figure B.13

NOTE: You are now being requested to enter the commands which should occur when module #22 turns on (forward sense is engaged).

43. PERCENT

PERCENT

44. "0" for 0 percent

0

45. ENTER to retain 0 percent

ENTER

STEP 5 AT: MODULE 22 ON, PERCENT 0,

ENTER COMMANDS, FINISHED. . PRESS ENTER

Figure B.14

46. ENTER since finished

ENTER

STEP 6 - EXAMPLE B.1

47. "2" for NEXT STEP

2

NOTE: The final step of this program is to stop the machine after a 600 second time delay.

48. "4" for DELAY

4

49. "0" for SECONDS (or “1” for MINUTES)

0

50. "600" for 600 second delay

6 0 0

51. ENTER to retain 600 seconds

ENTER

52. STOP

STOP

STEP 6 AT: 600 SECONDS DELAY, STOP,

ENTER COMMANDS, FINISHED. . PRESS ENTER

Figure B.15

53. ENTER since finished

ENTER

54. "1" for PROGRAM FINISHED

1

55. Press "1" to SAVE PROGRAM AND RUN.

1

RUNNING A STORED PROGRAM FROM ANOTHER CURRENT/STORED PROGRAM

A program can be created and then stored as program numbers 1-9. A stored program can be called upon to run from within other programs. For example, program #2 could be run in the last step of program #1, program #3 could be run from program #2, etc. Consider the following example for further explanation.

EXAMPLE B.2 Running Stored Programs From Other Programs

Current Conditions:

- Machine running at 0 degrees; Forward; Water On; 1.00 inch; Stop-in-slot set at 0 degrees and off

Program Machine To:

- Water Off at 180 degrees; 100 percent
- Water On at 225 degrees; 0.75 inches; Run program #2

Program #2 was written and stored to:

STEP 1 At 0 degrees - 100 percent; Auxiliary relay #1 ON.

STEP 2 At 180 degrees - Auxiliary relay #1 OFF; Water Off; Stop-in-slot on.

Follow These Steps To Program:

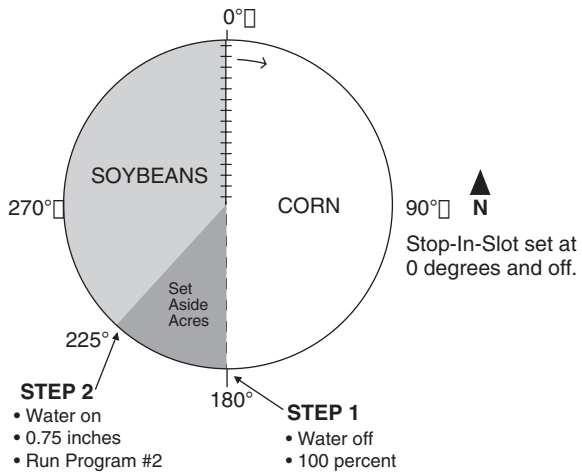


Figure B.25

1. PROGRAM

PROGRAM

2. "2" for CREATE NEW

2

STEP 1 - EXAMPLE B.2

3. "2" for POSITION

2

4. "180" for 180 degrees

1 8 0

5. ENTER to retain 180 degrees

ENTER

6. WATER OFF

WATER OFF

7. PERCENT

PERCENT

8. "100" for 100 percent

1 0 0

9. ENTER to retain 100 percent

ENTER

STEP 1 AT: 180 DEGREES, WATER OFF,
PERCENT 100,

ENTER COMMANDS, FINISHED . . PRESS ENTER

Figure B.26

10. ENTER since finished

ENTER

STEP 2 - EXAMPLE B.2

11. "2" for NEXT STEP

2

12. "2" for POSITION

2

13. "225" for 225 degrees

2 2 5

14. ENTER to retain 225 degrees

ENTER

15. WATER ON

WATER ON

16. DEPTH

17. ".75" for 0.75 inches

18. ENTER to retain 0.75 inches

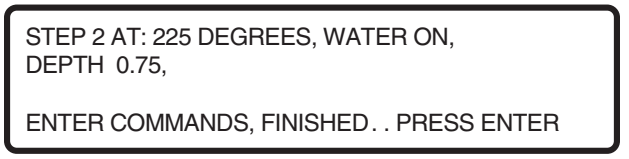


Figure B.27

NOTE: The next command in step #2 is to run program #2. Program #2 will then turn the injector pump on for the corn with Auxiliary relay #1.

19. PROGRAM to select program #2

20. "2" for program #2 (assuming program #2 has been written and stored)

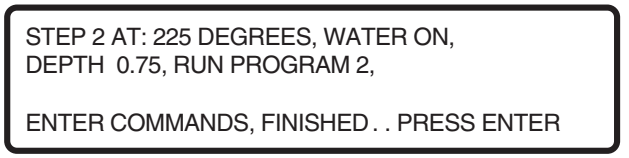


Figure B.28

NOTE: Program #2 will then be loaded and run immediately after WATER ON and DEPTH = .75 inches has been executed at 225 degrees in the field.

21. ENTER since finished

22. "1" for PROGRAM FINISHED

23. "2" to SAVE PROGRAM AND RUN

The previous program will be executed as outlined below:

1. At 180 degrees the machine will change the percentage timer setting to 100 percent and the water supply will be shut off (WATER OFF).
2. At 225 degrees the water will be turned back on and applied at a depth of 0.75 inches on the soybeans. Program #2 will then be loaded and run.
3. At 0 degrees the percentage timer setting will be set to 100 percent and auxiliary relay #1 will be turned on.
4. Step #2 of program #2 will turn auxiliary relay #1 off, turn the water off and turn the stop-in-slot on at 180 degrees. The machine will then run forward at 100 percent without water and shut off at 0 degrees which is the stop-in-slot location.

RUNNING STORED PROGRAMS IN A SEQUENCE

Let's assume 4 different programs have been written and stored as program numbers 1-4. Using the same type of logic as in example B.3, these could be run in a sequence such as 1, 2, 3, and 4 and then repeat the sequence again. The last step in program number 1 would command program #2 to run, the last step in program #2 would command program #3 to run, program #3 would command program #4 to run and then the last step in program #4 would command program number 1 to run again which would start the sequence over again.

POSITION ACCURACY

The Valley Pro control panel utilizes a resolver which is installed in the collector ring to determine the position of the pivot in the field as illustrated in figure C.1.

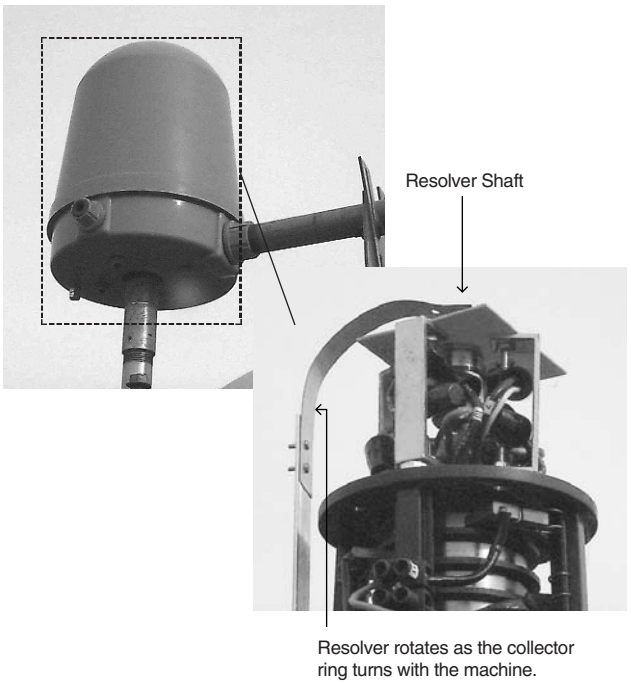


Figure C.1

As the pivot rotates, the collector ring turns which also turns the shaft of the resolver and sends back two low voltage signals to the Pro 2 control panel. These voltage readings change as the resolver shaft turns. The Pro panel then uses these voltage readings to determine field position in degrees. These field position readings are then used to turn the end gun on and off or to stop at the stop in slot position.

Some machines may require some slight adjustments to the pivot position readings. These adjustments may be required for a number of reasons including if the packing material around the J-Pipe is a little too tight or if a pivot flex is used. These situations will be different for every machine, so therefore, you have the ability to make an adjustment based on your individual machine.

Machines which always run in one direction, will generally not need any adjustments. It is when the machine reverses its direction that “slight adjustments” may need to be made. In this case, the end gun may turn on/off at a location several degrees different than when the machine was running the other direction. The same inaccuracy could hold true for the Stop In Slot setting also. The reason for this is that any “slack” in the mechanical connection to the resolver is taken up during the direction change and can result in slight position inaccuracies in the opposite direction.

It is important to note that accuracy can be expected within a range of plus or minus one degree. One degree on a standard length machine of 1320 feet is equal to 23 feet at the last regular drive unit.

The Direction Offset constant is utilized to adjust or “offset” any inaccuracies in the readings on the screen. If the end gun on/off locations or the stop in slot locations are not repeatable when the direction of the machine is changed, then follow the procedures in the next section to determine the appropriate Direction Offset constant.

DETERMINING THE APPROPRIATE DIRECTION OFFSET CONSTANT

Estimated

The factory preset value for Direction Offset is 0.5 degree. This value is estimated and generally is sufficient in most cases.

However, you may notice that when the direction of the pivot is changed that the end gun turns on or off past or before the normal settings. If the machine runs past the normal end gun on/off settings, the Direction Offset needs to be increased. The Direction Offset must be decreased if the machine is short of the normal end gun on/off settings. This same logic would also hold true for a stop in slot setting as described in the following example:

EXAMPLE
The stop in slot has been set at the pivot road which has been defined as 90.0 degrees. When the machine is running in the forward direction, it always stops near the pivot road. However, when the direction of the machine is changed to reverse, the machine runs past the road about 25 feet as illustrated in figure C.2. On a standard length machine of 1320 feet (typical quarter section machine), one degree on the outer end of the machine is approximately 23 feet. Therefore, the machine "over ran" by about 1 degree. In this case you would add one half of this estimated value to the existing Direction Offset value. If the existing value was 0.5 (factory preset value), then the new value would be approximately 1.0 + 0.5 = 1.5.

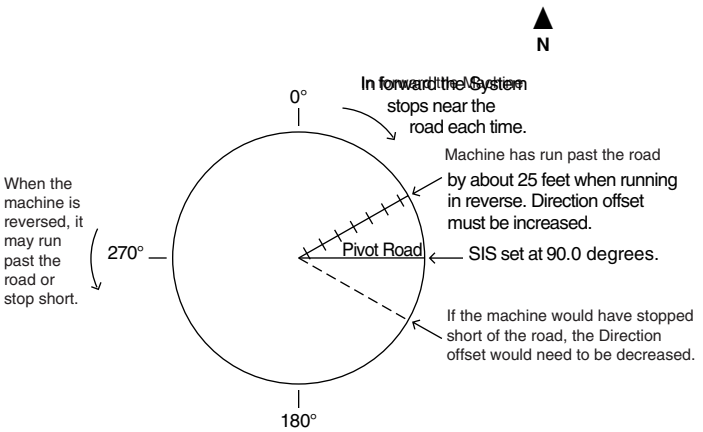


Figure C.2

In the same example, if the pivot would have stopped short by about one degree, then the existing Direction Offset value would have been *decreased* by approximately half a degree.

REMEMBER: The estimated degrees should be divided by two and added or subtracted to the existing Direction Offset value.

RULE OF THUMB: If the pivot is "over running" the locations of end gun operation or stop in slot, then INCREASE the Direction Offset. If the pivot is coming up short of these locations, then DECREASE the Direction Offset value.

Calculated

A more accurate value for the Direction Offset value can be determined by making a few measurements and actually calculating a value for the direction offset. This procedure will take about 30 minutes to complete. If you choose to do so, then follow this procedure:

STEP 1
Start the machine in the forward or reverse direction and watch the position reading on the display screen. When you see the position change by one or two degrees, then stop the machine. This indicates that all the "mechanical slack" has been taken out of the resolver. (In other words, the resolver is turning as the pivot rotates.)

STEP 2
Place a flag at the first regular drive unit (point A) as illustrated in figure C.3 and measure a distance of 15 feet along the FIRST regular drive unit wheel track and place another flag (point B).

NOTE: Measure the distance opposite from the direction the machine ran in step #1.

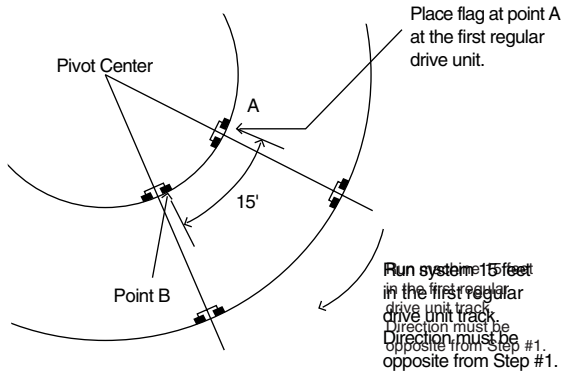


Figure C.3

STEP 3
After placing the flags in step #2, go back to the control panel and determine the position of the machine to the nearest tenth of a degree. To determine the position to the nearest tenth of a degree, you must look at the Current Position value.

a) Press SYSTEM
b) Press "1" for CONSTANTS
c) Press "5" for POSITION

NOTE: Current Position will be displayed in degrees as illustrated in figure C.4. Write this value down (161.6 degrees) as Position 1 and press ESCAPE to exit.

0 EXIT	3 SIS	6 PRES DLY
1 TIME	4 END-GUN	7 LOW PRES
2 DATE	5 POSITION	8 OTHER
CURRENT POSITION (161.6) >		

Figure C.4

STEP 4
Start the pivot in the opposite direction which it ran in step #1 and let it run exactly 15 feet to the flag and STOP the machine. (Remember, the 15 feet is measured at the first regular drive unit track.)

STEP 5
Record the current position again by following the procedure in Step #3. Record this value as Position 2. In this example, that value would be 165.3 degrees as illustrated in figure C.5.

0 EXIT	3 SIS	6 PRES DLY
1 TIME	4 END-GUN	7 LOW PRES
2 DATE	5 POSITION	8 OTHER
CURRENT POSITION (165.3) >		

Figure C.5

STEP 6
Determine how many degrees the pivot was supposed to travel in 15 feet. This will be called "Measured Degrees". To do this, you must measure the distance "R" in feet from the center of the pivot to the center-line of the tire on the first regular drive unit as illustrated in figure C.6.

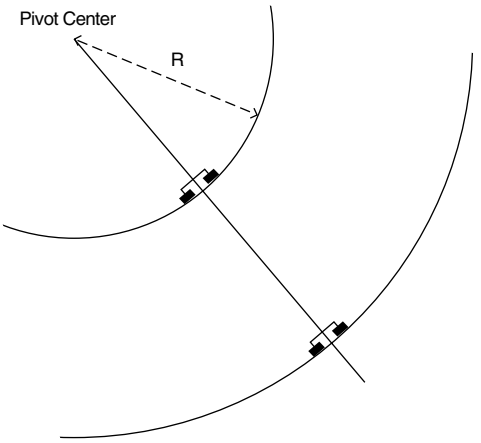


Figure C.6

The formula for Measured degrees is:

Measured degrees = (859.4) / R

NOTE: Calculate the "Measured degrees" to the nearest tenth. Remember, the formula above is only good for 15 feet of travel at the first regular drive unit. If you only measure 10 feet worth of travel, this formula can't be used.

EXAMPLE
X was measured as 183.0 feet

Measured Degrees = (859.4) / (183.0) = 4.7 degrees

STEP 7
Determine the "actual degrees" traveled. This is the difference in readings from steps #3 and #5.

EXAMPLE
Position 1 = 161.6 degrees
Position 2 = 165.3 degrees

If Position 2 is greater than Position 1 machine ran forward), then:

Actual degrees = Pos2 - Pos1

Actual degrees = 165.3 - 161.6

= 3.7 degrees

If Position 1 is greater than Position 2 (machine ran reverse), then:

Actual degrees = Pos1 - Pos2

STEP 8
Determine the calculated value for the Direction Offset. Determine which Case (I or II) applies to your situation.

CASE I
If the actual degrees is less than the measured value, the direction offset constant must be increased in value:

$$\text{Dir Offset} = \text{Current Dir Offset} + \left[\frac{(\text{Measured Degrees}) - (\text{Actual Degrees})}{2}\right]$$

EXAMPLE

$$\text{Direction Offset} = 1 + \left[\frac{4.7 - 3.7}{2}\right]$$

$$= 1 + \left[\frac{1}{2}\right]$$

$$= 1 + 0.5$$

$$= 1.5$$

CASE II
If the actual degrees is greater than the measured value, the direction offset constant must be decreased in value:

$$\text{Dir Offset} = \text{Current Dir Offset} - \left[\frac{(\text{Actual Degrees}) - (\text{Measured Degrees})}{2}\right]$$

EXAMPLE

$$\text{Direction Offset} = 1 - \left[\frac{5.7 - 4.7}{2}\right]$$

$$= 1 - \left[\frac{1}{2}\right]$$

$$= 1 - 0.5$$

$$= 0.5$$

NOTE: The value for "Current Direction Offset" is the value which is currently entered as the Direction Offset value at the time this procedure is performed. The factory preset value is 1.0 degree.

STEP 9
Enter the "new" calculated value for Direction Offset as explained below in "Entering the Direction Offset". The form "Calculating the Direction Offset" at the end of Appendix C should be used when performing this procedure for quick and accurate results.

ENTERING THE DIRECTION OFFSET

To enter a value for the DIRECTION OFFSET, follow these steps:

1. SYSTEM

SYSTEM

0 EXIT	3 RESET	6 TRANSMIT
1 CONSTANTS	4 REVIEW	7 LANGUAGE
2 DATA	5 CYCLE	8 HOURS
PRESS NUMBER >		

Figure C.7

2. "1" for CONSTANTS

1

0 EXIT	3 SIS	6 PRES DLY
1 TIME	4 END-GUN	7 LOW PRES
2 DATE	5 POSITION	8 OTHER
PRESS NUMBER >		

Figure C.8

3. "8" for OTHER constants

8

0 EXIT	3 VOLTAGE	6 PASSWORD
1 MIN APP	4 WIDE BND	7 DAILY OPS
2 HRS/REV	5 HR METER	8 OTHER
PRESS NUMBER >		

Figure C.9

4. “8” for second OTHER constants screen

8

```
0 EXIT          3 PERCENT TIMER   6 ENGINE/PUMP
1 WIND          4 LOW VOLTAGE     7 BAUD
2 AR/AS         5 DIR OFFSET      8 MODEL
PRESS NUMBER >
```

Figure C.10

5. “5” for DIR OFFSET

5

```
0 EXIT          3 PERCENT TIMER   6 ENGINE/PUMP
1 WIND          4 LOW VOLTAGE     7 BAUD
2 AR/AS         5 DIR OFFSET      8 MODEL
DIRECTION OFFSET (1.0) >
```

Figure C.11

NOTE: Notice the value displayed in parentheses is 1.0. This is the initial or default value from the factory. To change the value, enter the calculated offset. A value for DIR OFFSET of less than 0.5 will not be accepted.

6. “1.5” for DIR OFFSET (calculated to be 1.5 in our CASE I example)

1 **.** **5**

```
0 EXIT          3 PERCENT TIMER   6 ENGINE/PUMP
1 WIND          4 LOW VOLTAGE     7 BAUD
2 AR/AS         5 DIR OFFSET      8 MODEL
DIRECTION OFFSET (1.0) > 1.5
```

Figure C.12

7. ENTER to retain 1.5

ENTER

```
0 EXIT          3 PERCENT TIMER   6 ENGINE/PUMP
1 WIND          4 LOW VOLTAGE     7 BAUD
2 AR/AS         5 DIR OFFSET      8 MODEL
PRESS NUMBER >
```

Figure C.13

8. Select “0” 3 times to exit to main Status Screen.

IMPORTANT NOTE: The position adjustment procedure has now been completed. End gun settings, SIS positions and position related programs may need to be fine-tuned. Adjust these settings as required after one revolution of the pivot is completed.

CALCULATING THE DIRECTION OFFSET WORKSHEET

STEP 1
Start the pivot in the forward or reverse direction. Make sure the position reading on the display screen has changed by one or two degrees and then STOP the machine.

STEP 2
Measure 15 feet at the first regular drive unit in the running direction opposite to that in step #1.

STEP 3
Record the current position to the nearest tenth of a degree:

Position 1 = _____ degrees

STEP 4
Start the machine, run exactly 15 feet to the flag and stop the machine.

STEP 5
Record the current position again to the nearest tenth of a degree:

Position 2 = _____ degrees

STEP 6
Measure the distance from the center of the riser pipe to the center-line of the tire on the first drive unit. Record this distance in feet as "R".

R = _____ feet

Determine how many degrees the pivot should have traveled. This will be defined as "Measured Degrees".

Measured Degrees = (859.4)/(R)

= (859.4)/ (_____)

= _____

STEP 7
Determine the "Actual Degrees" traveled.

Actual Degrees = Position 2 - Position 1

= _____ - _____

= _____

Note: If this value is negative, don't worry. Just drop the negative sign and use as a positive value. You are only interested in the value or the difference, not whether or not the machine was traveling forward or reverse.

STEP 8
You are now ready to calculate the new "Direction Offset" value. If the "Actual Degrees" in step #7 is less than the "Measured Degrees" in step #6, then use the formula in CASE I which increases the value for the Direction Offset. If the "Actual Degrees" is greater than the "Measured Degrees", then use the formula in CASE II which decreases the value for the Direction Offset.

CASE I – Actual Degrees Less Than Measured Degrees

$$\text{Dir Offset} = \text{Current Dir. Offset} + \left[\frac{(\text{Measured Degrees}) - (\text{Actual Degrees})}{2}\right]$$

$$\text{Dir Offset} = 1.0 + \left[\frac{(\_\_\_\_\_) - (\_\_\_\_\_)}{2}\right]$$

$$\text{Dir Offset} = 1.0 + \left[\frac{(\_\_\_\_\_)}{2}\right]$$

Dir Offset = 1.0 + _____

Dir Offset = _____

NOTE: The value used for "Current Dir. Offset" is the value currently entered at the time this procedure is performed. The Factory preset value is 1.0 degree.

CASE II – Actual Degrees Greater Than Measured Degrees

$$\text{Dir Offset} = \text{Current Dir. Offset} - \left[\frac{(\text{Actual Degrees}) - (\text{Measured Degrees})}{2}\right]$$

$$\text{Dir Offset} = 1.0 - \left[\frac{(\_\_\_\_\_) - (\_\_\_\_\_)}{2}\right]$$

$$\text{Dir Offset} = 1.0 - \left[\frac{(\_\_\_\_\_)}{2}\right]$$

Dir Offset = 1.0 - _____

Dir Offset = _____

NOTE: The value used for "Current Dir. Offset" is the value currently entered at the time this procedure is performed. The factory preset value is 1.0 degree.

STEP 9
Enter the "new" calculated value for Direction Offset.

Notes