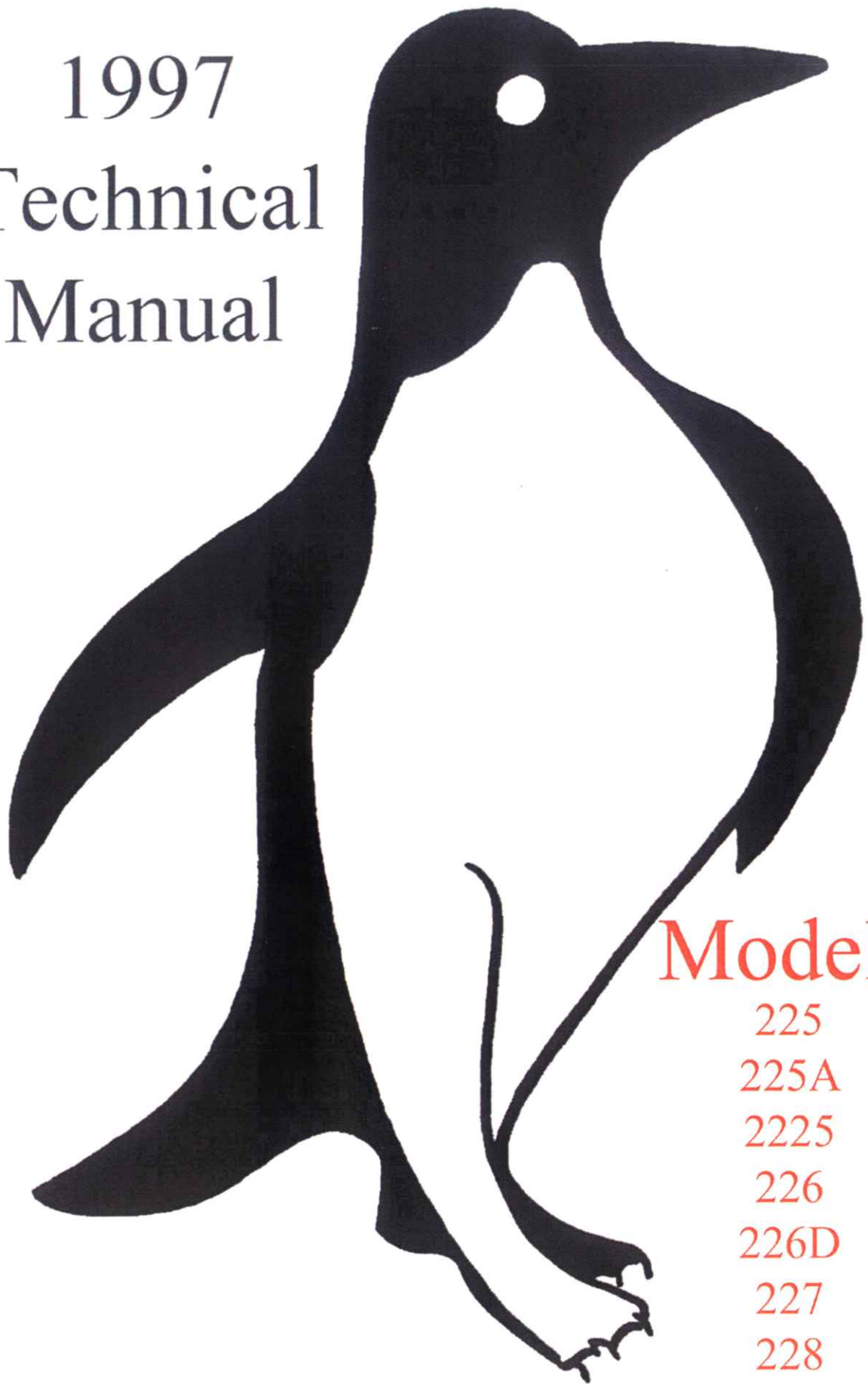


1997
Technical
Manual



Models

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Introduction

Thank you for choosing our ground-oriented central hydraulics system. Our goal has always been to provide great customer service and a safe, reliable product that emphasizes:

- simplicity of operation,
- operator safety,
- management control,
- reduced operating costs, and
- year round usage.

In order to reach our goal of reliability, your new Pengwyn system uses the rugged Autosucker™, on-demand pump. It has a dry valve design with fixed displacement that generates hydraulic flow to a series of poppet-style solenoid cartridge valves. Poppet valves are bang-bang solenoid devices which means they are either on or off. They are reliable, dirt tolerant, inexpensive to repair, contain only static seals, and are not damaged by long periods of sitting idle. These features, as well as the testing done on each system before it leaves the facility, contribute to the overall dependability.

Not only is your new system reliable, but it has been designed to be safe and easy for the operator, as well as the maintenance personnel. The operator has complete control of all the functions with the touch of a switch or dial on the control console. This allows the operator to concentrate on the road. Another feature to help the operator is the system of alarms. The alarms alert the operator to any problems with low material, jams, high oil temperature, and low oil level. This again keeps the operator from diverting attention from the roadway. Another safety consideration includes having all the hydraulics on the exterior of the cab and away from the operator.

Other features of your Pengwyn system, include running hydraulic tools off the system itself and allowing for management programming of spreader constants. By allowing for management control and year round utilization, your system is cost effective and lowers deicing material usage. Lowered material usage not only allows money to be used for something else, but helps to limit the damage done to the environment.

Please look to this manual for information on the major features, calibration of the system, and troubleshooting guidelines. This manual will help you calibrate, operate, and maintain your new spreader system. Pengwyn does offer extensive training and we are also available by calling 1-800-233-7568. Please call if you have a problem. We are here to help you.

CAUTION

**DISCONNECT AMPHENOL PLUG FROM
MANIFOLD AND REMOVE CONTROL
CONSOLE FROM THE CAB BEFORE
WELDING ON THE TRUCK.**

**DO NOT OVER TIGHTEN SOLENOID
COIL NUT, THE COIL SPINDLE IS HOL-
LOW AND EASILY DAMAGED. BE CARE-
FUL NOT TO PINCH WIRES UNDER COIL
WHEN INSTALLING.**

**TURN THE CONTROL CONSOLE
POWER SWITCH OFF BEFORE CON-
NECTING AND DISCONNECTING BAT-
TERY CABLES, BATTERY CHARGERS,
OR JUMPING THE BATTERY.**

**DO NOT DRILL HOLES IN OR MOUNT
AUXILIARY SWITCHES TO THE CON-
TROL CONSOLE. THIS WILL VOID THE
WARRANTY. USE THE CONTROL CON-
SOLE MOUNTING BRACKET FOR THIS
PURPOSE.**

LIMITED WARRANTY

Pengwyn warrants products of its manufacture to be free of defects in material and workmanship, under normal use and service for a period of two (2) years from date of shipment. Pengwyn's obligation under this warranty is limited to repairing or replacing at its factory, or other location designated by Pengwyn, any part or parts thereof which are returned within thirty (30) days of the date when failure occurs or defect is noted, with transportation charges prepaid, and which upon examination appears to Pengwyn's satisfaction to have been defective. **Such free repair or replacement does not include transportation charges, or the cost of installing the new part or any other expense incident thereto. Pengwyn will not be liable for other loss, damage, or expense directly or indirectly arising from the use of its products, nor will Pengwyn be liable for special, incidental or consequential damages.**

Ordinary wear and tear, and damage from abuse, misuse, neglect or alteration are not covered by this warranty. Pengwyn assumes no liability for expenses incurred or repairs made outside Pengwyn's factory except by written consent. Pengwyn's warranty also does not cover the requirement of control box programming. All control box programming is to be performed by the end user after receiving training and with the use of the technical manual. This warranty is null and void if instructions and operating procedures are not followed.

Equipment or parts not manufactured by this company, but which are furnished in connection with Pengwyn products, are covered directly by the warranty of the manufacturer supplying them. However, Pengwyn will assist in obtaining adjustment on such equipment or parts when necessary.

It is recommended that spare parts be purchased for critical items to allow continued operation of equipment during the inspection, evaluation, or repair/replacement process.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND OF ANY OTHER OBLIGATION OR LIABILITY OF PENGWYN.

PRODUCT IMPROVEMENT LIABILITY DISCLAIMER

Pengwyn reserves the right to make any changes in or improvements on its products without incurring any liability or obligation whatever and without being required to make any corresponding changes or improvements in products previously manufactured or sold.

Control Console Front Panel

16 CHARACTER LIQUID CRYSTAL
DISPLAY (LCD)

SPREADER
AUTO - OFF - MANUAL
TOGGLE SWITCH

BEEPER

FRONT PANEL
MOUNTING SCREWS
(QTY OF 4)

DISPLAY MODE
SELECTION SWITCH

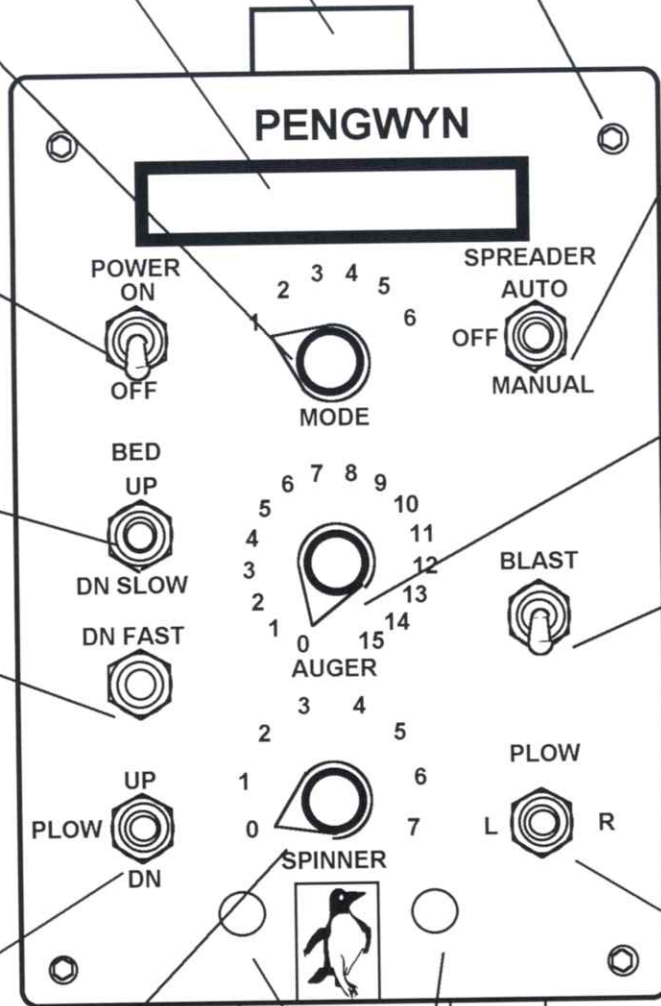
MAIN POWER
ON - OFF
TOGGLE SWITCH

SPREADER MATERIAL
OUTPUT SELECTION
SWITCH

BED UP - DOWN
SLOW
TOGGLE SWITCH

SPREADER BLAST
TOGGLE SWITCH

BED DOWN FAST
PUSHBUTTON



BED UP
TOGGLE SWITCH

PLOW UP - DOWN
TOGGLE SWITCH

PLOW ANGLE
TOGGLE SWITCH

SPINNER/*NaClone*TM
SPEED CONTROL
SELECTION SWITCH

MANUAL LOCKOUT
KEYSWITCH

PROGRAMMING AND
MAINTENANCE
KEYSWITCH

Operation of Control Console

Initial Startup

On initial start up the control box will start a program that informs the operator of the control box model and the software version.

Software versions have been changed periodically to add features and fix problems that have occurred. Please take note of which software version you have. There is a sheet at the back of the manual to record this information.



Pre-Trip Test

PRE-TRIP TEST

SET RPM TO 1500

PLOW UP & HOLD

The Pengwyn control box's initial procedure is a pre-trip testing of its control functions.

Upon initialization, the display prompts the operator to set the RPM to 1,500 and to lift the plow cylinder and hold. This procedure will test the temperature sensor and both pressure transmitters. Continuing to hold will also test all the programmed constants to see if they are all rational. The control will then beep indicating that the display constants check out. If the initial Pengwyn prompt is ignored three times the unit will revert to its normal mode of operation.



Manual Lockout Keyswitch

The manual lockout keyswitch position determines whether the system's manual control is available. See the section on the Spreader Control. The vertical position is manual on and the clockwise position is manual off.



Programming and Maintenance Keyswitch

The programming and maintenance keyswitch has three settings. They are run, calibrate, and maintenance. The vertical position is run, one click clockwise is calibrate, and full clockwise is maintenance. Each setting will be discussed in more depth where they apply.

The programming and maintenance keyswitch must always be returned to the RUN position before turning the power switch or the truck off, so that newly programmed numbers won't be lost.

Operation of Control Console (Cont'd)

Main Power



200 SERIES U3.12

When the power switch is in the ON position, the panel will light up and the display will come on. The display will briefly show the current software update and then the information dictated by the mode selected.

Mode Selection Switch

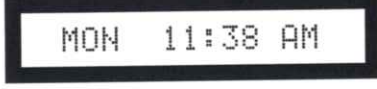
The selection of the mode dial indicates the type of information shown on the display. The following table shows the information displayed at each selection of the dial.



MILES/HOUR XX



POUNDS/MI XXXX



MON 11:38 AM



START FEET XX



XX M XX P

Position	Type of Information
----------	---------------------

- 1. Vehicle speed in miles per hour (MPH)**
Should closely match truck speedometer.
- 2. Pounds per mile of material output at the spreader**
Number shown is material output if the truck is driven at the current speed for one full mile.
- 3. Day and Time**
- 4. Distance measured in feet**
To use this function the spreader must be **OFF** when the truck comes to the starting point. Operate and hold the blast switch **UP** until the display reads start feet then release. Drive the truck the distance to be measured and operate the blast switch again. The display will show the stop feet. To clear the stored data, turn the mode switch to any position other than 4 or 5.
- 5. Distance measured in miles**
This is the same as mode 4 but shows the distance measured in miles.
- 6. Total pounds of material and total miles traveled**
The control console stores the total pounds of material spread and the total miles traveled when the spreader switch is **ON**. Data accumulation stops when the spreader switch is turned **OFF**, but continues when it is turned back **ON**. The data is added to that in memory. To clear the stored data, turn the mode switch to any position other than 4 or 5, turn the spreader **OFF**, and operate the blast button. The display will turn to zero. This feature is available on model 226D and newer. The information must be downloaded into a computer for display.

Operation of Control Console (Cont'd)

Bed Switches

There is a bed switch and a bed down fast button. The switch controls raising the bed and lowering it slowly. When the bed switch is in the down position and the bed down fast button is pushed at the same time the bed is lowered more quickly.



Plow Switches

There are two plow switches. The plow switch on the left hand side of the control panel controls the up and down motion of the plows. The plow switch on the right hand side of the control panel controls the left and right movement of the plow.



Spreader Switch

The spreader switch has three positions; **AUTOMATIC**, **OFF**, and **MANUAL**. The manual position is only active if the manual lockout keyswitch is turned **ON**.



Spreader Material Output Selection Switch (Auger Switch)

The auger has 15 settings. If the spreader switch is on **MANUAL** and the manual lockout keyswitch is turned **ON** then each numerical position sets the flow to the auger circuit. Position **1** will indicate that one GPM of hydraulic oil is moving to the auger circuit and so on up to 15 GPM at position **15**. Flow to the auger circuit in **MANUAL** is constant and not ground oriented.

If the spreader switch is on **AUTOMATIC** and the manual lockout keyswitch is **OFF** then the positions will output preprogrammed values. This will be ground oriented and depends on truck speed. Position **1** will output the amount that is programmed into it, such as 100 lbs of material per mile. Position **2** may be set for 200 lbs of material and so on. Management will determine these constants and maintenance will program them in.



Spinner / NaClone™ Speed Control Selection Switch

The spinner has seven settings. In **AUTOMATIC** settings **1** through **6** the flow is not ground oriented and the spinner will continue to turn even when the truck stops. In position **7**, the spinner is ground oriented and flow is determined by the speed of the truck. When the truck is stopped and the spinner is in position **7** the circuit has a minimum flow of 1 GPM. Position **7** is used for zero velocity. The spinner is not effected by the blast switch. In **MANUAL** all seven positions are not ground oriented.

Operation of Control Console (Cont'd)

Hydraulic Tool Mode



TOOL MODE

In order to run tools off the Pengwyn system you must connect the pressure hose of the tool to the pressure side of the auger circuit and the return hose of the tool to the return side of the spinner circuit. The manual lockout key will be in the ON position and the dial labeled mode should be on position 4. The display will read tool mode. Bring the truck engine speed up to approximately 1000 RPMs. The dial labeled auger will allow you to select the gallons per minute needed for the tool. Each position on the dial is equal to the gallons per minute. Therefore, position 1 gives one gallon per minute of flow and so on.



Warning Alarms

There are four warning alarms including:

- Low fluid
- High temperature
- Spreader alert
- Spreader jam

Low Fluid



LOW FLUID

If the spreader auto-off-manual switch is in the MANUAL or AUTO position, the control box will produce an audible beep to warn about low fluid. The display will flash LOW FLUID even if the spreader switch is in the OFF position.

This warning indicates that the hydraulic fluid in the reservoir tank is low. This will not interrupt the functions of the system, as long as there is some hydraulic fluid in the reservoir. The spreader switch should be turned to the OFF position and the truck should return to the shop for maintenance immediately.



High Temperature



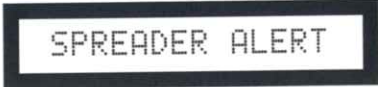
FLUID TEMP XXXX

This warning indicates that the temperature has exceeded the maximum recommended operating temperature. The control box will produce an audible beep and the display will flash FLUID TEMP XXX. The truck should be returned to the shop for maintenance immediately.



Operation of Control Console (Cont'd)

Spreader Alert



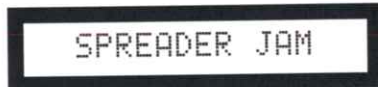
If there is an audible beep and the control box display flashes SPREADER ALERT, there is no material being ejected by the spreader.

Spreader Alert indicates that there has been a reduction of the load on the drive motor. Generally, this is caused when the spreader is out of material. Other causes include:

- Tunneling / bridging of the material
- A broken mechanical connection between the drive motor and the auger / conveyor
- A blown hose on the auger / conveyor drive motor
- A drive motor with reduced efficiency



Spreader Jam



Spreader Jam will cause an audible beep and the control box display will flash SPREADER JAM. This indicates that no material is being ejected by the spreader system. It may be caused by a material jam at the auger / conveyor or the quick disconnect to the auger / conveyor drive motor may not be connected.



Blast Switch

The blast switch is designed to allow maximum material output when going through intersections, over bridges, or wherever a higher application rate may be needed.

The blast switch is a spring return to neutral toggle switch that is used to override the setting of the spreader material output selection switch in either the automatic or manual mode of operation. When activated, the blast switch energizes all the auger / conveyor valves, sending maximum hydraulic flow to the auger / conveyor drive motor. The auger / conveyor will put out maximum material when the blast switch is activated. When released, the switch returns to its off position and the spreader returns to the material output as set by the material output selection switch. If the mode switch is in position 7 the Pengwyn will calculate the blast in pounds per mile.



Operation of Control Console (Cont'd)

Retracting the Plow Cylinder

The 200 Series plow circuit is basically a single acting circuit which utilizes the plow's weight to retract the cylinder or lower the plow; however, for hook up purposes only, we borrow some oil from the bed down circuit to retract the plow cylinder. This is accomplished by simultaneously operating the plow down and the bed down switches. This will hydraulically retract the plow cylinder.



Very Cold Temperature Operation

During extremely cold weather with the spreader off the hydraulic fluid viscosity may become so thick the cylinder functions become very sluggish. To remedy this, two procedures will help.

1. Turn the auger and spinner rotary knobs to 0 and turn the spreader switch to AUTO. This will allow continuous circulation of the pump with the spreader off.
2. If more rapid hydraulic fluid warming is desired, hold the plow switch UP for a minute or two; dead heading the plow cylinder and forcing the oil over the plow relief valve. This will warm the oil approximately five to 10 degrees per minute.



Dirty Disconnects

If the spreader is hooked up and the disconnects are dirty, the dirt lodges in the valves down stream from the disconnects and causes the auger and spinner compensators to hang up. This results in the fluid being blocked from any down stream functions. This disables all the bed and plow functions.

Always be sure to carefully wipe off all auger and spinner disconnects before hooking up the spreader.

Control Console Diagnostic Features

Caution: Always return the programming key to the RUN position before turning the console power switch or the truck key off. Turning the power off before resetting the programming key may cause the loss of some of the newly programmed numbers.



Temperature Sensing

FLUID TEMP XXX

The Pengwyn control console will read and display the hydraulic reservoir temperature. To read the temperature:

1. Push spreader switch to OFF position
2. Start engine and run at idle
3. Turn programming / maintenance key to MAINT

The display will show FLUID TEMP XXX .

4. Push the spreader switch to MANUAL
5. Wait 10 seconds
6. Turn spreader switch OFF

This allows the pump to circulate hydraulic fluid from the reservoir through the manifold to the temperature sensor. It will now display the actual temperature.



Pressure Sensing

FLUID TEMP XXX

PRESSURE = XXXX

The Penwyn control console will read and display the hydraulic system pressure. To read system pressure:

1. Push the spreader switch to OFF
2. Start the engine and run at desired engine speed
3. Turn programming / maintenance key to MAINT

The display will show FLUID TEMP XXX .

4. Push the spreader switch to MANUAL

The display will show PRESSURE = XXXX. The pressure displayed is the pressure required to push pump flow through the manifold, compensator valves, pump bypass valve, and return line hosing.

5. Operate any hydraulic function


The pressure required to operate that function will be displayed. By running the cylinders to the end of their stroke or disconnecting the spreader system quick disconnects, the pressure setting of the relief valve protecting the specific function will be displayed.



Control Console Programming

Caution: Always return the programming key to the RUN position before turning the console power switch or the truck key off. Turning the power off before resetting the programming key may cause the loss of some of the newly programmed numbers.

Setting the Speed Constant



CAL MILE 0

The speed constant and the distance measuring constant method can both be used to program the control console to the truck's speedometer. Using the surveyed mile method is recommended because it is the most accurate.

Setting the Distance Measuring Constant (using a surveyed mile)



PULSES/.1 MI XXX

1. Jack rear axle of truck up and block the front wheels.

or

1. Be prepared to drive the truck.
2. Turn the programming key to the CALIBRATE position
3. Turn the mode selection switch to position 1

The display will read CAL MILE 0.

4. Operate the truck at a constant speed (30 MPH or more)

Use the truck speedometer, not the control console, to determine truck speed.

5. Compare truck speedometer to speed shown on control console display

If the display remains at 0, a jumper must either be installed or removed. (See: Speedometer Jumper section)

To adjust the speed of the console to match the speed of the truck speedometer:

1. Push the bed switch to the UP position to increase the displayed console speed
2. Push the bed switch to the DN SLOW position to decrease the displayed console speed

The speedometer setting is now complete.

3. Turn the mode selection switch to position 4
4. Record the pulse count shown for your records
5. Turn key to run position.



To set the distance measuring constant using a surveyed mile:

1. Turn the programming key to the CALIBRATE position
2. Turn the mode selection switch to position 4

The display will read PULSES/.1MI XXXX. The XXXX will indicate some number from 0 to 5000.

3. Drive the truck toward the starting point of the measured mile

Control Console Programming (Cont'd)

Setting the Distance Measuring Constant (Cont'd)

```
CAL MPH 0
```

```
PULSES/.1 MI XXX
```

4. Push up on the blast switch when at the starting point

The display will instantaneously show CAL MPH 0 and then will begin increasing as the truck continues toward the mile marker.

5. Push up on the blast switch when the end of the measured mile is reached

The display will now show the number of pulses the console counted over the measured mile. The console speedometer setting is now complete.

6. Record the number shown for your records

If setting the constant with a known constant:

1. Turn the programming key to the CALIBRATE position
2. Turn the mode selection switch to position 4

The display will read PULSES/.1MI XXXX. The XXXX indicates some number that could be anything from 0 to 5000. If the correct pulse count is known, this number can be directly inserted without having to drive the truck.

3. Push the bed switch to the UP position to increase the number displayed
4. Push the bed switch to the DN SLOW position to decrease the number displayed

If a large number change must be made, pushing the front plow switch to the DN position while simultaneously pushing the bed switch UP or DN SLOW will change the displayed number in increments of 1000. When the correct number is achieved, the speedometer setting is complete.



Setting the Minimum Value

```
MINIMUM VALUE X
```

When operating in the automatic mode, the Pengwyn system is set up to send a minimum flow rate to the auger / conveyor drive motor, regardless of the amount of material output requested. This is to compensate for volumetric inefficiencies of the drive motor and assure that the system puts out material when starting the truck from a dead stop. To set the minimum number:

1. Turn the programming key to the CALIBRATE position
2. Push the front plow switch to the UP position

The display will read MINIMUM VALUE X.

3. Push the bed switch to the UP position while holding the plow switch to increase the displayed number

Control Console Programming (Cont'd)

Setting the Minimum Value (Cont'd)

4. Push the bed switch to the DN SLOW position while holding down the plow switch to decrease the displayed number.

The minimum value number is adjustable from 1 to 5. For most applications, the minimum value should be set at 1.

5. Record the minimum value for your records.



Setting the NaClone™ Zero-Velocity Ejector Constant



CAL SPIN XX.X

This is an option that may not be used on all trucks. If your truck uses a conventional broadcast type spinner, ignore this programming procedure. The CAL SPIN setting is the truck speed at which the zero-velocity ejector achieves maximum hydraulic flow. This speed must be programmed into the console. To check for the correct setting the first time the truck is programmed:

1. Decide what the desired maximum spreading speed will be
2. Plug this number into the console
3. Do a trial run to see if maximum effectiveness is achieved.
4. Record the number for your records

To set the ground oriented NaClone™:

1. Turn the programming key to the CALIBRATE position
2. Turn the mode selection switch to position 2
3. Push the front plow switch to the DOWN position


The display will read CAL SPIN XX.X.

4. Hold the plow switch and push the bed switch to the UP position to increase the number
5. Hold the plow switch and push the bed switch to the DN SLOW position to decrease the number

Once the desired number is set, this setting is complete.



Setting the Day and Time



CAL DAY XXX

1. Turn the programming key to the CALIBRATE position
2. Turn the mode selection switch to position 3

The display will read CAL DAY XXX. The XXX represents the day, i.e. SUN, MON, etc.

3. Push the bed switch to the UP position until the correct day is shown
4. Push the plow angle switch to the L position

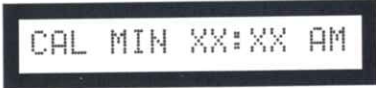
The display will read CAL HRS XX:XXAM.



CAL HRS XX:XX AM

Control Console Programming (Cont'd)

Setting the Day and Time (Cont'd)



5. Hold the front plow switch and push the bed switch to the UP position to change the displayed hours and the displayed AM or PM

This works on a 24 hour clock and is set the same as a digital watch. When this is set correctly:

6. Push the front plow angle switch to R

The display will read CAL MIN XX:XXAM.

7. Hold the front plow switch and push the bed switch to the UP position to change the displayed minutes

This works on a 60 minute clock and is set the same as a digital watch. When this is set correctly, the day and time settings are complete.



Setting Spreader Alarm

This procedure must be done every time a control console is changed. The procedure should be repeated occasionally as a standard maintenance check to adjust for auger / conveyor or motor wear. The procedure should also be done anytime the auger / conveyor motor is changed or the design of the spreader is changed. This is to prevent nuisance spreader alert alarms. To set the spreader alarm:

1. Have the engine running
2. Have the spreader box or conveyor belt empty of material
3. Turn the programming / maintenance key to MAINT
4. Push the spreader switch to MANUAL
5. Wait 10 seconds
6. Push the spreader switch to OFF
7. Read the temperature on the display
8. If temperature is below 80° then warm up the hydraulic oil to at least 80°

To warm up the hydraulic oil:

1. Bring truck engine speed to 1500 rpm
2. Push the spreader switch to MANUAL
3. Turn both the spreader material output switch and the spinner speed control switch to position 15
4. Push the front plow switch to the UP position and hold
5. Periodically push the spreader switch to the OFF position and read the temperature



Control Console Programming (Cont'd)

Setting Spreader Alarm (Cont'd)



SETTING 1 - XXX

Once the proper temperature is achieved continue to set the spreader alarm:

9. Release the plow switch
10. Maintain 1500 rpm engine speed
11. Turn the spreader switch to the OFF position
12. Turn the spreader material output switch and the spinner speed control switch to 0
13. Push the spreader switch to AUTO

The display will read SETTING 1 = XXX. Then the display will read SETTING 2 = XXX. The displayed pressure readings should slightly increase for each progressive setting. This will continue automatically up to SETTING 15 = XXX. The display will then read FINISHED and then TURN SPREADER OFF.

14. Turn the spreader OFF
15. Lower the engine speed

The spreader alert is now set. As the automatic spreader alert settings advance:

16. Write down the settings so they can be checked in the next programming step



Checking the Spreader Alert

To assure the spreader alert programming numbers were maintained in memory, the program numbers should be reviewed. To review these numbers:

1. Turn the programming key switch to CALIBRATE
2. Turn the mode switch to position 1
3. Momentarily push the front plow angle switch to the R position

All the spreader alert programming numbers will flash across the display.

4. Check these to the numbers that were written down

If they match, the numbers were held. If the numbers are not the same, repeat the spreader alert procedure. If this does not work, the control console may need to be replaced.



Control Console Programming (Cont'd)

Setting the Spreader Jam

CAL JAM XXXX

Spreader jam is the pressure setting at which the control box will alarm the operator that the auger / conveyor has jammed or locked up. Spreader jam is typically set at 2300. It should be set at 200 psi below the main relief valve setting. To set this number:

1. Turn the programming key to the CALIBRATE position
2. Turn the mode selection switch to position 2
3. Push the front plow angle switch to the R position

The display will read CAL JAM XXXX.

4. Hold the plow switch and push the bed switch to the UP position to increase the setting
5. Hold the plow switch and push the bed switch to the DN SLOW position to decrease the setting

The numbers will change in increments of 10.

6. Record the spreader jam number for your records



Setting the Spreader Drag

CAL DRAG XXX

The spreader drag setting determines the amount of material remaining on the auger or conveyor when the spreader alert alarm goes off. To set the spreader drag:

1. Turn the programming key to the CALIBRATE position
2. Turn the mode selection switch to position 2
3. Push the front plow angle switch to the L position

The display will read CAL DRAG XXX. This number will usually be set between 50 and 120. This number varies with the type and make of the spreader used on the truck.

4. Hold the front plow switch and push the bed switch to the UP position to increase the setting
5. Hold the front plow switch and push the bed switch to the DN SLOW position to decrease the setting
6. Record the spreader drag number for your records



Control Console Programming (Cont'd)

Checking the Spreader Drag

With material on the spreader box or the conveyor:

1. Start the engine
2. Bring the engine speed up to about 1500 RPM
3. Turn the manual lockout key to ON
4. Turn the programming key to the RUN position
5. Turn the spreader material selection switch to position 8
6. Push the spreader switch to manual
7. Allow the system to run until the auger fault alarm goes off
8. Immediately push the spreader switch to OFF

Go back and check the amount of material left on the auger / conveyor. If too much material remains, lower the spreader drag number. If too little material remains, raise the spreader drag number. Setting the drag too high will cause nuisance alarm signals.



Setting the Automatic Spreader Control

SPREADER XX-XXX

When operating the spreader in automatic, positions 1 through 15 on the spreader material output selection switch determine the spreader output rate in pounds per mile. Each position must have the desired output rate programmed into it. The number programmed into each setting determines the available spreader rates the operator has to choose from. It is up to the end user to determine the programmed rates they wish to make available to the operator. To program:

1. Turn the programming key switch to the CALIBRATE position
2. Turn the mode switch to position 2
3. Turn the spreader material selection switch to the position to be programmed (1 through 15)

Each position will have to be set. The display will read SPREADER XX-XXX.

4. Push the bed switch to the UP position to increase the setting
5. Push the bed switch to the DN SLOW position to decrease the setting

The numbers will change in increments of 10.

6. Record the spreader settings for each position for your records

If 0 is programmed into any setting, the auger / conveyor will not turn when that setting is selected.



Control Console Programming (Cont'd)

Finding the Spreader Constant

To find the spreader constant, material must be in the bed of the truck and the spreader system must be attached and operating.

To set up to find the spreader constant:

1. Weigh an empty bucket capable of holding 30 to 90 lbs of your granular deicing material.
2. Position bucket under output of the auger / conveyor to catch the material
3. Ensure that material is distributed evenly over entire spreader box or conveyor belt

With a V-box hopper, the gate opening must be adjusted to the position in which the truck will be operated. If the gate opening is changed, the new auger constant number must be found or the spreader system will no longer be accurate.

To find the spreader constant:

4. Turn the manual lockout keyswitch to the ON position
5. Turn the programming key to the RUN position
6. Start the engine and bring the engine speed to 1000 RPM
7. Turn the spreader material output switch to position 1
8. Turn the spinner speed control switch to position 0

You will need a stop watch to time the procedure.


9. Push the spreader switch to MANUAL and start timing
10. Allow the system to run for one minute
11. Turn the spreader switch OFF
12. Weigh the bucket of material
13. Repeat the procedure with the spreader switch in position 2
14. Subtract the value measured at spreader 1 from spreader 2
15. Record this number for your records

The resulting number is the spreader constant. You may want to run through this procedure twice, in order to double check.



Control Console Programming (Cont'd)

Setting the Spreader Constant



CAL SPREAD XX

To insert the spreader constant into the control console:

1. Turn the programming key to CALIBRATE
2. Turn the mode selection switch to position 2
3. Turn the spreader material output switch to position 0

The display will read CAL SPREAD XX.

4. Push the bed switch to UP to increase the number
5. Push the bed switch to DN SLOW to decrease the number

When the number on the display matches the spreader constant number this procedure is finished.



Changing Control Consoles

If it is necessary to change the control console, the only programming test that is required to be repeated is the auger fault setting. All other programming numbers can be directly plugged into the console based on the numbers that were recorded during the initial setup.



See the Pre-Winter Checklist at the back of this manual for a guide to programming the Pengwyn in the field.

Laptop Programming and Data Logging

Data Storage

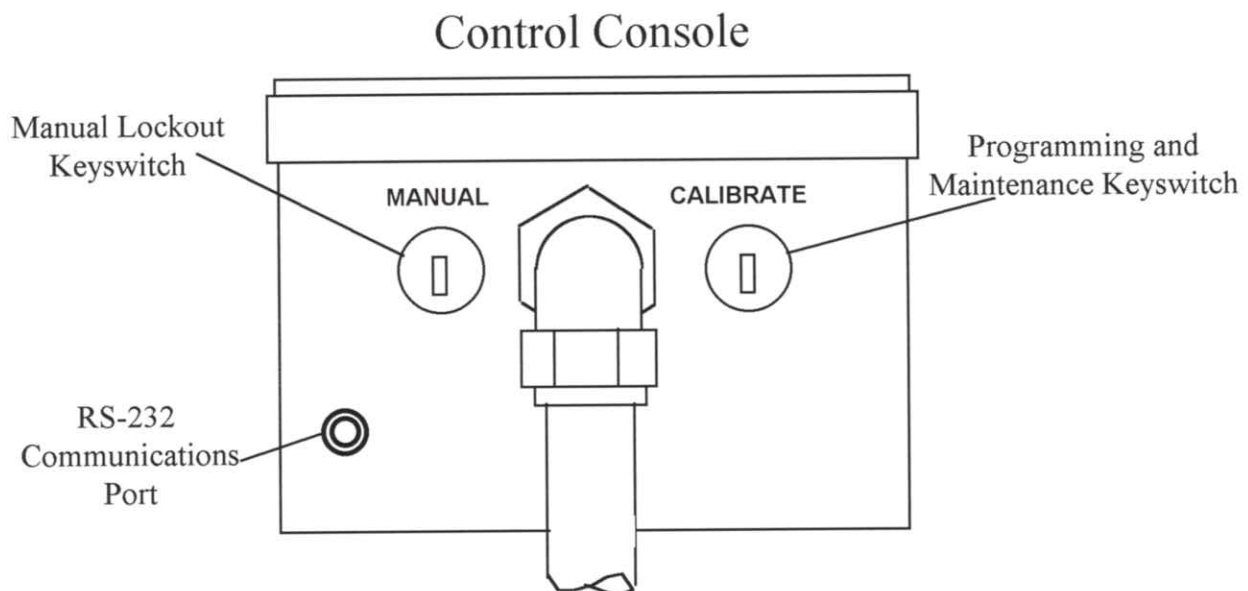
The Pengwyn control console is equipped with an RS-232 data communications port. The control console also includes a 32K battery-backed ram chip for patrol data storage. The storage capacity affords retrieval of 12 hours of operating information, including:

- Time control console is turned on
- Truck speed
- Miles driven with the spreader on
- Miles driven with the spreader off
- Time the truck idles
- Material spread rates

Laptop Communications / Software

Software is provided so that the accumulated data can be downloaded into a DOS-based laptop PC or a desktop PC. This is done through the RS-232 communications port. The data can be presented in a log summary itemizing all spreader on and off times and all truck idle times to give a total account of:

- Total miles driven with the spreader on
- Total miles driven with the spreader off
- Average spread rate
- Peak speed spreader on
- Total miles traveled
- Peak spread rate
- Total material spread
- Peak speed spreader off



Laptop Programming and Data Logging (Cont'd)

Laptop Communications / Software (Cont'd)

The provided software will also plot a graph similar to the example below.

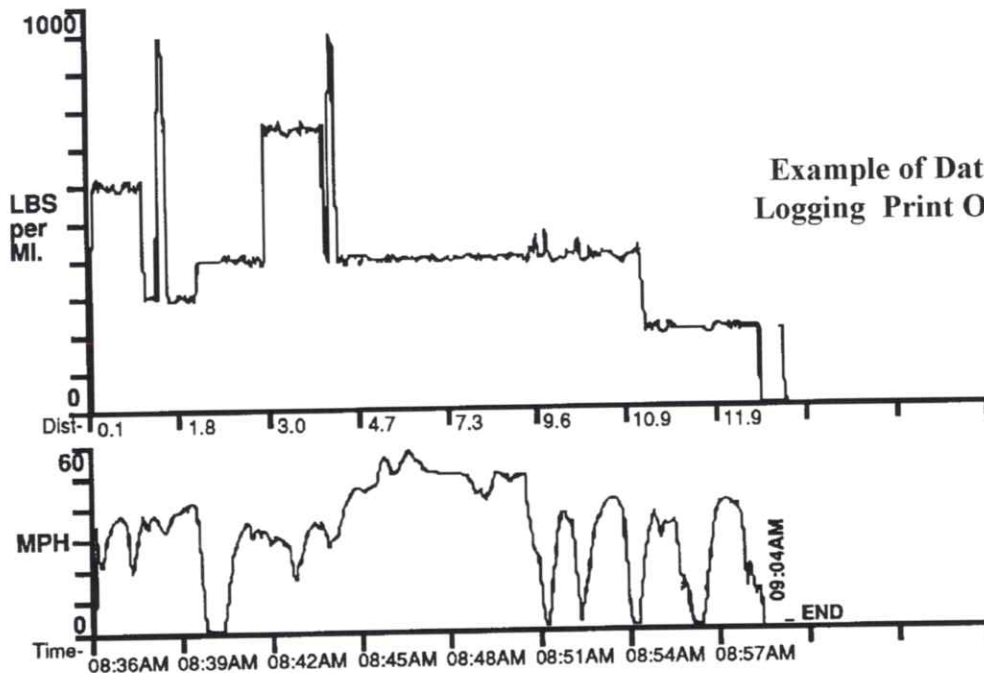
Programming and calibration of the Pengwyn control console can be done directly from the laptop computer through the software. Programming values can be individually changed by moving through (use the TAB key) a displayed table on the laptop screen and typing in the desired value(s). If several trucks are to be programmed with the same values, a calibration log can be created in the laptop and then the complete log transferred to the control console by doing the following:

- Plug into the RS-232 port
- Call up the input screen on the laptop
- Press ENTER

The entire file is transferred to the control console.

Additional Information

For more information on this feature consult the Pengwyn *Data Control System Laptop Version Installation & Operating Manual*. If you have any questions, please contact Pengwyn.



Unit ID #	DT632	SPEED		SPREAD		Estimated	
Filename	07150904	Max.	Avg.	Max.	Avg.	Miles	Lbs.
Scale Hrs =	0.5	59	33	1087	421	12.5	5320

Pressure Adjustments

The 200 series manifold system incorporates three relief valves. Pengwyn tests each manifold for function and sets each relief valve prior to shipping. After manifold installation, the relief valve pressures should be checked and, if necessary, set to the pressures recommended by the equipment manufacturers. (See: Valve Function Diagram for location of valves)

Main Relief

1. Turn the maintenance key to MAINT
2. Turn manual keyswitch to ON
3. Disconnect the auger pressure hose quick disconnects
4. Start engine and bring engine speed to 1500 rpm
5. Turn Pengwyn ON
6. Turn spreader switch to MANUAL
7. Turn spreader material output switch to position 1
8. Quickly read the pressure on the display
9. Turn engine off
10. Remove cap from main relief (some reliefs have an external adjustment screw with locking nut)
11. Use an allen wrench to adjust the internal / external screw clockwise to increase pressure setting or counter clockwise to decrease pressure setting
12. Replace cap or tighten lock nut
13. Repeat above procedure until proper setting is achieved
14. Return the maintenance key to RUN and manual key switch to OFF when finished



Bed Up / Plow Up Relief

1. Turn maintenance key to MAINT
2. Turn manual keyswitch to ON
3. Start engine and bring engine speed to 1500 rpm
4. Turn Pengwyn ON
5. Turn spreader switch to MANUAL
6. Push plow switch to UP and extend cylinder until it bottoms out
7. Quickly read the pressure on the display
8. Turn engine off
9. Remove cap from bed up / plow up relief (some reliefs have an external adjustment screw with locking nut)
10. Use an allen wrench to adjust the internal / external screw clockwise to increase pressure setting and counter clockwise to decrease pressure setting

Pressure Adjustments (Cont'd)

Bed Up / Plow Up Relief (Cont'd)

11. Replace cap and tighten lock nut
12. Repeat the above procedure until proper setting is achieved
13. Return maintenance key to RUN and manual key switch to OFF when finished



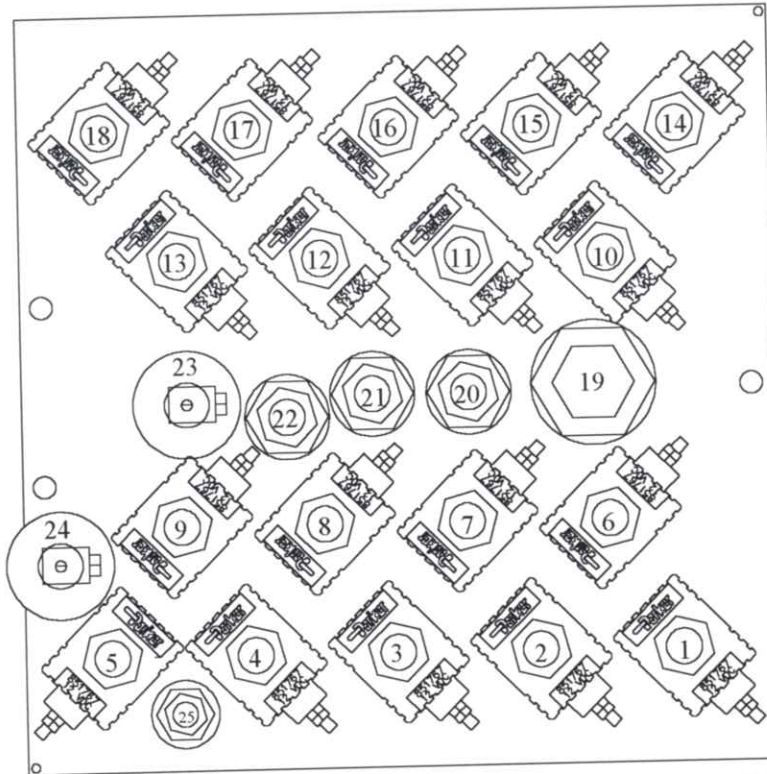
Bed Down Relief (for double acting only)

1. Turn the maintenance key to MAINT
2. Turn manual keyswitch to ON
3. Start engine and bring engine speed to 1500 rpm
4. Turn Pengwyn ON
5. Turn spreader switch to MANUAL
6. Push bed switch to DN SLOW
7. When the bed is all the way down quickly read the pressure on the display
8. Turn engine off
9. Remove cap from bed down relief (some reliefs have an external adjustment screw with a locking nut)
10. Use an allen wrench to adjust the internal / external screw clockwise to increase pressure setting and counter clockwise to decrease pressure setting
11. Replace cap or tighten lock nut
12. Repeat above procedure until proper setting is achieved
13. Return the maintenance key to RUN and manual key switch to OFF when finished



Valve Function Diagram

As viewed inside cab facing rearward



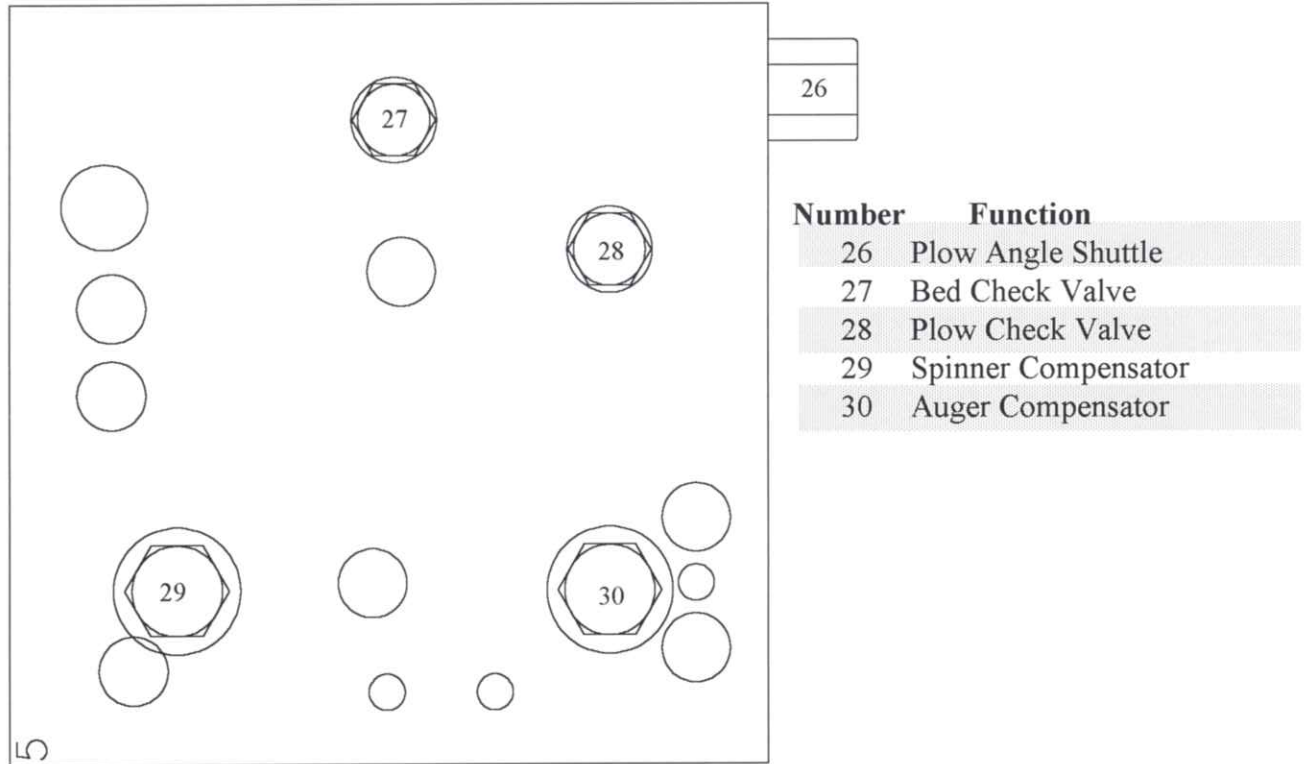
FUNCTION

WIRE COLOR

FUNCTION	WIRE COLOR
1. Spinner 2	White / Brown
2. Spinner 4	White / Purple
3. Auger 0.5	Pink
4. Auger 2	White / Yellow
5. Auger 8	White / Blue
6. Spinner 1	White / Orange
7. Pump Bypass Valve	White / Black
8. Auger 1	White
9. Auger 4	White / Green
10. Hoist, Rod to Tank	Orange
11. Hoist, Rod to Pressure	White / Red
12. Plow Down	Brown
13. Plow Up	White / Gray
14. Hoist Down Slow, Blind to Tank	White / Red
15. Hoist Down Fast, Blind to Tank	Yellow
16. Hoist Up, Blind to Pressure	Orange
17. Plow Right	Purple
18. Plow Left	Gray
19. Bed Compensator	N/A
20. Bed/Plow Up Relief	N/A
21. Bed Down Relief	N/A
22. Main Relief	N/A
23. High Pressure Transducer	N/A
24. Low Pressure Transducer	N/A
25. Thermistor	N/A

Valve Function Diagram

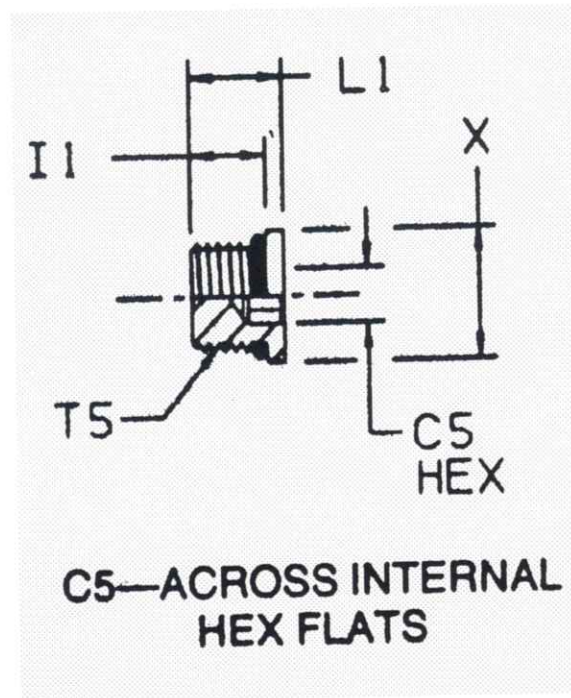
As viewed facing rear cab wall



Parts List for Manifold Assembly

FLAG NUMBER	FUNCTION	PART NUMBER
1,2,3,4,5,6,8, 9,12,13,14,17,18 10, 11, 15, 16	Normally Closed Solenoid Valve - 10 Size	DS101C or SV101
	Normally Closed Solenoid Valve - 16 Size	DS161C or SV401
7	Normally Open Solenoid Valve - 16 Size	DS161N or SV301
19	Bed Compensator	FRC600
20	Bed / Plow Up Relief	RV601
21	Bed Down Relief	RD0800
22	Main Relief	RD2750
23,24	Pressure Transducer With Plug	X5000-P
25	Thermistor Composite	TC101
26	Shuttle Valve	CP721
27	Check Valve	CV103
28	Check Valve	CV101
29,30	Auger / Spinner Compensator	CP701
No Flag	Molded Coil (Parker)	RC101P
	Molded Coil (Modular)	RC102
	Canned Coil (Modular)	RC101

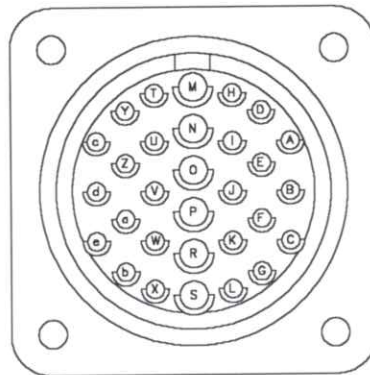
Torque Specs & O-Ring Numbers



Use a removable thread locker, such as Loctite 545.

TUBE FITTING PART #	T5 PORT THD UN / UNF-2A	C5 HEX	I1	L1	X DIA.	ASSEMBLY TORQUE FT. LBS	O-RING NUMBERS
#02 SAE O-Ring Boss	5/16-24	1/8	.30	.39	.44	3 ± .5	902
#03 SAE O-Ring Boss	3/8-24	1/8	.30	.39	.50	5 ± .5	903
#04 SAE O-Ring Boss	7/16-20	3/16	.37	.46	.56	11 ± 1	904
#05 SAE O-Ring Boss	1/2-20	3/16	.37	.46	.63	15 ± 1	905
#06 SAE O-Ring Boss	9/16-18	1/4	.40	.49	.69	18 ± 1	906
#08 SAE O-Ring Boss	3/4-16	5/16	.44	.57	.88	46 ± 2	908
#10 SAE O-Ring Boss	7/8-14	3/8	.50	.63	1.00	75 ± 5	910
#12 SAE O-Ring Boss	1 1/16-12	9/16	.59	.75	1.25	85 ± 5	912
#14 SAE O-Ring Boss	1 3/16-12	9/16	.59	.75	1.38	130 ± 6	914
#16 SAE O-Ring Boss	1 5/16-12	5/8	.59	.75	1.50	135 ± 6	916
#20 SAE O-Ring Boss	1 5/8-12	3/4	.59	.75	1.88	225 ± 12	920

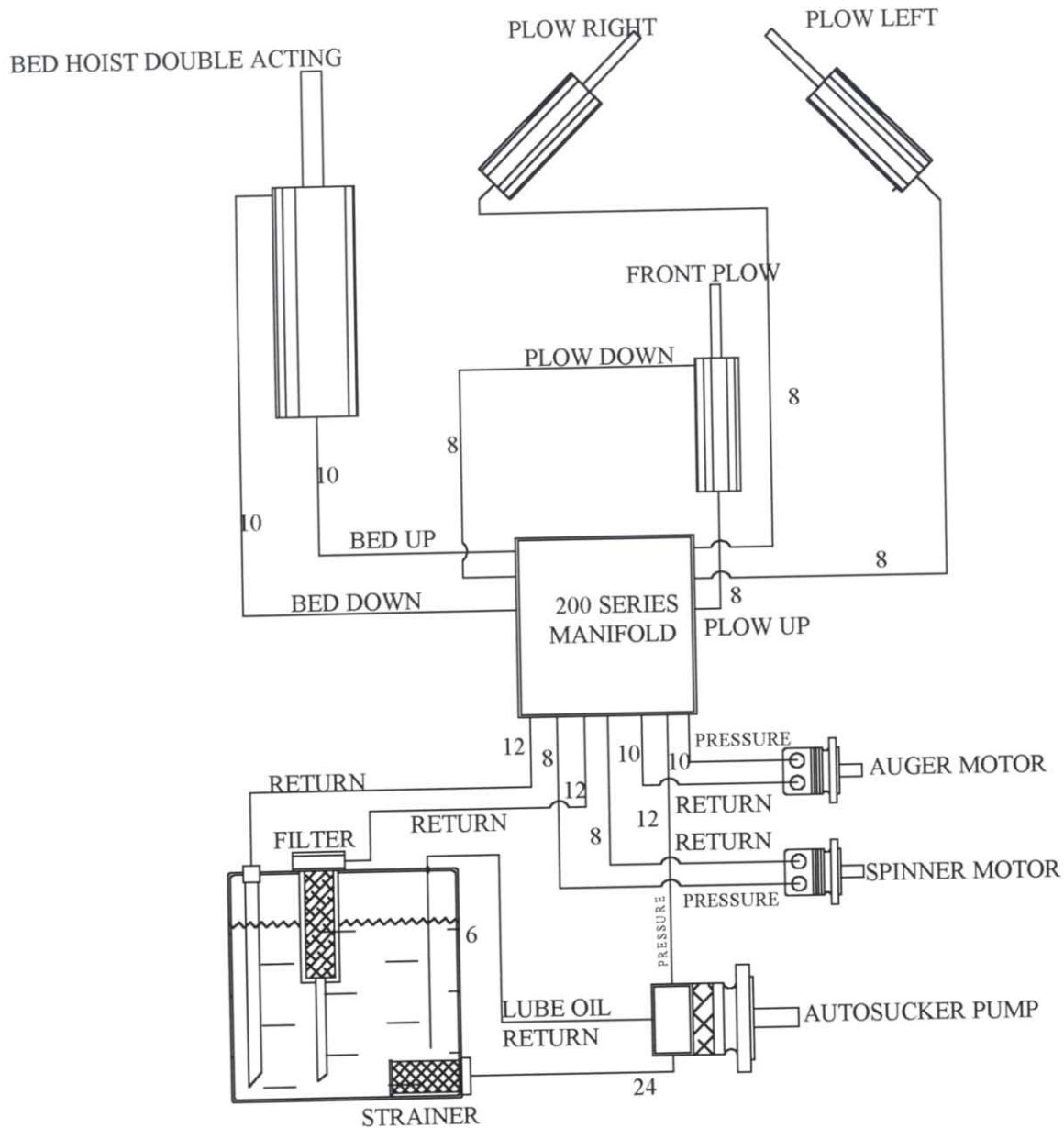
Amphenol Wiring



1.	White 22-2 (#2 or LOW)	e
2.	Black 22-2 (#3 or thermistor -to-manifold plug)	d
3.	White 22-2 (#3)	a
4.	Brown	Z
5.	White / Gray	Y
6.	White / Red (#1)	X
7.	White / Red (#2)	X
8.	Yellow	W
9.	Purple	V
10.	Gray	U
11.	White 22-2 (#1 or HIGH)	S
12.	Black 18 gauge	R
13.	Black 22-2 (#2 or LOW)	P
14.	Green	O
15.	Black 22-2 (#1 or HIGH)	N
16.	Orange (#1)	L
17.	Orange (#2)	L
18.	White / Purple	K
19.	White / Brown	J
20.	White / Orange	I
21.	White / Black	H
22.	White / Blue	G
23.	White / Green	F
24.	White / Yellow	E
25.	White	D
26.	Green	C
27.	Pink	B

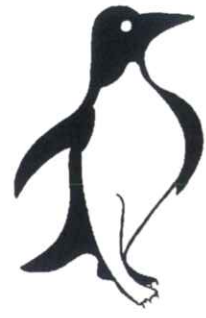
Plumbing Diagram

As viewed from rear of truck

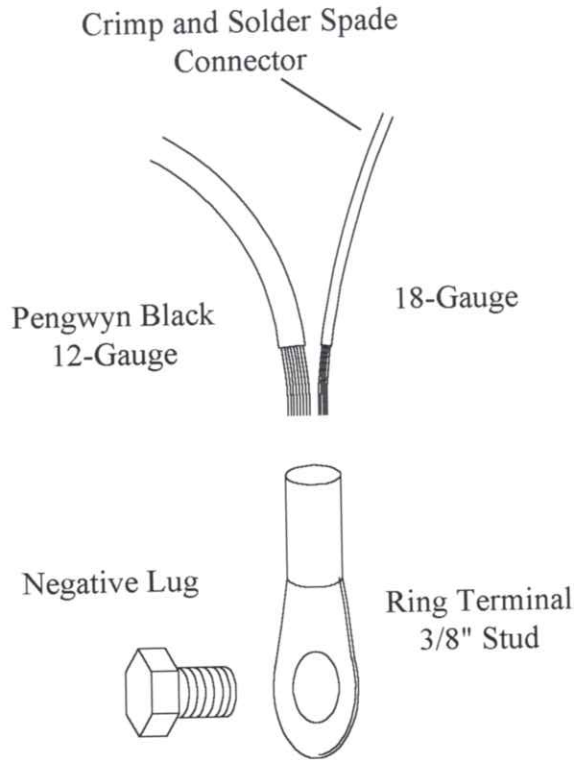


Hose Size Requirements

- 6 - 3/8" ID- Lube Oil Return for Autosucker™
- 8 - 1/2" ID - Plows and Spinner Motor
- 10 - 5/8" ID - Bed Hoist and Auger Motor
- 12 - 3/4" ID - Pump Pressure and Returns
- 24 - 1 1/2" ID - Pump Suction



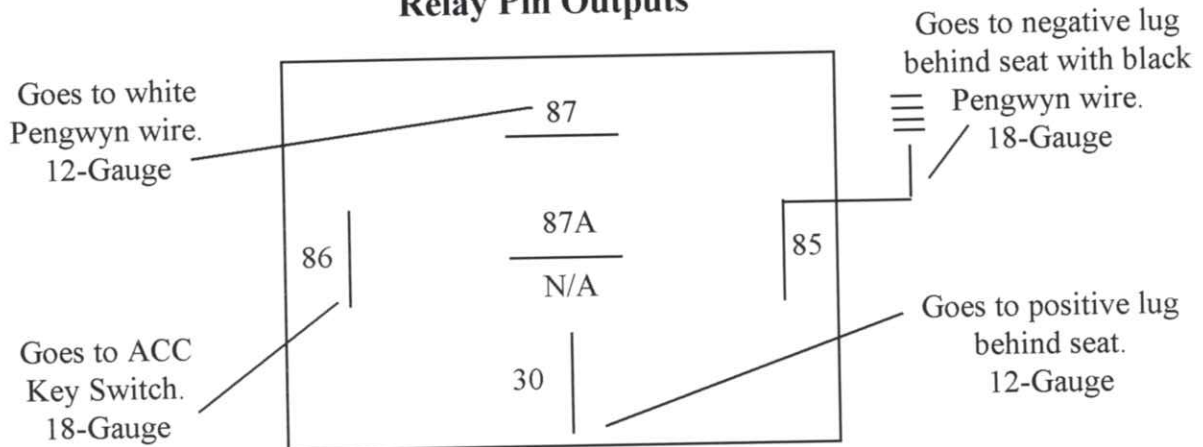
Relay Modification



In a few cases on Navistar trucks, the Pengwyn control box loses its programming constants if it is on during cranking. This is due to instantaneous voltage spikes below six volts. Another factor in this problem is that some ignition switches are only 20 amp devices. Some Pengwyn configurations are 30 amps and this would be added to the trucks load.

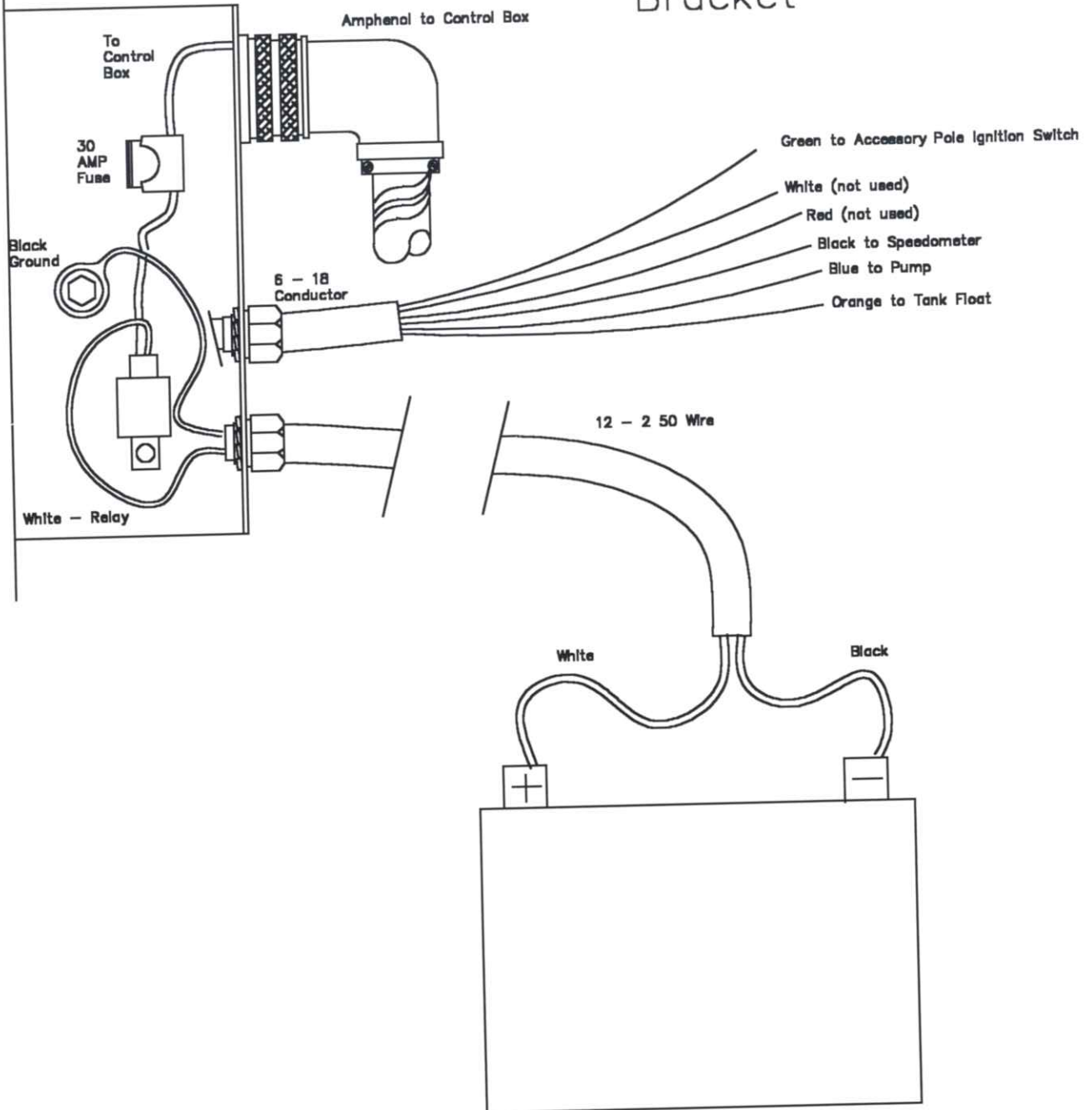
The Pengwyn should be wired to the battery with the relay supplied in the manifold.

Relay Pin Outputs



Relay Modification (cont'd)

Pengwyn Wiring Bracket



Troubleshooting

To check if a function is operating properly, touch the 1/2" - 20 nut at the top of the coil with a steel tool, such as a screwdriver, while actuating the function on the control console. You should be able to feel the magnetism generated by the coil when it is energized. This is usually done with the ignition switch on and the engine not running.

The following solenoid charts show which solenoids are energized with each function.

Solenoid 7 (the pump bypass valve) is not required to operate the auger and the spinner. When the auger and the spinner are disconnected from the truck, the spreader material output selection switch and the spinner / NaClone™ speed control switch must be set at position 0. The exception to this is when using the control console for pressure measuring. At this time the spreader switch should also be in the OFF position.

For safety, operate the power switch only when all the toggle switches are in the off position. Do not hold the bed and plow switches for long periods after their respective cylinders are completely extended.

Caution

Disconnect amphenol plug from manifold and remove the control console from the cab before welding on the truck.

Do not tighten solenoid coil nut - the coil spindle is hollow and easily damaged.

Be careful not to pinch wires under the coil when installing.

Turn the control console power switch off before connecting and disconnecting battery cables, battery chargers or jumping the battery.

Do not drill holes in or mount auxillary switches to the control console. This will void warranty. Use the control console mounting bracket for this purpose.

Solenoid Energization Chart

Auger (Manual)

E = the coil should be energized

Rate	Solenoid Number					PUMP	GPM
	8	4	9	5			
0						E	0
1	E					E	1
2		E				E	2
3	E	E				E	3
4			E			E	4
5	E		E			E	5
6		E	E			E	6
7	E	E	E			E	7
8				E		E	8
9	E			E		E	9
10		E		E		E	10
11	E	E		E		E	11
12			E	E		E	12
13	E		E	E		E	13
14		E	E	E		E	14
15	E	E	E	E		E	15

Spinner (Manual)

E = the coil should be energized

Rate	Solenoid Number				PUMP	GPM
	6	1	2			
0					E	0
1	E				E	0.8
2		E			E	1.6
3	E	E			E	2.4
4			E		E	3.2
5	E		E		E	4.0
6		E	E		E	4.8
7	E	E	E		E	5.6

Plow

E = the coil should be energized

	Solenoid Number							PUMP
	7	13	12	17	18	14	11	
Up	E	E						E
Down			E					
Power Dn	E		E			E	E	E
Left	E				E			E
Right	E			E				E

Bed (Double Acting)

E = the coil should be energized

	Solenoid Number						PUMP
	7	16	10	14	11	15	
Up	E	E	E				E
Down Slow	E			E	E		E
Down Fast	E			E	E	E	E

Troubleshooting Chart

Before troubleshooting the Pengwyn system, check all quick disconnects to be sure that they are connected properly. This is a common problem.

PROBLEM	CAUSE	SOLUTION
Solenoid valve stays open or closed all the time.	Coil nut too tight and cartridge spindle has been stretched.	Replace cartridge.
Noisy pump.	Low on fluid.	Add hydraulic oil.
Pump noisy all the time especially under a load.	Pump solenoid valve stuck.	Clean valve and check operation electrically while removed from pump then reinstall.
	Main poppet stuck.	Carefully clean poppet bore with fine emery cloth - check for free movement with fingers.
	Suction line or strainer plugged.	Clean suction line and sump strainer.
Pump noisy, oil aerated.	Pump solenoid cartridge loose allowing air in.	Tighten pump solenoid cartridge.
	Pump check valve cartridge loose.	Tighten pump check valve cartridge.

Troubleshooting Chart (Cont'd)

Pump noisy, oil aerated. (Cont'd)

Shaft seal leaking.
Suction line loose.

Replace shaft seal.
Tighten suction line.

Dump hoist vent leaking.

Clean, repair, or replace vent.



Nothing works, Pump runs.

Out of fluid.

Add hydraulic oil
Check for leaks.

Solenoid bad on pump bypass valve.

Replace coil.

Suction poppet stuck.

Clean suction poppet.

Bypass coil nut over tightened.

Replace bypass cartridge.



No pump effect.

Bad pump coil or wiring.

Repair or replace.



Solenoid does not magnetize when turned on.

Bad electrical ground.

Remove cartridge carefully, punch threads to make ground, and replace cartridge.



Auger does not change speeds smoothly.

One of the auger solenoids not working.

Turn manual key on then set auger switch to (1), (2), (4), and (8) to find the bad valve. Clean valve or change coil as needed.



Troubleshooting Chart (Cont'd)

Auger runs all the time.

Dirt holding one of the auger solenoid valves open.

Clean solenoid valve.

Auger turns on and off but runs too fast when empty and stalls when loaded.

Dirt in auger compensator spool.

Remove auger-compensator spool on outside of truck. Clean and reinstall.

Compensator spool too tight.

Loosen spool slightly.

Spinner turns on and off but runs too fast when empty and stalls when loaded.

Dirt in spinner compensator spool.

Remove spinner-compensator spool on outside of truck clean and reinstall.

Compensator spool too tight.

Loosen spool slightly.

Spinner does not change speeds smoothly.

One of the spinner solenoids not working.

Set spinner switch to (1), (2), and (4) to find bad valve. Clean valve or change coil as needed.

Spinner runs all the time.

Dirt holding one of the spinner solenoid valves open.

Clean solenoid valve.

Bed won't go up.

Bed down valve stuck open.

Clean bed down valves.

Bed up solenoid failed.

Replace bed up coil.

Troubleshooting Chart (Cont'd)

**Bed won't go up.
(Cont'd)**

Bed up coil nut
overtightened.

Replace bed-up cartridge.

Pump bypass valve
not operating.

Clean or replace.

Auger or spinner valve
leaking when spreader
disconnected.

Clean or replace.



**Bed goes up when
plow up is operating.**

Dirt in bed-up
solenoid valve.

Clean valve.



Bed drifts down.

Dirt in any one
of the lift-port
valves 14, 15 or 16.

Clean all valves.
Check poppets for
spring action.



**Bed will only creep
down. (no high
speed)**

Bed compensator
cartridge bad.

Replace bed-compensator
cartridge.



Bed chatters down.

Compensator
cartridge bad.

Replace bed-compensator
cartridge.



Plow won't go up.






Plow down valve
stuck open.

Clean valve.

Plow up valve
failed.

Clean or replace valve.

Troubleshooting Chart (Cont'd)

Plow won't go up. (Cont'd)	Plow relief set too low.	Adjust bed / plow relief.
	Plow up coil nut over tightened.	Replace plow-up cartridge.
<hr/> 		
Plow drifts down.	Dirt in plow up valve.	Clean valve.
	Dirt in plow down valve.	Clean valve.
	Plow down coil over tightened.	Replace plow-down cartridge.
<hr/> 		
Plow will go up, but will not go down. Hydraulic fluid too hot.	Faulty plow quick disconnect. Low fluid level.	Clean or replace as necessary. Add hydraulic fluid.
	Bypass valve stuck closed.	Clean valve.
	Bypass coil nut over tightened.	Replace bypass cartridge.
	<hr/> 	
Mode 1 Speed display slow or erratic.	Transmitter pick up out of adjustment or failed.	Adjust or replace transmitter.
<hr/> 		
Display not showing speed.	Jumper in wrong position.	Move jumper. (See: Double Acting Hoist Jumper section)
<hr/> 		

Troubleshooting Chart (Cont'd)

Auger will not turn when fully loaded but oil is heard in manifold.

Main relief is set too low.

Check pressures and reset pressure relief.



Bed / plow will not raise but oil is heard in manifold.

Bed / plow relief is set too low.

Check pressures and reset pressure relief.



Bed will not lower when all the way up but oil is heard in manifold.

Bed down relief is set too low.

Check pressures and reset pressure relief.



Auger is in blast in automatic.

Spreader constant calibration is on "0".

Change calibration to correct number (See: Finding the Spreader Constant in Control Console Programming)



Control will turn off and turn on automatically.

Circuit Breaker is in the main power feed.

Take circuit breaker out and replace it with a 30 amp fuse.



Bed does not power down.

Jumper in single acting.

Change jumper to double acting. (See: Double Acting Hoist Jumper)



Pump operates about 2 minutes and quits then starts again in a few minutes.

Short in pump wiring.

Fix wiring.

Bad pump coil.

Replace pump coil.



Troubleshooting Chart (Cont'd)

Plow will angle in one direction but not in the other.

Hot shuttle valve too tight.

Loosen valve slightly.

Faulty disconnect.

Replace quick disconnect.



Gunning engine makes the bed come down slower.

Bed jumper in single acting/ double acting.

Change jumper to proper configuration. (See: Double Acting Hoist Jumper)



Beeper comes on too often in spreader alert.

Auger drag set too high.

Lower auger drag constant (See: Setting the Spreader Drag in Control Console Programming)

Material is bridging across the auger.

Break salt bridge.



Beeper comes on when truck first started.

A Pre-trip test has been added to the software.

If the initial prompt is ignored three times the unit will beep then revert to its normal mode of operation.



Spinner speed is not adequate.

Spinner may be in mode 7.

Change to mode 6.



Spreader switch will not stay on AUTO or MANUAL.

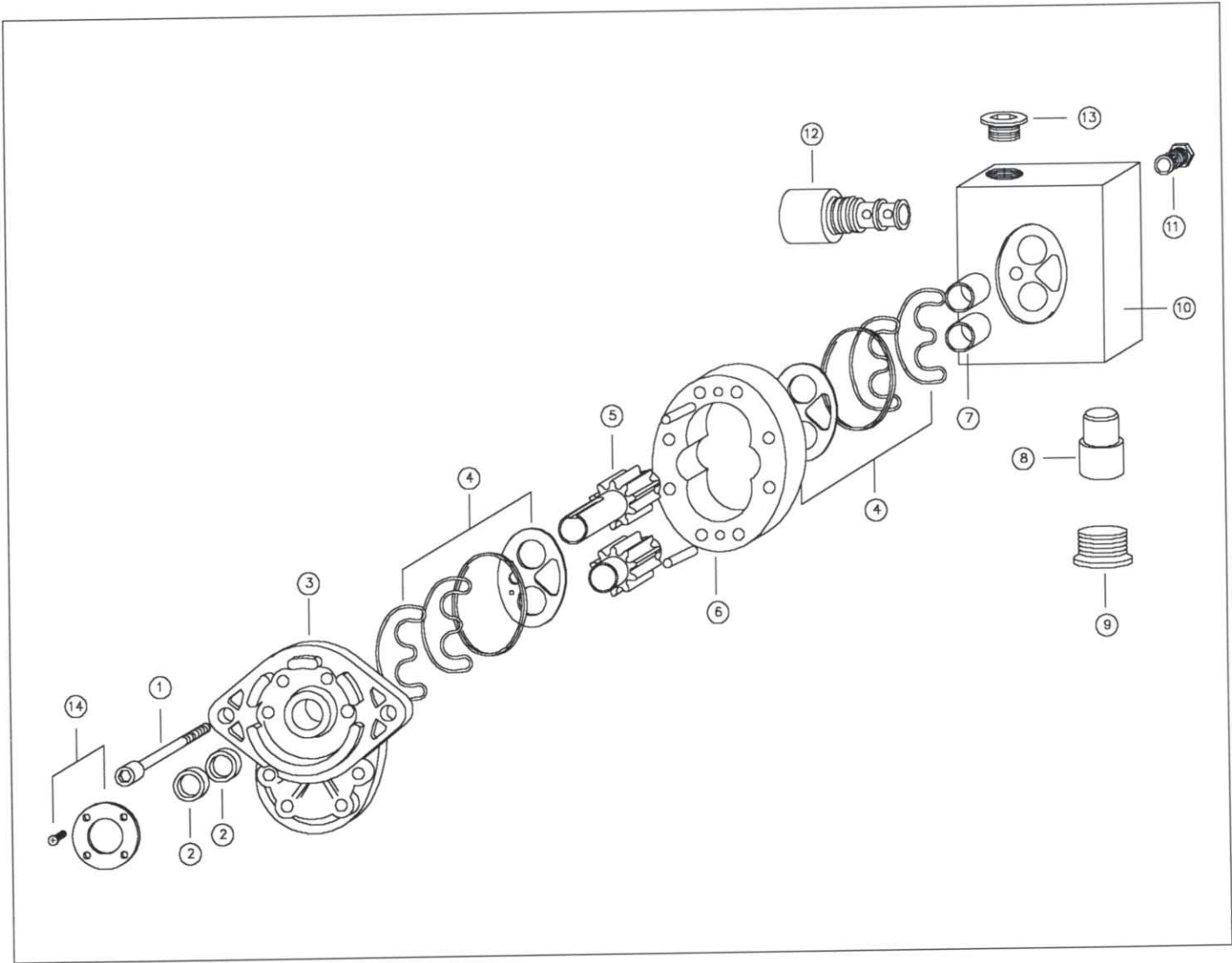
The rubber boot may have shrunk due to temperature.

Stretch or shave the rubber boot to allow for full motion of the switch.



Parts Drawing

Single Autosucker™ Pump



Parts List for Single Autosucker™ Pump

1.	Bolt kit (8 pieces)	A-237-10
2.	Shaft Seal	A-20
3.	Front Cover	A-LH-30
4.	Wear Plate Kit	A-40
	Pre-load Seal	A-45
	Load Seal	A-46
	Seal Ring	A-47
	Wear Plate	A-48
5.	Gear Set	A-237-50
6.	Gear Housing	A-237-60
7.	Shaft Bearing Kit (2 pieces)	A-70
8.	Suction Poppet	A-80
9.	Suction Poppet Cap	A-90
10.	Back Cover	AS-100
11.	Check Valve	A-110
12.	Solenoid Valve Assembly	A-120
	Coil Only	A-120
	Nut Only	A-125
	Valve Only	A-127
13.	Plug	A-150
14.	Seal Retainer and Screws (4 pieces)	SRSTB-4
	Seal Retainer	SR-11394
	Screws (4 pieces)	STB-4-1420
	Double Shaft Seal and Retainer Kit	ASRK-237
	Seal Kit	A-140

Miscellaneous Parts List

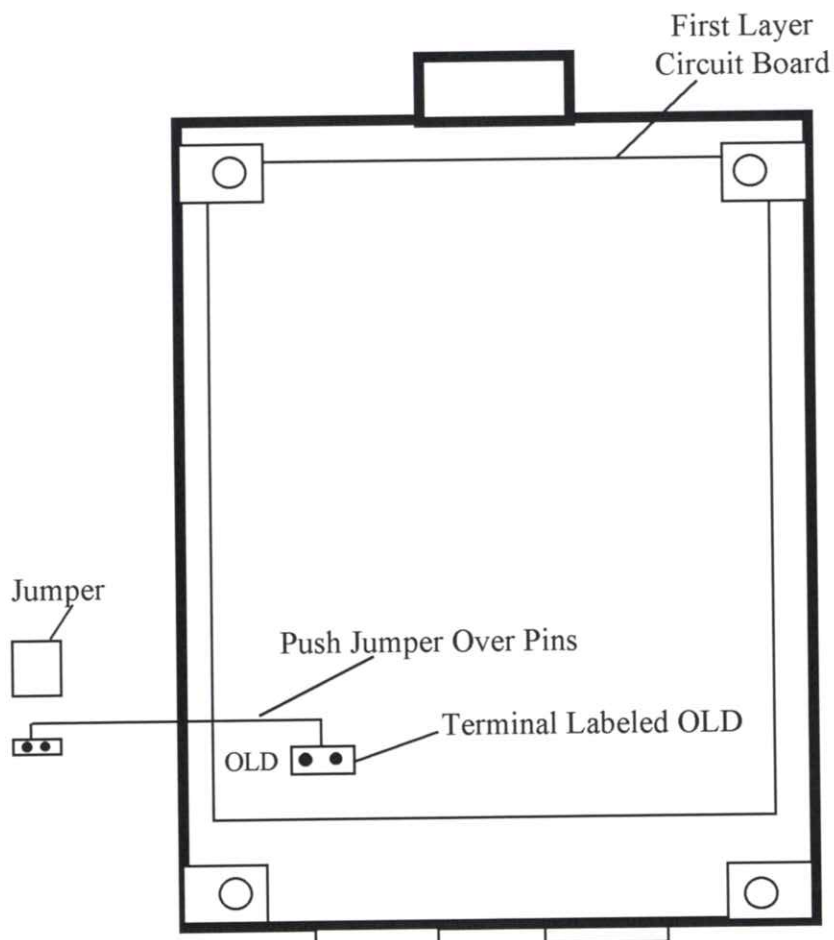
IT-2010	Tank Immersed Filter
FE-202	Replacement Filter Element for IT-2010
AS-237-LH	Single Autosucker™ Pump
CB-227	Control Console - Model 227 w/ Data Logging
CB-TF	Control Console Test Fixture
CN-101	Control Console Mounting Nuts
DC-101	Data Logging Cable (6' long)
FB-101	Filler Breather
FC-800	Flow Control
LA-101	Light Assembly for Control Console
LB-101	Illumination Bulb for Console
LS-101	Level Sensor
SG-101	Sight Glass
SP-9100788	Switch Panel (Auxiliary for lights, etc.)
SW-101	Data Logging PC Software w/ Cable
SW-102	Data Logging Software Disk Only
TF-101	Tank Filter, Suction Strainer
AUGCK-101	Auger Return Check Valve
SPNCK-101	Spinner Return Check Valve

Speedometer Jumper

On trucks using an Allison World Transmission or on Freightliner trucks, it is necessary to have a jumper in the box as shown below to allow the Pengwyn control console to pick up the truck speedometer. If specified in advance, Pengwyn will supply the control console with the jumper installed. In cases where the jumper was not installed at the factory, proceed as follows:

1. Remove the four front panel mounting screws.
2. Lift the front cover up and swing it out of the way.
3. Find the two small pins labeled OLD in the bottom left hand corner of the first layer board.
4. Push the jumper (mini-shunt shorting jumper, #276-1512A) over both pins.
5. Reassemble the front cover.

The control console may occasionally be supplied with the jumper installed on one of two pins. To be activated the jumper must be pulled off and steps 3 to 5 should be followed.

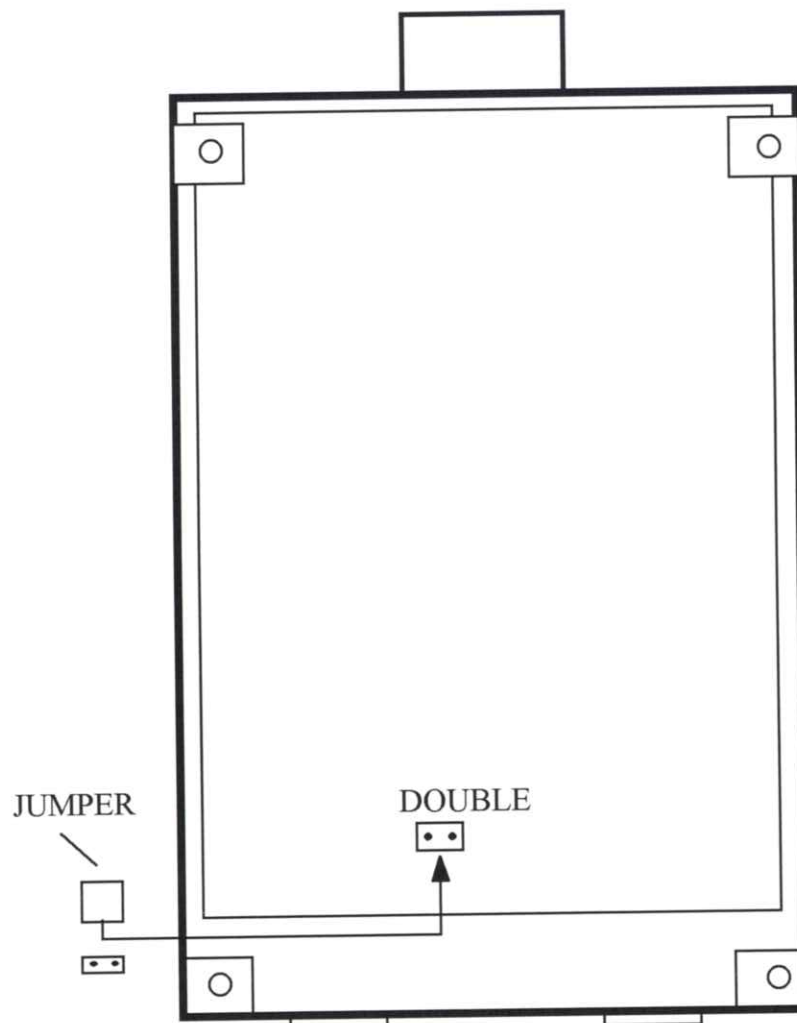


Double Acting Hoist Jumper

To allow the system to operate a double acting hoist cylinder, it is necessary to have a jumper in the box as shown below. If specified in advance, Pengwyn will supply the control console with this jumper installed. In cases where the jumper was not installed at the factory, proceed as follows:

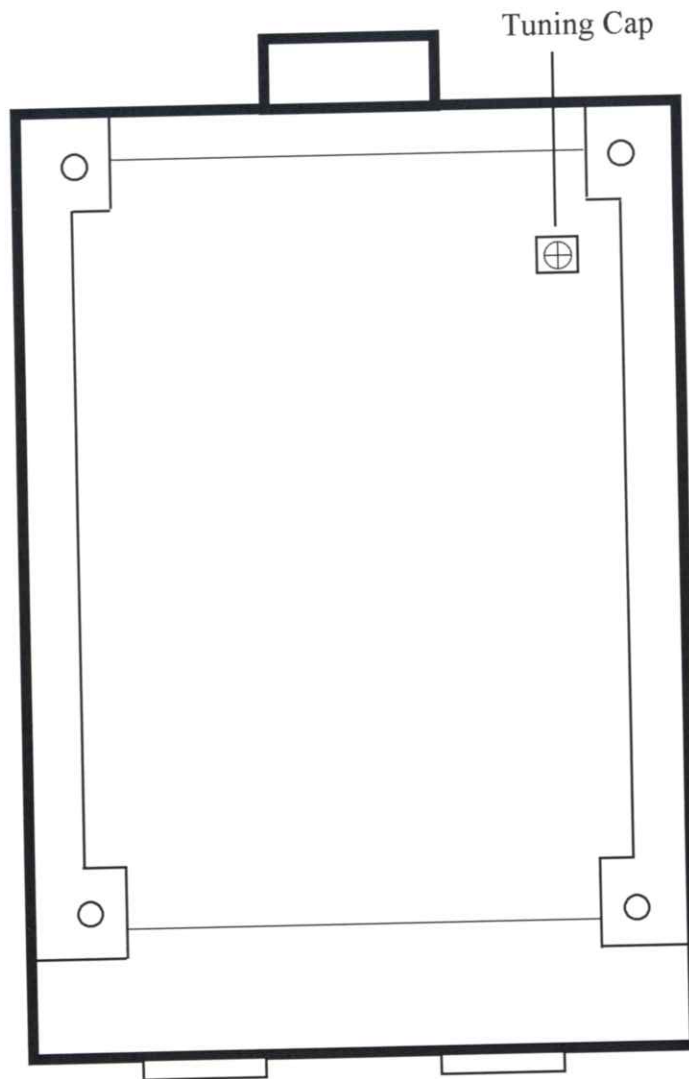
1. Remove the four front panel mounting screws.
2. Lift the front cover up and swing it out of the way.
3. Find the two small pins labeled DOUBLE in the bottom portion of the first layer board.
4. Push the jumper (mini-shunt shorting jumper #276-1512A) over both pins.
5. Reassemble the front cover.

The control console may occasionally be supplied with the jumper installed on one of two pins. To be activated the jumper must be pulled off and steps 3 to 5 should be followed.



RFI Adjustments

The Pengwyn processor circuit board design incorporates aerospace technology, including exterior grounding planes to isolate radio frequency interference. In the rare event that the Pengwyn processor interferes with the truck 2-way radio, the processor frequency can be adjusted, moving the frequency off the 2-way radio channel. The adjustment capacitor is conveniently located under the bottom cover and can be adjusted with power on. If you have any questions or concerns, contact Pengwyn for more information and technical support.



Truck Wiring

Caution: Power to the Pengwyn system must be off during engine cranking.

The manifold includes a power relay and 30 amp fuse.

Green lead connects to accessory pole on ignition switch.

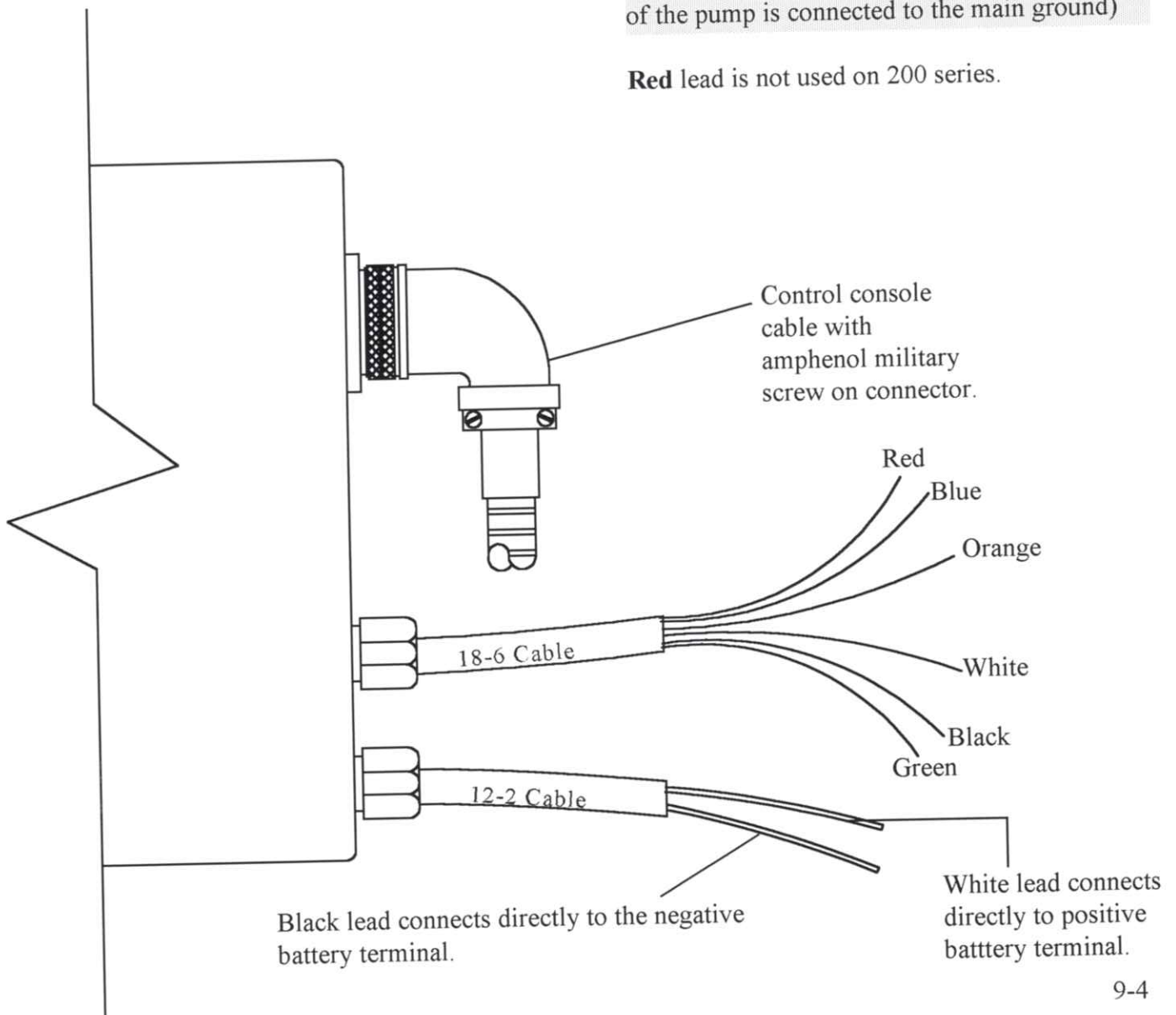
Black lead connects to the pulse lead behind the speedometer.

White lead is not used on 200 series.

Orange lead connects to the tank level sensor (the second lead of the sensor is connected to the main ground).

Blue lead connects to the pump (the second lead of the pump is connected to the main ground)

Red lead is not used on 200 series.



Programming Constants

Record you programming constants below for future reference. It is important to keep this record in the event of a control box change.

CAL SPREAD	_____
CAL SPIN	_____
MINIMUM VALUE	_____
CAL DRAG	_____
CAL JAM	_____
PULSES/.1MI	_____
SPREADER 1	_____
2	_____
3	_____
4	_____
5	_____
6	_____
7	_____
8	_____
9	_____
10	_____
11	_____
12	_____
13	_____
14	_____
15	_____

200 Series / M-97 Pengwyn System Pre-Winter Check List

Tag Number
 Software Version
 Equipment Number

Manifold S.N.
 Control Box S.N.
 Pump S.N.

Date Tested

Test By

<p>1. Jack the rear axle of the truck up and block the front wheels. or 1. Be prepared to drive the truck. 2. Turn the programming key to the CALIBRATE position. 3. Turn the mode selection switch to position 1 The display will read CAL MILE 0 4. Operate the truck at a constant speed (30 MPH or more) Use the truck speedometer, not the control console, to determine truck speed. 5. Compare truck speedometer to speed shown on control console display.</p>											<p>If the display remains at 0, a jumper must either be installed or removed. (see: Speedometer Jumper section) To adjust the speed of the console to match the speed of the truck speedometer: 1. Push the bed switch to the UP position to increase the displayed console speed 2. Push the bed switch to the DN SLOW position to decrease the displayed console speed The speedometer setting is now complete. 3. Turn the mode selection switch to position 4 4. Record the pulse count shown for your records 5. Turn key to RUN position.</p>										
Constant Setting	Manual Lock Out Key Position	Programming Key Position	Mode Switch Position	Spreader Switch	Auger Switch	Plow Lift Switch	Plow Angle Switch	Blast Switch	Bed Switch	Display Reads	Existing Value	New Value	Notes								
Minimum Value	ON	CALIBRATE	2	OFF	0	UP and hold	OFF	OFF	UP to increase DN to decrease	MINIMUM VALUE X			Min. value of "1" is recommended for single axle trucks.								
Zero Velocity	ON	CALIBRATE	2	OFF	0	DN and hold	OFF	OFF	UP to increase DN to decrease	CAL SPIN XX.X or 0 VEL MPH XX.X			Required for Zero Velocity Equipped trucks only.								
Day of Week	ON	CALIBRATE	3	OFF	0	OFF	OFF	OFF	UP to advance	CAL DAY XXX			When used with laptop, laptop will set.								
Time of Day (HRS)							L and hold			CAL HRS XX:XX XX											
Time of Day (MIN)							R and hold			CAL MIN XX:XX XX											
Main Relief Pressure (factory set at 2500 psi)	ON	MAINTENANCE	6	MANUAL	0	OFF	OFF	ON	OFF	HI = XXXX DF = XXXXX			Run engine approx. 1,500 RPM. Auger hoses should be disconnected.								

Constant Setting	Manual Lock Out Key Position	Programming Key Position	Mode Switch Position	Spreader Switch	Auger Switch	Plow Lift Switch	Plow Angle Switch	Blast Switch	Bed Switch	Display Reads	Existing Value	New Value	Notes
Bed / Plow Relief Pressure (factory set at 1800 psi)	ON	MAINTENANCE	6	MANUAL	0	OFF	R and hold	OFF	OFF	HI = XXXX DF = XXXXX			Run engine approx. 1,500 RPM. Bottom out plow cylinder while reading pressure on control box.
Bed Down Relief Pressure (factory set at 800 psi)	ON	MAINTENANCE	6	MANUAL	0	OFF	OFF	OFF	DOWN and hold	HI = XXXX DF = XXXXX			Run engine approx. 1,500 RPM. Hold bed down switch.
Auger Fault or Spreader Alert	ON	MAINTENANCE	1	AUTO	0	OFF	OFF	OFF	OFF	SETTING 1 = XXXX SETTING 2 = XXXX SETTING 3 = XXXX SETTING 4 = XXXX SETTING 5 = XXXX SETTING 6 = XXXX SETTING 7 = XXXX SETTING 8 = XXXX SETTING 9 = XXXX SETTING 10 = XXXX SETTING 11 = XXXX SETTING 12 = XXXX SETTING 13 = XXXX SETTING 14 = XXXX SETTING 15 = XXXX			Spreader should be installed but empty. Warm fluid to 80 degrees. Rev engine to 1,500 RPM. Dead head plow up switch. Set engine throttle to 1,500 RPM and record values.* When finished, turn spreader switch off.
													* The values recorded are the amount of pressure it takes to turn an empty auger for each gallon per minute setting.

Constant Setting	Manual Lock Out Key Position	Programming Key Position	Mode Switch Position	Spreader Switch	Auger Switch	Plow Lift Switch	Plow Angle Switch	Blast Switch	Bed Switch	Display Reads	Existing Value	New Value	Notes
Constants Check	ON	CALIBRATE	1	OFF	0	OFF	R and hold	OFF	OFF	DISPLAYS CONSTANTS			Allows you to view the auger fault settings saved in memory to record for your records.
Calibrated Drag or Material Load	ON	CALIBRATE	2	OFF	0	OFF	L and hold	OFF	UP to increase DN to decrease	CAL DRAG XXXX OR MATR LOAD XXXX			This should usually be set around 50 - 100 PSI. This value sets the sensitivity by telling the Pengwyn how high above the empty auger fault pressure reading to set the alarm. (higher settings cause alarms sooner)
Spreader Jam	N/A	CALIBRATE	2	OFF	0	OFF	R and hold	OFF	UP to increase DN to decrease	CAL JAM XXXX OR JAM PSI XXXX			Set at 200 PSI below main relief setting.
Obtaining LBS / GPM Spreader Constant	ON	RUN	2	ON	1 & 2	OFF	OFF	OFF	OFF	POUNDS / MILE Setting 2 - Setting 1 Auger Constant			Run engine at 1,500 RPM. Weigh spreader output for 1 minute at setting 1 then again for setting 2. Subtract value 1 from value 2 and enter.
LBS / GPM or Spreader Constant	ON	CALIBRATE	2	OFF	0	OFF	OFF	OFF	UP to increase DN to decrease	AUGER CNST XXXX LBS PER GPM XXXX			Install spreader value from above.

Constant Setting	Manual Lock Out Key Position	Programming Key Position	Mode Switch Position	Spreader Switch	Auger Switch	Plow Lift Switch	Plow Angle Switch	Blast Switch	Bed Switch	Display Reads	Existing Value	New Value	Notes
Spread Rate 1	ON	CALIBRATE	2	OFF	1	OFF	OFF	OFF	UP to increase DN to decrease	SPREADER-1 XXXX	-----	-----	
2					2					SPREADER-2 XXXX	-----	-----	
3					3					SPREADER-3 XXXX	-----	-----	
4					4					SPREADER-4 XXXX	-----	-----	
5					5					SPREADER-5 XXXX	-----	-----	
6					6					SPREADER-6 XXXX	-----	-----	
7					7					SPREADER-7 XXXX	-----	-----	
8					8					SPREADER-8 XXXX	-----	-----	
9					9					SPREADER-9 XXXX	-----	-----	
10					10					SPREADER-10 XXXX	-----	-----	
11					11					SPREADER-11 XXXX	-----	-----	
12					12					SPREADER-12 XXXX	-----	-----	
13					13					SPREADER-13 XXXX	-----	-----	
14					14					SPREADER-14 XXXX	-----	-----	
15					15					SPREADER-15 XXXX	-----	-----	
Orifice Check	ON	RUN	N/A	MANUAL	1 2 4 8	OFF	OFF	N/A	OFF		-----	-----	Count RPM of auger shaft. Each value should be twice the preceding.