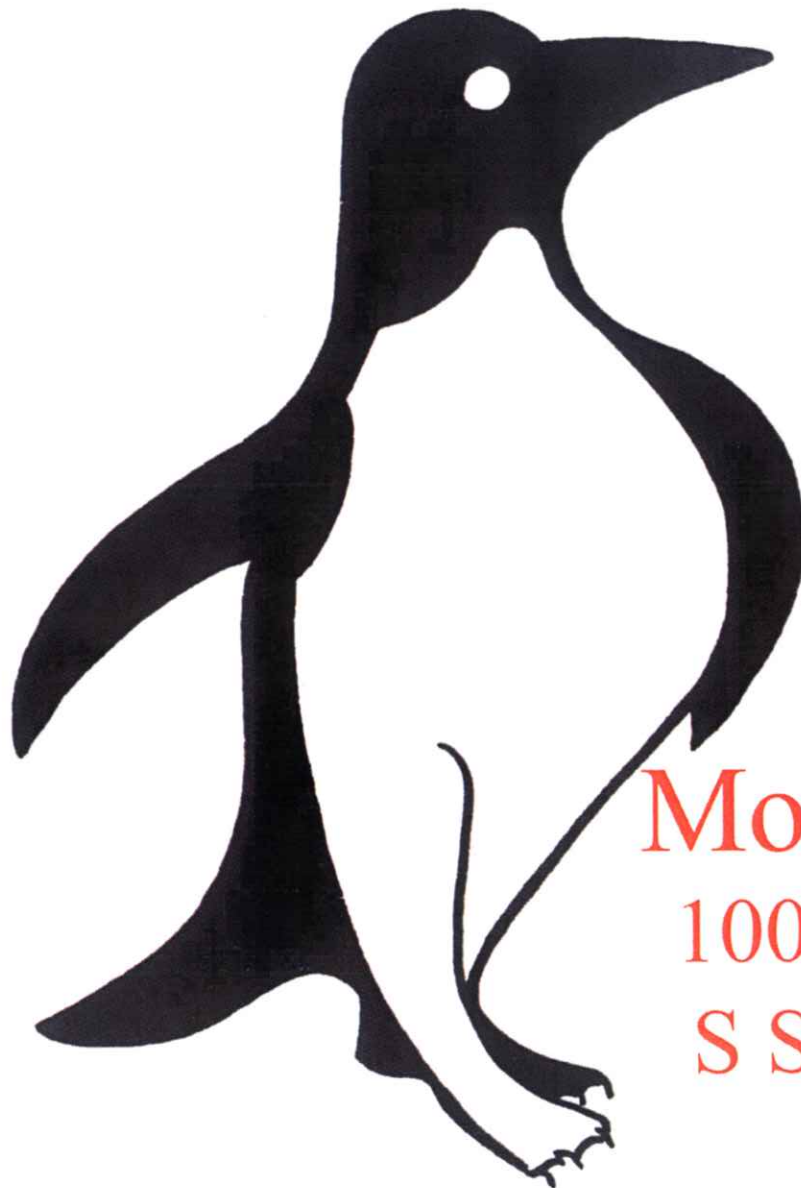


S Series

Technical Manual



Models:
1000 OC
S Series

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Introduction

The Pengwyn **S Series** system incorporates an electronically operated, ground oriented granular material spreader system for trucks utilized in snow and ice control. Through the use of an onboard computer, the ground oriented material spreader allows the operator, through management programming, to set a desired material spread rate in pounds per mile. The computer automatically adjusts hydraulic flow to the auger and maintains this setting throughout the vehicle speed range while maintaining a consistent pounds per mile application rate. The major advantages are; improved operating efficiencies, a reduction in material usage, faster coverage of ice and snow covered roadways and safer operation of the snow truck. An electronic ground oriented material spreader system is estimated to reduce your annual salt usage by as much as 20 to 50%. Unlike the full Pengwyn central hydraulic systems, (the **M Series** and **Z Series** systems), the **S Series** manifold and computer controller consists of only the electric-hydraulic functions required to operate the spreader system (auger or conveyor and spinner). It is made up of only two major components; the electronic control console and the manifold-valve assembly. The cylinder functions are controlled by standard, manually actuated spool valves which are hydraulically connected to the S Series manifold.

The manifold-valve assembly accurately directs the oil flow to the auger/conveyor and spinner based on commands it receives from the control console. The **S Series** incorporates the field proven Pengwyn **DIGITAL hydraulic technology** that is found in the Pengwyn **M and Z Series Systems**. Digital hydraulics use simple, reliable and rugged poppet valves as opposed to proportional spool valves. The poppet-style solenoid cartridge valve is inherently reliable, always repeatable, extremely dirt tolerant, insensitive to long periods of sitting idle and are easy to diagnose and inexpensive to maintain. Digital hydraulics also **do not require a troublesome and maintenance intensive speed pick-up device** on the auger/conveyor to maintain material output accuracy. The manifold-valve assembly also incorporates the onboard computer which utilizes **DIGITAL LOGIC** to monitor and control the spreader system based on operator input and the pre-programmed calibrations. The **S Series** manifold mounts through the back cab wall. This allows for all the wiring to be inside the cab for increased reliability and reduced maintenance. It also allows for all the hydraulic plumbing to remain outside the cab for operator safety. If valve maintenance is required, the valves are easily accessible and removable from inside the cab.

The control console, mounted inside the cab, contains an auger/conveyor or output control knob, a spinner broadcast rate control knob, a system on/off switch, a blast switch, a manual lockout key switch and a flashing "RUN" light. That's it! It is very simple to use!

When computer or control-console maintenance is required, both are easily accessible and removable from inside the cab.

All Pengwyn systems now come standard with data logging. The **S Series** system's computer stores truck operation information, including; vehicle speed in MPH, spreader application in pounds per mile, total miles traveled, time of day, vehicle ID number, miles traveled with spreader on, and miles traveled with spreader off. Through a connected laptop computer to the control console's RS-232 port, the stored operating data can be downloaded and displayed either as a summary table or in graph form plotted against either distance or time. This can be viewed from the laptop computer screen, from a desktop computer screen, or from a printed hard copy.

The laptop computer is also used to program the control console. The programming requirements are prompted on the laptop screen. Just type in the number and hit enter, or pre-load the known programming constants into the laptop's files. Plug in the laptop and just hit enter. All the constants are loaded. Programming of the **S Series** system's computer is very simple.

CAUTION

DISCONNECT COMPUTER FROM MANIFOLD AND REMOVE FROM THE CAB BEFORE WELDING ON THE TRUCK.

DO NOT OVER TIGHTEN SOLENOID COIL NUT, THE COIL SPINDLE IS HOLLOW AND EASILY DAMAGED. BE CAREFUL NOT TO PINCH WIRES UNDER 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 AUXILIARY SWITCHES TO THE SWITCH BOX OR COMPUTER. THIS WILL VOID THE WARRANTY. USE THE CONTROL CONSOLE MOUNTING BRACKET FOR THIS PURPOSE.

LIMITED WARRANTY

Pengwyn warrants **S Series** components 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.

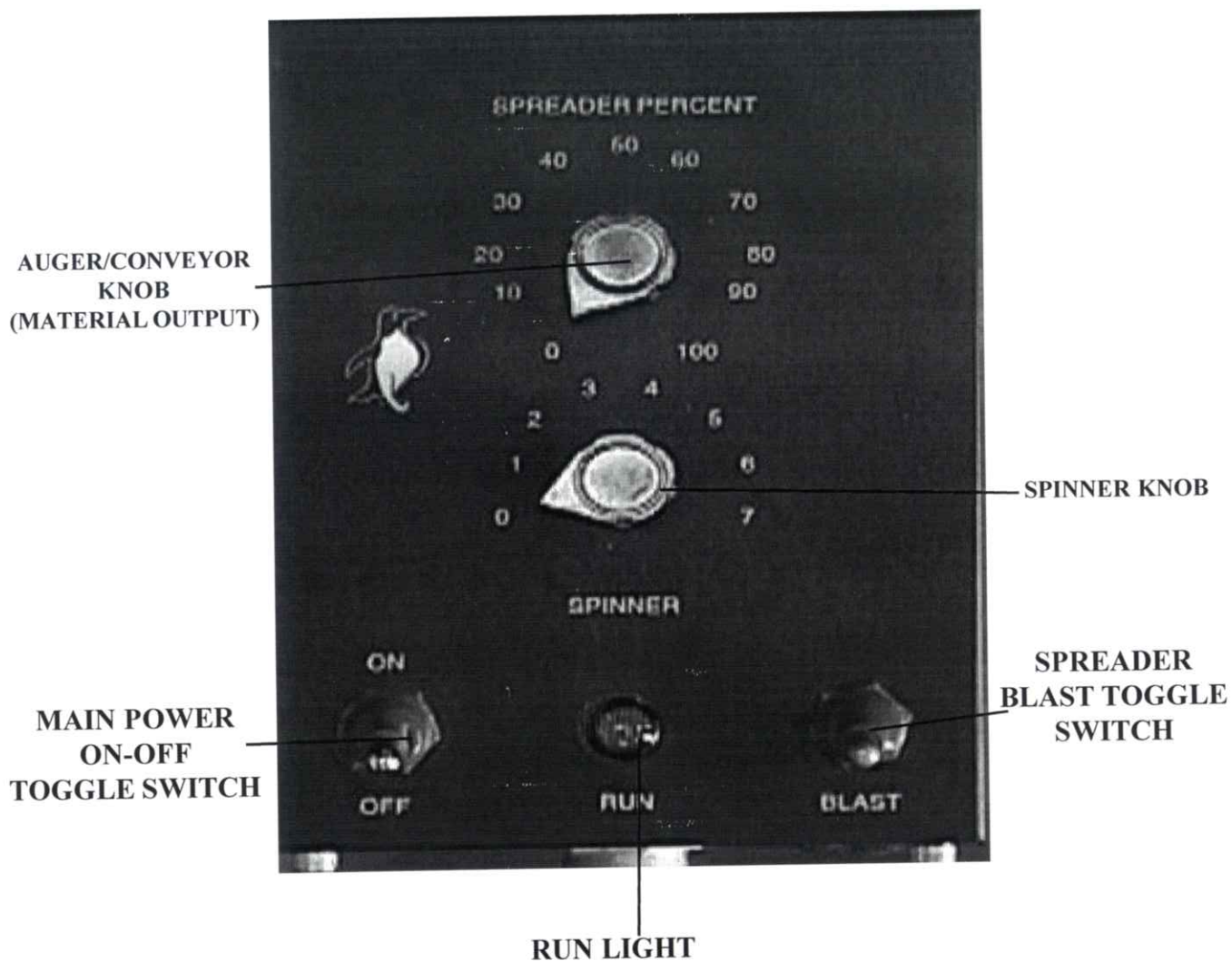
It is recommended that spare parts be purchased for critical items to allow continued operation of equipment during the inspection, evaluation, or repair/replacement process.

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



OPERATION OF CONTROL CONSOLE

MAIN POWER SWITCH

Turn the main power switch to the "ON" position. If the console and computer are functioning correctly, the run light will begin flashing and will continue to flash as long as the power switch is on.

DIGITAL OPEN LOOP AUTOMATIC SPREADER CONTROL

To operate in the automatic ground oriented mode, the manual lockout switch must be in the "AUTOMATIC" position. Use the spreader material output selection switch to select the desired material output rate in pounds per mile. This switch has 11 possible selections from "0" to "100". In "0", no material output will be obtained. In positions "10" through "100", the rate of material output, in pounds per mile, is determined as a percentage of the maximum rate that has been programmed into the computer. For example, if the maximum material rate is programmed at 1000 pounds per mile, position "10" would be 10% of the maximum which is 100 pounds per mile, position "20" would be 20% which is 200 pounds per mile, and so on up to position "100" which would be 100% or 1000 pounds per mile. To control the broadcast spinner, use the spinner speed control selection switch. In position "0", the spinner will turn at a very slow rate of speed up to the maximum speed in position "7".

DIGITAL OPEN LOOP MANUAL SPREADER CONTROL

NOTE: The manual system is locked out and will not function if the manual lockout key switch is in the "AUTOMATIC" position. The purpose of the manual spreader override is to bypass the processor and allow continued operation of the system should some computer problem occur. Use the spreader material output selection switch to activate the auger/conveyor. In manual, the hydraulic flow, in gallons per minute (GPM), being sent to the auger/conveyor drive motor is controlled in 1 GPM increments from 0 to 10 GPM using the spreader material output selection switch. For example, in "0", no material output will be obtained. Position "10" would be 1 GPM, position "20" would be 2 GPM, and so on up to position "100" which would be 10 GPM. In manual, the material output is no longer ground oriented. The auger/conveyor turns at a fixed speed based on the setting of the spreader material output switch. To control the spinner, use the spinner speed control selection switch. In position "0", the spinner will not turn. By turning the spinner selection switch to position "1", the spinner will turn at a very slow rate of speed. Increasing the setting to higher numbers will progressively increase the spinner speed up to the maximum speed in position "7".

BLAST SWITCH

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.

The blast button is intended to allow maximum material output when going through intersections, over bridge decks or in other conditions that might intermittently require higher application rates of de-icing material.

HYDRAULIC TOOL OPERATION

The Pengwyn system is capable of operating hydraulic tools. The actual hook-up of the tool would depend on the S Series configuration being used. For a closed center load sensing circuit, connect the pressure side of the tool to the pressure inlet side of the auger/conveyor circuit and the return side of the tool to the return side of the auger conveyor circuit. For an open center fixed pump circuit, connect the pressure side of the tool to the pressure inlet side of the auger/conveyor circuit and the return side of the tool to the return side of the spinner circuit. Turn the manual lockout key switch to the "MANUAL" position.

With the tool connected, bring the truck engine speed up to about 1000 RPM. Use the spreader material output switch to select the proper flow to send to the hydraulic tool (see "Digital Open Loop Manual Spreader Control" section on page 2-2). Refer to the tool manufacturers literature to determine the proper flow requirements of the hydraulic tool being used.

DATA STORAGE AND LAPTOP COMMUNICATIONS

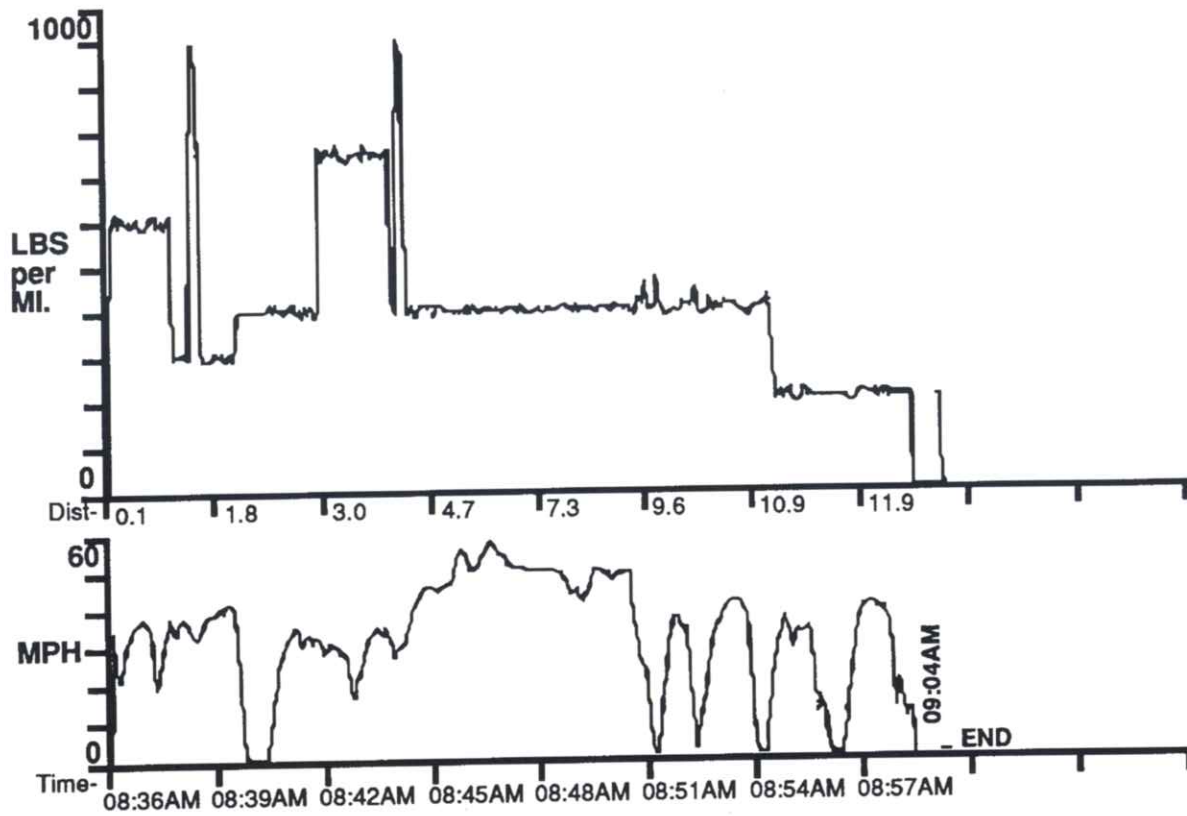


The pengwyn **S Series** control console comes equipped with an RS-232 data communications port as a standard feature. This enables the user to input programming constants and retrieve 12 hours of patrol data information. The data stored includes:

- * **Time control console is turned on.**
- * **Truck speed.**
- * **Miles driven with:**
 - * **Spreader on.**
 - * **Spreader off.**
- * **Time truck idles.**
- * **Material spread rates.**

The data can be presented in a log summary itemizing all spreader on and off times and all truck idle times to give a totaled 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.**



The provided software will also enable plotting a graph similar to the above example.

The software is also used for programming and calibration of the Pengwyn control console directly from the laptop computer. 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 simply by plugging into the RS-232 port, calling up the input screen on the laptop and pressing "enter". The entire file is transferred to the control console.

NOTE: A computer is required to program the **S Series** hydraulic system.

LAPTOP PROGRAMMING AND CALIBRATIONS

To insure that the PENGWYN **S Series** system is operating the way it was designed to, it needs to be calibrated before the truck ever gets into its first snow storm. NOTE: A laptop or desktop computer with PENGWYN software is required to program the **S Series** computer. A representative from PENGWYN who will be doing the initial training will assist with the first calibrations. It is best to check the calibrations annually, during the time that is set aside for dry run. Calibrations should also be checked anytime that welding has been done on the truck, just to ensure that no damage has been done to the memory. (SEE PAGE 6-1 FOR INSTRUCTIONS ON REMOVING COMPUTER FROM VEHICLE BEFORE WELDING.)

The **S Series** is designed to be easy to calibrate. The values that can be changed are:

UNIT ID# - Truck, equipment, or license plate number.

MPH CONSTANT - The number of electrical speedometer pulses that the Pengwyn should read for each 1/10 of a mile.

MAX SPREAD RATE - Maximum amount of material per lane mile allowed by management for the operator to spread when PENGWYN is set a 100% (Setting 100).

SPREADER CONSTANT - Weight of material that comes off the auger or conveyor from one gallon of hydraulic fluid. All of the above values can be viewed and changed from the laptop programming screen "F3". Once the "F3" key is pressed, the display will read:

[] WRITE* CONSTANTS [S SERIES]

UNIT ID#:	PENGWYN
MPH:	0
LBS/MI:	0
DAY OF WEEK:	WED
TIME OF DAY:	9:52:43
MPH CONSTANT:	3500
MAX SPREAD RATE:	1000
SPREADER CONSTANT:	30

*[WRITE] Designates values that can be changed &/or calibrated.

UNIT ID:

By pressing the "TAB" key once, the UNIT ID: is selected. This can be filled with any type of identifier such as truck number, license plate number or equipment number. Whatever is put in this box will be written into the computer as the file name that it will store datalogging files under. After inputting a new value in this box, "TAB" down to the WRITE box and press "Enter."* (See bottom of page 3-6)

MPH CONSTANT:

Press the "TAB" key once more and it will select the MPH CONSTANT value. This value will tell the PENGWYN computer how many pulses it will read from the electronic speedometer for every 1/10th of a mile that the vehicle travels. When a PENGWYN system leaves the factory the MPH CONSTANT has a factory preset that enables it to read the speed. By using that factory set MPH Constant it is possible to use that formula and figure out what the correct MPH Constant should be.

Because the S Series control box does not have a digital screen that displays the speed of the vehicle, the laptop computer must be used. By pressing "F2", the computer will display a screen similar to the one on the previous example. This screen will show the truck characteristics in real time, as it is happening. As the speed of the truck increases the speed in the MPH line will also increase.

CALIBRATION:

1. The laptop computer must be connected using the cord provided and plugged into the RS-232 port. The PENGWYN program must be running and the "F2" (Read constants currently in PENGWYN) screen must be selected.
2. To begin the actual calibration the truck must either be put up on jacks and accelerated to at least 30 MPH, or driven down a straight road without traffic at a continuous speed of 30 MPH or more.
3. Accelerate the truck to 30 MPH or more on the trucks speedometer and hold it there. Then see what value is on the computer screen in the MPH line and write it down.
4. Stop and shut off the truck.

5. Take the values and input them into this equation:

$$\frac{(\text{TRUCK SPEEDOMETER IN MPH})}{(\text{PENGWYN SPEED READING IN MPH})} \times \text{EXISTING PULSES (MPH CONSTANT)} = \text{NEW MPH CONSTANT}$$

6. Press the Escape Key from the "F2" screen and select the "F3" (Write new constants into the PENGWYN) screen. "TAB" down to MPH CONSTANT, and insert the new MPH CONSTANT that was just figured with the previous equation.
7. "TAB" down to the WRITE box and press "Enter." * (See bottom of page 3-6) That will record the new value into the PENGWYN memory.
8. Repeat steps 1 thru 3 again to see if the PENGWYN is now reading the correct speed of the truck. If it is not, continue with steps 4 thru 6.

MAX SPREAD RATE:

The maximum spread rate is the value in pounds per mile that the management can input into the computer and the operators can select as much output as they want up to that amount. The operators can select from ten preset percentages, starting at 10% and going up to 100% of the maximum spread rate.

To input a new value into the computer, select the "F3" screen and TAB down to the "MAX SPREAD RATE" line. Type in the value that management has selected to be the maximum allowable spread rate in pounds per mile. "TAB" down to the "WRITE" box and press "Enter."* (Bottom of page 3-6) The new spread rate will be recorded in the computer.

SPREADER CONSTANT:

The spreader constant is another important variable that needs to be calibrated correctly for the PENGWYN to spread an accurate amount of material. This constant is needed so the PENGWYN will know how much material it is putting out for each gallon of hydraulic oil it is sending back to the auger/conveyor. Using the Spreader Constant information along with the information from the constantly changing speedometer, the PENGWYN does instantaneous calculations to determine how many gallons of hydraulic oil it should send back to the auger/conveyor to keep the spread rate at the operators desired selection on the control console.

CALIBRATE:

What will be needed:

Material in the bed of the truck.
Plastic tarp or bucket to catch material in.
Stopwatch.
Scale to weigh material.

1. Place empty tarp or bucket underneath spinner.
2. Turn MANUAL LOCKOUT KEY to on position.
3. Start truck. Rev up to 1000 RPM.
4. Start stopwatch and turn auger percent switch to "10".
5. At 1 minute, turn off auger.
6. Weigh material.
7. Repeat steps 1 and 2.
8. Start stopwatch, and turn auger percent switch to "20".
9. At 1 minute, turn off auger.
10. Weigh material.
11. Subtract weight of:

$$\begin{array}{r} \text{Auger setting 20\%} \\ - \text{Auger setting 10\%} \\ \hline \text{New Spreader Constant} \end{array}$$
12. Type new spreader constant into SPREADER CONSTANT box.
"TAB" down to WRITE box, and press "Enter."*

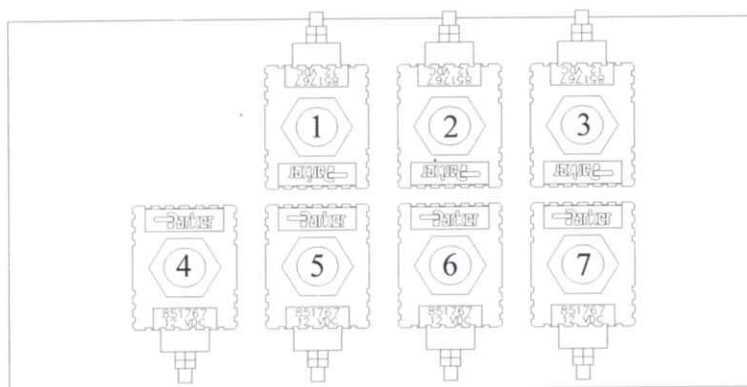
DAY OF WEEK / TIME OF DAY:

These settings will automatically be set by the laptop or desktop computer that is used to input the calibrations.

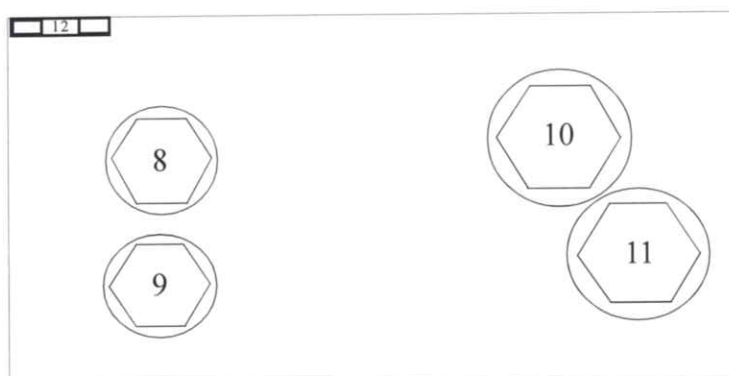
* If changing all calibrations for the first time, it is not necessary to "TAB" down and WRITE each individual change into the computer. It is possible to change all four constants on the screen first, and then WRITE all the changes to the computer.

VALVE FUNCTION DIAGRAM S SERIES

CLOSED CENTER LOAD SENSE



As Viewed Inside Cab Facing Rearward

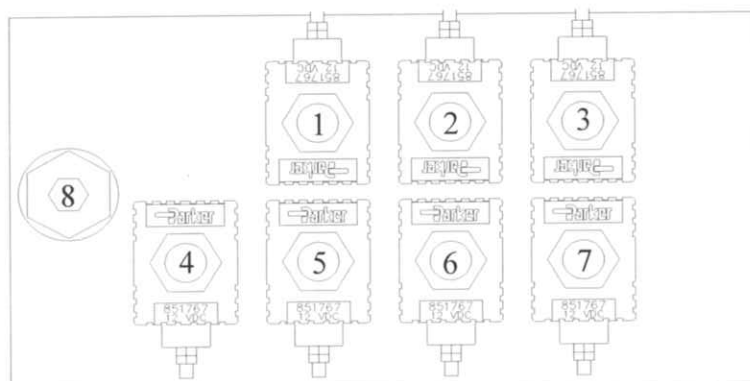


As Viewed Outside Cab Facing Rear of Cab

FLAG NUMBER	FUNCTION	WIRE COLOR
1	SPINNER 4	WHITE/PURPLE
2	SPINNER 2	WHITE/BROWN
3	SPINNER 1	WHITE/ORANGE
4	AUGER 8	WHITE/BLUE
5	AUGER 4	WHITE/GREEN
6	AUGER 2	WHITE/YELLOW
7	AUGER 1	WHITE
8	CHECK VALVE, SPINNER	N/A
9	CHECK VALVE, AUGER	N/A
10	COMPENSATOR, SPINNER	N/A
11	COMPENSATOR, AUGER	N/A
12	CHECK VALVE, SPOOL VALVE	N/A

VALVE FUNCTION DIAGRAM S SERIES

OPEN CENTER LOAD SENSE



As Viewed Inside Cab Facing Rearward

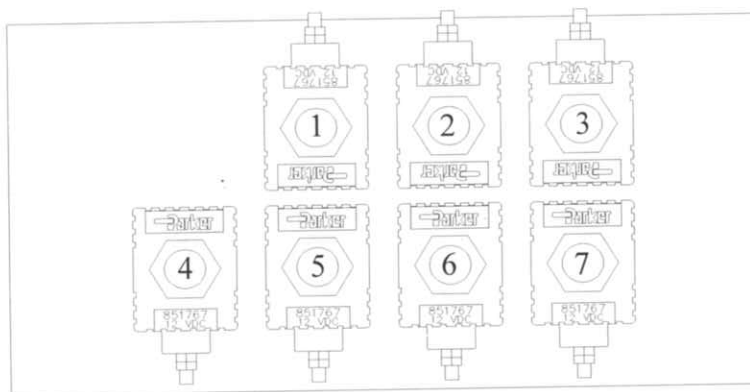


As Viewed Outside Cab Facing Rear of Cab

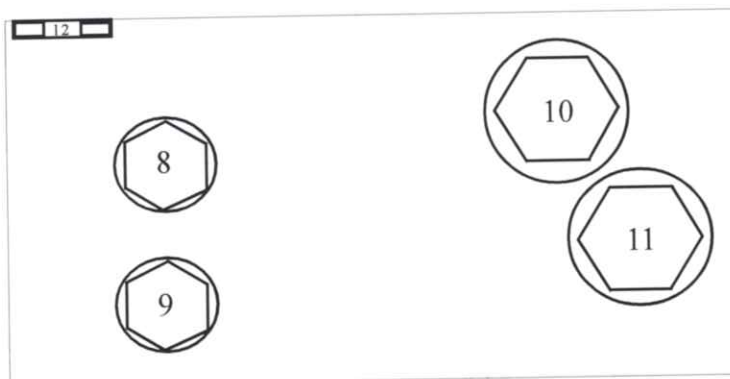
FLAG NUMBER	FUNCTION	WIRE COLOR
1	SPINNER 4	WHITE/PURPLE
2	SPINNER 2	WHITE/BROWN
3	SPINNER 1	WHITE/ORANGE
4	AUGER 8	WHITE/BLUE
5	AUGER 4	WHITE/GREEN
6	AUGER 2	WHITE/YELLOW
7	AUGER 1	WHITE
8	RELIEF VALVE	N/A
9	COMPENSATOR, AUGER	N/A
10	COMPENSATOR, SPINNER	N/A

VALVE FUNCTION DIAGRAM S SERIES

CLOSED CENTER LOAD SENSE



As Viewed Inside Cab Facing Rearward

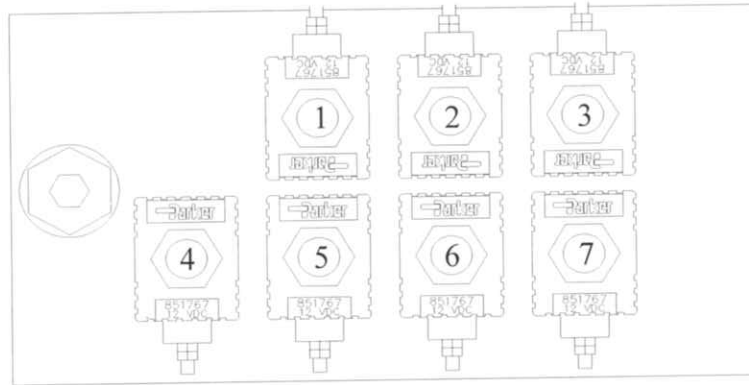


As Viewed Outside Cab Facing Rear of Cab

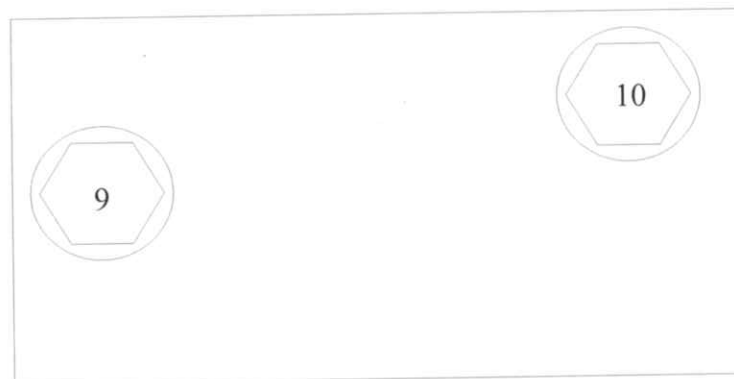
FLAG NUMBER	DESCRIPTION	PART NUMBER
1, 2, 3, 4, 5, 6, 7	NORMALLY CLOSED SOLENOID VALVE - SIZE 10	DS101C
8, 9, 12	CHECK VALVE	CV101P
10, 11	COMPENSATOR	CP702-4

VALVE FUNCTION DIAGRAM S SERIES

CLOSED CENTER LOAD SENSE



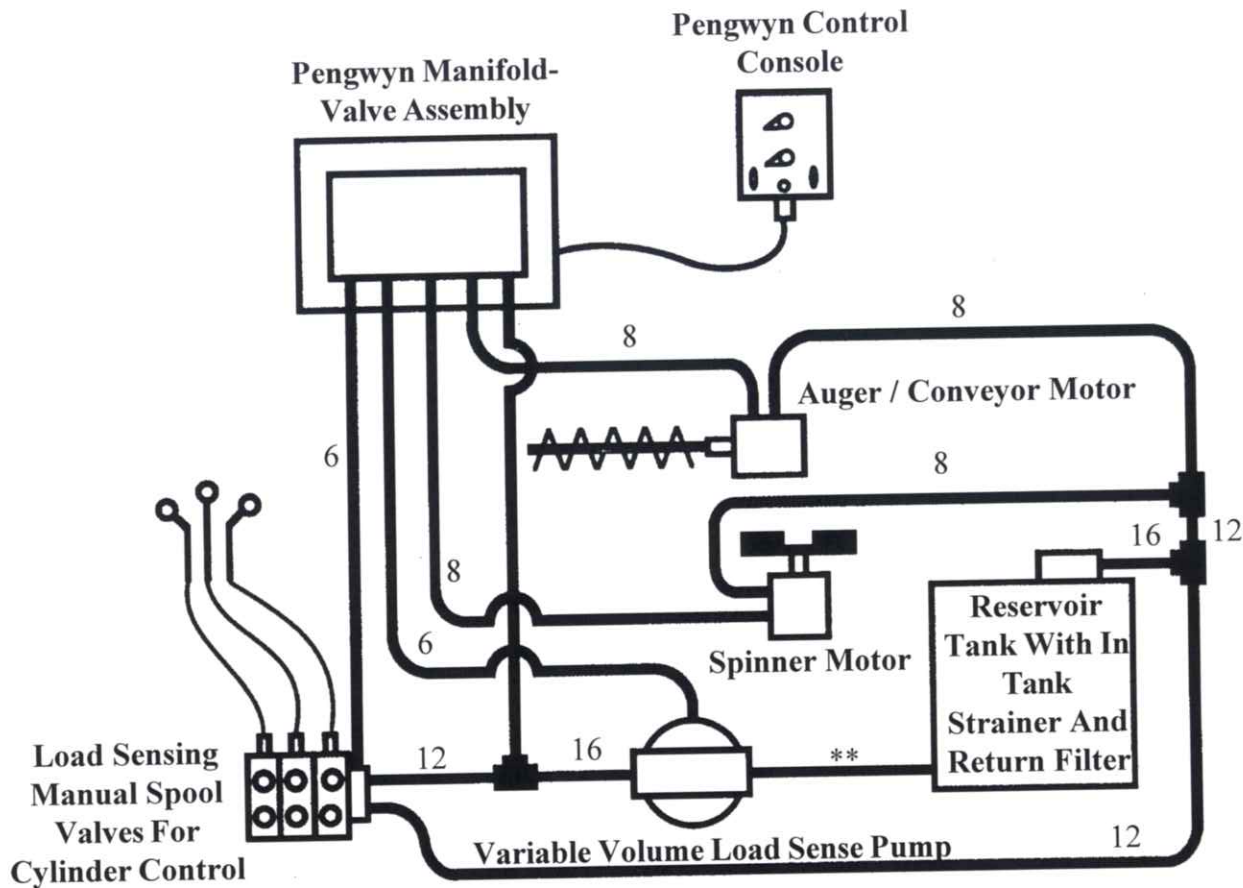
As Viewed Inside Cab Facing Rearward



As Viewed Outside Cab Facing Rear of Cab

FLAG NUMBER	DESCRIPTION	PART NUMBER
1, 2, 3, 4, 5, 6, 7	NORMALLY CLOSED SOLENOID VALVE - SIZE 10	DS101C
8, 9, 12	CHECK VALVE	CV101P
10, 11	COMPENSATOR	CP702-4

AS VIEWED FROM REAR OF TRUCK



MINIMUM HOSE SIZE REQUIREMENTS

6 = 3/8" I.D. HOSE

8 = 1/2" I.D. HOSE

10 = 5/8" I.D. HOSE

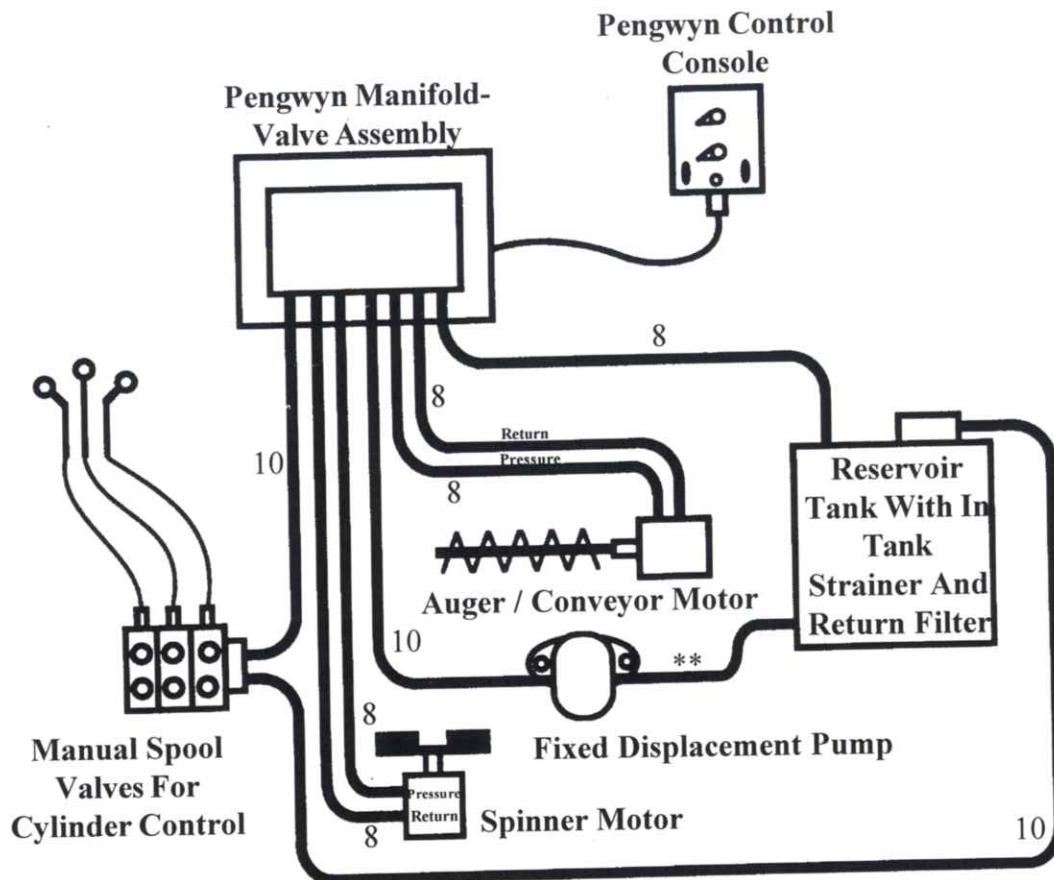
12 = 3/4" I.D. HOSE

16 = 1" I.D. HOSE

**** = SUCTION SIZE AS RECOMMENDED
BY PUMP MANUFACTURER**

PLUMBING DIAGRAM S SERIES OPEN CENTER

AS VIEWED FROM REAR OF TRUCK



MINIMUM HOSE SIZE REQUIREMENTS

6 = 3/8" I.D. HOSE

8 = 1/2" I.D. HOSE

10 = 5/8" I.D. HOSE

12 = 3/4" I.D. HOSE

16 = 1" I.D. HOSE

** = SUCTION SIZE AS RECOMMENDED
BY PUMP MANUFACTURER

PRESSURE ADJUSTMENTS

CLOSED CENTER LOAD SENSING SYSTEM:

The **S Series** closed center, load sensing manifold incorporates no relief valves. It depends on the pressure compensation feature of the pump for pressure protection. The valve bank used for cylinder control (which can be supplied by Pengwyn as an optional accessory) should incorporate the necessary relief valves for pressure protection of the cylinders and associated functions. Examples of functions that might require work port reliefs with lower pressure settings than standard system pressure are hoist down and underbody scraper plow operation. In all cases, pressures should be controlled as recommended by the equipment manufacturers.

OPEN CENTER FIXED PUMP SYSTEM:

The S Series open center, fixed pump manifold incorporates one relief valve and acts as the system's main relief set at 2700 psi. Pengwyn tests each manifold for function and sets the relief valve prior to shipping. If the relief requires adjustment, follow the procedures shown below. Refer to page 4-2 for location of valves.

The valve bank used for cylinder control (which can be supplied by Pengwyn as an optional accessory) should incorporate the necessary relief valves for pressure protection of the cylinders and associated functions. The valve inlet section should have a relief valve for overall cylinder pressure protection. Examples of functions that might require work port reliefs with lower pressure settings than the inlet relief are hoist down and underbody scraper plow operation. In all cases, pressures should be controlled as recommended by the equipment manufacturers.

MAIN RELIEF

- 1.) Install a gauge in the line between the pump and the **S Series** manifold.
- 2.) Turn manual lockout key switch to MANUAL.
- 3.) Disconnect the auger pressure hose quick disconnects.
- 4.) Start engine and bring engine speed to 1800 rpm.
- 5.) Turn Pengwyn "ON".
- 6.) Turn spreader material output switch to position "10".

- 7.) Quickly read the pressure on the gauge.
- 8.) Turn engine off.
- 9.) Remove cap from main relief (some reliefs have external adjustment screw with locking nut).
- 10.) With allen wrench, adjust internal/external screw Clockwise to increase pressure setting or 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 manual lockout key to AUTOMATIC.

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 solenoid charts (page 5-2) show which solenoids are energized with each different function. E denotes that a coil is energized

When the auger and the spinner are disconnected from the truck, the spreader material output selection switch and the spinner speed control switch must be set at position "0".

CAUTION

REMOVE THE COMPUTER FROM THE MANIFOLD AND CAB BEFORE WELDING ON THE TRUCK. SEE PAGE 6-1 FOR INSTRUCTIONS ON REMOVING THE COMPUTER.

DO NOT OVER TIGHTEN SOLENOID COIL NUT - THE COIL SPINDLE IS HOLLOW AND EASILY DAMAGED. ALSO, BE CAREFUL NOT TO PINCH WIRES UNDER 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 NOR MOUNT AUXILIARY SWITCHES TO THE CONTROL CONSOLE. THIS WILL VOID WARRANTY. USE THE CONTROL CONSOLE MOUNTING BRACKET FOR THIS PURPOSE.

SOLENOID ENERGIZATION CHART

MANUAL SPREADER PERCENT

SOLENOID NUMBER				
PERCENT	7	6	5	4
0				
10	E			
20		E		
30	E	E		
40				
50	E		E	
60		E	E	
70	E	E	E	
80			E	E
90	E			E
100		E		E

SPINNER

SOLENOID NUMBER			
RATE	3	2	1
0			
1	E		
2		E	
3	E	E	
4			E
5	E		E
6		E	E
7	E	E	E

NOTE: "E" denotes the coil should be energized.

S-SERIES

TROUBLESHOOTING CHART

Before troubleshooting the PENGWYN S Series system, check all quick disconnects to be sure that they are in good working order and 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.
Solenoid does not magnetize when turned on.	Bad electrical ground.	Check ground.
	Bad coil.	Replace Coil.
Auger does not change speeds smoothly.	One of the auger solenoids not working.	Turn manual key on, set auger switch to (10), (20), (40), and (80) percent to find bad valve. Clean or replace valve or change coil as needed.
Auger runs all the time.	Dirt holding one of the auger solenoid valves open.	Clean solenoid valve.
Auger is in blast in Automatic.	Spreader constant calibration is on "0".	Change calibration to correct number cannot be zero. (Refer to calibration part of manual)

PROBLEM	CAUSE	SOLUTION
Spinner does not change speeds smoothly.	One of the spinner solenoids not working.	Set spinner to “1”, “2”, and “4” to find bad valve. Change coil if needed.
Spinner runs all the time.	Dirt holding one of the spinner solenoid valves open.	Clean solenoid valve.
Spreader manifold blocking hydraulic system when spreader not connected.	Flow compensator held shut by leaking solenoid valve.	Install jump hoses on connections when auger and spinner are not being used in the off season or replace leaking solenoid valve.
Receiving message “NO CONNECTION” when trying to download information or calibrate PENGWYN.	Data link cable not plugged into RS-232 port.	Plug cable into port and hit function key again.
	Incorrect COM port called up	Change COM port call up.
Flow compensators chattering.	Pilot orifice to compensator too large.	Replace with smaller orifice.

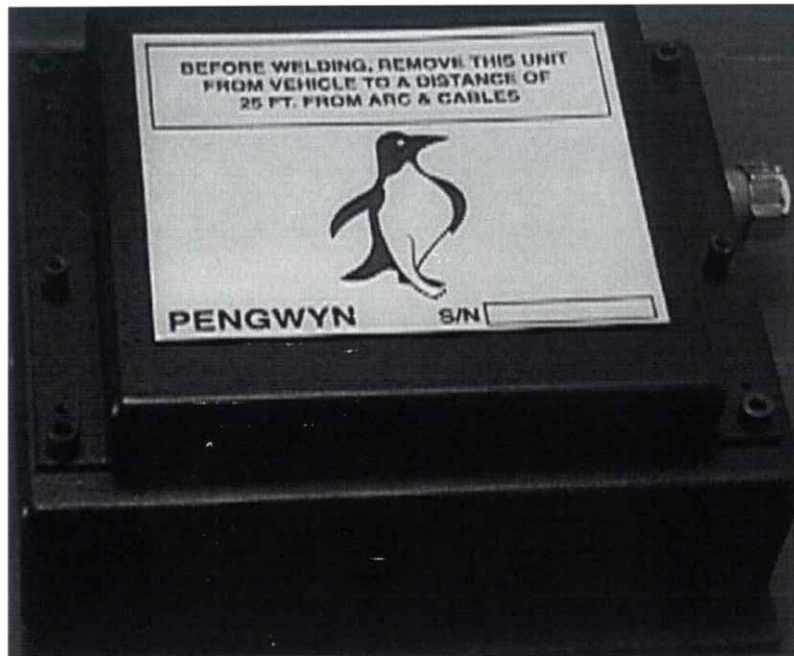
IF ANY OTHER PROBLEMS OCCUR, OR YOU HAVE ANY OTHER QUESTIONS PLEASE FEEL FREE TO CALL:

1-800-233-7568

FOR FREE TECHNICAL ASSISTANCE.

REMOVAL OF COMPUTER

COMPUTER MOUNTED ON TOP OF MANIFOLD COVER



The computer for the **S Series** Pengwyn is mounted on the manifold cover lid. It is held on by four (4) socket head cap screws, one in each corner. To remove the computer for service, repair, welding on truck, jumping the battery, etc. take out the four bolts, grasp the unit firmly on the sides and lift or pull gently but firmly to disconnect the two molex connectors.

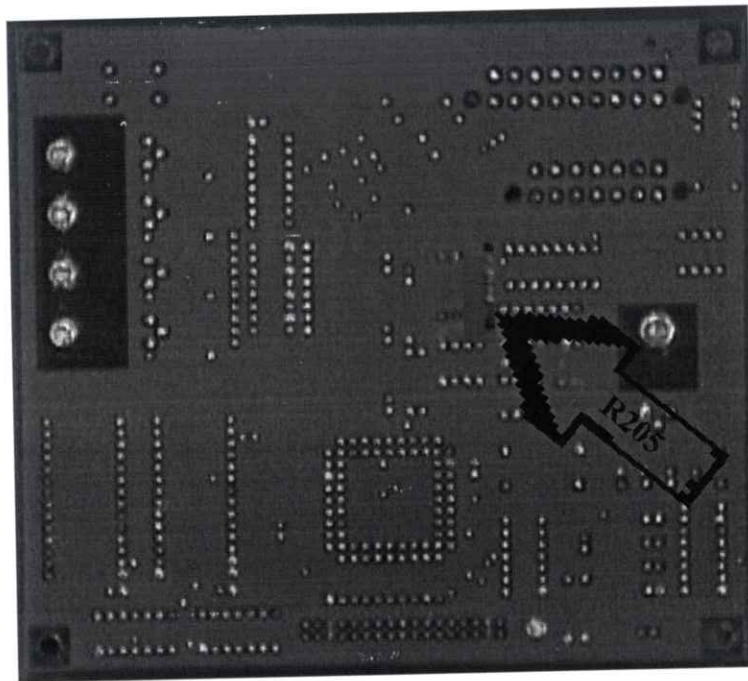
BEFORE WELDING ON THE TRUCK, REMOVE THE COMPUTER UNIT FROM THE MANIFOLD LID AND FROM THE VEHICLE TO A DISTANCE OF 25 FEET OR MORE FROM ARC AND CABLES. FAILURE TO DO SO WILL VOID WARRANTY.

To re-install the computer or a replacement align the positioning studs on either side of the manifold lid and press down firmly and evenly to engage the molex plugs. Replace the socket head cap screws in each corner.

SPEEDOMETER

The new **S Series** computer boards will be delivered ready to work with manual transmissions. To allow the board to pick up the signal sent out by an automatic transmission the 470 ohm resistor on the back of the board (seen below) at position R205 will have to be cut. Once the 470 ohm resistor is cut, (the resistance becomes the 1k ohm resistor on the opposite side of the circuit board) the computer will now read the signal from an automatic transmission. If the **S Series** system is being retrofitted into a older truck with a manual transmission a 560k ohm resistor will need to be inserted into the circuit in the position of R205.

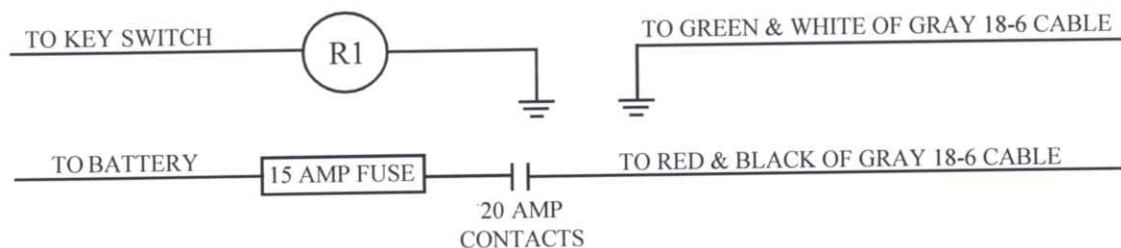
(Contact Pengwyn for further information regarding older truck applications.)



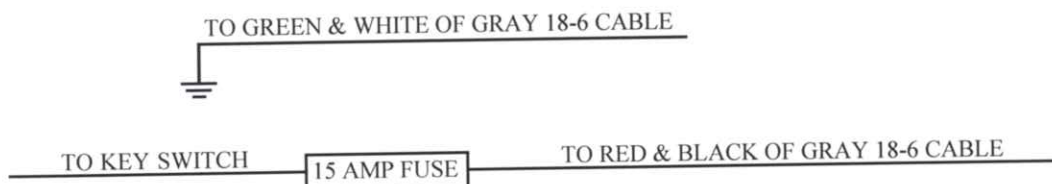
Automatic Transmission: 1k ohm resistor
Manual Transmission: 470 ohm resistor
Old Manual Transmission: 560k ohm resistor

POWER HOOK-UP OPTIONS

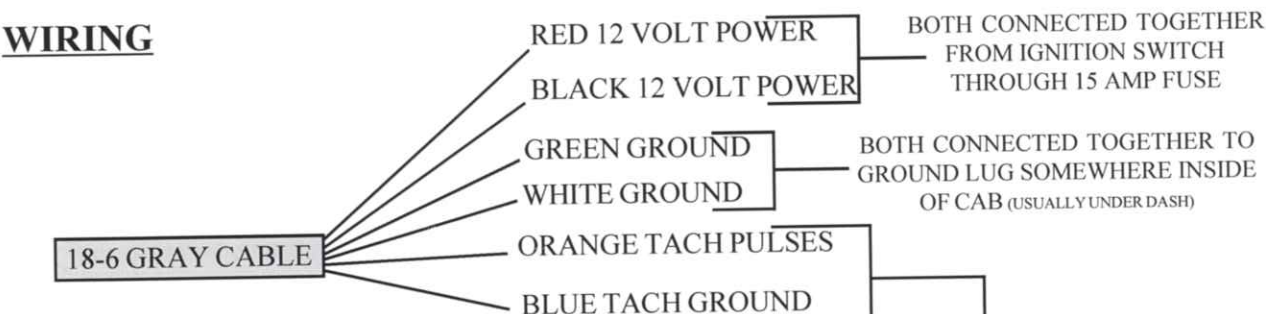
OPTION A



OPTION B



WIRING



ORANGE WIRE
GRAY 18-6 CABLE

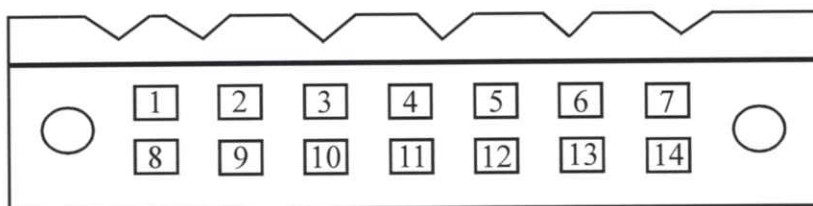
BLUE WIRE
GRAY 18-6 CABLE

SPEEDOMETER HOOKUP
BEHIND DASH INSTRUMENT CLUSTER

INTERNATIONAL	TACH PULSES WIRE #47 BEHIND DASH TACH GROUND WIRE #47A BEHIND DASH
FORD	TACH PULSES AND GROUND LISTED IN JUNCTION BOX BEHIND PASSENGER SEAT OR SEE DIAGRAM AT LEFT.
CHEVY GMC	TACH PULSES - PULSE WIRE ON SENSOR TACH GROUND - GROUND WIRE ON SENSOR

MANIFOLD CONNECTOR PIN OUT

PIN NUMBER COLOR	FUNCTION	WIRE
1	+ 12 VOLTS INPUT	(18-6) RED
8	+ 12 VOLTS INPUT	(18-6) BLACK
2	CHASSIS GROUND	(18-6) GREEN
9	CHASSIS GROUND	(18-6) WHITE
14	AUGER 1 VALVE	WHITE
13	AUGER 2 VALVE	WHITE/YELLOW
7	AUGER 4 VALVE	WHITE/GREEN
6	AUGER 8 VALVE	WHITE/BLUE
3	SPINNER 1 VALVE	WHITE/ORANGE
4	SPINNER 2 VALVE	WHITE/BROWN
5	SPINNER 4 VALVE	WHITE/PURPLE
11	TACH INPUT	(18-6) ORANGE
10	CHASSIS GROUND	BLACK
	TACH GROUND TO CHASSIS	(18-6) BLUE



CONSOLE CONNECTOR PIN OUT

PIN NUMBER	FUNCTION	WIRE COLOR
1	+12 VOLT POWER	RED/WHITE RED/BLACK
2	+12 VOLT POWER	3 ORANGES
3	RS-232 TX	WHITE/BLACK
4	RS-232 RX	WHITE/RED
5	RS-232 GND	WHITE
6	RUNNING LAMP	BLK/WHITE
7	MANUAL	BLK/RED
8	AUGER 8	BLUE/WHITE
9	AUGER 2	BLUE/BLACK
10	+12 VOLT POWER	RED/GREEN
11	GROUND	SHIELD
12	SPINNER 1	GREEN/WHITE
13	SPINNER 2	GREEN/BLACK
14	SPINNER 4	GREEN
15		
16	BLAST	BLACK
17	AUGER 1	BLUE
18	AUGER 4	BLUE/RED

PROGRAMMING RECORDS

UNIT ID# :

MPH :

Lbs/Mi :

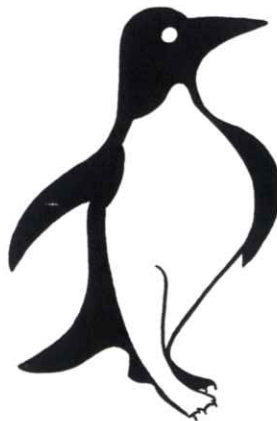
DAY OF WEEK :

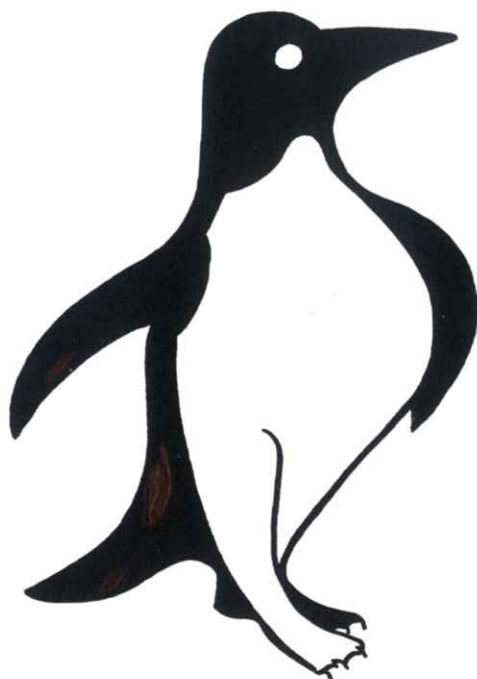
TIME OF DAY :

MPH CONSTANT :

MAX SPREAD RATE :

SPREADER CONSTANT :





PENGWYN

2550 West 5th Avenue

Columbus, OH 43204

(614) 488-2861

(800) 233-7568

FAX (614) 488-0019