

**M-215-02R**  
**Computerized Variable Hopper**  
**CHIPSPREADER**  
**Operation, Maintenance and Safety Manual**  
for Hydrostatic Drive Units with Variable Hopper

**WARRANTY**

E. D. Etnyre Co. warrants to the original Purchaser, it's new product to be free from defects in material and workmanship for a period of twelve (12) months after date of delivery to original Purchaser. The obligation of the Company is limited to repairing or replacing any defective part returned to the Company and will not be responsible for consequential damages or any further loss by reason of such defect.

**The company excludes all implied warranties of merchantability and fitness for a particular purpose. There are no warranties, express or implied, which extend beyond the description of the goods contained in this contract.**

This warranty does not obligate the Company to bear the cost of machine transportation in connection with the replacement or repair of defective parts, nor does it guarantee repair or replacement of any parts on which unauthorized repairs or alterations have been made or for components not manufactured by the Company except to the extent of the warranty given by the original Manufacturer.

This warranty does not apply to:

- (1) Normal start-up services, normal maintenance services or adjustments usually performed by the selling dealer, factory service representative or customer personnel.
- (2) Any product manufactured by E. D. Etnyre Co. purchased or subjected to rental use.
- (3) Any product or part thereof which shows improper operation, improper maintenance, abuse, neglect, damage or modification after shipment from factory.
- (4) Any product or part thereof damaged or lost in shipment. Inspection for damage should be made before acceptance or signing any delivery documents releasing responsibility of the delivering carrier.

This warranty and foregoing obligations are in lieu of all other obligations and liabilities including negligence and all warranties of merchantability or otherwise, express or implied in fact or by law.





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## Safety Precautions, Hazard Seriousness Level

You will find safety information boxes throughout this manual. These boxes contain information alerting you to situations or actions to avoid.

Signal words (DANGER, WARNING and CAUTION) are used to identify levels of hazard seriousness. Their selection is based on the likely consequence of human interaction with a hazard. Definitions of hazard levels are as follows.

 **DANGER** - Immediate hazards which **will** result in severe personal injury or death.

 **WARNING** - Hazards or unsafe practices which **could** result in severe personal injury or death.

 **CAUTION** - Hazards or unsafe practices which could result in minor personal injury or product or property damage.

### CALIFORNIA

#### Proposition 65 WARNING

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

Please note this warning and remember -

Always start and operate the engine in a well ventilated area;

If in an enclosed area, vent the exhaust to the outside;

Do not modify or tamper with the exhaust system.

### WARNING

Do not use this machine for any operation which is not described in this manual.

If you have any questions about operation of this machine, contact the Etnyre Service Department at  
1-800-995-2116 or 1-815-732-2116.

Operations that are not approved could cause serious injury or death.

### WARNING

#### FLUROELASTOMER HANDLING

Some O-rings and seals used in this vehicle are made from fluoroelastomers. When used under design conditions, fluoroelastomers do not require special handling. However, when fluoroelastomers are heated to temperatures beyond their design temperature (around 600<sup>o</sup> Fahrenheit), decomposition may occur with the formation of hydrofluoric acid. Hydrofluoric acid can be extremely corrosive to human tissue if not handled properly.

A degraded seal may appear as a charred or black sticky mass. Do not touch either the seal or the surrounding equipment without wearing neoprene or PVC gloves if degradation is suspected. Wash parts and equipment with 10% lime water (calcium hydroxide solution) to neutralize any hydrofluoric acid.

If contact with the skin occurs, wash the affected areas immediately with water. Then rub a 2.5 calcium gluconate gel into the skin until there is no further irritation, while seeking prompt medical attention.

Note to Physicians: For advice or treatment of HF burns, call the DuPont Medical Emergency number, 1-800-441-3637

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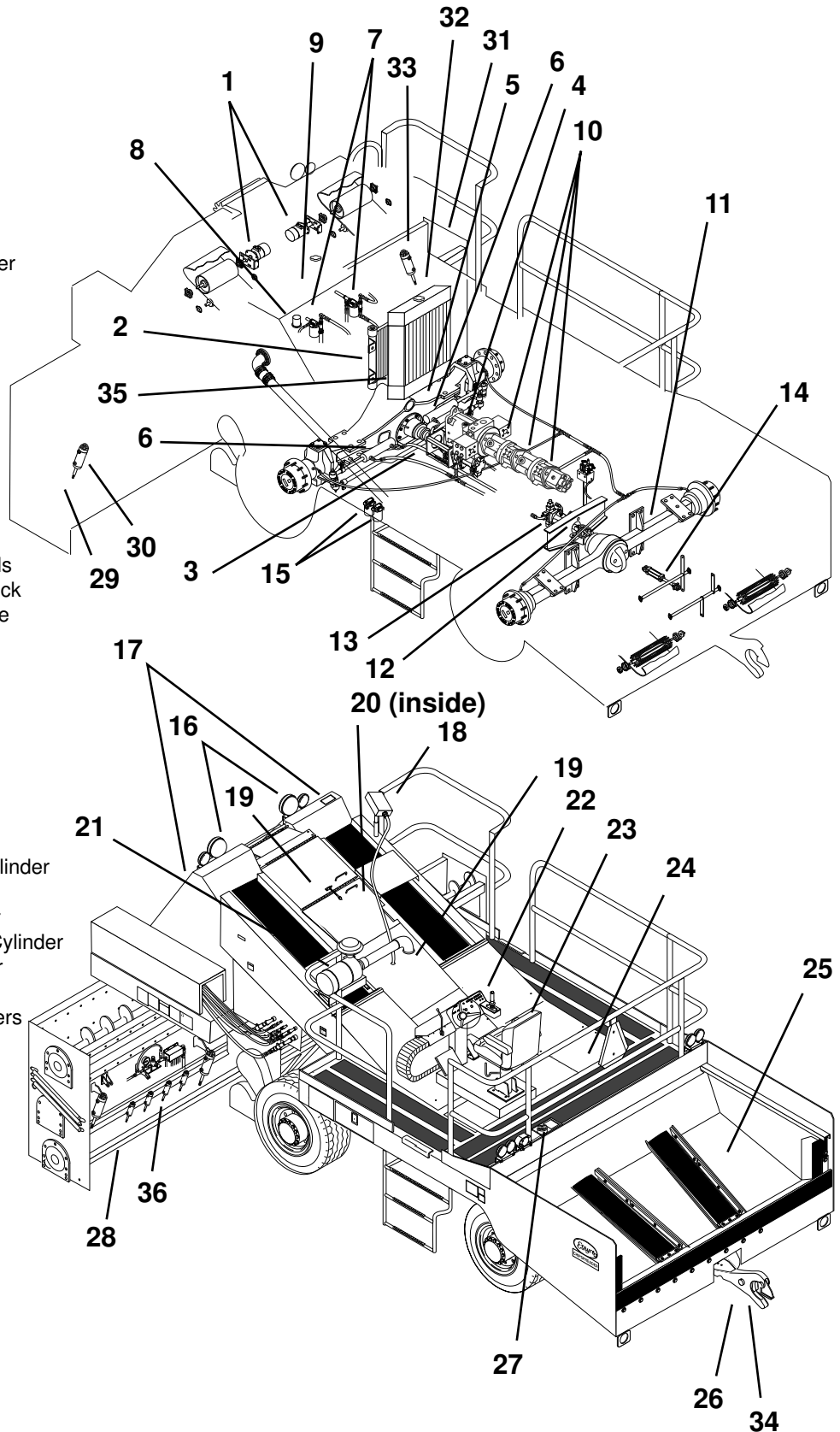
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# GENERAL IDENTIFICATION

Ref	Qty	Description
1	1	Conveyor Drive
2	1	Hydraulic Oil Cooler
3	1	Front Drive Line
4	1	Hydrostatic Pump
5	1	Front Drive Axle
6	2	Power Steering Cylinder
7	2	Return Filter
8	1	Tank Breather
9	1	Hydraulic Reservoir
10	3	Implement Pump
11	1	Rear Drive Axle
12	1	Rear Drive Line
13	1	Rear Drive Motor
14	1	Hitch Height Cylinder
15	2	Suction Filter
16	2	Lights
17	2	Conveyor Hood
18	1	Front End Man Controls
19	AR	Engine Covers and Deck
20	2	Conveyor Control Valve
21	1	Air Filter
22	1	Control Console
23	1	Operator Seat
24	2	Rear Deck Covers
25	1	Receiving Hopper
26	1	Truck Hitch
27	1	Fuel Tank
28	1	Left Spread Hopper
29	1	Left Gate Transducer
30	1	Left Gate Actuating Cylinder
31	1	Right Spread Hopper
32	1	Right Gate Transducer
33	1	Right Gate Actuating Cylinder
34	1	Hitch Release Cylinder
35	1	Engine Radiator
36	AR	Individual Gate Cylinders



# INTRODUCTION

The Etnyre Variable Hopper Hydrostatic ChipSpreader has been designed to improve the accuracy of chip spreading while improving productivity. This has been done by incorporating Application Rate capabilities using precise gate opening control and speed feedback in closed loop controls, and the ability to do most roads in a single pass.

It is especially important from the safety standpoint that this manual be thoroughly read and understood before performing any operational or maintenance function.

The information contained in this manual will enable you to better understand the operation and performance of the machine and thus better utilize it to obtain maximum performance from your ChipSpreader.



## WARNING

Unsafe operation of equipment may cause injury. Read, understand and follow the manuals when operating or performing maintenance

## IMPORTANT

1. The front hoppers should be fully closed up and latched using the safety chains on the left side of the machine when the unit is traveling between job sites to avoid possible damage to the outer ends of the hoppers.

2. Keep machine on road or relatively uniform surface at all times to avoid loss of traction and/or possible damage to the front hoppers or rear of conveyors.

3. Place truck gearshift in neutral as soon as the truck is connected to the spreader.

4. Under most operating conditions the ChipSpreader should be allowed to tow the truck. However, certain steep upgrade or downgrade conditions may require the truck to assist the ChipSpreader. The ChipSpreader must pull the truck even while the truck is assisting. Do not attempt to push the ChipSpreader with the truck.

5. Do not tow or push the ChipSpreader before reading the towing instructions contained in this manual as this may damage the hydraulic motors.

6. Never use the ChipSpreader to dislodge a truck or other equipment which has become stuck in mud or soft shoulder conditions as this may cause damage to the hitch, which could fail later in normal operation.

7. Avoid roading the machine with material in the

hoppers if at all possible. Added weight in either the front hoppers or the rear hopper increases stopping distance, and weight in the front hopper decreases available traction at the rear wheels.

8. After changing filters or working on the hydrostatic system, be sure to follow hydrostatic start up procedure to reduce the potential for damage to the hydrostatic system.

9. Always install locking control box cover & chock wheels when leaving machine unattended as protection against vandalism and accidental movement.

10. Before operating the ChipSpreader, do an inspection of the machine for condition of the tires, fluid leaks, fluid levels, fuel level, loose bolts, improper hose routings etc. Be sure that the machine is in a safe condition to operate.



## CAUTION

The front hoppers should be fully closed up and latched using the safety chains at the left side of the machine when the unit is traveling between job sites to avoid possible damage to the outer ends of the hoppers.

## REPORTING SAFETY DEFECTS

If you believe that your vehicle has a defect which could cause a crash or could cause injury or death you should immediately inform the National Highway Traffic Safety Administration (NHTSA) in addition to notifying E. D. Etnyre & Co.

If NHTSA receives similar complaints, it may open an investigation, and if it finds that a safety defect exists in a group of vehicles, it may order a recall and remedy campaign. However, NHTSA cannot become involved in individual problems between you, your dealer, and E. D. Etnyre & Co.

## CHECK OUT

1. The following accessories are shipped with each ChipSpreader: extra linkage rods for shortened truck hookup, parts book and operation, maintenance and safety manual, wiring and hydraulic diagrams, and engine parts and operator's manual.

2. Best performance for most operating conditions is achieved when tire pressures are set to 55 to 60 PSI

in front and 60 to 65 PSI in rear. However, various operating speeds, road bed conditions, truck pulling arrangements and other operating conditions may require different tire pressures.

**⚠ WARNING**

Never exceed the maximum inflation pressures indicated on the tire's sidewall.

3. Grease all fittings and check all reservoir oil levels in accordance with the ChipSpreader Lubrication Chart on the side of the tool box prior to operation.

4. Check engine coolant and oil levels prior to operation. Refer to engine operator's maintenance manual for complete engine service requirements.

## ATTACHING HOPPER TO UNIT

### SAFETY PRECAUTIONS:

Before lifting hopper, check to ensure that adequate clearance will be maintained between the lifting machine and overhead electrical lines. You must maintain at least 10 feet of clearance.

Ensure that the hopper is well secured and rigged before starting any lifting operation.

Ensure that the area around the hopper is clear of personnel and equipment and only trained personnel are used to assist in installing the hopper.

Never let anyone go under the hopper while it is suspended.

Ensure that hands and feet are kept clear of the hopper and potential pinch points on front of the ChipSpreader during installation.

### Attaching Hopper to Unit

1. By hooking a lifting sling into the two rear lifting eyes, the hopper can be tilted forward while being raised, allowing the hopper carrying shafts to engage the hopper carrying arms on the ChipSpreader. (Figure 1 & 2) Lower hopper slowly until lifting sling can be disconnected.

2. Attach lifting device to front lifting attachment and raise hopper to vertical position.

3. Install hopper pins, in front of latch arms, through pin catch.

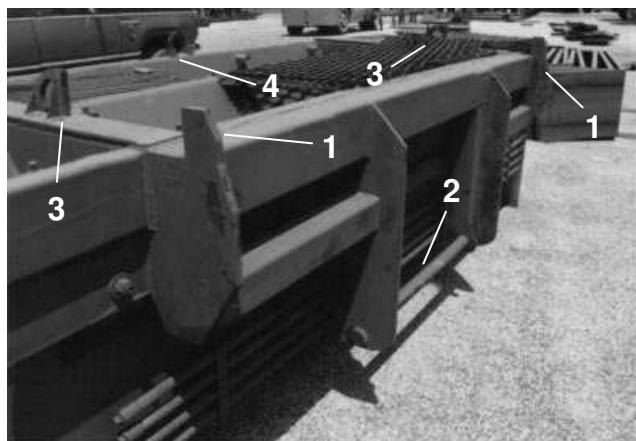
4. Always install latch pin lock pins and snap down rings properly prior to releasing the lifting device.

5. Connect all hopper hoses per the parts book diagram. Use caution to wipe each half of each connector clean before connecting. ***Dirt and contaminants can cause major damage to the hydraulic systems.***

6. Install hoods and connect electrical connections (Figure 3)

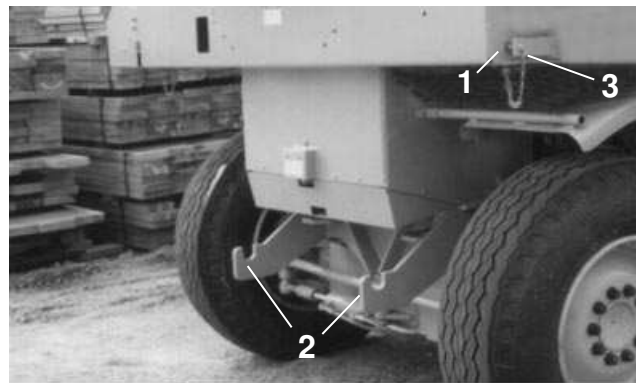
7. Connect the transducer electrical connectors the other connectors for the auto features and headlights.

8. Hopper gate adjustment and spread roll straightness are established at the factory. However, to be sure adjustments or straightness were not altered during shipment and storage, the following gate and spread roll adjustment checks should be performed prior to operation:



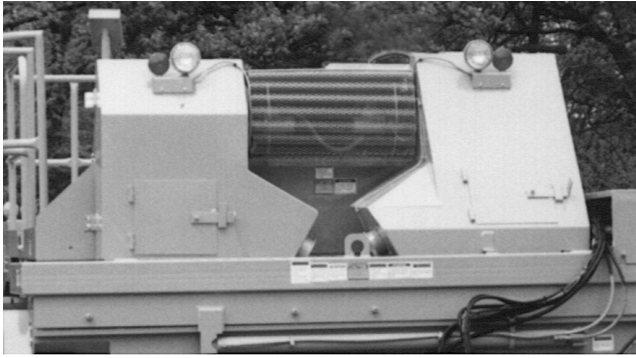
**Figure 1 Rear of Hopper**

- |                |                      |
|----------------|----------------------|
| 1. Latch Arm   | 3. Rear Lifting Eye  |
| 2. Carry Shaft | 4. Front Lifting Eye |



**Figure 2 Front of Chipspreader**

- |                   |              |
|-------------------|--------------|
| 1. Latch Pin      | 3. Pin Catch |
| 2. Carry Arms (2) |              |



**Figure 3 Install Conveyor Hoods**

Check that each gate opening cylinder rod clevis is fully screwed onto its respective cylinder rod.

With the hopper on the machine, start the engine and run it at a minimum of 2000 rpm and extend the hoppers fully. Depress and hold the left and right gate override push button switches until the gate position is at full opening. Release push button switches and gate position will return to full close. There should be 1/16" clearance between the gate and the spread roll. If this clearance is not constant across the full width of the hopper, it indicates that wear plates may need to be adjusted or the spread roll is not straight. Contact the factory for straightening instructions.

### IMPORTANT

1. Since the ChipSpreader is designed to operate on new sealcoat surfaces, all dynamic braking is being done by the hydrostatic system. With abrupt control inputs it is possible to "scuff" the road surface during starting or stopping. However, with smooth application of control, inputs very precise accelerations and decelerations can be made, giving the ability to outperform a conventional clutch/brake/gear combination.

2. Friction characteristics on both new sealcoat surfaces and other surfaces vary considerably. Therefore stopping distances must be watched carefully, particularly when towing a truck, going downhill or in stopping from higher travel speeds.

3. The larger the truck or steeper the grade, the longer the stopping distance.

4. Traveling with the front hoppers loaded removes weight from the rear wheels thus reducing the braking effectiveness of the rear wheels while the additional weight increases the braking forces required. Carrying material in the rear hopper also increases the braking forces required and consequently increases the required stopping distance from a given speed. It is therefore highly recommended to travel or "road" the machine in an empty condition.

5. When operating with the truck, in some cases, such as on steep downgrades, the truck should assist in braking. The truck should always set its own brakes after stopping, regardless of whether the combination is stopped on a downgrade, upgrade or level. The braking effort must be a coordinated effort when required. It is therefore important to have a clearly understood means of communication between the ChipSpreader and truck. This may be done by radio, hand signals, horns etc. Each truck driver should know who is to give signals, where to look for the signal and the meaning of each signal.



### WARNING

Stay off hopper while machine is moving.  
Machine movements could cause a fall resulting in injury or death.

### Identification and Function of Controls

Refer to figure 4 for identification of described features.

#### 1. Power/Ignition Switch.

Rotating from "off" to "on" supplies electric power to all systems and controls. Rotating the switch further to the right against the spring will engage the starter. When the engine runs, release the key and the switch will remain in the "on" position. Note the engine will not start with the control joystick removed from the neutral position. It is recommended the "park/drive" switch be in the park position during startup also.

**SINCE ALL FUNCTIONS EXCEPT POWER STEERING, AND REAR BRAKES ARE ELECTRICALLY CONTROLLED, TURNING THE KEY TO "OFF" RESULTS IN AN EMERGENCY STOP.**



### WARNING

Turning ignition switch to "off" results in emergency stop

**SHUT MACHINE OFF AND WAIT FOR ALL MOVEMENT TO STOP BEFORE LEAVING OPERATOR'S SEAT OR SERVICING**

**FAILURE TO DO SO COULD RESULT IN UNEXPECTED MOVEMENT AND CAUSE SERIOUS INJURY OR DEATH**



## 2. Mode Selector-Drive/Park

A two position switch selects either “drive” or “park” position.

In “Park” mode, the “speed/direction handle”, (9) is disabled and the parking brake is applied. The parking brake is applied when the chipspreader is stopped by returning the speed/direction handle to neutral, regardless of the position of the “Drive/park” switch.

In the “Drive” position, the parking brake will release when the “speed/direction handle”, (9) is moved from the neutral position resulting in forward or reverse motion of the chipspreader.

Since engaging “park” disables “speed/direction handle” and applies the parking brake, selecting park while the chipspreader is moving will result in an emergency stop. Do not select “park” unless the chipspreader is at a full stop.

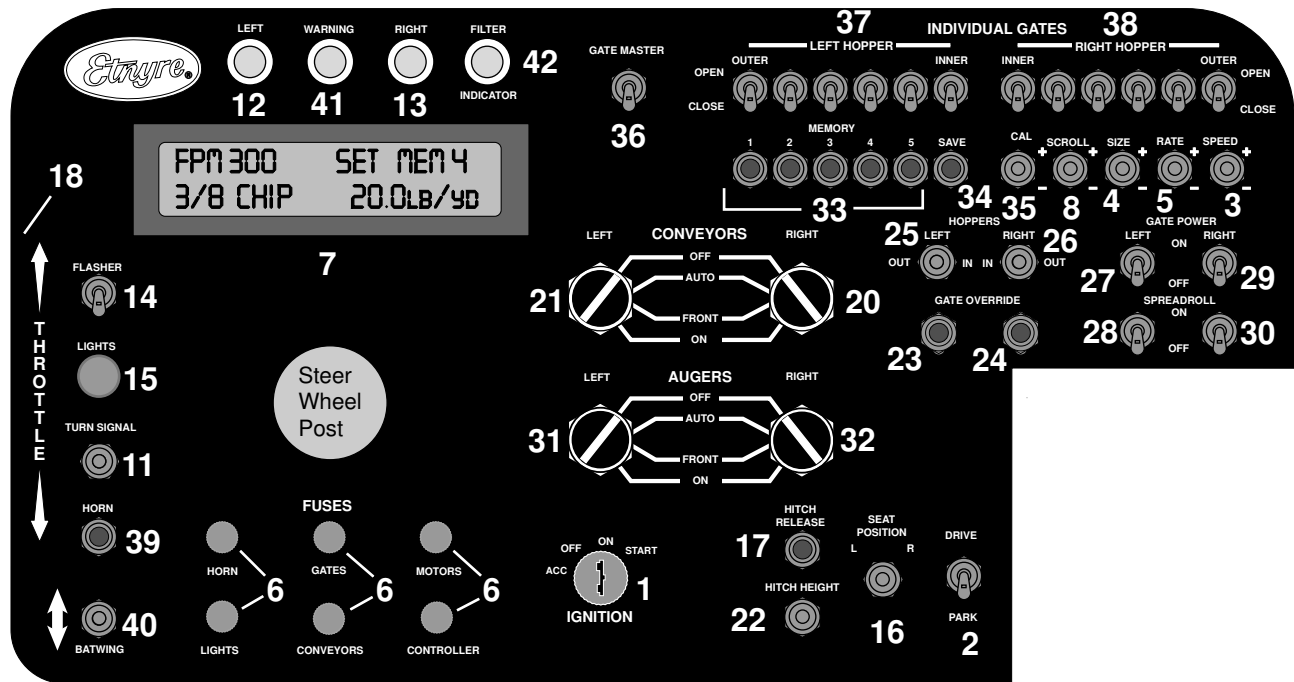
**⚠ WARNING**

Selecting “park” while the chipspreader is moving results in an emergency stop.

**CAUTION! ALWAYS PLACE THE MODE SELECTOR SWITCH IN THE “PARK” POSITION WHEN THE CHIPSREADER IS STOPPED TO AVOID ACCIDENTAL MOVEMENT OF THE MACHINE.**

## 3. Speed Set Toggle Switch

When in the “Drive” position, this switch provides the command signal (or set point) to the computer. This switch is used to set the desired ChipSpreader speed in feet per minute. Pushing the toggle switch up will in-



**Figure 4 Control Panel Identification**

- |   |  |   |
|---|--|---|
| <ul style="list-style-type: none"> <li>1. Power/Ignition Switch</li> <li>4. Aggregate Size Switch</li> <li>7. Computer Display Screen</li> <li>12. Left Turn Signal Indicator</li> <li>15. Headlight Switch</li> <li>18. Throttle Lever</li> <li>21. Left Conveyor Control Selector</li> <li>24. Right Gate Override Switch</li> <li>27. Left Gate Power Switch</li> <li>30. Right Spreadroll Switch</li> <li>33. Memory Selector Buttons</li> <li>36. Individual Gate Master Switch</li> <li>39. Horn Button</li> <li>42. Charge Filter Indicator</li> </ul> | <ul style="list-style-type: none"> <li>2. Mode Selector-Drive/Park</li> <li>5. Application Rate Switch</li> <li>8. Screen Scroll Switch</li> <li>13. Right Turn Signal Indicator</li> <li>16. Seat Shift Switch</li> <li>19. Computer (inside panel)</li> <li>22. Hitch Height Switch</li> <li>25. Left Hopper Position Switch</li> <li>28. Left Spreadroll Switch</li> <li>31. Left Auger Control Selector</li> <li>34. Memory Save Button</li> <li>37. Left Hopper Gate Selector Switches</li> <li>40. Batwing/Strobe/Beacon Switch</li> </ul> | <ul style="list-style-type: none"> <li>3. Speed Set Toggle Switch</li> <li>6. Circuit Breakers</li> <li>11. Turn Signal Selector</li> <li>14. Hazard Flasher Switch</li> <li>17. Hitch Release Pushbutton</li> <li>20. Right Conveyor Control Selector</li> <li>23. Left Gate Override Switch</li> <li>26. Right Hopper Position Switch</li> <li>29. Right Gate Power Switch</li> <li>32. Right Auger Control Selector</li> <li>35. Calibrate Switch</li> <li>38. Right Hopper Gate Selector Switches</li> <li>41. Warning Light</li> </ul> |
|---|--|---|

crease the speed set point, while pushing the switch down will decrease the speed set point. The computer display screen will display the set point until the control handle is moved out of neutral, and then it will display the actual speed. Once the speed is set, the ChipSpreader will repeat that speed any time the control handle is pushed fully forward. The “Speed Set Toggle Switch” can be pushed to either increase or decrease the set point while the ChipSpreader is moving. When this is done, the ChipSpreader will smoothly transition to the new set point, and the display will display the set point rather than the actual speed. When the switch is released, the display will switch back to the actual speed.

If the engine cannot maintain the ChipSpreader speed on a steep hill, bring the control handle rearward toward neutral to slow the ChipSpreader down so that the engine can recover to high idle rpm, and when the steepness of the hill decreases, or the truck lightens up, push the control handle fully forward again to return to the set speed.

#### 4. Aggregate Size Switch.

This switch (4) selects the size of the aggregate to be spread. The size should be set to the size of the aggregate to be spread before setting the application rate and doing any calibrating of material.

The choices of aggregate size are: Sand, 1/4” Chips, 3/8” Chips, 3/8” Gravel, 5/8” Chips, and 1” Chips.

The amount of aggregate applied on the ground (application rate) is a function of the front hopper gate opening. The gate opening is determined by the selected aggregate (i.e. 3/8 chips) and the chippers speed. The computer controls the gate opening to maintain the application rate (i.e. 20.0 lbs/yd<sup>2</sup>).

#### 5. Application Rate Switch.

This switch sets the position to which the gates will open, by increasing or decreasing the setpoint. The set point is the application rate, in lbs/ yd<sup>2</sup>, that will be delivered when the Gate/Spread Roll switch (10) is activated. Pushing the switch up will increase the set point while pushing the switch down will decrease the set point. The set point can be changed at any time whether spreading aggregate or not.

#### 6. Circuit Breakers.

These circuit breakers are powered from the accessory post on the ignition switch and lose voltage when starter is engaged.

Light circuit breaker: Supplies power to all lights except brake lights.

Conveyor circuit breaker: Supplies power to conveyors and augers

Controller circuit breaker: Supplies power to hopper in/out, gate override, hitch release, hitch height, and seat position functions.

These circuit breakers are powered from the ignition post on the ignition switch and maintain voltage while starter is engaged.

Horn circuit breaker: Supplies power to the horn and the front control box.

Gate circuit breaker: Supplies power to the joystick and individual gates when required.

Motor circuit breaker: Supplies power to the motors and all relays.

The computer is fused with an in-line, 20 amp fuse and is powered from the accessory post on the ignition switch.

### 7. Computer Display Screen.

#### OPERATOR SCREENS

<b>20.0</b>	<b>3/8</b>	<b>400</b>
<b>lb/yd<sup>2</sup></b>	<b>Chip</b>	<b>fpm</b>

The screen shown above is displayed when power is turned on to the computer. This screen shows the application rate set point, aggregate size, and the speed set point while at a stand still. These values can all be changed depending on the application as described in earlier sections. When the chipperspreader is powered down, the values currently on the screen are saved and returned the next time power is turned on.

The speed setpoint is displayed while the chipperspreader is not moving. Once the chipperspreader is in motion, the actual speed is displayed. The speed feedback is generated by a magnetic pickup mounted on the motor output shaft which generates pulses which the computer displays as feet per minute (FPM).

Different configurations of these three values can be saved in one of five memory presets. The memory presets store an application rate set point, an aggregate, and a speed set point in one of the memory locations. The memory pushbutton then restores the information stored in that location to the screen when activated. This allows the operator to switch between stored combinations with the push of a button as opposed to having to scroll the individual values.

It is important to understand that the memory functions simply restore the selected values to the operat-

ing, such as the speed setpoint, the speed will change. The values stored in the memory will not change. Pressing the memory pushbutton will restore the saved values and overwrite the changed speed setpoint.

To save information in a memory, adjust the application rate set point, the aggregate size, and the speed set point to values that will be commonly used together. When the values displayed on the screen are set to the desired values, press the save pushbutton. Activating the save pushbutton will change the display to read “Select location 1, 2, 3, 4 or 5”. Select the location, or memory, the information is to be stored in by pressing the corresponding memory pushbutton (i.e. memory 1). The display will return to the main operator screen depicted above when this has been done. As a check, press the memory pushbutton the information was saved to prompting the display to read “Restoring memory 1”. The display will then show the values saved in memory 1.

Certain material conditions could require a calibration of the computer to insure the application rate set point is equal to the actual application on the ground. It is important to understand that the aggregate is being calibrated and not the memory. For example, if 3/8 chips are saved in memory 1 with an application rate setpoint of 20.0 lb/yd<sup>2</sup> and also in memory 2 with an application rate of 8 lb/yd<sup>2</sup>, a calibration of 3/8 chips will update both memory locations. The memory functions serve as a means to quickly change between frequently used operating parameters.

If the set point on the display is dramatically different from the application on the ground it is possible the incorrect aggregate has been selected. Assuming this is not the case, the following procedure should be used to calibrate the aggregate to correct the application rate information stored in the computer.

Before calibrating a material, verify that both spread rolls are turning at 96 rpm. The aggregate to be calibrated needs to be selected on the display (i.e. 3/8 chips). Set the application rate setpoint to the desired value (i.e. 20 lb/yd<sup>2</sup>). The speed setpoint should be set around 300 FPM. Using the canvas supplied, place on a flat surface leaving plenty of room for the chippers to get up to speed. With the control handle in the full forward position to assure constant speed, maneuver chippers towards the canvas. Actuate the gate thumbswitch about 10 feet before the material will hit the canvas to insure the gate is in the correct position. Deactivate the gate thumbswitch once the canvas is covered. Weigh the material and the canvas with the scale provided. Empty the canvas and weigh it empty. Subtract the empty canvas weight from the total weight

to arrive at the pounds per square yard. On a variable hopper machine, this will need to be done for the left and right hopper. Do this a minimum of 3 times and average the values before making any changes.

Compare the measured values against the application rate setpoint on the display to determine calibration required for each hopper. As an example, assume the left hopper weighed in at 23.5 lbs and the right hopper weighed 18.0 lbs. Press the cal switch up or down to access the calibration screens. The screen will now read:

<b>0.0</b>	<b>95.6%</b>
<b>lb/yd<sup>2</sup></b>	<b>RIGHT CAL</b>

The right hopper measured 18.0 lbs and the setpoint is 20.0 lbs, meaning the right hopper is 2 lbs light. Press and hold the cal switch up (+) until the lb/yd<sup>2</sup> reads 2.0. The RIGHT CAL value will decrease as the rate is increased, and increase as the rate is decreased. The RIGHT CAL value is a density factor that serves as a reference to keep track of the calibration. Press the save pushbutton to store the calibration for the right hopper. This process will increase the output of the right hopper by 2.0 lbs making the output equal to the application rate setpoint. The screen will reset to zero once the save pushbutton is activated.

Press the scroll switch down (-) to access the calibration screen for the left hopper which displays the following:

<b>0.0</b>	<b>95.6%</b>
<b>lb/yd<sup>2</sup></b>	<b>LEFT CAL</b>

The left hopper weighed 23.5 lbs at the application rate setpoint of 20.0 lbs/yd<sup>2</sup>. The measured weight is 3.5 lbs heavy compared to the setpoint. Press and hold the cal switch down (-) until the lb/yd<sup>2</sup> reads -3.5. The LEFT CAL value will decrease as the rate is increased, and increase as the rate is decreased. The LEFT CAL value is a density factor that serves as a reference to keep track of the calibration. Press the save pushbutton to store the calibration for the left hopper. This process will decrease the output of the left hopper by 3.5 lbs making the output equal to the application rate setpoint. The screen will reset to zero once the pushbutton is activated.

The calibration for the left and right hoppers is now complete. To exit the calibration screens, press the scroll switch up (+) two times to return to the main operators screen. The calibration screens can be exited at any time by pressing the scroll switch without changing the calibration. The calibration is changed only by press-

ing the save pushbutton. The calibration process may need to be repeated depending on the accuracy desired. For very accurate calibrations ( $\pm 2.0$  lbs) it will be necessary to weigh at least three samples to get an average material weight to use in the calibration process.

The calibration process will correct both hoppers to spread very close to the application rate setpoint. While chipping it may become evident that one side appears heavier or lighter than the other. This can be fine tuned using the calibration process explained above while chipping. If the left hopper appears lighter than the right, press the cal switch and scroll to the left calibration screen. Toggle the cal switch up (+) to raise the 0.0 to 1 or 2 lbs and press the save pushbutton. This will increase the output of the left hopper without affecting the right. The change will take effect as soon as the save pushbutton is activated and should be noticeable on the ground. This process can be repeated until the left and right hoppers appear the same.

The calibration process is permanent, meaning when the machine is powered down the changes will be saved for the next time the machine is put to use.

To move to the next screen, press the scroll switch down (-).

<b>100°F</b>	<b>60 PSI</b>	<b>15%</b>
<b>WATER</b>	<b>OIL</b>	<b>FUEL</b>

This screen shows the engine coolant temperature on the left, the engine oil pressure in the center, and the fuel remaining in the fuel tank on the right. To move to the next screen, press the scroll switch down (-).

<b>100°F</b>	<b>2200 RPM</b>	<b>13.8 V</b>
<b>HYD OIL</b>	<b>ENGINE</b>	<b>BATTERY</b>

This screen shows the hydraulic oil temperature on the left, the engine rpm in the center, and the system voltage on the right side. The right side will display battery voltage when the ignition is on but the engine is not running. The voltage will increase to 13.5 to 15.0 volts as the output of the alternator supplies voltage to the system. To move to the next screen, press the scroll switch down (-).

<b>120.8</b>	<b>7550 FT</b>
<b>ENGINE</b>	<b>CHIPPED</b>

This screen shows the hours on the machine on the left side, and the feet chipped on the right side. When the ignition key is turned on but the engine is not running, the hours will not accumulate since the hourmeter is started and stopped by an oil pressure switch. If the engine is shut down after running less than 6 minutes, the hourmeter will not increase, as it counts up in 6 minute increments. Once the engine is started, the hours will start to accumulate. The feet chipped will accumulate as long as the gate thumbswitch is activated. Distance will not accumulate when traveling and not chipping. To reset to 0, press the cal switch up or down. You must push the scroll switch up to return to each previous screen, eventually returning to the top screen.

A series of alarm functions are built into the computer. If an item sensed by the computer reaches its programmed alarm condition, the appropriate item will appear and flash on the screen, regardless of what screen is currently displayed. In addition, an output is sent to the beeper and also to the warning light mounted in the upper part of the control box. For instance, the normal use will be to have the first screen displayed (FPM & LBS/SQ. YD) - this will automatically be displayed on starting the engine. If the fuel level gets down to the alarm level (approximately 10% or 7 gallons), the words "low fuel" will flash, the beeper will sound and the warning light below the steering wheel will come on. The same is true for any of the items monitored which have alarm points. The alarm points are as follows:

- low oil pressure            5 PSI
- high water temperature   240 F
- low fuel                     10%-7 Gal.
- high hydraulic oil temp. 180 F.
- low voltage                 11 volts
- high voltage                15 volts

### 8. Screen Scroll Switch

This switch is used to scroll the screen from the first to the fourth screen. You scroll down one screen each time you push the switch down. Upon reaching the last screen, you must push the scroll switch up to return through the screens to the first screen.

### 9. Speed/Direction Control Handle (Figure 6)

The control handle controls both direction (forward, neutral, reverse) and rate of speed.

Full reverse movement will give 100% of the preset speed in reverse, up to 1300 fpm. In order to back up faster, you must increase the speed setting. After backing up, you must reselect the appropriate memory but-

ton to reset the speed to your chipping speed. Full forward movement will give 100% of the selected speed set point. Speed can be slowed down at any time by pulling the handle back towards neutral and resumed by pushing the handle fully forward at any time. The control handle controls the rate of acceleration and deceleration. If the handle is moved quickly, the ChipSpreader will respond quickly. If the control handle is moved slowly, the ChipSpreader will respond slowly.

The control handle also incorporates a neutral safety start switch, automatic application of the brake lights and parking brake, when placed in neutral, and activation of the backup alarm. The handle has a detent in the neutral position and an adjustable friction drag for holding at any desired position other than neutral.

**PARKING BRAKE MEETS SAE J1472**  
**PARKING BRAKE MAY NOT HOLD ON**  
**GRADES STEEPER THAN 15%**



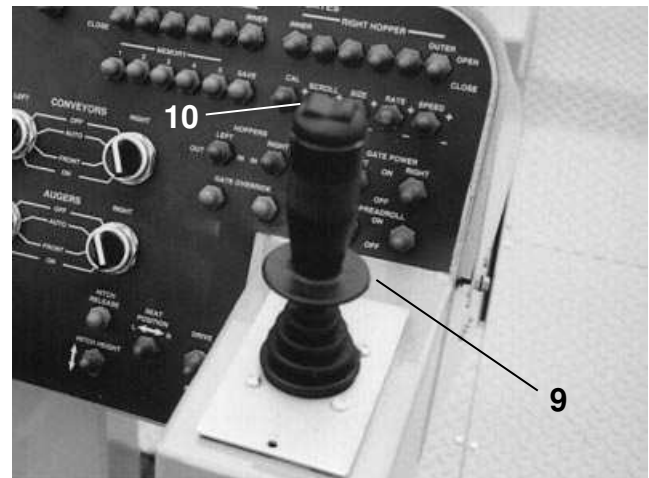
**Figure 5 Throttle Lever**

1. Throttle Lever

Decelerating is always accomplished by moving the handle toward neutral. Upon reaching the neutral position of the handle, the parking brake will be automatically applied, after the speed sensor reads “0” speed.

The control handle will operate as follows: moving the handle rearward out of the neutral position approximately 3 degrees will activate the backup alarm and release the brakes. Moving the handle further rearward will increase the reverse speed proportionate to the handle movement until full set speed is achieved with the handle in the full reverse position. Moving the handle forward out of the neutral position approximately 3 degrees will release the brakes and begin to increase the forward speed until at the full forward position of

the handle the ChipSpreader will be at 100% of the set point speed and the computer will maintain the set speed. If the set speed is 200 fpm, the handle must be moved fully forward to obtain 200 fpm. If the set speed is 500 fpm, the handle must be fully forward to reach 500 fpm. The rate of acceleration, to the set speed, is controlled by how fast the handle is moved from neutral to the full forward position. Adjustments to the set point speed are made using the “Speed” toggle switch. A change in the speed setpoint may be made at any time using the “Speed” toggle switch. The speed may



**Figure 6 Speed/Direction Control Handle**

9. Control Handle 10. Gate/Spread Roll Switch

be decreased at any time by moving the handle rearward toward neutral without changing the set point and then be brought back up to the set point by moving the handle fully forward again. The Aggregate Application rate is automatically maintained when either of these methods is used to adjust the travel speed.

Stopping is always accomplished by returning the handle to neutral.

10. Gate/Spread Roll Switch. (Figures 4 & 6)


This rocker switch (10) activates the spread roll and also the command circuit for the gates. The gate opening is set by the rate switch (5) to the desired opening. The gates are then opened or closed with the gate/spread roll switch. Depressing the left side of the switch closes the gates, while depressing the right side opens the gates. When used this way the gates will go from closed to the required opening for the speed and application rate or from the required opening to closed.

The gate opening will vary, depending on the forward speed of the ChipSpreader, to maintain the set application rate. The gate switch may be turned on at any time. If the speed is too slow for the size aggregate

the computer display will read “CAUTION: Speed Too Slow” in place of the speed, but the gates will be open to an opening dependent on the speed, and as the speed increases, the gates will continue to open further to maintain the selected Application Rate . When the speed has become high enough to exceed the minimum opening for the aggregate selected, the display will return to showing the actual speed. If the speed is increased or decreased using either the “Speed Toggle Switch” or the control handle, the gates will open or close as necessary to maintain the set application rate. When the ChipSpreader has come to a halt, depress the left side of the rocker switch to close the gates. The gates will close automatically when the ChipSpreader’s speed is less than 30 fpm even if the switch is left on and will remain closed in neutral without being turned off, however, if they were not turned off, they will immediately begin to open whenever the forward or reverse speed exceeds 30 fpm.

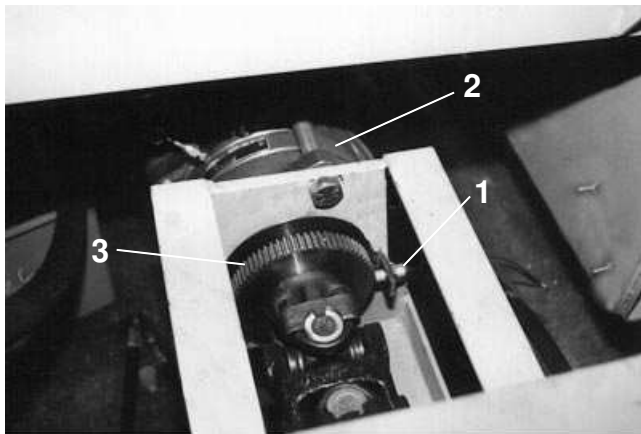
**11, 12, 13. Turn Signal Selector and Indicators. (Figure 8)**

Push the switch to the right to signal a right turn, and to the left to signal a left turn.

 <b>CAUTION</b>
Turn signals are not self canceling

**14. Hazard Flasher Switch (Figure 8)**

Push up for “on” and push down for “off”.




**Figure 7 Ground Speed Pickup**

- 1. Magnetic Pickup      2. Motor      3. Gear

**15. Headlight Switch. (Figure 9)**

Pull out for “on” and push in for “off”.

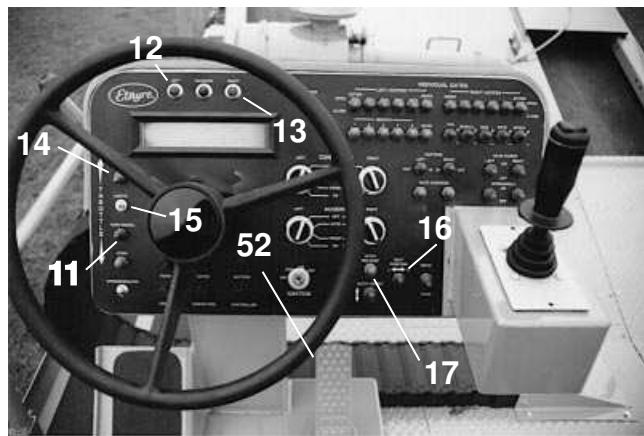
 <b>WARNING</b>
Check local regulations and codes to determine the lighting and marking requirements for your usage.

**16. Seat Shift Switch. (Figure 8) (Optional)**

Hold the switch right or left to move the seat to the desired position. The moving seat is meant to be an operator convenience during chipping.

**17. Hitch Release Pushbutton. (Figure 8)**

Push the hitch release pushbutton to disengage the ChipSpreader from the supply truck. There must be some “slack” in the hitch (between the ChipSpreader and supply truck) in order for the latch to release. While pushing the hitch release pushbutton, one should momentarily pull the control handle rearward slightly to slow the ChipSpreader. This will cause the required “slack”. The control stick should then be pushed forward again, while still depressing the hitch release pushbutton. Once the truck has separated from the ChipSpreader, the hitch release pushbutton can be released. A second hitch release pushbutton is provided at the front operator’s controls.



**Figure 8. Control Panel**

- 11. Turn Signal Selector      14. Hazard Flasher Switch
- 12. Lt Turn Signal Ind      15. Headlight Switch
- 13. Rt Turn Signal Ind      16. Seat Shift Switch (optional)
- 17. Hitch Release Pushbutton      52. Brake Pedal

It is possible to stop with no “slack” in the hitch (between the ChipSpreader and supply truck). If this happens, the ChipSpreader must be backed up slightly to create the necessary “slack” and then driven forward while pushing the hitch release pushbutton.

In order to hook up to a supply truck, momentarily depress the hitch release pushbutton to open the hitch if it is not already open, and back into the truck. The

hitch automatically closes and locks when it contacts the back of the truck.

### 18. Hand Throttle Lever. (Figure 5)

Push forward and up to decrease engine RPM, pull back and downward to increase RPM. Under certain conditions it may be desired to have an intermediate RPM setting, however the hydrostatic system is designed to be run with the engine running at full governed RPM. Therefore whenever chipping at normal spreads (i.e. anything over 80 FPM) the engine should be run at governed RPM.

### 19. Application Rate Computer. (inside control panel)

The speed pickup (Figure 7) feeds a pulse speed signal to the computer. The gate position feedback transducer feeds a gate position signal to the computer. The computer compares the speed feedback signal to the set point and sends the appropriate signal to the pump to maintain the set speed. The computer also calculates the required gate opening for the set application rate and opens and closes the gates to maintain the application rate.

Normal spreading would be done as follows:

- a) Place the control handle in neutral.
- b) Set the desired speed using the Speed Toggle Switch (3).
- c) Turn the gate/spread roll switch (10) “off”.
- d) Set the desired application rate using the Rate Switch (5), or select the appropriate memory by pushing the appropriate memory button.
- e) Push the speed/direction handle (9) forward smoothly to the full forward position to accelerate to the speed set point.
- f) Upon reaching the starting line of spreading, depress the right side of the gate/spread roll switch (10) fully to turn the gates “on”.
- g) Upon reaching the ending line, center or depress the left side of the gate/spread roll switch fully (10) to shut the gates “off”.
- h) Return the control handle to neutral.

Speed changes may be made while moving by using the Speed Toggle Switch to set a new speed. The ChipSpreader will change speed to the new speed. The application rate will remain the same as long as the ChipSpreader is within the limits of gate opening for the particular aggregate selected.

If a speed is reached which requires a gate opening greater than that available for the aggregate selected, or than the hopper has available, the message “CAU-

TION: Speed Too High” will appear in the display. The gates will remain open but the ChipSpreader will not be able to maintain the set application rate.

### 20. Right Conveyor Selector (Figure 4)

In the bottom position, the conveyor is turned “On”.

In the next position from the bottom power is supplied to the front operator’s “on/off” selector switch allowing the front operator to turn the conveyors “on” or “off”.

In the 2nd position from the top, power is supplied to the auto diaphragm switch mounted below and along the inboard side of the conveyor hood. (See fig. 12) When this switch is tripped by material moving the paddle, the conveyor will shut off and conversely when it is untripped by a lack of material it will start the conveyor attempting to fill the hopper.

In the upper position, the conveyor is turned “Off”

### 21. Left Conveyor Selector. (Figure 4)

Same operation as above except for left conveyor and left conveyor auto diaphragm switch.

Since both conveyors are independently controlled, it is possible to run one conveyor in one mode of control while running the other conveyor in a totally different mode if so desired.

### 22. Hitch Height Switch. (Figure 4)

Push up to raise the hitch, push down to lower the hitch. When the switch is released, the cylinder will hold the hitch at a given height, about which it is free to float up and down on a spring to provide vertical articulation between the ChipSpreader the truck.

### 23. Left Gate Override Switch (Figure 4)

Depress to momentarily fully open the left hopper gate to clear a jam. Upon releasing the pushbutton, the gate will return to its original set point.

### 24. Right Gate Override Switch (Figure 4)

Depress to momentarily fully open the right hopper gate to clear a jam. Upon releasing the pushbutton, the gate will return to its original set point.

### 25. Left Hopper Position Switch (Figure 4)

Push left to extend the left hopper and push right to retract the left hopper.

### 26. Right Hopper Position Switch (Figure 4)

Push right to extend the right hopper and push left to retract the right hopper.

### 27. Left Gate Power Switch (Figure 4)

This switch connects or disconnects the left hopper’s

gate to the “gate/spread roll” switch (Item 10). When connected, the hopper is then turned “on” or “off” using the “gate/spread roll” switch.

### 28. Left Spread Roll Switch (Figure 4)

This switch connects or disconnects the left hopper’s spread roll to the “gate/spread roll” switch (Item 10). When connected, the spread roll is then turned “on” or “off” using the “gate/spread roll” switch. This switch is only supplied with the optional individual gates.

### 29. Right Hopper Power Switch (Figure 4)

This switch connects or disconnects the right hopper’s gate to the “gate/spread roll” switch (Item 10). When connected, the hopper is then turned “on” or “off” using the “gate/spread roll” switch.

### 30. Right Spread Roll Switch (Figure 4)

This switch connects or disconnects the right hopper’s spread roll to the “gate/spread roll” switch (Item 10). When connected, the spread roll is then turned “on” or “off” using the “gate/spread roll” switch. This switch is only supplied with the optional individual gates.

### 31. Left Auger Selector (Figure 4)

In the bottom position, the left auger is turned “On”.

In the next position from the bottom, power is supplied to the front operator’s “on/off” switch allowing the front operator to turn the left auger “on” or “off”.

In the 2nd position from the top, power is supplied to the auto switch located at the outboard end of the left hopper (See fig. 10). When this switch is tripped by material against the diaphragm, the auger will shut off and conversely when it is untripped by a lack of material, it will start the auger attempting to fill the outer end of the hopper. In the upper position, the auger is turned “Off”.

### 32. Right Auger Selector (Figure 4)

In the bottom position, the right auger is turned “On”.

In the next position from the bottom, power is supplied to the front operator’s “on/off” switch allowing the front operator to turn the right auger “on” or “off”.

In the 2nd position from the top, power is supplied to the auto switch located at the outboard end of the right hopper (See fig. 10). When this switch is tripped by material against the diaphragm, the auger will shut off and conversely when it is untripped by a lack of material, it will start the auger attempting to fill the outer end of the hopper. In the upper position, the auger is turned “Off”.

Since both augers are independently controlled, it is possible to run one auger in one mode of control while running the other auger in a totally different mode if so desired.

### 33. Memory Selector Buttons (Figure 4)

These switches select which of the 5 preset aggregate combinations of speed, application rate, size and material is to be spread.

### 34. Memory Save Button

This button is used to save the preset combination once it has been set to the desired parameters. See the section on Material Calibration and saving in a preset location.

### 35. Calibrate Switch (Figure 4)

This switch is used to calibrate the material before use. See the section on Material Calibration and saving in a preset location.

### 36. Individual Gates Master Switch

This switch connects the selected individual gates to the Thumb Switch on the top of the control stick so that the selected gates will open when the Thumb Switch is turned on. A more detailed description of how the gate operates is located in the section on the Individual Gates.

### 37. Left Hopper Gate Selector Switches

These switches select which gates on the left hopper will be opened when the Thumb Switch is turned on. Once the hopper is spreading, these switches are used to control individual gates on the left hopper, turning them on or off as the spread requires. A more detailed description of how the gate operates is located in the section on the Individual Gates.

### 38. Right Hopper Gate Selector Switches

These switches select which gates on the right hopper will be opened when the Thumb Switch is turned on. Once the hopper is spreading, these switches are used to control individual gates on the right hopper, turning them on or off as the spread requires. A more detailed description of how the gate operates is located in the section on the Individual Gates.

### 39. Horn (Figure 4)

This button is used to operate the Chipsreader’s horn for signalling the truck or warning of danger.

### 40. Batwing/Strobe Beacon Switch (Figure 4)

This switch is used to operate the batwing hopper. Push up to raise the batwings, and down to lower. On units with an optional strobe light or warning beacon,



that switch is located here and the batwing switch is located above the park/drive switch.

#### 41. Warning Light (Figure 4)

This light will be activated whenever one of the monitored functions reaches its alarm point. As in high oil temperature, high engine coolant temperature, low engine oil pressure, low voltage, and low fuel. The function which has reached its alarm point will be described in the computer's digital display.

#### 42. Filter Indicator (Figure 4)

This light indicates that the charge pressure filter is clogged when lit.

#### 52. Brake Pedal (Figure 8)

The brake pedal can be used to assist the hydrostatic braking. For instance, the parking brake is applied when the computer sees the chpspreader is stopped. On a grade, the chpspreader may roll back, since it did not come to a complete stop and apply the parking brake. The foot brake will hold the chpspreader on the grade until the parking brake is set.

When the chpspreader is in motion and the brake pedal is applied, a pressure switch in the brake line sends a 12 volt signal to the computer, which destroys the pump. The chpspreader will decelerate as long as the brake pedal is applied until it comes to a stop, regardless of the joystick position. To resume operation, the joystick must be returned to center. If the brake pedal is released during deceleration, the speed at that instant will become the new speed set point. For example, if the chpspreader is traveling at 1000 FPM and the brake pedal is applied, the chpspreader will begin to decelerate. If the brake pedal is then released at 500 FPM, this will be the new speed set point. When the joystick is returned to center, the speed set point will return back to the original 1000 FPM.



#### WARNING

Auger may start automatically at any time! Do not attempt to clear any jam with the engine running.

**ITEMS 43 THRU 51 ARE LOCATED IN THE FRONT OPERATOR'S CONTROL BOX (Figure 11)**

#### 43. Left Hopper Switch (Figure 11)

Push left to extend the left hopper and push right to retract the left hopper.

#### 44. Right Hopper Switch (Figure 11)

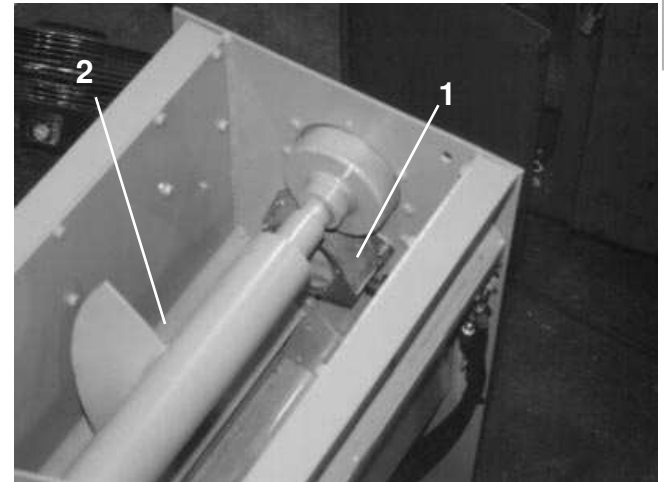
Push right to extend the right hopper and push left to retract the right hopper.

#### 45. Left Conveyor Switch (Figure 11)

When the driver has selected "front" on the left conveyor selector switch (22) this switch will turn the left conveyor "on" or "off".

#### 46. Right Conveyor Switch (Figure 11)

When the driver has selected "front" on the right conveyor selector switch (20) this switch will turn the right conveyor "on" or "off".



**Figure 10. Auger Auto On/Off Switch**

1. Switch

2. Auger

#### 47. Hitch Release Pushbutton (Figure 11)

Push the hitch release pushbutton to disengage the supply truck from the ChipSpreader. (See item 17 "Hitch Release Pushbutton, operator's control panel")

#### 48. Left Auger Switch (Figure 11)

When the driver has selected "front" on the left auger selector (38), this switch will turn the left auger "on" or "off".

#### 49. Right Auger Switch (Figure 11)


When the driver has selected "front" on the right auger selector (40), this switch will turn the right auger "on" or "off".

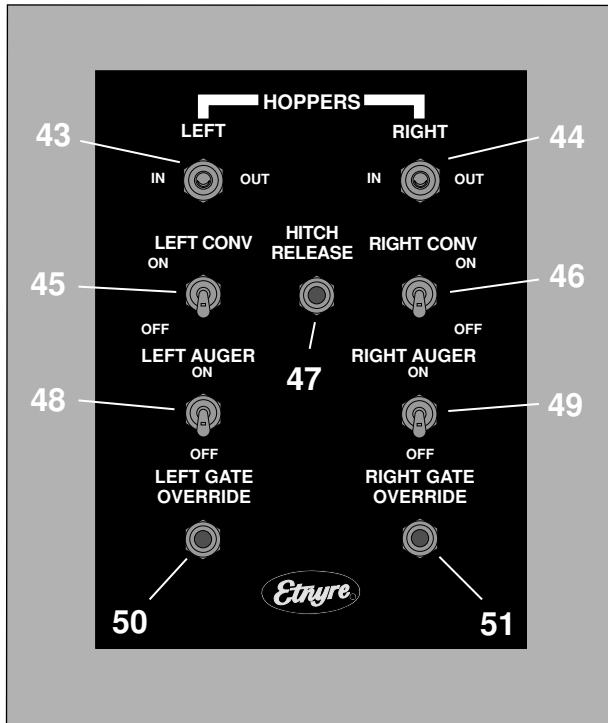
#### 50. Left Gate Override Switch (Figure 11)

Depress to momentarily fully open the left hopper gate to clear a jam. Upon releasing the pushbutton, the gate will return to its original set point.

### 51. Right Gate Override Switch (Figure 11)

Depress to momentarily fully open the right hopper gate to clear a jam. Upon releasing the pushbutton, the gate will return to its original set point..

 <b>WARNING</b>
<p>Unsafe operation of equipment may cause injury. Read, understand and follow the manuals when operating or performing maintenance.</p>



**Figure 11. Front Operator's Control Panel**

- |                              |                         |
|------------------------------|-------------------------|
| 43. Lt Hopper Switch         | 48. Lt Auger Switch     |
| 44. Rt Hopper Switch         | 49. Rt Auger Switch     |
| 45. Left Conveyor Switch     | 50. Left Gate Override  |
| 46. Right Conv Switch        | 51. Right Gate Override |
| 47. Hitch Release Pushbutton |                         |

# OPERATION

## WARNING

Unsafe operation of equipment may cause injury. Read, understand and follow the manuals when operating or performing maintenance.

Never place hands between the spread roll or gate and rear of hopper. The gate could move at any time and cause severe injury.

Do not travel with the seat unlatched. Seat movement could occur causing disorientation and possible loss of control.

Remain clear of all moving parts.

## CAUTION

Before operating the ChipSpreader, make an inspection of the machine to be sure that the machine is in a safe condition to operate.

## WARNING

Always use steps, platforms and handrails provided.

Always have shields, covers and guards in place when operating.

Make certain everyone is clear of machine before starting or operating the machine.

Since all functions except power steering and brakes are electrically controlled, turning the ignition key to "off" results in an emergency stop.

Keep loose clothing away from conveyor area when operating the conveyors.

## CAUTION

Always install locking control box cover and chock wheels when leaving machine unattended as protection against vandalism and accidental movement.

## IMPORTANT

Do not tow the ChipSpreader before reading the towing instructions contained in this manual. Improper towing may damage the hydraulic motors.

## WARNING

Unsafe operation of equipment may cause injury. Read, understand and follow the manuals when operating or performing maintenance.

Never put hands in between gate and spread roll or gate and rear of hopper. The gate could move at any time and cause severe injury.

Remain clear of all moving parts.

Should a piece of foreign material become lodged in the gates, push the gate override pushbutton (Ref. 23 or 24, Fig. 4) to open the appropriate gate above the set point to allow the piece to pass. Releasing the override will return the gates to the previously set position.

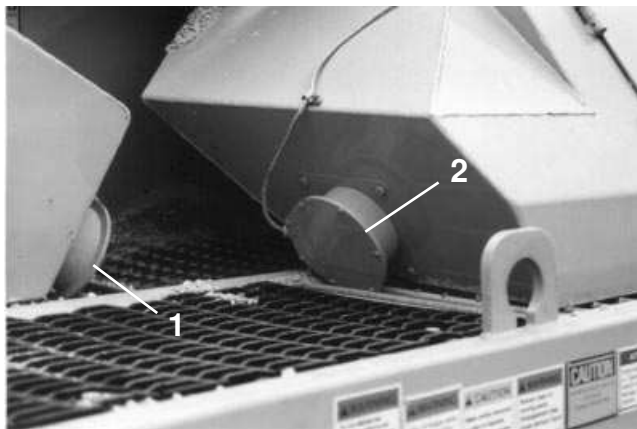
Adjust ChipSpreader hitch height as necessary to accommodate different individual trucks.

Operate the conveyor belt switches so as to maintain an even distribution of aggregate in the front hopper.

The machine is equipped with conveyor belt speed controls. The rear conveyor gates should be set to deliver as much material as possible into the conveyor without spillage and then the conveyor speed should be adjusted to deliver slightly more aggregate to the front hopper than the amount being spread. When properly adjusted, the conveyors should run approximately 80% of the time with the hopper at maximum width and the ChipSpreader traveling at maximum speed for the particular job.

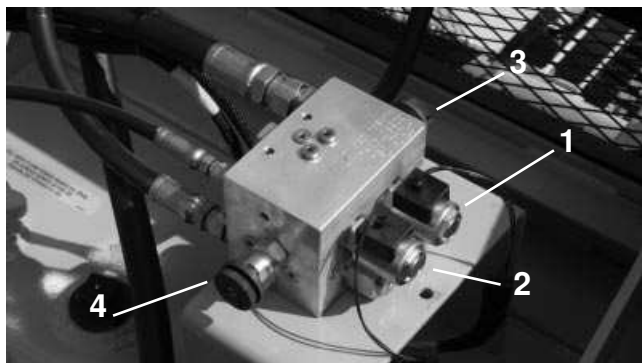
### Automatic Conveyor Control (Figure 4)

In the 2nd position from the top, power is supplied to the auto diaphragm switch mounted below and along the inboard side of the conveyor hood. When this switch is tripped by material moving the paddle, the conveyor will shut “off” and conversely when it is untripped by lack of material it will start the conveyor attempting to fill the hopper. (Fig. 12)



**Figure 12. Conveyor Diaphragm Switches**

1. Right Diaphragm Switch    2. Left Diaphragm Switch



**Figure 13. Belt Speed Controls**

1. Rt Conv Solenoid Valve    3. Rt Speed Control Valve  
2. Lt Conv Solenoid Valve    4. Lt Speed Control Valve

### Belt Speed Controls (Figure 13)

This feature allows the operator located on the right catwalk to vary the speed of each conveyor independently to provide a uniform distribution of material to the front hopper. Valves for this operation are incorporated in the integrated circuit block under cover between the conveyors. Each valve has an adjustment knob and a locking ring.

With the knob screwed fully out, the conveyor will run at its highest speed. Screwing the knob clockwise to its full in position will slow the conveyor down. The knob may be positioned anywhere in between and locked at the desired speed with the lock ring.

This feature is particularly useful in doing shoulder

work or in operations requiring less than full hopper width. It is also useful in trying to smooth out delivery of material to match the rate being spread. (Fig.13) When properly adjusted, the conveyors should run approximately 80% of the time with the hopper at maximum width and the ChipSpreader traveling at maximum speed for the particular job.

**⚠ CAUTION**

Keep loose clothing away from conveyor area when operating conveyors.

### Backup Alarm

The electric backup alarm is automatically actuated when the speed/direction control handle (Fig. 6) is pulled to the rear of neutral.

**⚠ WARNING**

Unsafe operation of equipment may cause injury. Read, understand and follow manuals when operating or performing maintenance.

### Hydraulic Powered Seat Assembly

A hydraulically powered seat positioner is operated by a spring centered toggle switch (Fig 8). The seat may be positioned wherever it is desired for operation.

### Individual Gates (Figure 14)

The individual gates are located at the outer ends of each hopper as described below.

hopper lgth	9'	10'	11'	12'
gates/side	4	4	5	5
lgth inside gate	5'	6'	6'	7'

These gates are turned on or off by air cylinders. The air cylinders either keep the gate closed, or when turned on, they open the gate up against the hydraulically positioned buss bar. The computer controls the position of buss bar according to the gate opening required. The buss bar is turned on/off by using the gate/spread roll thumb switch. For opening of all of the gates, the left and right gate power switches should be turned on and the left and right spread roll switches should be turned on. For normal operation, the Gate Master switch is turned on, and the switches for the individual gates are all turned on. When operated in this manner, the entire left and right hoppers will open across their full

width. If the hoppers are fully extended, turning off individual switches on the outboard end will turn off 1 foot increments until getting to the inboard gate which will shut off 4 or more feet depending on hopper size and extension. The inboard gate will always shut off that side from the centerline of the ChipSpreader to the 1st 1 foot gate.

As an example, assume a 10 ft variable hopper is fully closed up. There are 4 1 ft gates and a single 6 ft gate on each side. When the hopper is fully closed up the 6 ft gate has only 1 ft exposed beyond the centerline. This is the same on the other side. The hopper will operate as a 10 ft hopper with 10 individual 1 ft gates across its length. If the left hopper were extended 2 ft out and the right hopper were also extended 2 ft out, you would have a 14 ft hopper with gates of 1,1,1,1,3,3,1,1,1, and 1 ft widths. When the hopper is fully extended to 20 ft the gates would be 1,1,1,1,6,6,1,1,1,1.

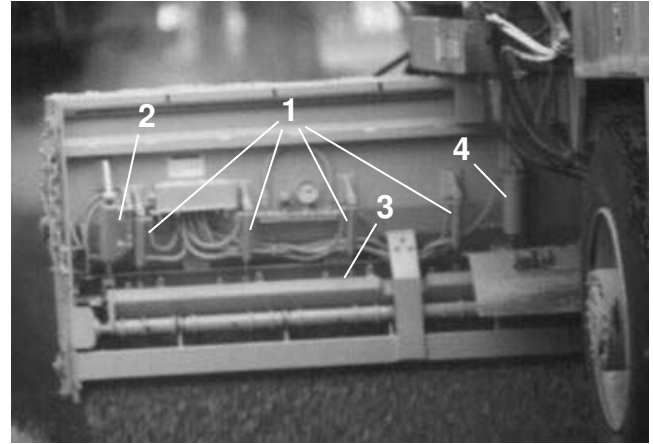
The normal operation would be to turn on the Master gate switch and also all of the individual switches. The gates would then be turned on or off from the thumb switch on the control handle. If it is desired to turn the gates off instantly in some operations, the Gate Master switch can be turned off before the thumb switch, and then the thumb switch turned off.

*Be sure to turn the Gate Master Switch back on again before opening the thumb switch or no gates will open with the buss bar.*

If it is desired to spread a couple of feet at the end of a hopper for either shoulder work or patching, it is recommended that the spread roll for the hopper be turned off to avoid unnecessary wear on the portion of the spread roll that is turning against the closed gates. If the spread roll is turned off, the application rate will be less than with the spread roll on, so it will be necessary to increase the application rate or gate opening to get the same amount of material.

Units built after 3/1/2002 are equipped with individual 1 ft gates across the entire width of the hopper

and operated in a similar manner against a buss bar.



**Figure 14. Individual Gates**

- |                  |                             |
|------------------|-----------------------------|
| 1. Air Cylinder  | 3. Buss Bar                 |
| 2. Hydr Cylinder | 4. Inside Gate Air Cylinder |

# APPENDIX A

## MAINTENANCE ADJUSTMENTS

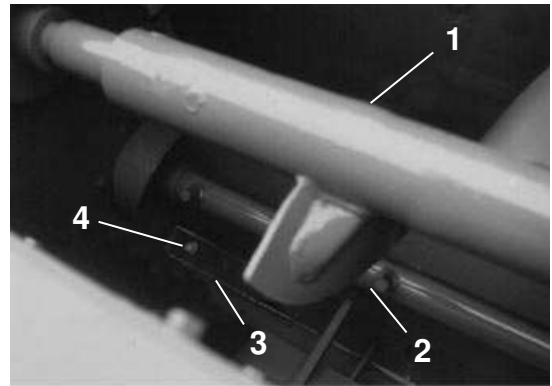
### WARNING

When two people are required to perform adjustments or maintenance operations or two people are simultaneously performing different operations, the work must be coordinated between the two people to avoid possible injuries.

### WARNING

When two people are performing maintenance adjustments, do not start engine without assuring that the other person is clear of moving parts and out from under the machine. Be sure that the mode selector is in park and the control stick is in neutral before attempting to start engine.

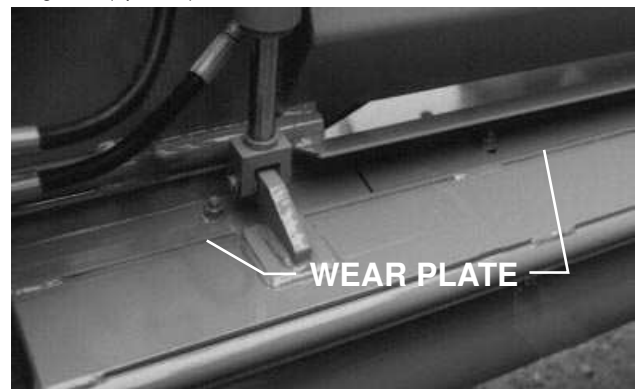
MAINTENANCE



**Figure 15. Spread Roll Wear Plate**

(View from top of Hopper Looking Down)

1. Auger
2. Agitator (optional)
3. Spread Roll Wear Plate
4. Hold Down Bolts



**Figure 16 Hopper Gate Wear Plate**

### Hopper Spread Roll Wear Plate Adjustment

#### (Figure 15)

Turn the spread rolls and conveyors “off”.

1. Loosen all spread roll wear plate hold down bolts and adjust the wear plate until a nominal 1/16" clearance exists between the wear plate and the spread roll for the entire hopper width.

2. Re tighten all the hold down bolts.

3. When one side of a plate has worn excessively it is possible to turn the plate over and use the opposite side.

### Hopper Gate Wear Plate Adjustment (Fig. 16)

Turn spread roll and conveyors “off”.

1. Loosen wear plate hold down bolts and extend the plate 1/32" past the gate edge along the entire gate width.

2. Tighten hold down bolts.

3. As plate wear occurs, additional adjustment will be necessary.

4. When one side of a plate has been worn away it is possible to turn the plate over and use the opposite side.

### WARNING

Conveyor must be running during this procedure. To avoid personal injury, be sure to remain clear of moving belt.

### Conveyor Belt Adjustment

1. If the conveyor belt tends to move towards one side of the conveyor, tighten tail pulley adjustment on that side until the belt is running in the center.

2. Should it be impossible to obtain centered belt operation by adjusting the tail pulley (Fig. 17) it will then be necessary to adjust the head pulley as outlined below. (Fig. 18)

#### For the right hand conveyor:

a) Loosen the four bolts holding the left hand side head pulley bearing.

- b) Loosen adjusting bolt jam nuts.
- c) Start conveyor at this time.
- d) If belt runs to the right hand side of the conveyor, loosen the adjusting screws until the belt is centered on the head pulley.
- e) If belt runs to the left hand side of the conveyor, tighten the adjusting screws until the belt is centered on the head pulley.
- f) Re tighten adjusting screw jam nuts.
- g) Stop the conveyor belt.
- h) Tighten head pulley bearing bolts.

<b>⚠ WARNING</b>
Remain clear of all moving parts.



**Figure 17 Conveyor Tail Pulley**

1. Conveyor Belt Tail Pulley Adjustment Bolt (4 Places)

**For left hand conveyor:**

- a) Loosen the four bolts holding the right hand side head pulley bearing.
- b) Loosen the adjusting bolt jam nuts.
- c) Start conveyor at this time.

<b>⚠ WARNING</b>
Remain clear of all moving parts.

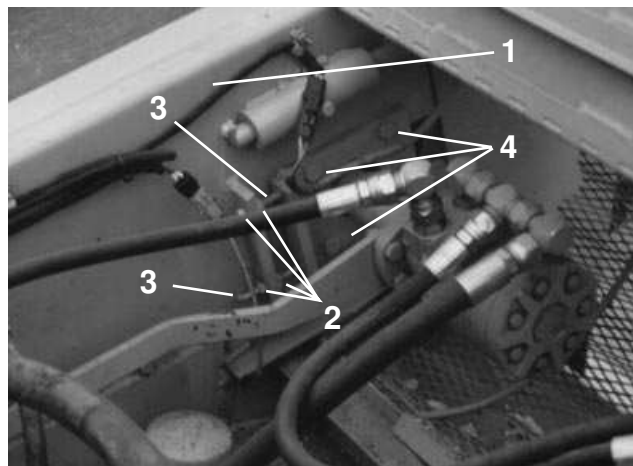
- d) If belt runs to the right side of the conveyor, tighten the adjusting screws until the belt is centered on the head pulley.
- e) If belt runs to the left side of the conveyor, loosen the adjusting screws until the belt is centered on the head pulley.
- f) Re tighten adjusting screw jam nuts.
- g) Stop the conveyor belt.
- h) Tighten head pulley bearing bolts.

**NOTE:** Only a small amount of head pulley adjustment should be necessary to center conveyor belts.

3. Conveyor belts should be sufficiently tight to prevent head pulley slippage when the belts are loaded and operating at full governed speed. It should be noted, however, that excessive belt tightness will result in shortened belt and pulley bearing life. It may be necessary to tighten the belts several times during the first few weeks of operation until most of the initial belt stretch has been removed. When doing so it is necessary to tighten each side equally to keep the belt running centered.

<b>⚠ WARNING</b>
The fuel tank is part of the crosswalk. Do not drill or weld in this area.

<b>⚠ CAUTION</b>
To avoid potential damage to electrical components, disconnect batteries before welding



**Figure 18 Conveyor Head Pulley Adjustment**

- 1. Left Conveyor
- 2. Jam Nut
- 3. Adjusting Screw
- 4. Bearing Bolts

<b>⚠ IMPORTANT</b>
Do not tow the chipspreader before reading the towing instructions contained in this manual. Improper towing may damage the hydraulic motors and brakes.

**Towing Instructions**

Disconnect driveline assembly at front axle. On a 4WD machine, also disconnect the driveline on the rear axle

# APPENDIX B

## COMPUTER SETUP

### COMPUTER SET UP

The computer must be set up and the various sensors calibrated for the particular ChipSpreader that the computer is installed in. This is normally done at the factory, and the settings are retained in the computer's non volatile memory. Normally an entire set up does not have to be done in the field, but if a joystick or a gate transducer is replaced, that particular item would have to be re-calibrated. In the case of a gate transducer, it should be mechanically set using the procedure described under "Hopper Gate Transducer Adjustment" before re-calibrating the computer. In order to do that, you must enter the set up screens and follow through the various screen as described below. If an item is already properly set, you can just scroll by it to the next item, until you get to the one that needs to be re-calibrated. If any one item is changed, you must save it using the procedure described at the end of the various screens.

### SET UP SCREENS

The following screens are entered by holding the cal switch either up or down while turning the ignition key on.

**IMPORTANT:** The setup of the computer should be performed with the ignition key on, but the engine not running, except for calibrating the gates and the speed.



#### CAUTION

Always place the mode selector switch in the "park" position when the chipspreader is stopped to avoid accidental movement of the machine.

These screens are used to configure the computer to the particular ChipSpreader and to calibrate the speed pickup, control stick, gates, and application rate. The first screen will appear when the ignition key is released from the start position.

#### SETUP: FIRMWARE

##### Version 2.XX

This screen shows the version of firmware which is loaded in the machine. (version 2.60 for example)

Push the "scroll" switch down to move to the next screen.

#### SETUP: ENGINE

##### CUMMINS

This screen shows which engine is in the machine and sets the tach input for that manufacturers engine. Use the "cal" switch to toggle between Cummins and Caterpillar engines. Push the "scroll" switch down to move to the next screen.

#### SETUP: DRIVE

##### 4 WHEEL

This screen is used to set the type of drive in the machine. Either 2 wheel or 4 wheel drive. Use the "cal" switch to toggle between 2 and 4 wheel drive. Push the "scroll" switch down to move to the next screen.

#### SETUP: MOTOR SIZE

##### 107 CC

This screen is used to set the motor displacement. Use the "cal" switch to toggle between 107 CC and 160 CC. If the machine is a 2WD this must be set to 160 CC. If it is a 4WD, this must be set to 107 CC (standard) or 160 CC depending on the size of the motors. When this has been properly set, push the "scroll" switch down to move to the next screen.

#### SETUP: HOPPER

##### VARIABLE

This screen is used to set the type of hopper installed on the machine. Use the "cal" switch to toggle between fixed and variable hoppers. When this set for your machine, push the "scroll" switch down to move to the next screen.

#### SETUP: UNITS

##### ENGLISH

This screen is used to set the display units to either english or metric. Use the "cal" switch to toggle between english and metric units. When this set for your



machine, push the “scroll” switch down to move to the next screen.

**SETUP: JOYSTICK**

**Actual            0.0%**

This screen is the entry screen for calibrating the joystick. It should say 0.0% with the stick in neutral. If the stick is pushed full forward, the reading should change to 100% and if it pulled fully back into reverse, the reading should change to -100%. If it does not at any of these positions, place the stick in neutral. Be sure it is in neutral and then push the “cal” switch. **Once you have pushed the “cal” switch you must complete the sequence or you will have lost the existing calibration of the joystick.** When you push the “cal” switch, the screen will change to

**SETUP: JOYSTICK**

**Neutral            0.0 volts**

Push the “cal” switch to calibrate the neutral position. The display will change to

**SETUP: JOYSTICK**

**forward            0.0 volts**

Push the stick full forward, the reading should change to approximately 4.8 or 4.9 volts. When you have the stick fully forward, push the “cal” switch to calibrate the full forward position of the control stick. The display will change to

**SETUP: JOYSTICK**

**reverse            0.0 volts**

Pull the stick to the full reverse position, the reading should change to approximately 4.8 or 4.9 volts. When you have the stick fully rearward, push the “cal” switch to calibrate the full reverse position of the control stick. The display will change to

**SETUP: JOYSTICK**

**Actual            0.0%**

When you have finished calibrating the joystick, push the “scroll” switch to change to the next screen.

**SETUP: THRESHOLDS**

**Forward:            0.450 amps**

This screen is used to set the threshold current to the

forward solenoid on the hydrostatic pump. This value should be set to 0.450 amps, using the “cal” switch. When it is set to this value, push the “scroll” switch to move to the next screen.

**SETUP: THRESHOLDS**

**Reverse:            0.350 amps**

This screen is used to set the threshold current to the reverse solenoid on the hydrostatic pump. This value should be set to 0.350 amps, using the “cal” switch. When it is set to this value, push the “scroll” switch to move to the next screen.

**SETUP: RIGHT NULL**

**Actual:            0.00 inches**

This screen is used to set the actual closed position of the right gate. Be sure that the gate is actually closed. This number should read 0.00 inches, if this number is not 0.00, set it to 0.00 using the “cal” switch. When it is set to this value, push the “scroll” switch to move to the next screen.

**SETUP: RIGHT SCALE**

**Actual:            0.00 inches**

This screen is used to set the actual open position of the right gate. The number will read 0.00 inches until the right gate override is actuated. While holding the right gate override the number should read 4.00 inches. If it does not read 4.00, first visually verify that the gate is actually fully open. After verification, while holding the right gate override, press the CAL switch to set the value to 4.00 inches. When the right gate override is released, the number on the screen should go back to 0.00.

**SETUP: LEFT NULL**

**Actual:            0.00 inches**


This screen is used to set the actual closed position of the left gate. Be sure that the gate is actually closed. This number should read 0.00 inches, if this number is not 0.00, set it to 0.00 using the “cal” switch. When it is set to this value, push the “scroll” switch to move to the next screen.

**SETUP: LEFT SCALE**

**Actual:            0.00 inches**

This screen is used to set the actual open position of

the left gate. The number will read 0.00 inches until the left gate override is actuated. While holding the left gate override the number should read 4.00 inches. If it does not read 4.00, first visually verify that the gate is actually fully open. After verification, while holding the left gate override, press the CAL switch to set the value to 4.00 inches. When the left gate override is released, the number on the screen should go back to 0.00.

 <b>WARNING</b>
<p>Never put hands in between gate and spread roll or gate and rear of hopper to clear obstruction. The gate could move at any time and cause severe injury.</p>

**SETUP: Front Motor**

**0 fpm 0.400 amp**

This screen is used to set the threshold current to the front motor. The threshold current normally does not need to be changed. It only might need to be changed if the ChipSpreader is to be operated at extremely slow speeds -well under 100 fpm. Operate the chipsreader at 300 fpm. While the chipsreader is running at 300 fpm, increase the threshold current until a change in speed is felt, and then back it down until there is no speed change. The normal threshold current setting from the factory is 0.400 amps. When it is set to this value, push the “scroll” switch to move to the next screen.

**SETUP: Rear Motor**

**0 fpm 0.400 amp**

This screen is used to set the threshold current to the rear motor of a 4WD ChipSpreader. The threshold current normally does not need to be changed. It only might need to be changed if the ChipSpreader is to be operated at extremely slow speed -well under 100 fpm. Operate the chipsreader at 300 fpm. While the chipsreader is running at 300 fpm, increase the threshold current until a change in speed is felt, and then back it down until there is no speed change. The normal threshold current setting from the factory is 0.400 amps. When it is set to this value, push the “scroll” switch to move to the next screen.

The calibration done in these setup screens is to adjust the open and close thresholds on the proportional valves controlling the gate cylinders. These thresholds determine the speed at which the gates open and close and allow the operator to adjust them independently from side to side to make them open and close at the same speed.

**SETUP: RIGHT OPEN**

**0.900 amps**

Use the “cal” switch to adjust the current up or down to increase or decrease the speed at which the right gate opens.

**SETUP: RIGHT CLOSE**

**1.200 amps**

Use the “cal” switch to adjust the current up or down to increase or decrease the speed at which the right gate closes.

**SETUP: LEFT OPEN**

**0.975 amps**

Use the “cal” switch to adjust the current up or down to increase or decrease the speed at which the left gate opens.

**SETUP: LEFT CLOSE**

**0.900 amps**

Use the “cal” switch to adjust the current up or down to increase or decrease the speed at which the left gate closes.

**SETUP: GATE OPEN HOLD**

**DISTANCE: 0.0 inches**

This screen is used to set the delay of the right gate on a variable hopper. This value should be set to 18.0. The computer would wait until the chipsreader travels an additional 18 inches before the right gate will open. The left gate is not affected by changing this number.

**SETUP: GATE SHUT HOLD**

**DISTANCE: 0.0 inches**

This screen is used to set the delay of the right gate on a variable hopper. This value should be set to 18.0. The computer would wait until the chipsreader travels an additional 18 inches before the right gate will close. The left gate is not affected by this number.

**SETUP: SAVE AND EXIT**

**Press Save to Exit**

Press the “Save” button to save any changes that were made or press the “Scroll” switch down to exit without saving.

# APPENDIX C

## COMPUTER SERVICE SCREENS

### SERVICE SCREENS

The service screens are entered by holding the “scroll” switch either up or down while turning the ignition key on. The first four screens are the same as the “Operator Screens” described under “OPERATOR SCREENS” but will be repeated here.

**CAUTION:** When in the service screens, all interlocks are disabled and it is possible to open the gates in the manual mode while standing still.

<b>20.0</b>	<b>3/8</b>	<b>400</b>
<b>lb/yd<sup>2</sup></b>	<b>Chip</b>	<b>fpm</b>

This screen shows the application rate set point, aggregate preset and the speed set point when standing still.

This is the screen that will come up when the ignition is turned on and the engine is started, while holding the “scroll” switch either up or down. To move to the next screen, push the scroll switch down.

<b>100°F</b>	<b>60 PSI</b>	<b>15%</b>
<b>WATER</b>	<b>OIL</b>	<b>FUEL</b>

This screen shows the engine coolant temperature on the left, the engine oil pressure in the center, and the fuel remaining in the fuel tank on the right. To move to the next screen, push the scroll switch down.

<b>100°F</b>	<b>2200 RPM</b>	<b>13.8 V</b>
<b>HYD OIL</b>	<b>ENGINE</b>	<b>BATTERY</b>

This screen shows the hydraulic oil temperature on the left, the engine rpm in the center, and the system voltage on the right side. To move to the next screen, push the scroll switch down.

<b>120.8</b>	<b>7550 FT</b>
<b>ENGINE</b>	<b>CHIPPED</b>

This screen shows the hours on the machine on the

left side, and the feet chipped on the right side. To move to the next screen, push the scroll switch down to move to the first real service screen

**SERVICE: RIGHT NULL**  
**Actual: 0.0 inches**

This screen shows the actual position of the right gate. Push the scroll switch down to move to the next screen.

**SERVICE: LEFT NULL**  
**Actual: 0.0 inches**

This screen shows the actual position of the left gate. Push the scroll switch down to move to the next screen.

**SERVICE: Aggre. Last**  
**Status: De-activated**

This screen shows the position of the “Size” switch. Push the “Size” switch up and the display should change to Activated until the switch is released. Push the scroll switch down to move to the next screen.

**SERVICE: Aggre. Next**  
**Status: De-activated**

This screen shows the position of the “Size” switch. Push the “Size” switch down and the display should change to Activated until the switch is released. Push the scroll switch down to move to the next screen.

**SERVICE: Appl Rate-**  
**Status: De-activated**

This screen shows the position of the “Rate” switch. Push the “Rate” switch down and the display should change to Activated until the switch is released. Push the scroll switch down to move to the next screen.

**SERVICE: Appl Rate+**

**Status: De-activated**

This screen shows the position of the “Rate” switch. Push the “Rate” switch up and the display should change to Activated until the switch is released. Push the scroll switch down to move to the next screen.

**SERVICE: Cal Rate-**

**Status: De-activated**

This screen shows the position of the “Cal” switch. Push the “Cal” switch down and the display should change to Activated until the switch is released. Push the scroll switch down to move to the next screen.

**SERVICE: Cal Rate+**

**Status: De-activated**

This screen shows the position of the “Cal” switch. Push the “Cal” switch up and the display should change to Activated until the switch is released. Push the scroll switch down to move to the next screen.

**Be sure the “Park /Drive” Mode Switch is in the park position before performing the next sequence of checks.**

**SERVICE: L.GATE SEL**

**Status: De-activated**

This screen shows the position of the “Left Gate Selector” switch. Put the “Left Gate Select” switch up, depress the right side of the “Thumb” switch and push the joystick out of neutral. The display should change to Activated. Check that it is deactivated with each of the following switches. Put the joystick in neutral. It should become deactivated. Push the joystick out of neutral, it should become activated again. With the joystick still out of neutral, center the “Thumb” switch and it should become deactivated. Turn the “Thumb” switch back on again. With the joystick still out of neutral, push the “Left Gate Select” switch down and the display should change to deactivated. Push the scroll switch down to move to the next screen.

**SERVICE: L.GATE OVER**

**Status: De-activated**

This screen shows the position of the “Left Gate Override” switch. Push the left gate override button down and the display should change to activated as long as the button is held down and return to deactivated when the button is released. Push the scroll switch down to move to the next screen.

**SERVICE: R.GATE SEL**

**Status: De-activated**

This screen shows the position of the “Right Gate Selector” switch. Put the “Right Gate Select” switch up, depress the right side of the “Thumb” switch and push the joystick out of neutral. The display should change to Activated. Check that it is deactivated with each of the following switches. Put the joystick in neutral. It should become deactivated. Push the joystick out of neutral, it should become activated again. With the joystick still out of neutral, center the “Thumb” switch and it should become deactivated. Turn the “Thumb” switch back on again. With the joystick still out of neutral, push the “Right Gate Select” switch down and the display should change to deactivated. Push the scroll switch down to move to the next screen.

**SERVICE: R.GATE OVER**

**Status: De-activated**

This screen shows the position of the “Right Gate Override” switch. Push the “Right Gate Override” button down and the display should change to activated as long as the button is held down and return to deactivated when the button is released. Push the scroll switch down to move to the next screen.

**SERVICE: BRAKE INPUT**

**Status: De-activated**

This screen shows the position of the “Brake” pedal. Push the “Brake” pedal down and the display should change to “Activated” as long as the pedal is held down. Push the scroll switch down to move to the next screen.

**SERVICE: Save**

**Status: De-activated**

This screen shows the position of the “Save” Button. Push the “Save” button down and the display should change to Activated as long as the button is held down. Push the scroll switch down to move to the next screen.

**SERVICE: Setup #1**  
**Status: De-activated**

This screen shows the position of the “Memory 1” Button. Push the “Memory 1” button down and the display should change to Activated as long as the button is held down. Push the scroll switch down to move to the next screen.

**SERVICE: Setup #2**  
**Status: De-activated**

This screen shows the position of the “Memory 2” Button. Push the “Memory 2” button down and the display should change to Activated as long as the button is held down. Push the scroll switch down to move to the next screen.

**SERVICE: Setup #3**  
**Status: De-activated**

This screen shows the position of the “Memory 3” Button. Push the “Memory 3” button down and the display should change to Activated as long as the button is held down. Push the scroll switch down to move to the next screen.

**SERVICE: Setup #4**  
**Status: De-activated**

This screen shows the position of the “Memory 4” Button. Push the “Memory 2” button down and the display should change to Activated as long as the button is held down. Push the scroll switch down to move to the next screen.

**SERVICE: Setup #5**  
**Status: De-activated**

This screen shows the position of the “Memory 5” Button. Push the “Memory 5” button down and the display should change to Activated as long as the button is

held down. Push the scroll switch down to move to the next screen.

**SERVICE: VEH. SPEED-**  
**Status: De-activated**

This screen shows the position of the “Speed” Switch. Push the “Speed” switch down and the display should change to Activated as long as the switch is held down. Push the scroll switch down to move to the next screen.

**SERVICE: VEH. SPEED+**  
**Status: De-activated**

This screen shows the position of the “Speed” Switch. Push the “Speed” switch up and the display should change to Activated as long as the switch is held up. Push the scroll switch down to move to the next screen.

**SERVICE: RELEASE**  
**Status: De-activated**

This screen shows the position of the “Brake Release” Switch. With the “Park/Drive” Mode selector in the park position and the engine not running, push the control stick out of neutral. The display should change to activated until the control stick is returned to neutral. Push the scroll switch down to move to the next screen.

**SERVICE: BATTERY**  
**Status: 12.3 volts**

This screen shows the condition of the battery and charging system. With the engine not running the battery voltage will be displayed. When the engine is running, the display will show the output voltage of the alternator. Push the scroll switch down to move to the next screen.

**SERVICE: OIL PRESSURE**  
**Status: 4.80 volts**

This screen shows the voltage being measured in the oil pressure sender circuit. Push the scroll switch down

to move to the next screen.

**SERVICE: WATER TEMP**

**Status: 4.80 volts**

This screen shows the voltage being measured in the water temperature sender circuit. Push the scroll switch down to move to the next screen.

**SERVICE: Engine Speed**

**Status: 0 Hertz**

This screen shows the frequency being measured in the engine tachometer circuit. Push the scroll switch down to move to the next screen.

**SERVICE: Fuel Level**

**Status: 2.80 Volts**

This screen shows the voltage being measured in the fuel level circuit. Push the scroll switch down to move to the next screen.

**SERVICE: Hyd Oil Temp**

**Status: 8.82 Volts**

This screen shows the voltage being measured in the hydraulic oil temperature circuit. Push the scroll switch down to move to the next screen.

**SERVICE: Front Speed**

**Status: 0 Hertz**

This screen shows the frequency being measured in the front motor speed feedback circuit. Push the scroll switch down to move to the next screen.

**SERVICE: Rear Speed**

**Status: 0 Hertz**

This screen shows the frequency being measured in the rear motor speed feedback circuit. Push the scroll switch down to move to the next screen.

**SERVICE: Left Gate**

**Status: 0.00 Volts**

This screen shows the voltage being measured in the left gate feedback circuit. Push the scroll switch down to move to the next screen.

**SERVICE: Right Gate**

**Status: 0.00 Volts**

This screen shows the voltage being measured in the right gate feedback circuit. Push the scroll switch down to move to the next screen.

**SERVICE: Joystick**

**Status: 0.00 Volts**

This screen shows the voltage being measured in the joystick circuit. 0.0 volts is the neutral position with +4.8 volts and -4.8 volts being the full forward and full reverse positions respectively. Push the scroll switch down to move to the next screen.

**SERVICE: Forward**

**Status: 0.00 Amps**

This screen shows the current to the forward solenoid of the pump. Push the scroll switch down to move to the next screen.

**SERVICE: Reverse**

**Status: 0.00 Amps**

This screen shows the current to the reverse solenoid of the pump. Push the scroll switch down to move to the next screen.

**SERVICE: Front Motor**

**Status: 0.00 Amps**

This screen shows the current to the front motor in either a 2WD or a 4WD machine. Push the scroll switch down to move to the next screen.

**SERVICE: Rear Motor**

**Status: 0.00 Amps**

This screen shows the current to the rear motor in a 4WD machine. Push the scroll switch down to move to the next screen.

**SERVICE: Left Close**

**Status: 0.00 Amps**

This screen shows the current to the left gate closing solenoid. Push the scroll switch down to move to the next screen.

**SERVICE: Left Open**

**Status: 0.00 Amps**

This screen shows the current to the left gate open solenoid. Push the scroll switch down to move to the next screen.

**SERVICE: Right Close**

**Status: 0.00 Amps**

This screen shows the current to the right gate closing solenoid. Push the scroll switch down to move to the next screen.

**SERVICE: Right Open**

**Status: 0.00 Amps**

This screen shows the current to the right gate open solenoid. Push the scroll switch down to move to the next screen.

**2 hrs**

**0 ft**

**ENGINE**

**CHIPPED**

From this screen, scrolling down will bring you back into the service screens, while scrolling up 3 times will take you back to the top operating screen.

# APPENDIX D1 for Units built before 3/1/2002

## SYSTEMS STARTUP AND ADJUSTMENTS

MAINTENANCE

### Hydrostatic System Startup

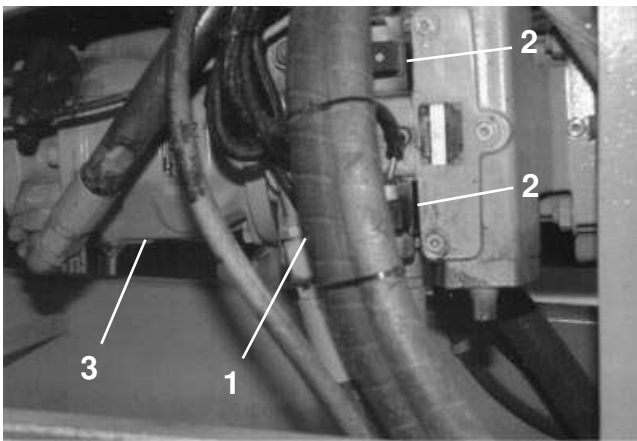
After any work has been done on the hydrostatic ground drive system which involved opening up the circuit in any way, the following startup procedure should be used.

1. Jack the machine up and securely support on stands with all four wheels off the ground.
2. Disconnect the fuel solenoid wire at the engine, so that the engine can only be cranked and cannot be started. (Fig. 20)
3. Disconnect pump stroker at the pump.

**⚠ WARNING**

Be certain that machine is securely supported on stands. Wheels will be rotating under power & if they contact the ground or debris becomes lodged between the wheels & ground, the chippers could drive off the stands.

4. Remove 1/4" plug (Fig. 27) on the hydrostatic drive pump and insert a 600 psi gage with the necessary adapters to hook to a 04MB port.



**Figure 19 Hydrostatic Pump**

1. Hydrostatic Pump
2. Fwd & Rev Solenoids
3. 1st Implement Pump

5. Make sure the gate valve, (Fig. 21) in the suction tube is turned fully open (counterclockwise) with sleeve and handle installed. Do not attempt to start the engine with the gate valve closed. This will block the flow to the pumps and cause cavitation.

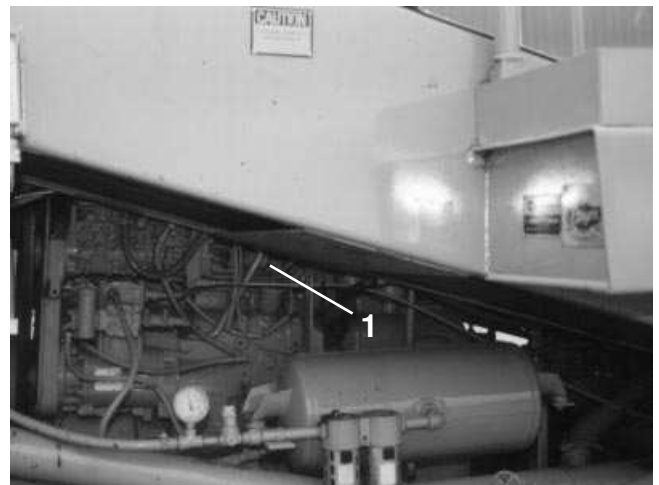
**CAUTION! DO NOT CRANK ENGINE WITH GATE VALVE CLOSED. DOING SO WILL CAUSE DAMAGE TO THE HYDRAULIC PUMPS.**

6. Turn ignition key “on” and retard throttle to idle. Turn key to “start” and crank engine with starter until seeing at least 40 to 60 psi on the charge pressure gage.

**DO NOT CRANK FOR MORE THAN 30 SECONDS.**

Wait at least 2 minutes before cranking again. If no pressure reading can be obtained after 2 or 3 attempts, the starter may not be cranking the engine fast enough to develop charge pressure.

7. Hook up fuel solenoid valve.
8. Turn ignition key to “start” and release, letting engine run at idle. Observe the charge pressure for a reading within 30 seconds. Once a reading is seen, allow the engine to idle for about 10 minutes.



**Figure 20. Engine Left Side**

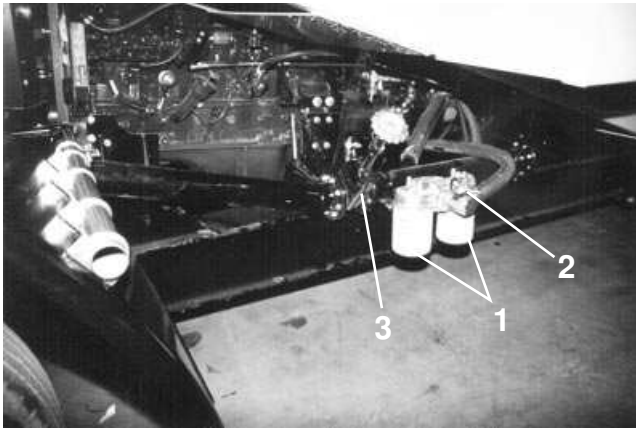
1. Fuel Solenoid

During filling of all lines and components, the charge pressure can surge between 50 and 500 psi. As the system fills, surging will decrease and the charge pressure should settle down to a steady reading.



**WARNING**

Be certain that machine is securely supported on stands. Wheels will be rotating under power.



**Figure 21 Suction Filters**

1. Suction Filters      2. Suction Gage      3. Gate Valve

9. Shut down engine, remove all gages and replace all plugs or caps. Recheck fluid levels after 15 minutes and add as necessary to bring to level of sight eyes in each tank.

### Gate Transducer Adjustment- Units Built Before 3/1/02

1. Place the Drive/Park selector in “PARK”
2. Hold the CAL switch down and start the engine. Release the CAL switch once the computer beeps three times. This will access the computer set up screens.
3. Scroll down until the display reads RIGHT GATE NULL. This value should be around 0.0. If it is not, verify that the right gate is closed. There should be 1/16” between each gate and the spreadroll. If necessary, disconnect the connectors from the right gate valve and power the gate shut using the manual override. Once the gate is shut, press the CAL switch down to set the closed value (null).
4. Once the null is set, scroll down to the next screen, RIGHT GATE SCALE. Hold the right gate override pushbutton down and monitor the display. The display should show 4.00” while the override is activated. If it does not, verify that the gate is fully open. Once the gate is fully opened, press the CAL switch down while holding the override to set the opening to 4.00” When the gate override is released, the display should go back to 0.00”
5. Scroll down to the next screen, LEFT GATE

NULL. Follow the procedure outlined above to set the null and the scale for the left gate.

6. Once both gates have been set, scroll down to the last screen of the set up screens and press the save push-button to save any changes that were made.

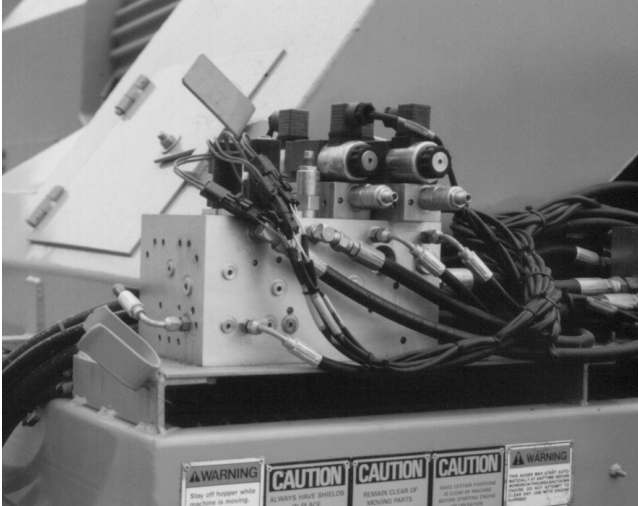
The procedure described above is very effective for making adjustments to the gate potentiometers and it is recommended to try and set the gates using the computer set up screens prior to physically making any adjustments to the potentiometer itself. If the gates cannot be set using the set up screens, or a new gate potentiometer is to be installed, the following procedure should be used.

1. Place the Drive/Park selector in “PARK”.
2. Disconnect the connector from each solenoid of both gate valves.
3. Start the engine and run it at about 1000rpm.
4. Extend both hoppers approximately 2 feet each.
5. Using the manual overrides on each gate solenoid valve, close the gates fully. There should be 1/16” between each gate and its spread roll.
6. Shut the engine off and reconnect the connectors to each solenoid of the gate valves.
7. Disconnect the 3-pin connector at the right gate transducer. Measure the resistance between the orange and green wires. The value should be approximately 250-280 ohms. Next, check the resistance between the black and green wires. This value should be between 950 and 1200 ohms.
8. Follow the same procedure for the left gate transducer.
9. If the values measured in steps 7 and 8 are not within the specified tolerance, remove the cover on each hopper that needs adjusting.
10. Loosen the locking bolt on the gate shaft until the pin plate can be rotated against the position feedback pot.
11. Rotate the pin against the position feedback pot to obtain a reading within the range and retighten the locking bolt.
12. Recheck the reading. Once it is within the range, reconnect the connector and reinstall each transducer cover.
13. Upon completion, access the computer set up screens and set the gate null as described above.

**WARNING**

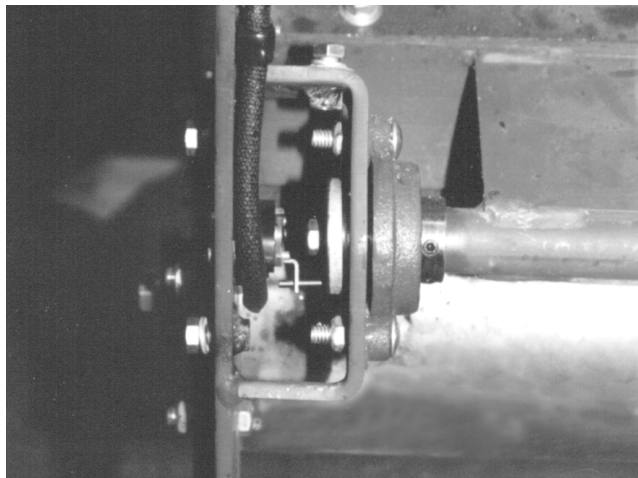
Never put hands in between gate and spread roll or gate and rear of hopper to clear an obstruction. The gate could move at any time and cause severe injury.

MAINTENANCE



**Figure 22 Gate Solenoids**

- 1. Gate Solenoid Valves
- 2. Hopper Solenoid



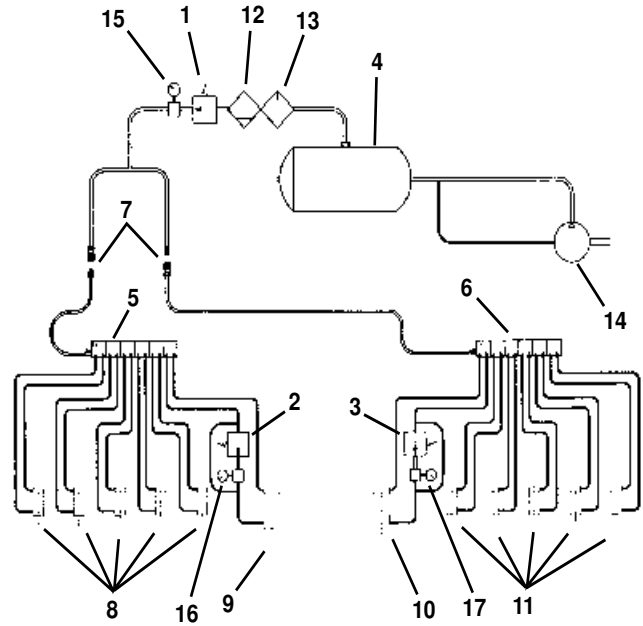
**Figure 23 Left Hopper Transducer**

- 1. Transducer
- 2. Pin Plate
- 3. Nut
- 4. Bearing

**Air Pressure Adjustments**

**(Individual Gate System Only)**

1. Set the main pressure regulator at 90 psi. (Fig.24)
2. Set the left inside gate open regulator (Fig. 24) to 35 to 40 psi.
3. Set the right inside gate open regulator (Fig. 24) to 35 to 40 psi.



**Figure 24 Air System  
(Individual Gate System Only)**

- 1. Main Regulator
- 2. Left Inside Gate Regulator
- 3. Rt Inside Gate Regulator
- 4. Reservoir
- 5. Left Valve Bank
- 6. Right Valve Bank
- 7. Quick Couplers
- 8. Left 1 FT Gate Cylinders
- 9. Left Inner Gate Cylinder
- 10. Right Inner Gate Cylinder
- 11. Rt 1 FT Gate Cylinders
- 12. Water Separator
- 13. Air Oiler
- 14. Compressor
- 15. Main Pressure Gage
- 16. Lt Inner Gate Pressure Gage
- 17. Rt Inner Gate Pressure Gage

## PRESSURE ADJUSTMENTS

### Pressure Settings For Hydrostatic Drive Pump (Rexroth AA4VG125 Pump)

The pressure settings consist of two (2) high pressure cross port relief valves (forward and reverse) and the pressure override (pressure cutoff) for the AA4VG125 pump. The adjustment procedure is as follows:

1) Install 10,000 psi pressure gages in ports  $M_A$  and  $M_B$  located on the topside of the pump as installed. These ports are -04 SAE O-ring.

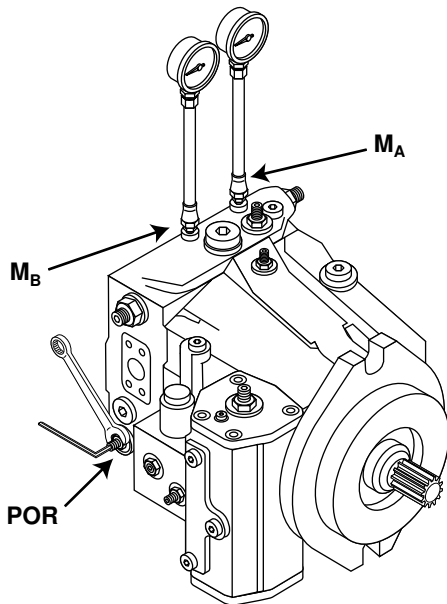


Figure 25 POR Setting

2) The pressure override (POR) should be turned all the way **IN** to be able to obtain the highest possible pressure cutoff setting. Turn screw in (clockwise) until resistance is encountered. Do not force the adjustment past this point. The POR adjustment is located below the curb side high pressure port. The adjustment will require a 4mm allen wrench and a 13mm box wrench. The protective plastic cover may have to be removed to gain access to the POR adjustment.

3) Set the forward and reverse high pressure cross-port relief valves (Relief valves A & B) to approximately 7,000 psi. To do this, first disable the parking brake release circuit by disconnecting the weatherpack connector at the parking brake release solenoid. This solenoid is located on the hydraulic manifold under the center deck cover below the operator's station. Of the three

solenoids on this manifold, it is the small single coil located to the front of the manifold. Disabling this circuit will insure the chipsreader will not move while checking pressures. Once the parking brake release has been disabled, unhook the brake pressure switch, if equipped. The switch is located on the hose coming from the foot pedal. Apply the foot pedal brake and push joystick forward developing maximum system pressure. Check reading on gage in port  $M_A$  for forward high pressure. Should the pressure need adjusting, you may have to remove the protective plastic cover located above the high pressure port on the street side of the pump. Turn adjusting screw in (clockwise) to increase relief setting. This adjustment requires a 5mm allen wrench and a 17mm box wrench. Once forward cross-port relief valve (relief valve A) has been set to 7000 psi, repeat above procedure for reverse (relief valve B). Adjustment for this relief is located above the curb side high pressure port.

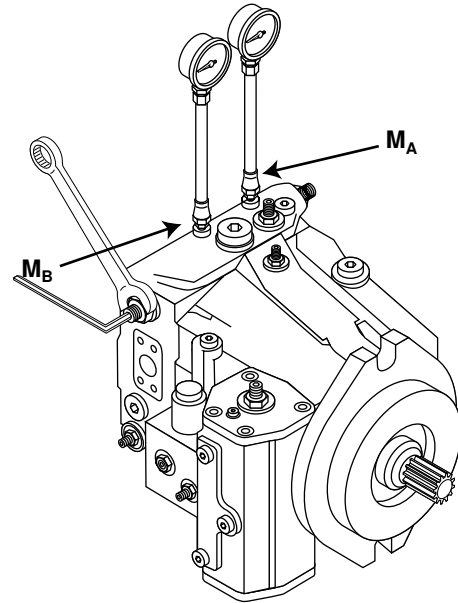


Figure 26 High Pressure Relief Setting

### CAUTION

When setting the two high pressure cross-port relief valves **DO NOT** leave the pump on stroke for more than a few seconds at a time. The flow is being short circuited from the pump inlet and a lot of heat is being generated.

The Correct procedure is to:

Put the pump on stroke and see where the relief valve pressure setting is at but not leaving the pump on stroke

for more than a few seconds


Put the pump to neutral

Make an adjustment to the relief valve

Put the pump on stroke again and see where the pressure level is at.

Repeat the above process as many times as necessary until the correct pressure level is obtained.

4) Once the two high pressure relief valves set correctly for forward and reverse, set the Pressure Override Valve to 6500 psi. To do this, adjust the POR screw out (counter clockwise) until the high pressure reads 6500 psi. The POR adjustment is the same screw that was turned in full in step 2. There is only one setting for this relief that controls forward and reverse.

 <b>CAUTION</b>
<p>When making the pressure override adjustment, the pump should be put on stroke only for a few seconds at a time until you are sure that the pressure cutoff setting is <b>Below</b> the setting of the two high pressure cross-port relief valves.</p>

Once the pressure override setting is below that of the two high pressure cross-port relief valves, the pump can be left on stroke without any problems as there will be no flow across the high pressure cross-port relief valves.

Remove the gages.

### Setting the Charge Pressure

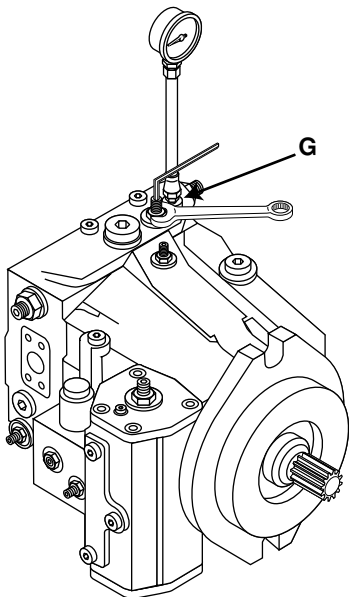


Figure 27 Charge Pressure Adjustment

1) Install 600 PSI gage in gage port on the left side of the top of the hydrostatic pump. The gage will require a size 04 female JIC end to plumb to the gage port. With engine at low idle, the charge pressure should read 400 psi.

2) If the pressure is below 380 or above 420, an adjustment should be made to the charge pressure relief valve. To access the relief valve adjustment, you may have to remove the protective plastic cap located on the topside of the pump beside the port marked “G”. Using a 17mm box wrench with a 5mm allen wrench, loosen the jam nut and turn set screw clockwise if the pressure is low. If the pressure is high, loosen the jam nut and turn set screw counterclockwise. One turn is equal to 55 psi.

Remove the gage.

### Pressure Settings For Auxiliary Pump(s) (Rexroth A10VO74 Pump)

The variable hopper chispsreader utilizes two variable displacement pumps to supply flow to hydraulic functions. These pumps are mounted piggyback on the through drive of the hydrostatic drive pump. Flow for both conveyors and the right spreadroll is supplied by the first pump. The second pump supplies flow for both augers, the left spreadroll, the hopper extend/retract cylinders, and the gate cylinders. These pumps have an internal high pressure relief setting and a standby or margin pressure setting. The high pressure relief should be set to 3000 psi, and the standby pressure set to 300 psi for both pumps.

### High Pressure Relief Valve

#### Setting the first pump (conveyors)

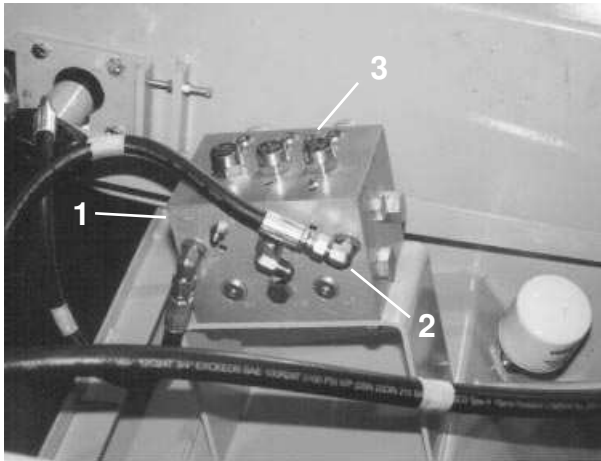
1) Install a 5000 psi gage in the port marked “GLS” on the conveyor manifold located on top of the hydraulic reservoir. This port is SAE 04 and requires a 3/16 allen wrench to remove the plug. Remove the pressure hose plumbed to the left conveyor at the manifold and cap the adapter in the port marked “LP” with a 1/2” (08) JIC hydraulic cap.

2) With engine running at high idle, turn on left conveyor and monitor gage pressure. If the pressure reading is below 2800 psi or above 3050 psi an adjustment can be made.

3) To make an adjustment, use a 17mm wrench to remove protective cap from relief set screw located to the rear of the pump on the curbside of the chispsreader. Of the two adjustments at this location, the high pressure relief is the lower one of the two (Figure 29, Ref

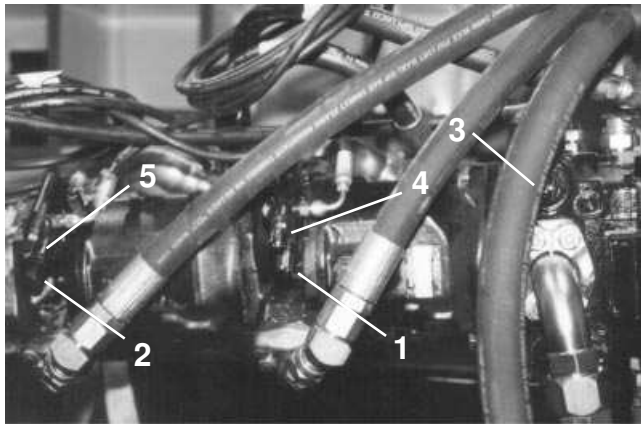
1) If pressure is low, loosen jam nut and turn set screw clockwise using a 5mm allen wrench. If pressure is high, loosen jam nut and turn set screw counterclockwise. Replace protective cover once correct pressure is set.

4) Reinstall the hose removed in step 1 and remove gage.



**Figure 28 Conveyor Block**

- 1. "GLS" Port
- 2. "LP" Port and Fitting
- 3. "G" Port



**Figure 29 Pumps**

- 1. Conveyor Relief Valve
- 2. Front Hopper Relief Valve
- 3. Main Hydrostatic Pump
- 4. Conveyor Standby Pressure
- 5. Hopper Standby Pressure

### Setting the second pump (front hopper functions)

1) Install a 5000 psi gage in the port marked "GLS" on the auger manifold located on the front hopper (Fig 30 Ref 1). This is the rear most manifold of the two. This port is SAE 04 and requires a 3/16 allen wrench to remove the plug. Remove the pressure hose plumbed to the left auger at the manifold and cap the adapter in the port marked "LP" with a 1/2" (08) JIC hydraulic cap (Fig 30 Ref 2).

2) With engine running at high idle, turn on left auger and monitor gage pressure. If the pressure reading is below 2800 psi or above 3050 psi an adjustment can be made.

3) To make an adjustment, use a 17mm wrench to remove protective cap from relief set screw located to the rear of the pump on the curbside of the chipspreader. Of the two adjustments at this location, the high pressure relief is the lower one of the two (Fig 29, Ref 2). If pressure is low, loosen jam nut and turn set screw clockwise using a 5mm allen wrench. If pressure is high, loosen jam nut and turn set screw counterclockwise. Replace protective cover once correct pressure is set.

4) Reinstall the hose removed in step 1 and remove gage.

### CAUTION

Do not set pressure above 3000 psi. The hydraulic components are rated for 3000 psi. Failure of these components could occur to at system pressures above 3000 psi.

### Standby Pressure

#### Setting the first pump (conveyors)

1) Install a 600 psi gage in the port marked "G" on the conveyor manifold located on top of the hydraulic reservoir (Fig 28 Ref 3). This port is SAE 04 and requires a 3/16 allen wrench to remove the plug.

2) Make sure the left and right conveyor switches are in the "off" position and the thumb switch on the control handle is in the center position before starting the engine. Failure to do so could result in a blown gage. Start the engine and run at high idle and monitor the gage pressure. If the pressure is below 285 psi or above 315 psi, an adjustment should be made.

3) To make an adjustment, use a 17mm wrench to remove protective cap from set screw. The standby pressure adjustment is higher adjustment of the two adjustments at the rear of the pump (Fig 29 Ref 4). The 1/4" load sense hydraulic line is plumbed into the "X" port in the side of the set screw housing. If pressure is low, loosen jam nut and turn set screw clockwise using a 5mm allen wrench. If pressure is high, loosen jam nut and turn set screw counterclockwise. Replace protective cover once correct pressure is set.

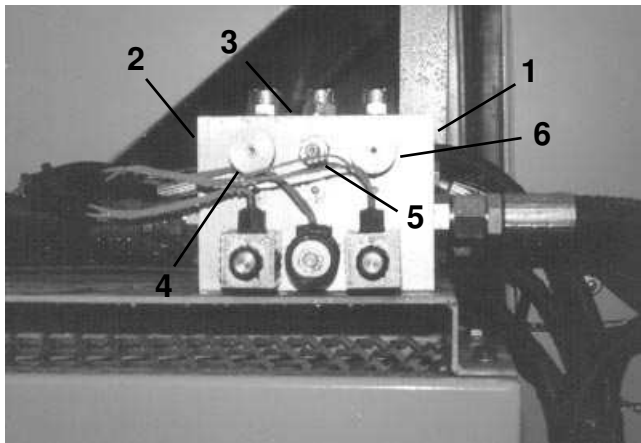
4) Reconnect the electrical connectors on the gate valve and remove the gage.

### Setting the second pump (front hopper functions)

1) Install a 600 psi gage in the port marked “G” on the auger manifold located on the front hopper (Fig 30 Ref 3). This port is SAE 04 and requires a 3/16 allen wrench to remove the plug.

2) Disconnect electrical connectors from gate valves. Make sure the left and right auger switches are in the “off” position and the thumb switch on the control handle is in the center position before starting the engine. Failure to do so could result in a blown gage. Start the engine and run at high idle and monitor the gage pressure. If the pressure is below 285 psi or above 315 psi, an adjustment should be made.

3) To make an adjustment, use a 17mm wrench to remove protective cap from set screw. The standby pressure adjustment is rear most adjustment of the two adjustments at the rear of the pump (Fig 29 Ref 5). The 1/4” load sense hydraulic line is plumbed into the “X” port in the side of the set screw housing. If pressure is low, loosen jam nut and turn set screw clockwise using a 5mm allen wrench. If pressure is high, loosen jam nut and turn set screw counterclockwise. Replace protective cover once correct pressure is set.



**Figure 30 Auger Manifold**

- 1. “GLS” Port
- 2. “LP” Port
- 3. “G” Port
- 4. Lt Auger Speed Control
- 5. Lt Spreadroll Speed Cont
- 6. Rt Auger Speed Control

### Pressure/Flow Settings For Actuator Valving

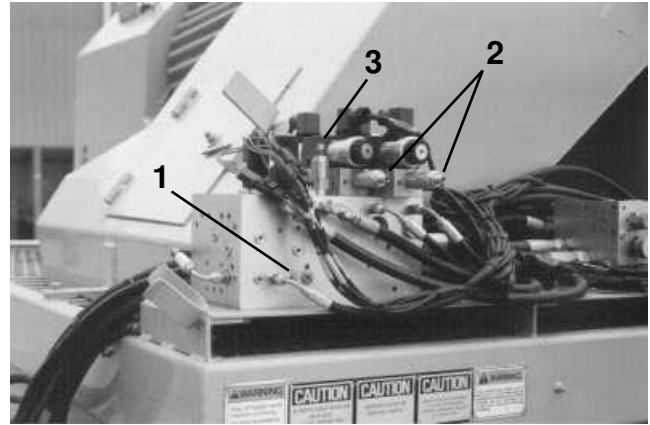
(Functions supplied by pressure compensating auxiliary pump)

Note: Other than individual circuits which require reduced pressure for mechanical purposes, the main system relief is set at the pump.

### Gate Cylinder Relief Valves

The relief setting for the gate cylinder relief valves (left and right) should be set to 1200 psi.

1) Install 2000 psi gage in “G” port of hopper cylinder manifold located to the front left of the hopper (Fig 31 Ref 1). This port is SAE 04 MB and requires a 3/16 allen wrench to remove the plug.



**Figure 31 Hopper Block**

- 1. “G” Port
- 2. Gate Relief Valves
- 3. Hopper Extend/Retract Relief Valve

2) With engine at high idle, depress and hold the left gate override push-button and monitor pressure. If pressure is below 1100 or above 1300, an adjustment should be made.

3) To adjust pressure, use 3/4” box wrench to loosen jam nut on set screw located on sandwich valve mounted under the directional control valve for gate cylinder (Fig 31 Ref 2). If pressure is low, turn set screw clockwise. If pressure is high, turn set screw counterclockwise.

4) Repeat above procedure for the right gate relief valve.

5) Reconnect the electrical connectors on the gate valve and remove the gage.

### Hopper Extend/Retract Relief Valve

The relief setting for the hopper extend/retract valve should be set to 2000 psi.

1) Install a 3000 psi gage in “G” port of hopper cylinder manifold located to the front left of the hopper (Fig 31 Ref 1). This port is SAE 04 MB and requires a 3/16 allen wrench to remove the plug.

2) With engine at high idle, extend or retract hopper fully (left or right) to bottom out cylinder. Hold cylinder in this position and monitor gage pressure. If pressure is below 1900 psi or above 2100 psi an adjustment

should be made.

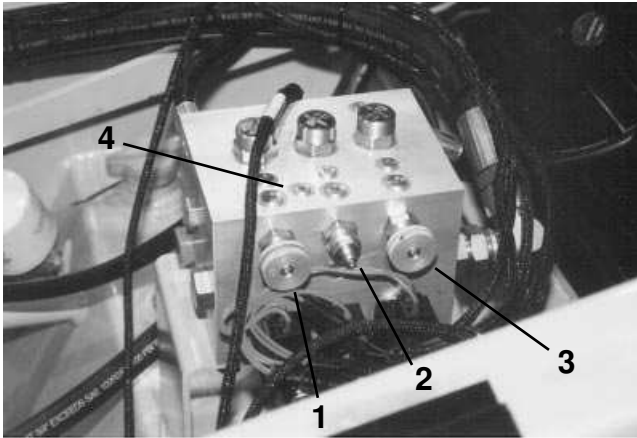
3) To adjust pressure, use a 3/4" box wrench to loosen jam nut (Fig 31 Ref 3). If pressure is low, turn set screw clockwise using a 1/4" allen wrench. If pressure is high, turn set screw counterclockwise. This relief valve regulates pressure for both left and right extend/retract functions.

### Spreadroll Speed Adjustment

The spreadrolls are each to be set at 96 rpm.

#### Right Spreadroll

1) Insure park/drive switch is in the park position and the right gate and right spreadroll power switches are on. With engine at high idle, push joystick slightly out of neutral and depress right side of thumb switch engaging the right gate/spreadroll circuit. Time the spreadroll with a stopwatch or a low speed tachometer to determine the revolutions per minute.



**Figure 32 Conveyor & Right Spreadroll Manifold**

- |                            |                                |
|----------------------------|--------------------------------|
| 1. Left Conv Speed Control | 2. Rt Spreadroll Speed Control |
| 3. Rt Conv Speed Control   | 4. Gage Port                   |

2) To adjust the speed, loosen the jam nut on the spreadroll flow control valve using a 3/4" box wrench. This valve is located on the conveyor manifold on the hydraulic reservoir and is the center of the three adjustments. Using a 1/4" allen wrench, turn set screw clockwise to decrease the speed of the spreadroll, or counterclockwise to increase the speed.

#### Left Spreadroll

1) Insure park/drive switch is in the park position and the left gate and left spreadroll power switches are on. With engine at high idle, push joystick slightly out

of neutral and depress right side of thumb switch engaging the left gate/spreadroll circuit. Time the spreadroll with a stopwatch or a low speed tachometer to determine the revolutions per minute.

2) To adjust the speed, loosen the jam nut on the spreadroll flow control valve using a 3/4" box wrench. This valve is located on the auger manifold on the front hopper and is the center of the three adjustments (Fig 30 Ref 5). Using a 1/4" allen wrench, turn set screw clockwise to decrease the speed of the spreadroll, or counterclockwise to increase the speed.

### Conveyor Speed Adjustment

The conveyors should be set to a speed that allows the aggregate to fall into the front hoods. Running the conveyors faster than this **does not** increase the amount of aggregate delivered to the front hopper but **does** cause premature wear of the hood frames and create unnecessary noise.

1) To adjust the speed of the conveyor (left or right) loosen jam nut by hand on the flow control valve for the conveyor to be changed. The adjustments are located on the conveyor manifold on the hydraulic reservoir (Fig 32 Ref 1 & 3). Turn the aluminum knob attached to the set screw clockwise to decrease conveyor speed or counterclockwise to increase speed. Hand tighten jam nut once speeds are set.

### Auger Speed Adjustment

1) To adjust the speed of the auger (left or right) loosen jam nut by hand on the flow control valve for the auger to be changed. The adjustments are located on the auger manifold on the front hopper (Fig 30 Ref 4 & 6). Turn the aluminum knob attached to the set screw clockwise to decrease conveyor speed or counterclockwise to increase speed. Hand tighten jam nut once speeds are set.

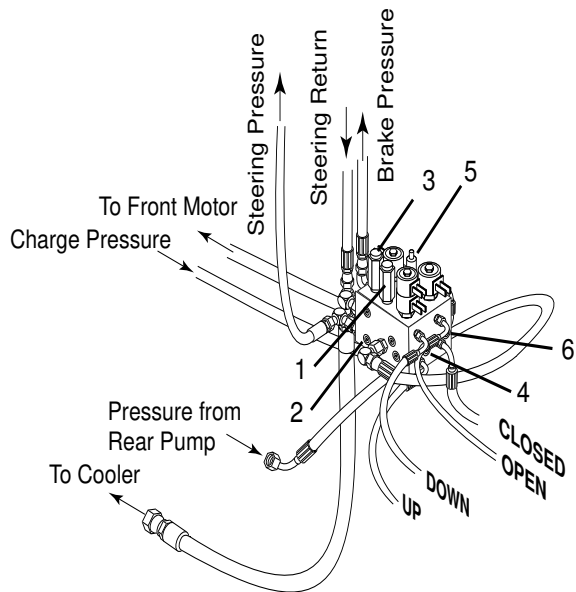
### Fixed Displacement Auxiliary Pump

The fixed displacement pump (gear pump) is mounted to the back of the pressure compensating auxiliary pump. This pump supplies flow for the power steering and hitch functions. The gear pump does not have an internal relief and relies on external valving to govern relief pressure.

## Pressure Settings For Actuator Valving Supplied By Fixed Displacement Pump

### Main Relief Pressure (MP)

The main relief pressure should be set to 2000 psi. The steering motor operates at this pressure.



**Figure 33 Hydraulic Control Assembly**

1. Main Pressure Relief Valve
2. Main Pressure Check Port
3. Pilot Pressure Relief Valve
4. Pilot Pressure Check Port
5. Hitch Release Pressure Reducing Valve
6. Reduced Pressure Check Port

1) Install 3000 psi gage in port marked “MP” on steering/hitch manifold located under center deck cover below operators station (Fig 33 Ref 2). This port is SAE 06 MB and requires a 1/4” allen wrench to remove plug.

2) With engine at or above 1000 rpm, turn front wheels full left or right until steering cylinder is fully stroked. Hold wheels in this position and monitor pressure.

**Note: Engine must not be running to adjust set screw. When cap is removed, oil will flow through valve and spray out top of valve.**

3) If the pressure is low, remove cap from top of relief valve (Fig 33 Ref 1) using vise grips and adjust set screw clockwise using a 1/4” allen wrench. If pressure is high, adjust set screw counterclockwise.

### Pilot Pressure (PP)

The pilot pressure should be set to 250 psi. The hitch raise/lower function operates at this pressure.

1) Install 600 psi gage in port marked “PP” on steering/hitch manifold (Fig 33 Ref 4). This port is SAE 06 MB and requires a 1/4” allen wrench to remove plug.

2) With engine at or above 1000 rpm, monitor pressure.

**Note: Engine must not be running to adjust set screw. When cap is removed, oil will flow through valve and spray out top of valve.**

3) If the pressure is low, remove cap from top of relief valve (Fig 33 Ref 3) using vise grips ) and adjust set screw clockwise using a 1/4” allen wrench. If pressure is high, adjust set screw counterclockwise.

### Reduced Pressure (RP)

The reduced pressure should be set to approximately 120 psi. This can vary due to back pressure in the return line to the reservoir. The hitch release function operates at this pressure.

1) Install 600 psi gage in port marked “RP” on steering/hitch manifold (Fig 33 Ref 6). On 2WD units, this port has a 1/4” JIC hydraulic tee installed with a 1/4” JIC cap. Remove cap to access the reduced pressure. This will require a 1/4” female JIC adapter on the gage. On 2WD units, the port is plugged. This port is SAE 06 MB and requires a 1/4” allen wrench to remove plug.

2) Once gage is installed, run engine at or above 1000 rpm and monitor pressure.

3) If pressure is low loosen jam nut on reducing valve (Fig 33 Ref 5), with 3/4” box wrench and turn set screw clockwise using 1/4” allen wrench. If pressure is high, turn counterclockwise. If pressure can not be set down to 120 psi, back set screw full out (counterclockwise) and turn back in 10-15 psi.



# APPENDIX D2 for Units built after 3/1/2002

## SYSTEMS STARTUP AND ADJUSTMENTS

### Hydrostatic System Startup

After any work has been done on the hydrostatic ground drive system which involved opening up the circuit in any way, the following startup procedure should be used.

1. Jack the machine up and securely support on stands with all four wheels off the ground.
2. Disconnect the fuel solenoid wire at the engine, so that the engine can only be cranked and cannot be started. (Fig. 35)
3. Disconnect pump stroker at the pump.



#### WARNING

Be certain that machine is securely supported on stands. Wheels will be rotating under power & if they contact the ground or debris becomes lodged between the wheels & ground, the chipperspreader could drive off the stands.

4. Remove 1/4" plug (Fig. 42) on the hydrostatic drive pump and insert a 600 psi gage with the necessary adapters to hook to a 04MB port.

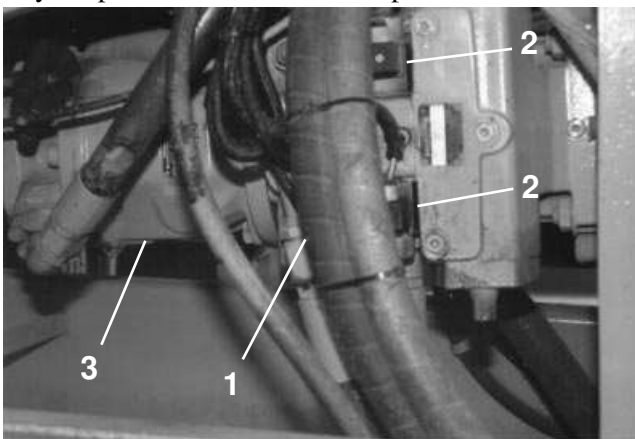


Figure 34 Hydrostatic Pump

1. Hydrostatic Pump
2. Fwd & Rev Solenoids
3. 1st Implement Pump

5. Make sure the gate valve, (Fig 36) in the suction tube is turned fully open (counterclockwise) with sleeve and handle installed. Do not attempt to start the engine with the gate valve closed. This will block the flow to the pumps and cause cavitation.

**CAUTION! DO NOT CRANK ENGINE WITH GATE VALVE CLOSED. DOING SO WILL CAUSE DAMAGE TO THE HYDRAULIC PUMPS.**

6. Turn ignition key "on" and retard throttle to idle. Turn key to "start" and crank engine with starter until seeing at least 40 to 60 psi on the charge pressure gage.

**DO NOT CRANK FOR MORE THAN 30 SECONDS.**

Wait at least 2 minutes before cranking again. If no pressure reading can be obtained after 2 or 3 attempts, the starter may not be cranking the engine fast enough to develop charge pressure.

7. Hook up fuel solenoid valve.

8. Turn ignition key to "start" and release, letting engine run at idle. Observe the charge pressure for a reading within 30 seconds. Once a reading is seen, allow the engine to idle for about 10 minutes.

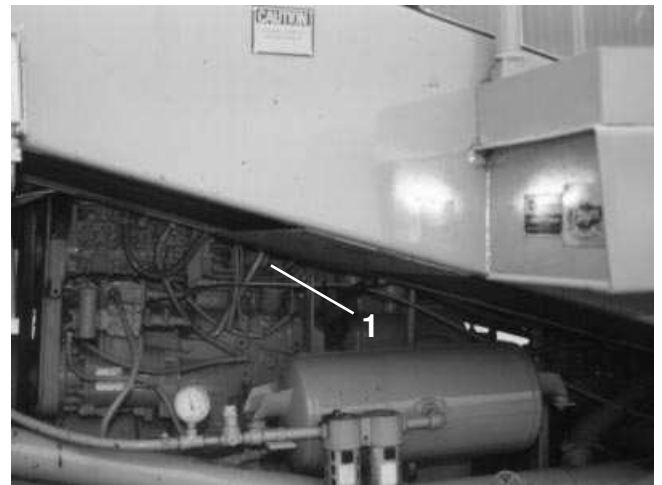


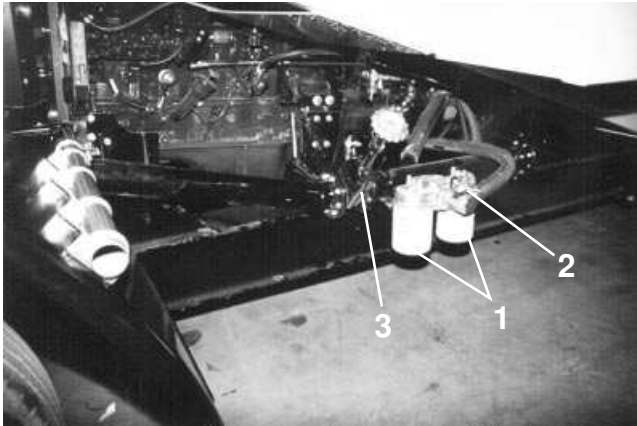
Figure 35. Engine Left Side

1. Fuel Solenoid

During filling of all lines and components, the charge pressure can surge between 50 and 500 psi. As the system fills, surging will decrease and the charge pressure should settle down to a steady reading.

**WARNING**

Be certain that machine is securely supported on stands. Wheels will be rotating under power.



**Figure 36 Suction Filters**

1. Suction Filters      2. Suction Gage      3. Gate Valve

9. Shut down engine, remove all gages and replace all plugs or caps. Recheck fluid levels after 15 minutes and add as necessary to bring to level of sight eyes in each tank.

### Gate Transducer Adjustment- Units Built After 3/1/02

1. Place the Drive/Park selector in “PARK”
2. Hold the CAL switch down and start the engine. Release the CAL switch once the computer beeps three times. This will access the computer set up screens.
3. Scroll down until the display reads RIGHT GATE NULL. This value should be around 0.0. If it is not, verify that the right gate is closed. There should be 1/16” between each gate and the spreadroll. If necessary, disconnect the connectors from the right gate valve and power the gate shut using the manual override. Once the gate is shut, press the CAL switch down to set the closed value (null).
4. Once the null is set, scroll down to the next screen, RIGHT GATE SCALE. Hold the right gate override pushbutton down and monitor the display. The display should show 4.00” while the override is activated. If it does not, verify that the gate is fully open. Once the gate is fully opened, press the CAL switch down while holding the override to set the opening to 4.00” When the gate override is released, the display should go back to 0.00”
5. Scroll down to the next screen, LEFT GATE NULL. Follow the procedure outlined above to set the null and the scale for the left gate.

6. Once both gates have been set, scroll down to the last screen of the set up screens and press the save push-button to save any changes that were made.

It is recommended to try and set the gates using the computer set up screens prior to physically making any adjustments to the potentiometer itself. If the gates cannot be set using the set up screens, or a new gate potentiometer is to be installed, the following procedure should be used. Refer to Figs 37 & 38.

1. Place the Drive/Park selector in “PARK”.
2. Start the engine and run it at about 1000 rpm.
3. Extend both hoppers approximately 2 feet each and shut the engine off.
4. To insure that the gates are fully closed, swap the connectors on the open and close solenoid valve and restart the engine. Depress the gate override button which will fully close the gates. While holding the override button down, shut the engine off. There should be 1/16” between each gate and its spread roll.
5. Return the connectors to their correct positions.
6. Enter the set up screens by holding the “Cal” switch down while turning the key on. Do not start the engine. Scroll down to the appropriate gate null setting and set the null to zero and then scroll down to the save screen and save the value.
7. Using needle probes on a digital voltmeter, measure the voltage between the red and black wires at the gate transducer. The value should be 5.0 volts DC. Next, check the voltage between the blue and black wires. This value should be between 4.0 and 4.7 volts.
8. If the values measured in step 7 are not within the specified tolerance, remove the transducer cover on the hopper.
9. Loosen the transducer mounting bolts and rotate the transducer to get the 4.0-4.7 volt DC reading.
10. Retighten the mounting bolts.
11. Recheck the reading.
12. Start the engine and depress the override button to fully open the gates. While depressing the override button, shut the engine off. The gates should remain fully open. Turn the key back on but do not start the engine. Measure the voltage between the red and black wires. The voltage should be more than 0.5 volts DC. If it is not, the transducer needs to be adjusted to get a reading of at least 0.5 volts. Restart the engine and let the gates close and recheck that the closed value is still within the specified range of 4.0-4.7 volts.

If it is, enter the set up screens while starting the engine and scroll down to the appropriate “Gate Scale” screen.

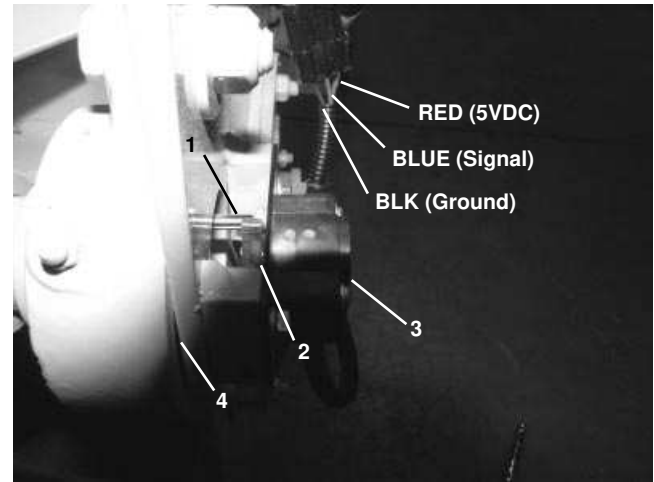
13. Depress the override button to fully open the gates and then press the “Cal” button. The reading should change to 4.0.

14. Release the override button and scroll up to the appropriate “Gate Null” screen to check the reading. If it is no longer at ”0”, depress the override button and scroll down to the appropriate “Gate Scale” screen. Depress the override button and while depressing the override button, depress the “Cal” button to set the scale.

15. Repeat these two steps as required until the readings get to “0” and “4” or until they no longer change.

16. Upon completion, scroll to the save screen and exit set up by depressing the “Save” button.

17. Repeat this procedure for the other gate, if its transducer has also been changed.



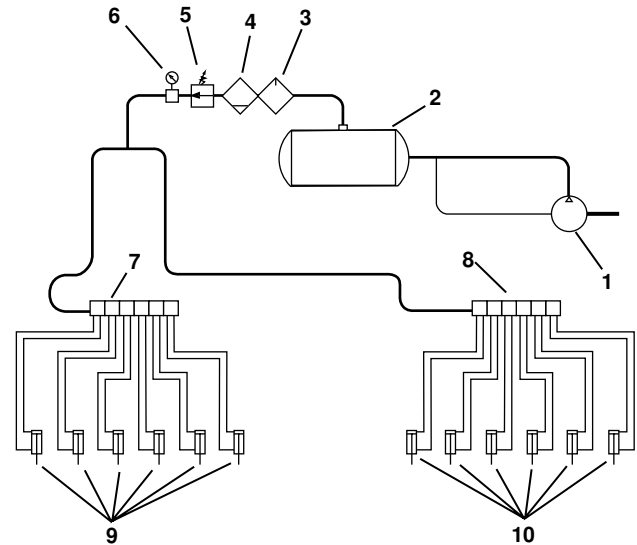
**Figure 38 Left Hopper Transducer**

- 1. Drive Pin
- 2. Lever Arm
- 3. Transducer
- 4. Bearing

**Air Pressure Adjustments**

(Individual Gate System Only)

1. Set the main pressure regulator at 90 psi. (Fig 39)

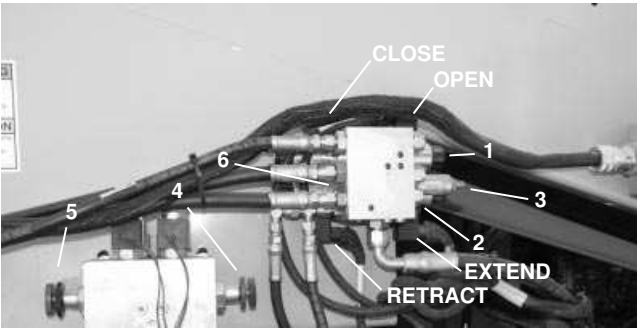


**Figure 39 Air System  
(Individual Gate System Only)**

- 1. Compressor
- 2. Reservoir
- 3. Air Oiler
- 4. Water Separator
- 5. Main Regulator
- 6. Main Pressure Gage
- 7. Left Valve Bank
- 8. Right Valve Bank
- 9. Left 1 FT Gate Cylinders
- 10. Rt 1 FT Gate Cylinders

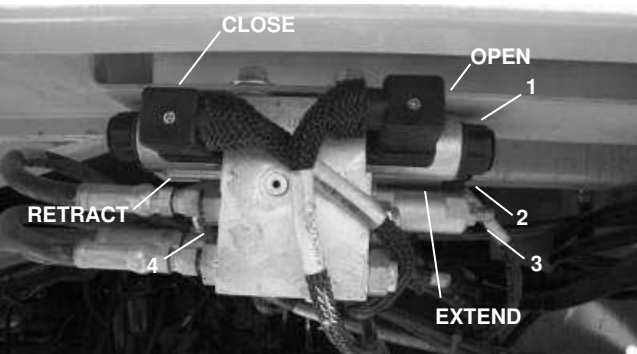
**! WARNING**

Never put hands in between gate and spread roll or gate and rear of hopper to clear an obstruction. The gate could move at any time and cause severe injury.



**Figure 37L Left Gate Solenoid**

- 1. Gate Solenoid Valve
- 2. Hopper Solenoid



**Figure 37R Right Gate Solenoid**

- 1. Gate Solenoid Valve
- 2. Hopper Solenoid

## PRESSURE ADJUSTMENTS

### Pressure Settings For Hydrostatic Drive Pump (Rexroth AA4VG125 Pump)

The pressure settings consist of two (2) high pressure cross port relief valves (forward and reverse) and the pressure override (pressure cutoff) for the AA4VG125 pump. The adjustment procedure is as follows:

1) Install 10,000 psi pressure gages in ports  $M_A$  and  $M_B$  located on the topside of the pump as installed. These ports are -04 SAE O-ring.

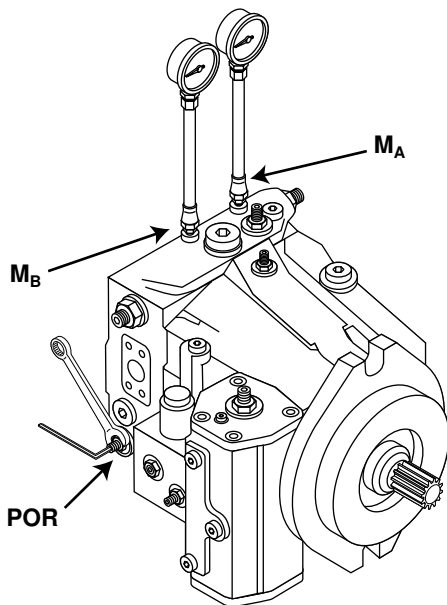


Figure 40 POR Setting

2) The pressure override (POR) should be turned all the way **IN** to be able to obtain the highest possible pressure cutoff setting. Turn screw in (clockwise) until resistance is encountered. Do not force the adjustment past this point. The POR adjustment is located below the curb side high pressure port. The adjustment will require a 4mm allen wrench and a 13mm box wrench. The protective plastic cover may have to be removed to gain access to the POR adjustment.

3) Set the forward and reverse high pressure cross-port relief valves (Relief valves A & B) to approximately 7,000 psi. To do this, first disable the parking brake release circuit by disconnecting the weatherpack connector at the parking brake release solenoid. This solenoid is located on the hydraulic manifold under the center deck cover below the operator's station. Of the three

solenoids on this manifold, it is the small single coil located to the front of the manifold. Disabling this circuit will insure the chipsreader will not move while checking pressures. Once the parking brake release has been disabled, unhook the brake pressure switch, if equipped. The switch is located on the hose coming from the foot pedal. Apply foot pedal brake and push joystick forward developing maximum system pressure. Check reading on gage in port  $M_A$  for forward high pressure. Should the pressure need adjusting, you may have to remove the protective plastic cover located above the high pressure port on the street side of the pump. Turn adjusting screw in (clockwise) to increase relief setting. This adjustment requires a 5mm allen wrench and a 17mm box wrench. Once forward cross-port relief valve (relief valve A) has been set to 7000 psi, repeat above procedure for reverse (relief valve B). Adjustment for this relief is located above the curb side high pressure port.

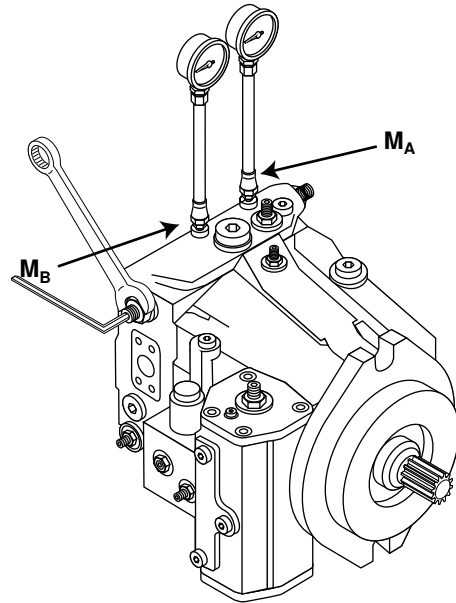


Figure 41 High Pressure Relief Setting

### CAUTION

When setting the two high pressure cross-port relief valves **DO NOT** leave the pump on stroke for more than a few seconds at a time. The flow is being short circuited from the pump inlet and a lot of heat is being generated.

The Correct procedure is to:

Put the pump on stroke and see where the relief valve pressure setting is at but not leaving the pump on stroke for more than a few seconds


Put the pump to neutral

Make an adjustment to the relief valve

Put the pump on stroke again and see where the pressure level is at.

Repeat the above process as many times as necessary until the correct pressure level is obtained.

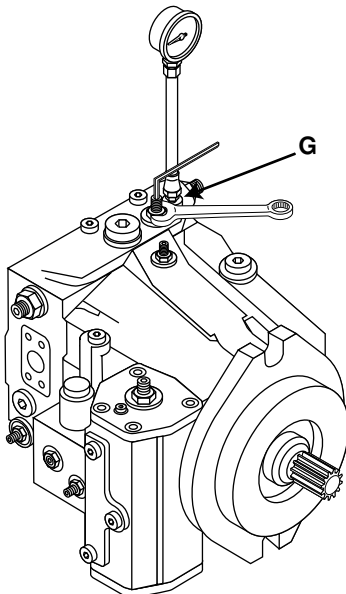
4) Once the two high pressure relief valves set correctly for forward and reverse, set the Pressure Override Valve to 6500 psi. To do this, adjust the POR screw out (counter clockwise) until the high pressure reads 6500 psi. The POR adjustment is the same screw that was turned in full in step 2. There is only one setting for this relief that controls forward and reverse.

 <b>CAUTION</b>
<p>When making the pressure override adjustment, the pump should be put on stroke only for a few seconds at a time until you are sure that the pressure cutoff setting is <b>Below</b> the setting of the two high pressure cross-port relief valves.</p>

Once the pressure override setting is below that of the two high pressure cross-port relief valves, the pump can be left on stroke without any problems as there will be no flow across the high pressure cross-port relief valves.

Remove the gages.

### Setting the Charge Pressure



**Figure 42 Charge Pressure Adjustment**

1) Install 600 PSI gage in gage port on the left side of the top of the hydrostatic pump. The gage will require a size 04 female JIC end to plumb to the gage port. With engine at low idle, the charge pressure should read 400 psi.

2) If the pressure is below 380 or above 420, an adjustment should be made to the charge pressure relief valve. To access the relief valve adjustment, you may have to remove the protective plastic cap located on the topside of the pump beside the port marked “G”. Using a 17mm box wrench with a 5mm allen wrench, loosen the jam nut and turn set screw clockwise if the pressure is low. If the pressure is high, loosen the jam nut and turn set screw counterclockwise. One turn is equal to 55 psi.

Remove the gage.

### Pressure Settings For Auxiliary Pump(s) (Rexroth A10VO74 Pump)

The variable hopper chipsreader utilizes two variable displacement pumps to supply flow to hydraulic functions. These pumps are mounted piggyback on the through drive of the hydrostatic drive pump. Flow for both conveyors both augers, both spreadrolls, the gate cylinders and the hopper extend/retract cylinders is supplied by these pumps. The pumps each have an internal high pressure relief setting and a standby or margin pressure setting. The high pressure relief should be set to 2900 psi on the rear pump, and 3100 on the front pump. The standby pressure should be set to 400 psi for on the rear pump, and 475 psi on the front pump.

### Relief Valve Settings

#### Setting the rear pump

1) Install a 1000 psi gage, with a shutoff valve in the port marked “TP” on the conveyor manifold located on top of the hydraulic reservoir (Fig 43 Ref 2). This port is SAE 04 and requires a 9/16 wrench to remove the plug.

2) Disconnect the electrical connectors from the gate valves (Fig 46L & 46R Ref 1). Make sure that all conveyor, auger and spreadroll switches are all in the “off” position before starting the engine. Make sure the shutoff valve is shut. Failure to do so could result in a blown gage. Back both standby pressure relief valves out about 2 turns. Start the engine and run it at low idle. Open the shutoff and monitor the gage pressure.

3) To make an adjustment, use a 17mm wrench to remove protective cap from set screw located to the rear of each pump on the curbside of the chipsreader.

The standby pressure adjustment is higher adjustment of the two adjustments at the rear of the pump (Fig 44 Ref 5).

4) Loosen the jam nut on the rear pump and turn the set screw until the pressure reads 400 psi on the gage. If the pressure will not get to 400 psi, loosen the jam nut on the front pump (Fig 44 Ref 4) and turn the set screw clockwise one turn. Return to the rear pump and set the pressure to 400 psi. Tighten the jam nut. Shut the engine off.

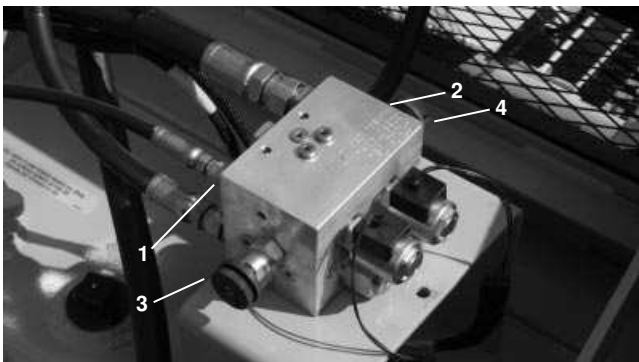
5) Install a 5000 psi gage in the port marked “TP” on the conveyor manifold located on top of the hydraulic reservoir. Back both high pressure relief valves out about 2 turns.

6) With engine running at half throttle, press the left hopper retract switch to retract the hopper until it hits its stop. While holding the switch to the “In” position, monitor the gage pressure.

7) To make an adjustment, use a 17mm wrench to remove protective cap from relief set screw located to the rear of the pump on the curbside of the chipspreader. Of the two adjustments at this location, the high pressure relief is the lower one of the two (Figure 44, Ref 2).

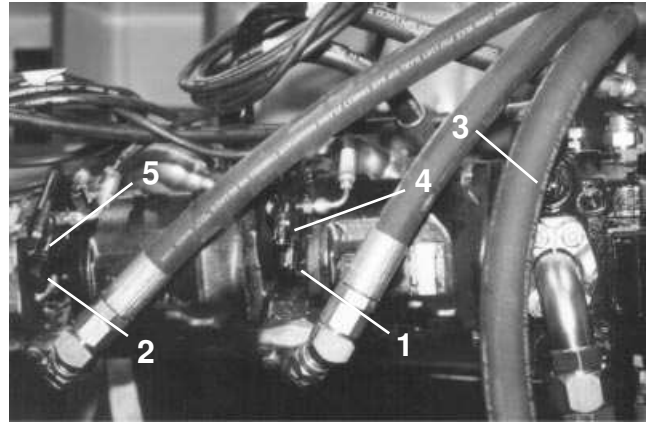
8) Loosen the jam nut and turn the set screw clockwise using a 5mm allen wrench until the pressure reads 2900 psi on the gage. If the pressure will not get to 2900 psi, loosen the jam nut on the front pump (Figure 44, Ref 1) and turn the set screw clockwise one turn. Return to the rear pump and set the pressure to 2900 psi. Tighten both jam nuts and replace both protective covers once the pressures are set. Shut off engine.

9) Remove gage and reinstall the 1000 psi gage with the shutoff closed. Restart engine and let it idle. Open the shutoff valve and verify that the standby pressure is still at 400 psi and adjust if necessary.



**Figure 43 Conveyor Block**

- 1. “LS” Port
- 2. “TP” Port
- 3. Lt Conv Speed Control
- 4. Rt Conv Speed Control



**Figure 44 Pumps**

- 1. Front Pump Relief Valve
- 2. Rear Pump Relief Valve
- 3. Main Hydrostatic Pump
- 4. Front Standby Pressure
- 5. Rear Standby Pressure

**⚠ CAUTION**

Do not set pressure above 3100 psi. The hydraulic components are rated for 3100 psi. Failure of these components could occur at system pressures above 3100 psi.

**Setting the front pump**

1) Install a 1000 psi gage, with a shutoff valve in the port marked “TP” on the conveyor manifold located on top of the hydraulic reservoir (Fig 43 Ref 2). This port is SAE 04 and requires a 9/16 wrench to remove the plug.

2) Start the engine and run it at low idle. Open the shutoff and monitor the gage pressure.

3) To make an adjustment, use a 17mm wrench to remove protective cap from set screw located to the rear of each pump on the curbside of the chipspreader. The standby pressure adjustment is higher adjustment of the two adjustments at the rear of the pump (Fig 44 Ref 4).

4) Loosen the jam nut on the front pump and turn the set screw until the pressure reads 475 psi on the gage. Tighten the jam nut. Shut the engine off.

5) Install a 5000 psi gage in the port marked “TP” on the conveyor manifold located on top of the hydraulic reservoir.

6) With engine running at half throttle, press the left hopper retract switch so retract the hopper until it hits its stop. While holding the switch to the “In” position, monitor the gage pressure.

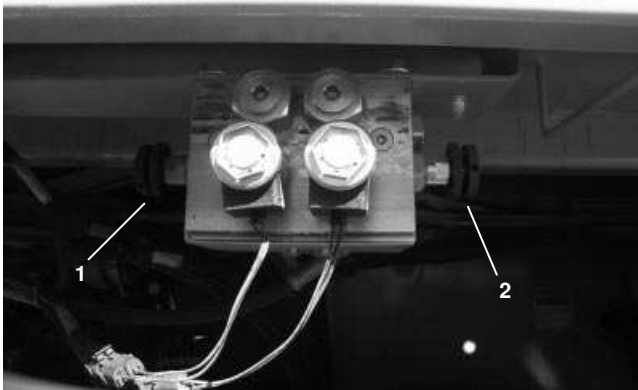
7) To make an adjustment, use a 17mm wrench to

remove protective cap from relief set screw located to the rear of the pump on the curbside of the chipspreader. Of the two adjustments at this location, the high pressure relief is the lower one of the two (Figure 44, Ref 1).

8) Loosen the jam nut and turn the set screw clockwise using a 5mm allen wrench until the pressure reads 3100 psi on the gage. Tighten the jam nut and replace both protective covers once the pressures are set. Shut off engine.

9) Remove gage and reinstall the 1000 psi gage with the shutoff closed. restart engine and let it idle. Verify that the standby pressure is still at 475 psi and adjust if necessary.

10) Reconnect the electrical connectors from the gate valves (Fig 46L & 46R Ref 1).



**Figure 45R Right Auger/ Spread Roll Manifold**

1. Rt Spreadroll Speed Cont 2. Rt Auger Speed Control

### Pressure/Flow Settings For Actuator Valving

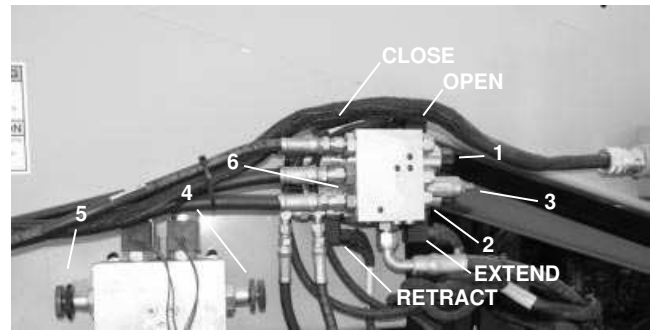
(Functions supplied by pressure compensating auxiliary pump)

Note: Other than individual circuits which require reduced pressure for mechanical purposes, the main system relief is set at the pump.

### Hopper Reducing Valves

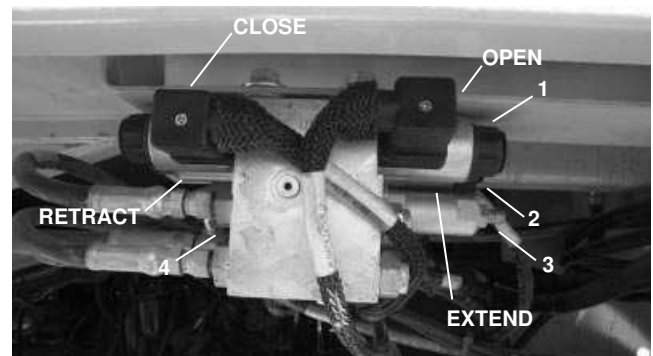
The relief setting for the hopper reducing valves (left and right) should be set to 1500 psi.

1) Install 2000 psi gage in “G” port of hopper manifold located on the left side of the left conveyor (Fig 46L Ref 6) and under the right walkway (Fig 46R Ref 4). This port is SAE 04 MB and requires a 3/16 allen wrench to remove the plug.



**Figure 46L Left Hopper Valves**

1. Gate Valve 2. Hopper Valve  
3. Lt Reducing Valve 4. Lt Auger Speed Control  
5. Lt Spread Roll Spd Control 6. “G” Port



**Figure 46R Right Hopper Block**

1. Rt. Gate Valve 2. Rt. Hopper Valve  
3. Rt. Reducing Valve 4. “G” Port

2) With engine at high idle, depress and hold the left gate override push-button and monitor pressure. If pressure is below 1400 or above 1600, an adjustment should be made.

3) To adjust pressure, use 3/4” box wrench to loosen jam nut on set screw located on the reducing valve mounted on the left side of the left conveyor (Fig 46L Ref 3). If pressure is low, turn set screw clockwise. If pressure is high, turn set screw counterclockwise.

5) Repeat above procedure for the right gate reducing valve, (Fig 46R Ref 3) under the right side walkway.

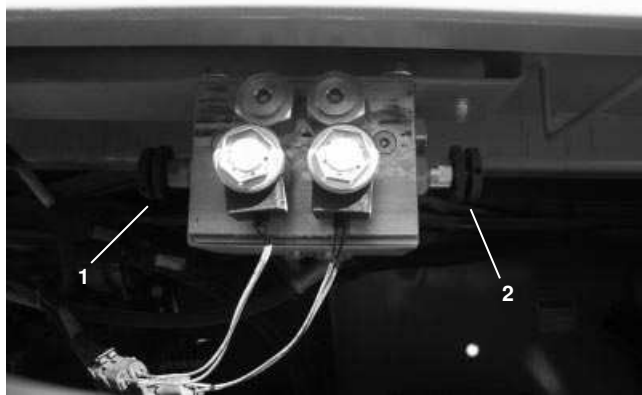
### Spreadroll Speed Adjustment

The spreadrolls are each to be set at 96 rpm.

### Right Spreadroll

1) Insure park/drive switch is in the park position and the right gate and right spreadroll power switches are on. With engine at high idle, push joystick slightly out of neutral and depress right side of thumb switch

engaging the right gate/spreadroll circuit. Time the spreadroll with a stopwatch or a low speed tachometer to determine the revolutions per minute.



**Figure 47 Right Auger/Spreadroll Manifold**

- 1. Rt Spreadroll Speed Control
- 2. Rt Auger Speed Control

2) To adjust the speed, loosen the jam wheel on the spreadroll flow control valve under the right walkway. Turn the adjusting knob clockwise to decrease the speed of the spreadroll, or counterclockwise to increase the speed. Retighten the jam wheel.

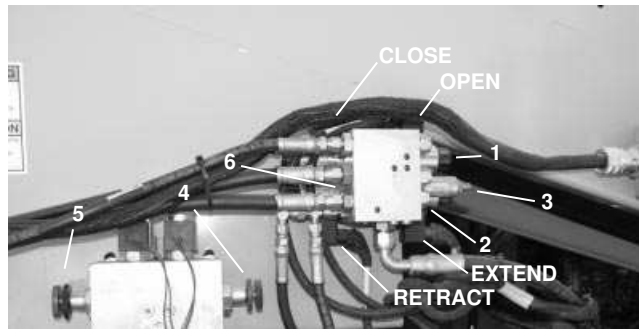
### Left Spreadroll

1) Insure park/drive switch is in the park position and the left gate and left spreadroll power switches are on. With engine at high idle, push joystick slightly out of neutral and depress right side of thumb switch engaging the left gate/spreadroll circuit. Time the spreadroll with a stopwatch or a low speed tachometer to determine the revolutions per minute.

2) To adjust the speed, loosen the jam wheel on the spreadroll flow control valve located on the left side of the left conveyor (Fig 48 Ref 5). Turn the adjuster knob clockwise to decrease the speed of the spreadroll, or counterclockwise to increase the speed.

### Auger Speed Adjustment

1) To adjust the speed of the auger (left or right) loosen jam wheel on the flow control valve for the auger. Turn the adjuster knob clockwise to decrease conveyor speed or counterclockwise to increase speed. Tighten jam wheel once the conveyor speeds are set.

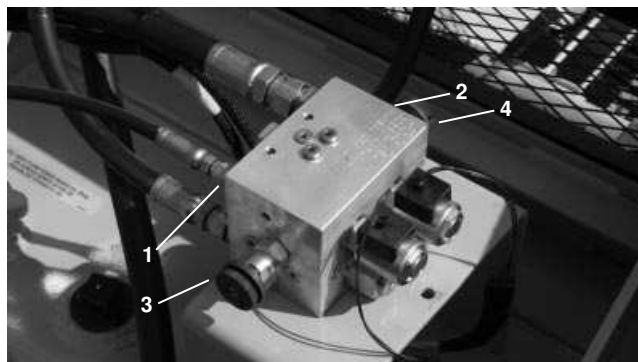


**Figure 48 Left Hopper Valves**

- 1. Lt. Gate Valve
- 2. Lt. Hopper Valve
- 3. Lt. Reducing Valve
- 4. Lt. Auger Speed Control
- 5. Lt. Spread Roll Spd Cont
- 6. "G" Port

### Conveyor Speed Adjustment

The conveyors should be set to a speed that allows the aggregate to fall into the front hoods. Running the conveyors faster than this **does not** increase the amount of aggregate delivered to the front hopper but **does** cause premature wear of the hood frames and create unnecessary noise.



**Figure 49 Conveyor Block**

- 1. "LS" Port
- 2. "TP" Port
- 3. Lt. Conv Speed Control
- 4. Rt. Conv Speed Control

1) To adjust the speed of the conveyor (left or right) loosen jam wheel by hand on the flow control valve for the conveyor to be changed. The adjustments are located on the conveyor manifold on the hydraulic reservoir (Fig 49 Ref 2 & 3). Turn the adjuster knob clockwise to decrease conveyor speed or counterclockwise to increase speed. Tighten jam wheel once the conveyor speeds are set.



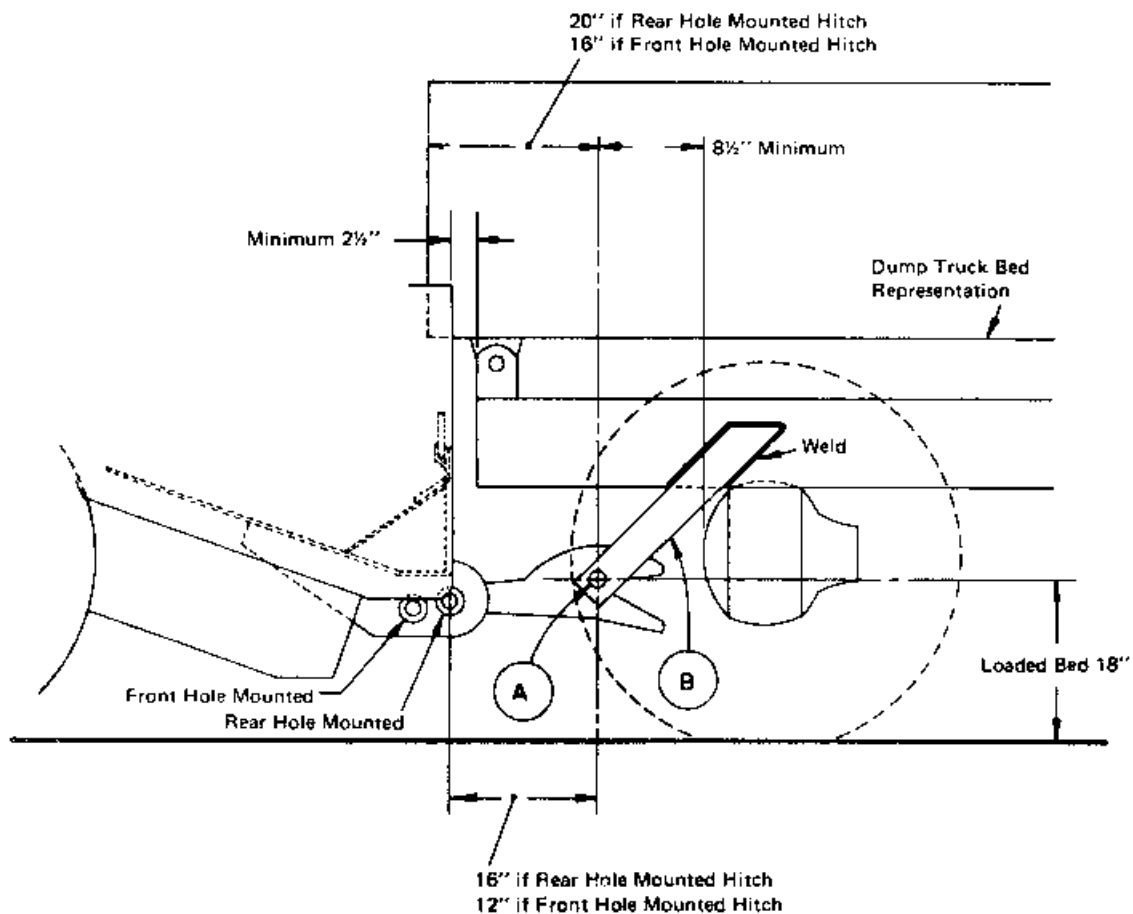
# TRUCK HITCH ARRANGEMENT

1. Trucks ranging in size from four to ten yards are handled easily by an ETNYRE Chip-Spreader.

2. An apron on the rear of each truck will be quite helpful.

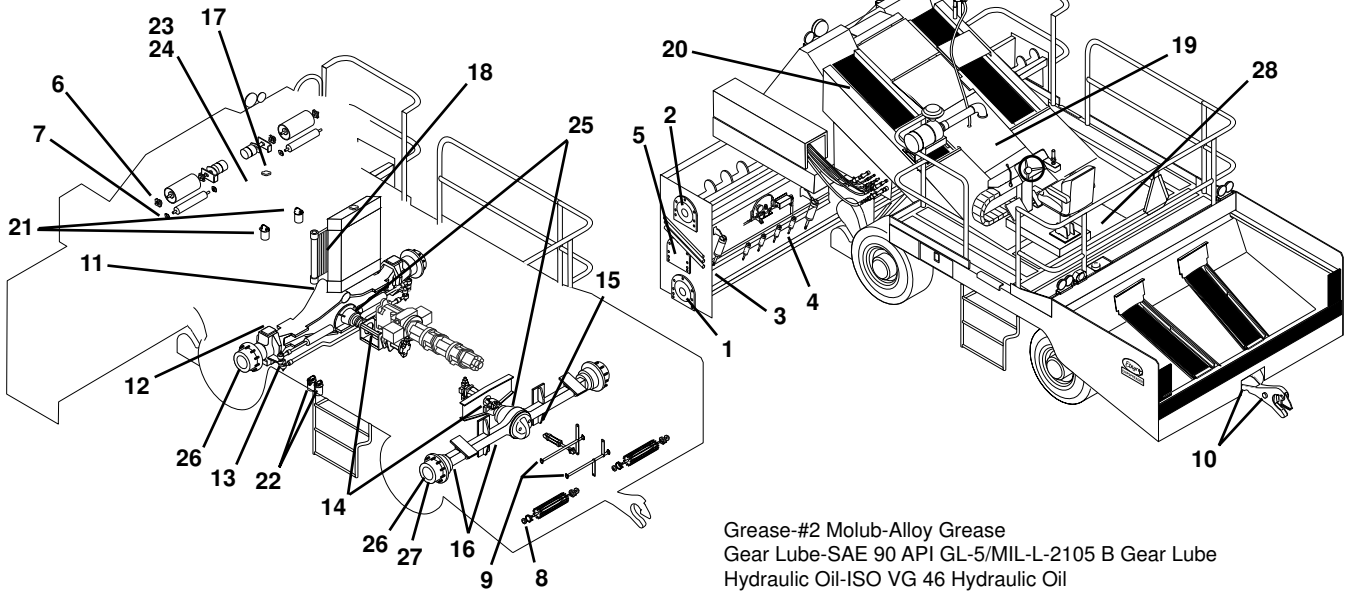
3. For truck hitch arrangement, see truck hitch tow bar illustration below.

**Truck Hitch Tow Bar Illustration**



- A. 3390451-Cold Rolled Round 1 3/4" dia. x 36" long
- B. 3390450-Hot Rolled Flat 1/2" x 4" x 18" long (2) Req'd

# LUBRICATION



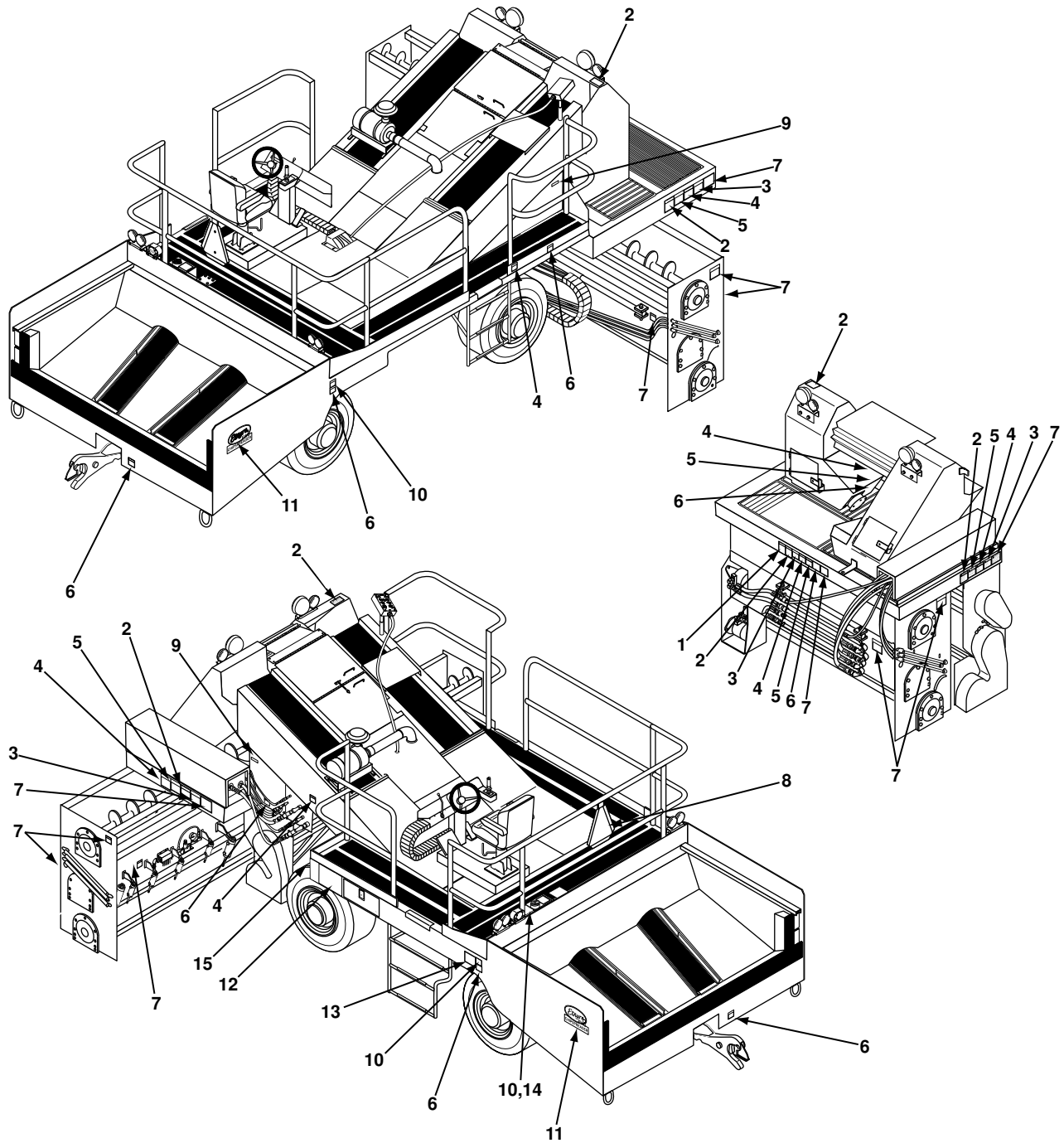
Grease-#2 Molub-Alloy Grease  
 Gear Lube-SAE 90 API GL-5/MIL-L-2105 B Gear Lube  
 Hydraulic Oil-ISO VG 46 Hydraulic Oil  
 Lube Oil-#10 Non-Detergent Oil

Interval	Point	Identification	No. of Points	Lubricant	Quantity
Weekly	1	Bearing-Spreadroll (Both Ends)	4	Grease	Sparingly
	2	Bearing-Auger (Both Ends)	4	Grease	Sparingly
	3	Bearing-Hopper Gate (Both Ends)	4	Grease	Sparingly
	4	Bearing-Individual Gates (Optional)	A/R	Grease	Sparingly
	5	Bearing-Agitator (Optional)	4	Grease	Sparingly
	6	Flange Bearing-Conveyors	4	Grease	Sparingly
	7	Flange Bearing-Return Idler	4	Grease	Sparingly
	8	Bearing-Tail Pulley	4	Grease	Sparingly
	9	Bearing-Hitch Levers	4	Grease	Sparingly
	10	Bearing-Truck Hitch	4	Grease	Sparingly
	11	Shaft-Front Axle Pivot	2	Grease	Sparingly
	12	Spindle-Front Axle	4	Grease	Sparingly
	13	Tie Rod-Front Axle	6	Grease	Sparingly
	14	Universal Joints-Drive Line	2-2wd 4-4wd	Grease Grease	Sparingly Sparingly
	15	Bearing-Slack Adjuster (2wd only)	2	Grease	Sparingly
	16	Bearing-Camshaft (2wd only)	4	Grease	Sparingly
	17	Hydraulic Reservoir	-	Hydraulic Oil	Add When Low
	18	Hydraulic Oil Cooler	-	-	Clean A/R
	19	Engine Oil	1	Engine Original	Engine Manual
When Indicator Turns Red	20	Filter-Engine Air Intake	1	-	Filter Element
Yearly	21	Filter-Return*	2	-	Filter Element
	22	Filter-Suction*	2	-	Filter Element
	23	Magnet-Hydraulic Reservoir (In Tank) 1 - Clean A/R	-	-	-
	24	Breather-Hydraulic Reservoir	1	-	Filter Element
	25	Differential Housing**	1-2wd 2-4wd	Gear Lube Gear Lube	Fill Fill
	26	Planetary Wheel End**	2-2wd 4-4wd	Gear Lube Gear Lube	Fill Fill
	27	Hub-Rear Axle (2wd only)**	2	Gear Lube	Fill
	28	Roller Chain-Power Seat (Optional)	2	Lube Oil	Sparingly

\* On new machines change filter elements after first two weeks of operation. After initial change (two weeks) replace elements on an annual basis unless hydraulic system has been worked on and contamination introduced into the system. Change elements anytime it is possible that contamination has been introduced to the system.

\*\* On new machines drain lubricant from axles after first 50 hours of operation and fill with SAE 90 API GL-5/MIL-L-2105 B gear lube. After initial change (50 hours) change lube on an annual basis.

# CAUTION AND INSTRUCTION PLATES



MAINTENANCE

REF	PART NO.	QTY	DESCRIPTION	REF	PART NO.	QTY	DESCRIPTION
1	3390678	1	Decal: WARNING, "Read Manuals"	9	4421557	2	Placard-Shafts, Grease Daily
2	3101717	10	Label: WARNING Hopper (STAY OFF)	10	3101247	3	Plate-WARNING, No Drill or Weld
3	3390682	3	Decal: CAUTION, Before Starting	11	3101999	2	Decal-Chips, FWD
4	3390681	6	Decal: WARNING, Remain Clear		3102000	2	Decal-Chips, Quad
5	3390683	4	Decal: CAUTION, Shields	12	3102026	1	Decal-Lube Chart, Var Hop
6	3101652	7	Plate-Hydro Towing Warning	13	3100716	1	Plate-CAUTION, General
7	3190505	9	Plate-WARNING, Auger	14	3360180	1	Plate-Fill W/Diesel Fuel Only
8	6000758	1	Emblem-Vehicle, Slow Moving	15	3100689	1	Plate Name-Chipspreader, Brass



**M-215-02R**

Serial Number K-5694, K5723, K5768  
K5781-82, K5789 and Up

Replaces M-215-02



# VARIABLE HOPPER Series Chipspreader



Operation



Maintenance



Safety



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