CHIPSPREADER
Variable Width Spread Hopper

Operation, Maintenance and Safety Manual

for Hydrostatic Drive Units with Variable Width Hopper

E.D. ETNYRE & CO., Oregon, Illinois 61061
CHIPSPREADER

Operation, Maintenance and Safety Manual

for Hydrostatic Drive Units with Variable Width Hopper

M-210-93

For Variable Width Hopper Machines
Serial Numbers K-5241 and up.

WARRANTY

E.D. ETNYRE & CO. warrants to the original Purchaser, its 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. Ettyre & Co. purchased for 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.

E.D. ETNYRE & CO., Oregon, Illinois 61061-9778
1333 South Daysville Road • Phone: 815-732-2116 • Fax: 815-732-7400 • Telex: MCI 6505104321
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 provided below.

⚠️ **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.
# TABLE OF CONTENTS

## SAFETY
- Safety Precautions ................................................ 4
- Reporting Safety Defects ............................................ 4
- Caution & Instruction Plates, Identification and Location ........ 41

## INTRODUCTION
- Introduction and General Operating Procedures ....................... 4
- General Identification of Unit Components .......................... 5

## INITIAL START-UP
- Machine Check Out .................................................. 6
- Attaching Hopper To Unit ............................................. 6
- Important Stopping and Brake Characteristics ......................... 7
- Truck Hitch and Tow Bar Arrangement ................................ 40

## IDENTIFICATION AND OPERATION OF CONTROLS
- Auger Control Switches .............................................. 15
- Conveyor Selector Switches .......................................... 14
- Control Box, Front End Man .......................................... 16
- Fuses ........................................................................... 9
- Gate Opening Set ........................................................ 9
- Gate Override Pushbuttons .............................................. 15
- Gate/Spread Roll Switch ................................................ 11
- Hopper Control Switches .............................................. 15
- Ignition/Power Switch .................................................. 8
- Instrument Panel, Digital .............................................. 9
- Lights and Turn Signals ................................................ 12
- Mode Selector, Manual/Park/Auto .................................... 8
- Override Pedal ............................................................ 11
- Speed Set, Auto .......................................................... 9
- Speed Controller, Auto .................................................. 14
- Speed Range Selector ................................................... 13
- Speed/Direction Control Handle ....................................... 11
- Spread Roll Switches ................................................... 15
- Temperature Display, Hydraulic Oil ................................... 9, 12
- Throttle ........................................................................ 13

## OPERATION
- Backup Alarm ............................................................. 21
- Brake and Stopping Characteristics ................................... 7
- Conveyor Controls, Automatic ........................................ 20
- Conveyor Belt Speed Controls ........................................ 20
- Conveyor Gate Adjustment, Rear ..................................... 19
- Control Box Adjustment ................................................ 19
- Differential Lock, Rear .................................................. 21
- Differential Lock, Front/Rear .......................................... 21
- Horn ............................................................................ 21
- Operating Procedures, General ........................................ 4
- Operating Range Charts
  - Cat 3208, 165 HP Engines .............................................. 22
  - Cat 3208T, 219 HP Engines ............................................ 23
  - Cat 3208T, 234 HP Engines ............................................ 24
  - Cummins 6BTA, 190 HP Engines ..................................... 22
  - Cummins 6CT, 210 HP Engines ....................................... 23
  - Cummins 6CTA, 234 HP Engines ..................................... 24
- Seat Assembly, Powered ................................................ 21
- Speed/Gate Opening Selection ......................................... 17
- Tilt Wheel ..................................................................... 20

## MAINTENANCE & ADJUSTMENTS
- Auger Relief Valves ..................................................... 27
- Conveyor Belt Adjustment .............................................. 25
- Conveyor Relief Valves ................................................ 29
- Hitch Relief and Pressure Reducing Valves .......................... 32
- Hopper Gate Adjustment ............................................... 34
- Hopper Gate Wear Plate ................................................ 25
- Hopper Gate Relief Valves ............................................. 29
- Hopper Positioning Valves ............................................. 28
- Hopper Flow Gate, Rear Hopper ..................................... 25
- Hydraulic Control Pressure Relief Valve ............................ 32
- Hydraulic System Start-Up Procedures ............................... 33
- Lubrication Chart ........................................................ 42
- Override Pedal Adjustment ............................................. 36
- Pressure Chart, Relief Valve Settings ................................. 39
- Relief and Reducing Valve Pressure Adjustments .................. 26
- Relief Valve, Rear Hydraulic Pump ................................... 33
- Steering Relief Valve, Power Steering ................................. 31
- Seat Chain Adjustment .................................................. 38
- Seat Relief Valves, Powered Seat ..................................... 31
- Spread Roll Wear Plate .................................................. 25
- Spread Roll Relief Valves .............................................. 27
- Tachometer Calibration .................................................. 37
- Towing Instructions ...................................................... 38
The Etnyre Variable Hopper Hydrostatic chips- spreader has been designed to improve the accuracy of chipspreading while improving productivity. This has been done by incorporating superior speed keep- ing capabilities, precise gate opening control and the ability to do most roads in a single pass.

*It is especially important from the safety stand- point 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 chip- spreader.

**Important**

1. The front hopper should be fully closed up and latched 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 Chip- spreader should be allowed to tow the truck. How- ever, certain steep upgrade or downgrade conditions may require the truck to assist the chipspreader. The chipspreader **must not** be in neutral but **must** be attempting to maintain the set speed with the truck coordinating as near as possible.

5. Do not tow 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 dam- age 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 hopper increases stopping distance, and weight in the front 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 dam- age to the hydrostatic system.

9. Always install locking control box cover and 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 hopper should be fully closed up and latched when the unit is traveling between job sites to avoid possible damage to the outer ends of the hoppers.

**WARNING**

Turning ignition key to “off” results in emergency stop.

**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 High- way 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, or E. D. Etnyre & Co.

To contact NHTSA, you may either call the Auto Safety Hotline toll-free at 1-800-424-9393 (or 366- 0123 in Washington, D.C. area) or write to NHTSA, U.S. Department of Transportation, Washington, D.C. 20696. You can also obtain other information about motor vehicle safety from the hotline.
<table>
<thead>
<tr>
<th>Ref.</th>
<th>Qty.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Conveyor Drive Assembly</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>Hydraulic Oil Coolers</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>Front Hydraulic Pump - Component System</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>Driveline-Hydraulic Pump</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>Valve-Front Drive Motors</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>Gate Actuating Cylinder</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>Front Wheel Drive Motors-4WD</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>Front Axle ASM-4WD</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>Return Manifold</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>Filter-Return Line</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
<td>Front End Man Hopper Controls</td>
</tr>
<tr>
<td>12</td>
<td>1</td>
<td>Reservoir-Hyd/Component System</td>
</tr>
<tr>
<td>13</td>
<td>1</td>
<td>Hydraulic Pump—Drive System</td>
</tr>
<tr>
<td>14</td>
<td>1</td>
<td>Reservoir-Hyd/Drive System</td>
</tr>
<tr>
<td>15</td>
<td>1</td>
<td>Filter-Suction</td>
</tr>
<tr>
<td>16</td>
<td>1</td>
<td>Hydrostatic Control Assembly</td>
</tr>
<tr>
<td>17</td>
<td>2</td>
<td>Rear Wheel Drive Motors</td>
</tr>
<tr>
<td>18</td>
<td>1</td>
<td>Conveying Arrangement</td>
</tr>
<tr>
<td>19</td>
<td>1</td>
<td>AR Spread Hopper Gates</td>
</tr>
<tr>
<td>20</td>
<td>1</td>
<td>AR Lights</td>
</tr>
<tr>
<td>21</td>
<td>2</td>
<td>Conveyor Deflectors</td>
</tr>
<tr>
<td>22</td>
<td>9</td>
<td>Covers-Conveyor and Engine</td>
</tr>
<tr>
<td>23</td>
<td>2</td>
<td>Conveyor Control Valves</td>
</tr>
<tr>
<td>24</td>
<td>1</td>
<td>Air Filter ASM</td>
</tr>
<tr>
<td>25</td>
<td>1</td>
<td>Control Console</td>
</tr>
<tr>
<td>26</td>
<td>1</td>
<td>Operator Seat ASM</td>
</tr>
<tr>
<td>27</td>
<td>5</td>
<td>Rear Deck Sections</td>
</tr>
<tr>
<td>29</td>
<td>2</td>
<td>Conveyor Flow Regulator Gates</td>
</tr>
<tr>
<td>30</td>
<td>1</td>
<td>Receiving Hopper</td>
</tr>
<tr>
<td>31</td>
<td>1</td>
<td>Truck Hitch</td>
</tr>
<tr>
<td>32</td>
<td>1</td>
<td>Fuel Tank</td>
</tr>
<tr>
<td>34</td>
<td>1</td>
<td>Spread Hopper-Left</td>
</tr>
<tr>
<td>36</td>
<td>1</td>
<td>Rear Pump</td>
</tr>
<tr>
<td>37</td>
<td>2</td>
<td>Hopper Material LVL Mechanism</td>
</tr>
<tr>
<td>38</td>
<td>2</td>
<td>Latch Pin</td>
</tr>
<tr>
<td>39</td>
<td>2</td>
<td>Gate Opening Transducer</td>
</tr>
<tr>
<td>40</td>
<td>1</td>
<td>Rear Flow Divider Valve Switch (Optional)</td>
</tr>
<tr>
<td>41</td>
<td>1</td>
<td>Front/Rear Flow Divider Valve Switch (Optional)</td>
</tr>
<tr>
<td>42</td>
<td>1</td>
<td>Shuttle Valve</td>
</tr>
<tr>
<td>43</td>
<td>1</td>
<td>Spread Hopper-Right</td>
</tr>
<tr>
<td>44</td>
<td>1</td>
<td>Hitch Release Cylinder</td>
</tr>
<tr>
<td>45</td>
<td>1</td>
<td>Hitch Raise Cylinder</td>
</tr>
<tr>
<td>46</td>
<td>1</td>
<td>Radar Speed Sensor</td>
</tr>
<tr>
<td>47</td>
<td>1</td>
<td>Driver Hopper Controls</td>
</tr>
<tr>
<td>48</td>
<td>1</td>
<td>Upper Valve Plate ASM</td>
</tr>
<tr>
<td>49</td>
<td>1</td>
<td>Side Valve Plate ASM</td>
</tr>
<tr>
<td>50</td>
<td>1</td>
<td>Gearbox</td>
</tr>
<tr>
<td>51</td>
<td>1</td>
<td>Engine Radiator</td>
</tr>
<tr>
<td>52</td>
<td>1</td>
<td>Power Steering Cylinder</td>
</tr>
</tbody>
</table>
INITIAL START-UP

Check Out

1. The following accessories are shipped with each spreader: grease gun, extra linkage rods for shortened truck hook up, parts book and operation, maintenance and safety manual, engine parts and operator's manual.

2. Best performance for most operating conditions is achieved when tires 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.

3. Grease all fittings and check all reservoir oil levels in accordance with the Chip Spreader Lubrication Chart on side of the toolbox 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.

Safety Precautions

Before lifting hopper, check to ensure that adequate clearance will be maintained between the lifting machine and overhead electrical line. 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 spreader 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 chip spreader. (Figure 1 & 2) Lower hopper slowly until lifting sling can be disconnected.

---

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

Figure 2
1. Latch Pin
2. Carry Arms (2)
3. Pin Catch
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.*

5a. Install hoods and connect Electrical connections (Figure 2a.)

6. Connect the transducer electrical connectors. For cleanliness, always connect the two caps to keep their insides clean. Snap the other connections together for the auto features and headlights.

7. 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:

   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. Set the gate opening to approximately 1½ inch, turn both spread roll arming switches “on” and depress the right side of the “gate/spread roll” switch.

   Depress the override pedal fully. With the override pedal fully depressed, there should be ½” clearance between the gate and the spread roll.

   Release the override pedal and depress the left side of the “gate/spread roll” switch. There should also be ½” clearance between the gate and the spread roll. If this clearance is not constant across the full width of the hopper, it indicates that either the gate and/or the spread roll is not straight. Contact the factory for straightening instructions.

---

**Important**

1. While 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 surface during starting or stopping. However, with smooth application of control inputs very precise accelerations and decelerations can be made giving the ability to out-perform a conventional clutch/brake/gear combination.

2. These characteristics on both new sealcoat surfaces and other surface 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 hopper loaded removes weight from the rear wheels thus reducing the braking effectiveness of the rear motors 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 if at all possible.

5. When operating with the truck, in some cases—for instance 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, if it is by signal, where to look for the signal and the meaning of each signal.
Identification and Function of Controls  Refer to figure 3 for identification of the following descriptions.

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. 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 key to “off” results in emergency stop.


A three position switch selects either “manual” or “auto” operation with a “park” position in between.

In “manual” mode, speed and direction are controlled by the handle.

In “auto” mode, only forward direction is available. The handle must be moved forward only a few degrees to engage the auto controller. Further forward movement has no effect. When in auto, speed is set by the auto speed potentiometer alongside the handle.

In “park” mode, the “speed/direction handle,” (Item 7, Figure 3) is disabled and the parking brakes are applied.

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Figure 3. Control Console Identification
Mode of operation must be selected with machine stationary.

If the selector is moved from “manual” to “auto” while moving, the chip spreader will come to a rather abrupt halt and then accelerate to the speed set by the “auto speed set” knob or the highest speed possible in the range selected—whichever is lower.

If the selector is moved from “auto” to “manual” while moving, the pump control will switch from the displacement commanded by the “auto speed set” knob to that commanded by the position of the manual handle. If the two are not nearly matched, an abrupt speed change will occur.

In either case the command signal will be momentarily disconnected from the pump and the rear parking brake will momentarily be applied during the attempted shift from manual to auto or vice versa. This will cause a very abrupt stop and could cause bodily injury.

3. Auto Speed Set—Potentiometer.

When the mode selector is in the “auto” position, this potentiometer provides the command signal (or set point) to the automatic controller. This potentiometer control should be set to the desired vehicle speed in feet per minute. The digital readout will display the actual feet per minute. Once the speed is set and the actual speed is confirmed, the chip spreader will repeat that speed any time “auto” is engaged with the range selector in the proper displacement for that speed (i.e. the “auto speed set” is set for 700 fpm; you must have the speed range control in “2nd” in order to reach 700 fpm. The automatic controller will bring the chip spreader up to and maintain the set speed of 700 fpm).

As noted under “Speed Range Control” the maximum speeds recommended in “auto” are approximately 15% lower than those available in manual. These lower speeds allow the automatic controller to have enough pump stroke left to compensate for normal engine governor droop. As an example, if a current Etnyre chip spreader (Eaton 4005A transmission and Spicer PR1300 axle) were operated in 2nd hi, the normal speed would be 346 fpm. However, when a hill is encountered, the increased load on the engine will cause the governor to allow the engine speed to decrease as much as 10% and the ground speed will fall to 311 fpm. Conversely when going downhill, the governor would allow the engine to increase speed by as much as 10% (although usually somewhat lower) thus the ground speed could become as high as 381 fpm.

The hydrostatic chip spreader when in the manual mode results in less than a 10% decrease or increase in vehicle speed, but it still has similar speed characteristics.

When the hydrostatic chip spreader is operated in the “auto” mode, 15% lower recommended speeds allow the controller the added capacity to make up the engine decrease or increase in speed. When the hydrostatic chip spreader is operated at a speed of 330 fpm in “lo” range it will typically maintain its speed within 5 to 6 fpm.

This is possible up to full engine HP available. If the required HP exceeds the available, the chip spreader will slow down and then recover to the preset speed as load (HP required) decreases.

4. Gate Opening Set Point.

This control sets the position to which the gates will open. The set point is the actual position, in inches, that the gates will open to when the gate/speed roll switch (8) is activated.

5. Fuses

Light fuse: Supplies power to all lights except brake lights.

Horn fuses: Supplies power to the horn, the hitch release, the hitch height control, the gate opener valve, and the engine throttle.

Conveyor fuse: Supplies power only to the conveyors.

Power fuse: Supplies power to the manual control handle, the auto speed controller, the magnetic pickup the brake lights, the backup alarm and the brake release valve.

Motor fuse: Supplies power to the rear motors, the front motor disengagement valve, and also the power seat valve.

Gate fuse: Supplies power to the gate control board and the spread roll valve.

6. Digital Instrument Panel. (Figure 4)

All instrumentation is included in the digital/bargraph panel. The left bargraph displays engine oil pressure. The right bargraph displays engine coolant temperature. The digital display area displays the following items: feet per minute, engine RPM, battery voltage, hydraulic oil temperature (selectable left or right tank) and fuel level. The displayed item is selectable by pressing the “select” area (6A) on the display. Pushing “select” once will cause the display to change from the current item to the next in the order. Pressing “select” again will change the display to the next item, etc. When hydraulic oil temperature is selected, toggle switch (14) is used to select which tank temperature is to be displayed.
An alarm function is built into the instrument panel. If an item sensed by the display reaches its built in alarm condition, the appropriate word will appear and flash regardless of what item is currently selected and displayed. In addition, an output is sent to the buzzer and also to the warning light mounted below the steering wheel hub. For instance, the normal use will be to have speed (FPM) on display—this will automatically be displayed on starting the engine. If the fuel level gets down to the alarm level (approximately 15% or 10½ gallons), the word “fuel” will flash in its location within the display, the buzzer will sound and the warning light below the steering wheel will come on, and the FPM will continue to be displayed. The same is true for any of the items monitored which have alarm points. The alarm points are as follows:

- low oil pressure 8 PSI
- high water temperature 220°F
- low fuel 15%-10 Gal.
- high hydraulic oil temp. 180°F

Note: There are two tanks selected by the selector switch (14). Only the tank selected will be connected to the alarm. It is therefore important to occasionally switch the selected tank to monitor its condition. The selector switch should normally be kept on the left (hydrostatic) tank, even though while chipping it normally runs cooler than the right (implement) tank. The reason for this is the relative costs of the components is much greater on the hydrostatic system. When travelling the hydrostatic oil temperature runs hotter and the switch should always be on the left during travel.

When chipping, the right tank should be selected for about 15 seconds minimum every 30 minutes or so. If the right tank is above 180 degrees F. the alarm will come on and “oil temp” will flash as well as the red light below the steering wheel. It is not necessary to display oil temperature to connect the monitor system to the right tank, but you may wish to view the actual temperature. After checking the right tank be sure to return the switch to the left tank.

The tachometer is digitally displayed to the nearest 10 RPM. There are 4 calibrations built into the display for different engines. The proper calibration is factory set and should not have to be reset except if the Chipspreader batteries are disconnected. The calibration procedure is covered under the adjustment section.

A digital readout of speed, reading to the nearest foot per minute, is provided. The display uses a ground speed radar (Figure 44a.) to generate pulses. The pulses are fed to both the automatic speed controller and a conditioning circuit which then feeds the signal to the digital display.
7. Manual Speed/Direction Control Handle (Figure 5)

The control handle provides both direction, (forward, neutral, reverse) and rate of speed when in the “manual” mode. In addition to controlling speed and direction in the “manual” mode, the handle provides on/off of the auto function when in the “auto” mode.

The handle also incorporates a neutral safety start switch, automatic application of the rear brakes and brake lights when placed in neutral, and activation of the back up alarm. These functions occur regardless of mode of operation (i.e. “auto” or “manual”). The handle has a detent in the neutral position and an adjustable friction drag for holding at any desired position other than neutral.

Decelerating is accomplished by moving the handle toward neutral. The pump displacement control follows the handle position with no lag, therefore smooth adjustments in speed are recommended, but rapid speed changes including coming to a complete halt may be accomplished with care. Extremely rapid decelerations will cause the hydrostatic system to reverse the high and low pressure sides of the loop and can raise the pressures to the relief valve setting and should be avoided. Upon reaching the neutral position of the handle, the rear brakes will be automatically applied. They will lock the wheels upon very rapid control handle movement into neutral from higher travel speeds, therefore the recommended procedure is to use the override pedal when stopping, returning the control handle to neutral immediately upon reaching a complete stop, thereby applying the rear brakes. Operation of the override pedal will be explained later in this description.

With the mode selector in “auto,” the control handle will operate as follows: moving the handle rearward out of the neutral position approximately 3 degrees will activate the optional backup alarm and release the brakes. The chipspreader cannot be operated in reverse while in “auto.” Moving the handle forward out of the neutral position approximately 3 degrees will release the rear brakes and engage the command signal circuit: the “auto” circuit will accelerate the chipspreader to the preselected speed at a non-adjustable rate. Acceleration and deceleration should be modulated by the override pedal which will be explained under that title heading (26). The speed range control must be appropriately set in order to reach the desired speed. Further displacement of the control handle will have no additional effect. Adjustments to speed are made using the “Auto Speed Set” potentiometer.

Stopping is accomplished by smoothly depressing the override pedal fully and returning the handle to neutral.

8. Gate/Spread Roll Switch. (Figure 5)

The rocker switch activates the spread roll and also the command circuit for the gates. The gate opening is set by the gate opening set point (4) to the desired opening. The gates are then opened or closed with the rocker 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 preset opening or from the preset opening to closed.

If a gradual opening of the gates is desired in conjunction with starting the machine traveling forward, depress the right side of the spread roll switch while keeping the override pedal fully depressed and then release the override pedal to control acceleration. The gates will also open from the fully closed position to the setpoint of the gate opener set point potentiometer. A gradual closing may be accomplished by depressing the override pedal to decelerate the vehicle to a halt while leaving the right side of the rocker switch depressed. This will close the gates in conjunction with decelerating the machine. When the machine has come to a halt, depress the left side of the rocker switch while simultaneously returning the handle to neutral to keep the gates closed. Moving the control handle into neutral will keep the rear brakes set and disengage the speed command. Once the handle is in neutral and the left side of the spread roll switch is depressed, the override pedal can be released.

26. Override Pedal (Figure 6)

The override pedal is used to accelerate and decelerate the chipspreader and can also be used to “feather” the front hopper gates closed or open. When the pedal is in the full up position, it has no effect on any of the other control settings. As the pedal is depressed toward the floor, it decreases the command signal from the set point toward zero and,
when it is fully depressed, it reduces the given command signal to zero and applies the rear brakes. In effect it works like slipping the clutch on a mechanically driven machine, enabling the driver to have full control over the acceleration and deceleration of the machine. However, unlike a mechanical machine, partial depression of the pedal does not cause any accelerated wear and can be used for unlimited time with no adverse effect.

The normal operation in “manual” mode would be to depress the pedal fully, move the handle forward to approximately the desired position and then releasing the pedal smoothly to full up position. The rate of release of the pedal will control the acceleration of the vehicle up to the selected speed in either forward or reverse.

The normal operation in “auto” mode would be to depress the pedal fully, set the desired speed on the potentiometer, move the handle forward more than 3 degrees and then releasing the pedal smoothly to the full up position controlling the acceleration up to the set point. To stop, in either mode of operation, the procedure is reversed. Depress the pedal smoothly, controlling the deceleration to a full halt and keep the pedal fully depressed thus applying the rear brakes while returning the handle to the neutral position and depressing the left side of the gate/spread roll switch to disengage the command signals and keep the rear brakes set and then the pedal may be released to the full up position.

If the gate/spread roll switch is engaged, the gate opening will follow the pedal up and down from zero to the preset position. Using the thumb switch will turn the gates on/off regardless of the position of the override pedal.

9. Turn Signal Selector (Figure 7)

10, 11. Turn Signal Indicators. (Figure 7)

12. Hazard Flasher Switch (Figure 7)

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

13. Headlight Switch (Figure 7)

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

14. Hydraulic Tank Temperature Display Selector. (Figure 7)

   The tank selected has its temperature displayed and is also connected to the alarm. The tank which is not selected is not connected to the alarm. It is recommended that the tank display be alternated between tanks for this reason. See digital instrument panel Item No. 6.

15. Seat Shift Switch. (Figure 7)

   Before using be sure seat is unlatched. Hold switch right or left to move seat to desired position. The moving seat is meant to be an operator convenience during the chipping. This switch only receives power when the speed range selector is in either lo or chip. Before traveling the machine, the seat must be moved to either the full left or right position and the seat latch pin inserted into the lock socket in the deck of the vehicle. Failure to do this may result in inadvertent movement of the seat assembly during acceleration and deceleration. The seat must always be latched during travel.

   The engine must be run at or near its governed RPM for the seat to operate.

   | CAUTION |
   | The seat must always be latched during travel. |

16. Hitch Release Pushbutton. (Figure 7)

   Push the hitch release pushbutton to disengage the chipsreader from the supply truck. There must be some “slack” in the hitch (between the chipsreader and supply truck) in order for the latch to release. While pushing the hitch release pushbutton, one should momentarily depress the override pedal slightly to slow the chipsreader. This will cause the required “slack.” The override pedal should then be released, while still depressing the hitch release
pushbutton. Once the truck has separated from the chipperspreader, the hitch release pushbutton can be released. A second hitch release pushbutton is provided for the front end man.

It is possible to stop with no “slack” in the hitch (between the chipperspreader and supply truck). If this happens, the chipperspreader 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 locks when it is closed by pushing back on the truck.

17. Throttle. (Figure 3)

Push down to increase engine RPM, pull upward to decrease 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.

17. Non-standard Electric Throttle
18. Speed Range Selector Switch

18. Speed Range Selector. (Figure 8)

A three position switch selects the vehicle speed range by changing the rear motors’ displacement from large to intermediate and disengages the front wheels for the travel range. On optional powered seat swing equipped units, this switch also supplies power to the seat shift switch only in lo or 2nd.

The speed ranges are approximately:

**Manual Operating Ranges**
- Lo 0-540 FPM (6.1 MPH, 9.8 KPH) 4 WD
- 2nd 0-730 FPM (8.3 MPH, 13.3 KPH) 4 WD
- Travel 0-1650 FPM (18.8 MPH, 30.2 KPH) 4 WD

**Actual Maximum Speed Possible**
- Lo 560 FPM (6.4 MPH, 10.2 KPH) 4 WD
- 2nd 760 FPM (8.6 MPH, 13.8 KPH) 4 WD
- Travel 1750 FPM (19.9 MPH, 31.8 KPH) 4 WD

All reverse speeds are 10 to 15% lower due to preferential rotation of the hydraulic drive motors.

**Auto Operating Range**
0-700 FPM (8.0 MPH, 12.8 KPH) 4 WD

---

**WARNING**

Shift in and out of “travel” only while stopped or moving at a very slow rate of speed. Shifts between “2nd” and “travel” are very abrupt and could cause personal injury.

The shift from 2nd to travel should be made only after positioning the seat full left or right and the latch pin inserted since electric power is not available to move the seat after the switch has been positioned to “Travel”. Upshifts and downshifts between “lo” and “2nd” may be made at any time whether moving or standing still without damaging the machine. They will be a bit abrupt and could cause personal injury to someone riding on the machine. The shift may be abrupt enough to skid a wheel or otherwise damage the newly chipped surface. It is therefore recommended to shift at very low speeds.

**A 4 WD machine should be shifted in and out of “travel” only while stopped or moving at a very slow rate of speed** (i.e. under 100 FPM).

The shift from “2nd” to “travel” disengages the front wheels to a free wheeling mode. The engagement valve must shift very quickly by necessity of function. This results in a rather abrupt shift which is particularly evident when high flow rates are in use. It also causes rather high pressure spikes to occur in the hydrostatic system which can cause eventual damage. **These upshifts and downshifts between “2nd” and “travel” are very abrupt and could cause personal injury.**

Selection of speed range should be based on the desired operating speed—generally you should use the lowest speed range that will give the desired operating speed (i.e. if the desired speed is 540 FPM or less, use “low”). If the desired operating speed is 680 FPM use “2nd.” If additional torque is required to start off, use “low” to get moving and, once moving, shift to “2nd.” When operating in “lo” there is more torque available and the torque split is 47/53 allowing the use of the optional front/rear diff lock in addition to the optional rear side/side diff lock, thus reducing the possibility of wheelspin. Use
“travel” only for moving the chips spreader by itself — 
*never attempt to pull a truck in “travel.”* The small 
displacement of the rear motors alone, necessary to 
get the higher travel speeds, will result in the pres-
sure rising to the relief valve setting of 5000 PSI. If 
the oil goes across the relief valve it will be heated to 
temperatures which can destroy seals and cause 
damage to hydraulic components.

27. Auto Speed Controller. (Figure 3)

The same ground speed radar (Figure 4a.) that 
feeds a signal to the conditioning circuit for the 
digital display (6) also feeds its signal to the au-
tomatic speed controller. The automatic speed con-
troller compares the feed back signal to the desired 
speed as set by the auto speed set point (3).

The auto speed controller is all contained on a 
single printed circuit board. It has three trim ad-
justments which have been factory preset for the 
unit and normally should not need adjustment in the 
field.

Normal spreading operation in auto would be 
done as follows:

a) Put the auto/manual selector in “auto.”
b) Place the control handle in neutral.
c) Set the desired speed on the auto speed set (3)
d) Set the speed range selector (18) appropri-
ately (“lo” or “2nd”) to reach the desired speed.
e) Turn the gate/spread roll switch (8) “off.”
f) Set the desired gate opening on the gate set 
point (4)
g) Depress the override pedal (26) fully.
h) Push speed/direction control handle (7) for-
ward more than 3 degrees.
i) Release override pedal (26) smoothly and 
slowly until fully up.
j) Upon reaching the starting line of spreading, 
depress the right side of the gate/spread roll switch 
(8) fully to turn the gates “on.”
k) Upon reaching the ending line, center or 
depress the left side of the gate/spread roll switching 
fully (8) to shut the gates “off.”
l) Depress the override pedal smoothly to the 
fully depressed position.
m) Return the control handle to neutral.
n) Release the override pedal.

Speed changes may be made while moving by 
rotating the auto speed set point (3) smoothly to the 
new speed. The chips spreader will change speed to 
the new speed. The gate opening set point (4) will 
then have to be reset to a new opening to compensate 
for the new speed in order to maintain the desired 
spread rate.

19. Right Conveyor Selector (Figure 9)

In the rearward position, power is supplied to the 
driver’s “on/off” selector switch (20) allowing the 
driver to turn the conveyor “on” or “off.”

In the center position power is supplied to the 
front end man’s “on/off” selector switch allowing 
the front end man to turn the conveyors “on” or 
“off.”

In the forward position, power is supplied to the 
auto paddle switch mounted below and along the 
inside of the side of the conveyor hood. (See Fig. 16) 
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.

21. Left Conveyor Selector. (Figure 9)

Same operation as above except for left conveyor 
and its associated switches (22), and left conveyor 
auto paddle switch.

Since both conveyors are independently con-
trolled, 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.

23. Hitch Height Switch. (Figure 9)

Push forward to raise the hitch, push rearward 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 chipspread-
er and truck.

29. **Left Gate Override Pushbutton** (Figure 3)

Push down to momentarily fully open the left hopper gate to clear a jam. Upon releasing the but-
tton, the gate will return to its original set point.

30. **Right Gate Override Pushbutton** (Figure 3)

Push down to momentarily fully open the right hopper gate to clear a jam. Upon releasing the but-
tton, the gate will return to its original set point.

**Items 31 through 39 are located in the small control box attached to the driver’s left arm rest.**

31. **Left Hopper Switch** (Figure 11)

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

32. **Right Hopper Switch** (Figure 11)

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

33. **Both Hopper Switch** (Figure 11)

Push up to simultaneously extend both hoppers and down to simultaneously retract both hoppers.

34. **Left Spread Roll Arm Switch** (Figure 11)

This switch connects or disconnects the left hopper’s spread roll and gate to the “gate/spread roll” switch (Item 8). The hopper is then turned “on” or “off” using the “gate/spread roll” switch.

35. **Right Spread Roll Arm Switch** (Figure 11)

This switch connects or disconnects the right hopper’s spread roll and gate to the “gate/spread roll” switch (Item 8). The hopper is then turned “on” or “off” using the “gate/spread roll” switch.

36. **Left Auger Switch** (Figure 11)

In the rearward position, power is supplied to the
driver’s “on/off” switch (37) allowing the driver to turn the left auger “on” or “off.”

In the center position, power is supplied to the front end man’s “on/off” switch allowing the front end man to turn the left auger “on” or “off.”

In the forward position, power is supplied to the auto switch located at the outboard end of the left hopper (see Figure 11a). When this switch is tripped by material moving the spring finger, 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.

![Figure 11. Driver Hopper Controls](image)

- 31. Left Hopper Switch
- 32. Right Hopper Switch
- 33. Both Hopper Switch
- 34. Left Spread Roll Arm Switch
- 35. Right Spread Roll Arm Switch
- 36. Left Auger Selector
- 37. Left Auger Switch
- 38. Right Auger Selector
- 39. Right Auger Switch

![Figure 11a. Auger Auto On/Off Switch](image)

1. Switch
2. Auger

37. **Left Auger Switch** (Figure 11)

When the left auger selector switch is (36) is in the rearward position, this switch allows the driver to turn the left auger “on” or “off.”

38. **Right Auger Selector** (Figure 11)

In the rearward position, power is supplied to the driver’s “on/off” switch (39) allowing the driver to turn the right auger “on” or “off.”
In the center position, power is supplied to the front end man’s “on/off” switch allowing the front end man to turn the right auger “on” or “off.”

In the forward position, power is supplied to the auto spring switch located at the outboard end of the right hopper (See Figure 11a). When this switch is tripped by material moving the spring finger, 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.

39. **Right Auger Switch** (Figure 11)

When the right auger selector switch (38) is in the rearward position, this switch allows the driver to turn the right auger “on” or “off.”

---

**Items 40 thru 47 are located in the front end man’s control box.** (Figure 12)

---

40. **Left Hopper Switch** (Figure 12)

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

41. **Right Hopper Switch** (Figure 12)

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

42. **Both Hopper Switch** (Figure 12)

Push up to simultaneously extend both hoppers and down to simultaneously retract both hoppers.

43. **Left Conveyor Switch** (Figure 12)

When the driver has selected “front” on the left conveyor selector switch (21) this switch will turn the left conveyor “on” or “off.”

44. **Right Conveyor Switch** (Figure 12)

When the driver has selected “front” on the right conveyor selector switch (19) this switch will turn the right conveyor “on” or “off.”

45. **Hitch Release Pushbutton** (Figure 12)

Push the hitch release pushbutton to disengage the supply truck from the chipspreader. (See Item 16 “Hitch Release Pushbutton,” operators control panel.)

46. **Left Auger Switch** (Figure 12)

When the driver has selected “front” on the left auger selector (36), this switch will turn the left auger “on” or “off.”

47. **Right Auger Switch** (Figure 11)

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

---

**WARNING**

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

---

**WARNING**

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

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

Remain clear of all moving parts.

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

Shift in and out of “travel” only while stopped or moving at a very slow rate of speed. Shifts between “chip” and “travel” are very abrupt and could cause personal injury.

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.

---

IMPORTANT

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

---

CAUTION

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

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 engine or operation.

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 conveyors.

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

---

Speed/Gate Opening Selection

Using chart 1A, 1B, or 1C determine the maximum possible speed which the chipsreader could be operated at and still convey enough material to the front hopper. As an example, using chart number 1C to spread 25 lb./sq. yd. of ⅛” chips, 22 ft. wide, enter from the left of the chart at 25 lb./sq. yd. horizontally to the hopper width being used, 22 ft., read the speed vertically below the intersection to be 285 fpm. Some speed less than this should be used in order to allow some extra capacity for changing trucks.

For example, if 275 fpm was selected as the speed, referring to chart number 2 at 25 lb./sq. yd. and 275 fpm, the required gate opening is 1”. This opening should be at least 2 times the size of the stone for reliable feeding therefore the stone should not be larger than ½”.

While in chart number 2 note that for ⅛” chips the minimum gate opening should be ¾”. The speed to be used with ¾” gate opening is approximately 225 fpm.

The chipsreader can spread 25 lb./sq. yd. of ⅛” chips at any of the following combinations of settings:

<table>
<thead>
<tr>
<th>Gate Opening</th>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>¾”</td>
<td>225 fpm</td>
</tr>
<tr>
<td>1”</td>
<td>275 fpm</td>
</tr>
<tr>
<td>1⅛”</td>
<td>300 fpm</td>
</tr>
<tr>
<td>1¼”</td>
<td>350 fpm</td>
</tr>
<tr>
<td>1⅛₁₆”</td>
<td>400 fpm</td>
</tr>
</tbody>
</table>

For maximum productivity one would want to chip at as high a rate of speed as is practical within the horsepower limitations of the machine, or any outside factors which may arise. (i.e. you are behind the distributor which is running at 300 fpm.)

You now have a selection of gate/speed combinations that will all spread 25 lb./sq. yd. of chips that are ⅛”. If you choose a speed greater than 285 fpm,
the conveyors may not be able to transfer the material fast enough resulting in having to stop or slow down occasionally to allow them to catch up. If you choose a speed less than 285 fpm, the conveyors can keep up and the chipsreader should be able to run continuously providing there is a great enough supply of trucks to supply the required amount of chips.

While 275 fpm may appear to be slower than previously used speeds, remember that since the entire road is being covered in a single pass it is really the equivalent of a non-variable hopped machine chipping in excess of 550 fpm since it does not have to return for a second pass.

Adjust the gate opener set point to 1”, adjust the speed control set point to 275 fpm.

To start spreading at this combination:
1. Turn ignition key to “on.”
2. Retard throttle to “low idle.”
3. Place control handle in “neutral.”
4. Turn ignition key to “start.”
5. Check engine oil pressure and coolant temperature after display has made its initial self-check. Allow the engine to reach normal operating temperature before placing any significant load on the engine.
6. Run engine at governed speed. Normal operation of the chipsreader is at full governed rpm.
7. Select speed range appropriate to the desired working speed. In this case “lo” for maximum torque and best controllability.

8. Select auto speed operation. (Ref. 2, Figure 3)

9. Depress the override pedal fully.

10. Push speed/direction handle forward (more than 3 degrees).

11. Release override pedal slowly and smoothly to the full up position. This must be done slow enough to allow the engine to remain at or near its governed RPM.

12. Depress the gate/spread roll switch (Ref. 8, Figure 3) fully to the right on reaching the start of spreading.

13. Verify speed as shown on the display after fully releasing the override pedal, and adjust if necessary using the auto speed set point. (Ref. 3, Figure 3)

14. Stopping:
   a) With space available to stop after running off the chipped surface:
      1. Center the gate/spread roll switch (Ref. 8, Figure 3) upon reaching the end of the newly chipped surface.
      2. Depress the override pedal smoothly to the fully depressed position.
      3. Return the control handle to “neutral”.
      4. Release the override pedal.

   b) Stopping with oil spread in front of chip-spreader:
      1. Depress the override pedal smoothly to the fully depressed position.
      2. Center the gate/spread roll switch.
      3. Return the control handle to “neutral”.
      4. Release the override pedal.

15. To back up from this stopped position:
   1. Switch auto manual selector to “manual”. (Ref. 2, Figure 3)
   2. Move handle out of neutral to the rear—the more rearward the handle is moved, the faster the machine will back up.
   3. To slow and stop the machine smoothly, bring the handle toward and into neutral.

Should a piece of foreign material become lodged in the gates, push the override pushbutton (Ref. 29 or 33, Figure 3) 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. Never put hand 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.

**WARNING**

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.

Adjust chip spreader 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.

Rear conveyor gates should be adjusted to feed material approximately equal to or slightly more than the rate at which material is being spread. Since the machine is equipped with conveyor belt speed controls, these 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 the required amount to the front hopper. (Figure 13)

![Figure 13. Rear Conveyor Gate](image)

1. Adjustment Bolt

The operator may wish to disengage the front hopper agitators while spreading clean dry aggregate. This operation is performed by removing the agitator drive chain (Figure 14) on each hopper. This will prevent unnecessary wearing of the agitator.

**Control Box**

The control box may be slid fore and aft approximately 4" by loosening the 4 bolts under the mounting plate and repositioning to the desired position and then retightening the bolts.
Tilt Wheel

The steering wheel can be placed in any of its 6 positions by removing the 2 bolts completely, positioning the wheel to the desired position, lining up the new set of holes and inserting the bolts. Be sure to torque the bolts fully to the proper value.

Automatic Conveyor Control (Figure 9)

In the forward position power is supplied to the auto paddle 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. (Figure 16)

Belt Speed Controls (Figure 17)

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 incorpo-
rated in the integrated circuit block on top of the right conveyor, outboard of each conveyor's solenoid valve. 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 to a stop. The knob may be positioned anywhere in between and locked at the desired speed with the lock ring.

This 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. (Figure 17)

**Horn (Figure 18)**

The horn is operated by depressing the trigger on the speed/direction control handle.

**Optional Equipment**

**Rear Flow Divider (Positraction)**

(Ref. 4, Figure 18)

An electrically controlled flow divider valve is operated by a toggle switch on the control panel. When the switch is "on", the difference in rotational speed between the two rear wheels cannot exceed 10% to 15%. This action is exactly like a limited slip differential in a mechanical rear axle.

This feature is only operable in "1st" and "2nd" ranges, it is automatically switched off in the travel range.

**Front/Rear Flow Divider (Positraction)**

(Ref. 5, Figure 18)

An electrically controlled flow divider valve is operated by a toggle switch on the control panel. When the switch is “on”, the difference in rotational speed between the front wheels and the rear wheels cannot exceed 15%. This action is exactly like the limited slip in a full time four wheel drive vehicle.

This feature is only operable in “1st” range and is automatically switched off in “2nd” and “travel” ranges.

**Electro-hydraulic Powered Seat Assembly**

An electrically controlled hydraulically powered chain drive is operated by a spring centered toggle switch (Figure 7 Ref. 15). The seat has a manually operated lock pin securing the seat either full left or right travel. The lock pin must be released and locked in the up position before using the electric switch. This is done by pulling up on the “tee” handle behind the seat raising the pin against the spring and bringing the roll pin thru the slot, and then turning the pin a quarter turn before releasing. The engine must be on and running near its governed RPM in order to have oil flow, and the range selector must be in either “1st” or “2nd” to have electric power to the switch. The seat may then be positioned wherever it is desired for operation. Before shifting to “travel”, the seat must be positioned either full left or right and the lock pin inserted in the hole in the deck.

---

**WARNING**

Do not travel with the seat unlatched. Seat movement could occur causing disorientation and possible loss of control.
OPERATING RANGES
For 4WD ChipSpreader with

190 HP Cummins 6BTA Engine
165 HP CAT 3208 Engine

ChipSpreader can be operated anywhere to the lower left of the appropriate gross weight curve.

LO RANGE
PV24, 76 CID FRONT
85 CID REAR
6BTA CUMMINS, 190 HP @ 2200 RPM
3208 CAT, 165 HP @ 2200 RPM

2ND RANGE
PV24, 76 CID FRONT
43 CID REAR
6BTA CUMMINS, 190 HP @ 2200 RPM
3208 CAT, 165 HP @ 2200 RPM

TRAVEL
PV 24, 43 CID REAR 2WD
6BTA CUMMINS, 190 HP @ 2200 RPM
3208 CAT, 165 HP @ 2200 RPM
OPERATING RANGES

For 4WD ChipSpreader with

210 HP Cummins 6CT Engine
219 HP CAT 3208T Engine

ChipSpreader can be operated anywhere to the lower left of the appropriate gross weight curve.

LO RANGE
PV24, 76 CID FRONT
85 CID REAR
6CT CUMMINS, 210 HP @ 2200 RPM
3208 CAT, 219 HP @ 2200 RPM

2ND RANGE
PV24, 76 CID FRONT
43 CID REAR
6CT CUMMINS, 210 HP @ 2200 RPM
3208 CAT, 219 HP @ 2200 RPM

TRAVEL
PV 24, 43 CID REAR
6CT CUMMINS, 210 HP @ 2200 RPM
3208 CAT, 219 HP @ 2200 RPM
OPERATING RANGES

For 4WD ChipSpreader with

234 HP Cummins 6CTA Engine
234 HP CAT 3208T ENGINE

ChipSpreader can be operated anywhere to the lower left of the appropriate gross weight curve.

LO RANGE
PV24, 76 CID FRONT
85 CID REAR
6CTA CUMMINS, 234 HP @ 2200 RPM
3208T CAT, 234 HP @ 2200 RPM

2ND RANGE
PV24, 76 CID FRONT
43 CID REAR
6CTA CUMMINS, 234 HP @ 2200 RPM
3208T CAT, 234 HP @ 2200 RPM

TRAVEL
PV 24, 43 CID REAR
6CTA CUMMINS, 234 HP @ 2200 RPM
3208T CAT, 234 HP @ 2200 RPM
Rear Hopper Flow Gate Adjustment (Figure 13)

Turn spread roll and conveyors “off”.
1. Loosen flow gate retaining bolts.
2. Raise gate to increase conveyor flow to front hopper.
3. Lower gate to decrease conveyor flow to the front hopper.
4. Retighten flow gate retaining bolts.

Hopper Spread Roll Wear Plate Adjustment (Figure 19)

Turn spread roll and conveyors “off”.
1. Loosen all spread roll wear plate hold down bolts and adjust the wear plate until a nominal \(\frac{1}{16}\)" clearance exists between the wear plate and the spread roll for the entire hopper width.
2. Retighten all the hold down bolts.
3. When one side of a plate has worn away it is possible to turn the plate over and use the opposite side.

Hopper Gate Wear Plate Adjustment (Figure 20)

Turn spread roll and conveyors “off”.
1. Loosen wear plate hold down bolts and extend the plate \(\frac{1}{32}\)" past the gate edge along the entire gate width.
2. Tighten hold down bolts.
3. As plate wear occurs, additional adjustment will be necessary.

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.

<table>
<thead>
<tr>
<th>WARNING</th>
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<tbody>
<tr>
<td>Conveyor must be running during this procedure. To avoid personal injury, be sure to remain clear of moving belt.</td>
</tr>
</tbody>
</table>

2. Should it be impossible to obtain centered belt operation by adjusting the tail pulley (Figure 21) it will then be necessary to adjust the head pulley as outlined below. (Figure 22)

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.

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remain clear of all moving parts.</td>
</tr>
</tbody>
</table>

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) Retighten adjusting screw jam nuts.
g) Stop the conveyor belt.
h) Tighten head pulley bearing bolts.

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.

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remain clear of all moving parts.</td>
</tr>
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</table>

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) Retighten 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.

<table>
<thead>
<tr>
<th>WARNING</th>
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<tbody>
<tr>
<td>The fuel tank is part of the crosswalk. Do not drill or weld in this area.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
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<tbody>
<tr>
<td>To avoid potential damage to electrical components disconnect batteries before welding.</td>
</tr>
</tbody>
</table>

Relief and Reducing Valve Pressure Adjustments

Before making any relief valve adjustments check to insure that there is sufficient oil in the hydraulic reservoirs and that all the filter elements are free of contamination. All pressures are to be set with the oil temperature at least 110 degrees.

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
</tr>
</tbody>
</table>
1. **Left Hopper Spread Roll Relief Valve** (Figure 23)

   a) With engine off remove plug (2) and install a 3000 psi gauge with necessary adapters to hook up to a 1/4 SAE O ring port (04 MB). Disconnect quick coupler (7).

   b) Start the engine and run at governed speed (2300 RPM).

   c) Use the manual override to actuate the valve (Fig. 23, Ref. 3).

   d) Adjust this relief valve (Fig. 23, Ref. 1) to a setting of 2000 psi.

   e) If relief pressure cannot be obtained, shut down the engine and remove left spread roll relief valve cartridge and check for contamination. Clean or replace as necessary.

   f) Shut engine off.

   g) Remove gauge, reinstall plug and reconnect quick disconnect.

### Figure 23 Side Plate

1. Relief Valve – Left Hopper Spread Roll
2. Plug “GL” – Left Hopper Spread Roll Pressure Port
4. Relief Valve – Right Hopper Spread Roll
5. Manual Override – Right Spread Roll Valve
6. Plug “GR” – Right Hopper Spread Roll Pressure Port
7. Quick Coupler – Left Spread Roll
8. Relief Valve – Left Auger
9. Plug “GL” – Left Auger Relief Pressure Port
10. Manual Override – Left Auger Valve
11. Relief Valve – Right Auger
13. Plug “GR” – Right Auger Relief Pressure Port
14. Quick Coupler – Left Auger

2. **Right Hopper Spread Roll Relief Valve** (Figure 23)

   a) With engine off remove plug (6) and install a 3000 psi gauge with necessary adapters to hook to a 1/4 SAE O ring port (04 MB). Disconnect the 2nd from the bottom quick coupler on the right side of the chip spreader.

   b) Start the engine and run at governed speed (2300 RPM).

   c) Use the manual override to actuate the valve (Fig. 23, Ref. 5)

   d) Adjust this relief valve (Fig. 23, Ref. 4) to a setting of 2000 psi.

   e) If relief pressure cannot be obtained, shut down the engine and remove right spread roll relief valve cartridge and check for contamination. Clean or replace as necessary.

   f) Shut engine off.

   g) Remove gauge, reinstall plug and reconnect quick disconnect.

3. **Left Auger Relief Valve** (Figure 23)

   a) With engine off remove plug (9) and install a 3000 psi gauge with necessary adapters to hook to a 1/4 SAE O ring port (04 MB). Disconnect quick coupler (14).

   b) Start the engine and run at governed speed (2300 RPM).

   c) Use the manual override to actuate the valve (Fig. 23, Ref. 10).

   d) Adjust this relief valve (Fig. 23, Ref. 8) to a setting of 2000 psi.

   e) If relief pressure cannot be obtained, shut down the engine and remove left auger relief valve cartridge and check for contamination. Clean or replace as necessary.

   f) Shut engine off.

   g) Remove gauge, reinstall plug and reconnect quick disconnect.

4. **Right Auger Relief Valve** (Figure 23)

   a) With engine off remove plug (13) and install a 3000 psi gauge with necessary adapters to hook to a 1/4 SAE O ring port (04 MB). Disconnect the top quick coupler on the right side of the chip spreader.
b) Start the engine and run at governed speed (2300 RPM).

   c) Use the manual override to actuate the valve (Fig. 23, Ref. 12).

   d) Adjust this relief valve (Fig. 23, Ref. 11) to a setting of 2000 psi.

   e) If relief pressure cannot be obtained, shut down the engine and remove right auger relief valve cartridge and check for contamination. Clean or replace as necessary.

   f) Shut engine off.

   g) Remove gauge, reinstall plug and reconnect quick disconnect.

5. Left Hopper Positioning Relief Valve
(Figure 24)

   a) With the engine off, remove plug (3) and install a 3000 psi gauge with the necessary adapters to hook to 1/2" SAE O ring port (08 MB). Disconnect quick couplers (10) and (11).

   b) Start the engine and run it at full rpm.

   c) Loosen locknut on relief valve (6).

   d) Use the manual override button to activate the valve (Fig. 24, Ref. 8).

   e) Use the box wrench to adjust the cartridge in valve (6). This relief valve pressure should be set at 2000 psi. Retighten the locknut to hold the setting.

   f) If relief pressure cannot be obtained, shut down the engine and remove left hopper in/out relief valve cartridge and check for contamination. Clean or replace as necessary.

   g) Shut engine off.

   h) Remove gauge and reinstall plug.

   i) Reconnect quick couplers.

6. Right Hopper Positioning Relief Valve
(Figure 24)

   a) With the engine off, remove plugs (1) and (2) and install 3000 psi gauges with the necessary adapters to hook to 1/4" SAE O ring port (04 MB).

   b) Disconnect quick coupler (9).

   c) Loosen locknuts on relief valves (4, 5).

   d) Start the engine and run at 2300 RPM (governed speed).

   e) Turn the relief valve (5) all the way in.

   f) Use the manual override button to activate the valve (Fig. 24, Ref. 7).

   g) Use a box wrench to adjust the cartridge in valve (4). This relief valve pressure should be set at 2300 psi at G1. Retighten the locknut to hold the setting.

   h) Use a box wrench to adjust the cartridge in valve (5). This relief valve pressure should be set at 2000 psi at G3. Retighten the locknut to hold the setting.

   i) If relief pressure cannot be obtained, shut down the engine and remove hopper in/out relief valve cartridges and check for contamination. Clean or replace as necessary.

   j) Shut engine off.

   k) Remove gauges and reinstall plugs.

   l) Reconnect the quick coupler.
7. **Left Hopper Gate Relief Valve**
(Figure 24)

a) With the engine off, remove plug (14) and install a 3000 psi gauge with the necessary adapters to hook to 1/2" SAE O ring port (08 MB). Disconnect quick couplers (23) and (20) and the 3 pin connector on the left side of the chipspreader.

b) Start the engine and run it at 1000 rpm.

c) Loosen locknut on relief valve (17).

d) Use the manual override button to activate the valve (Fig. 24, Ref. 19) if the valve is not already activated due to disconnecting the 3 pin connector.

e) Use a box wrench to adjust the cartridge in valve (17). This relief valve pressure should be set at 900 psi. Retighten the locknut to hold the setting.

f) If relief pressure cannot be obtained, shut down the engine and remove left hopper gate relief valve cartridge and check for contamination. Clean or replace as necessary.

g) Shut engine off.

h) Remove gauge and reinstall plug.

i) Reconnect quick couplers (23) and (20) and the 3 pin connector on the left side of the chipspreader.

8. **Right Hopper Gate Relief Valve**
(Figure 24)

a) With the engine off, remove plugs (12) and (13) and install 3000 psi gauges with the necessary adapters to hook to 1/4" SAE O ring port (04 MB).

b) Disconnect the 1/4" quick couplers on the right side of the chipspreader and also disconnect the 3 pin electrical connector on the right side of the chipspreader.

c) Loosen locknuts on relief valves (15, 16).

d) Start the engine and run at 1000 RPM.

e) Turn the relief valve (16) all the way in.

f) Use the manual override button to activate the valve (Fig. 24, Ref. 18), if the valve is not already activated due to the disconnection of the 3 pin connector.

g) Use a box wrench to adjust the cartridge in valve (15). This relief valve pressure should be set at 1250 psi at G1. Retighten the locknut to hold the setting.

9. **Left Conveyor Relief Valve**
(Figure 25, Ref. 4)

a) With the engine off remove plug (5) at port “GL” and install a 3000 psi gage with necessary adapters to hook to 1/4" SAE O ring port (04 MB).

b) Hold (lock) the left conveyor head pulley with a pipe wrench or other suitable tool. (Fig. 27) Use caution when doing this operation. Be sure wrench is securely positioned on U-joint rotated by hand against supporting steel so it cannot rotate further.
c) The engine should be run at governed speed (approximately 2300 RPM).

d) Use the manual override to actuate the valve (Fig. 25, Ref. 6).

e) Adjust this relief valve (Fig. 25, Ref. 4) to a setting of 2100 psi.

f) If relief pressure cannot be obtained, shut down the engine and remove left conveyor relief valve cartridge and check for contamination or damaged cartridge pieces. Clean and replace as necessary.

g) Shut engine off.

h) Remove gage and reinstall plug.

d) Use the manual override to actuate the valve (Fig. 25, Ref. 8).

e) Adjust this relief valve (Fig. 25, Ref. 7) to a setting of 2100 psi.

f) If relief pressure cannot be obtained, shut down the engine and remove left conveyor relief valve cartridge and check for contamination or damaged cartridge pieces. Clean and replace as necessary.

g) Shut engine off.

h) Remove gage and reinstall plug.

10. Right Conveyor Relief Valve
(Figure 25, Ref. 7)

a) With engine off remove plug (9) and install a 3000 psi gage with necessary adapters to hook to a 1/4 SAE o ring port (04MB).

b) Hold (lock) the left conveyor head pulley with a pipe wrench or other suitable tool. (Fig. 27). Use caution when doing this operation. Be sure wrench is securely positioned on U-joint & rotated by hand against supporting steel so it cannot rotate further.

c) The engine should be run at governed speed (approximately 2300 RPM).
11. Powered Seat Relief Valve (Fig. 25)

a) With the engine off remove plug (1) (Fig. 25) and install a 3000 psi gage with necessary adapters to hook to 1/2" JIC (08MJ) male fitting.

b) Run the engine at its governed speed, 2300 RPM. Position the seat full left or right, and insert the lock pin.

c) Use the manual override button to actuate the valve (Fig. 25, Ref. 3).

d) Use a box wrench to adjust the cartridge. This relief valve should be set to 1200 psi. (Fig. 25, Ref. 2).

e) If relief pressure cannot be obtained, shut down the engine and remove the relief valve cartridge and check for contamination or damaged cartridge. Clean or replace as necessary.

12. Power Steering Relief Valve
(At Hydraulic Control Assembly)
(Fig. 28, Ref. 1)

a) With engine “off”, remove plug (2) on integrated control circuit and install a 3000 psi gage with necessary adapters to hook up to a 1/4" SAE o ring port (04MB).

b) The engine must be run at or above 950 RPM.
c) Turn the front wheels full left or right until the cylinder is fully stroked.

d) While holding the wheels full left or right set the relief valve (1) pressure to 1800 psi.

e) If the relief valve pressure cannot be reached, the secondary relief valve within the pump may be set at or too close to 1800 psi. In order to verify and set this relief valve, the relief valve on the integrated circuit must be screwed all the way in and then the relief valve at the pump may be adjusted to 2250 psi by referring to (Fig. 26). Remove cap (5), loosen locknut (6) and adjust relief valve (7) to 2250 psi (Fig. 26) while holding the wheels full left or right.

f) Return to the relief valve at the hydraulic control integrated circuit (Fig. 28, Ref. 1) and repeat steps 4b, c and d. If the pressure cannot be set at 1800 psi without the control pressure dropping below 250 psi then set this pressure lower than 1800 psi but not lower than 1650 psi.

g) If relief pressure cannot be obtained at either cartridge, shut down the engine, remove appropriate cartridge and check for contamination or damaged cartridge pieces. Clean or replace as necessary.

h) Shut engine off

i) Remove gage and reinstall plug.

14. Hitch Release Pressure Reducing Valve (Fig. 28, Ref. 5)

a) With the engine off, remove plug (6) and insert a 1000 psi gage with the necessary adapters to hook to a 1/4" SAE o ring port (04MB).

b) Run the engine at idle RPM.

c) Loosen locknut and adjust pressure to approximately 600 psi (Fig. 28, Ref. 3).

d) Shut engine down, remove 3000 psi gage, and install 1000 psi gage.

e) Restart engine and run at or above 950 RPM.

f) Adjust relief valve to 400 psi and retighten locknut.

g) If relief pressure cannot be obtained, shut down the engine and remove the control pressure relief valve cartridge and check for contamination or damaged cartridge pieces. Clean or replace as necessary.

h) Shut engine off.

i) Remove gage and reinstall plug.

13. Hydraulic Control Pressure Relief
(Fig. 28, Ref. 3)

a) With the engine off, remove plug (4) and insert a 3000 psi gage with adapters to hook to a 1/4" SAE o ring port (04MB).

b) Run the engine at idle RPM.

c) Loosen locknut and set reduced pressure to 100 psi (Fig. 28, Ref. 5). You may not be able to get as low as 100 psi due to back pressure. If this is the case, reduce the pressure to its lowest point and then go back up 10-15 psi.

d) If reduced and/or relief pressures cannot be set, shut down engine and recheck hydraulic control pressure to be sure it is at 250 psi. If it is, shut down engine and remove the reducing valve or relief valve cartridge and check for contamination or damaged cartridge pieces. Clean or replace as necessary.

e) Shut engine off.

f) Remove gage and reinstall plug.

13. Hydraulic Control Pressure Relief
(Fig. 28, Ref. 3)

a) With the engine off, remove plug (4) and insert a 3000 psi gage with adapters to hook to a 1/4" SAE o ring port (04MB).
15. Rear Pump Built in Relief Valve
(Figure 29, Ref. 2)

a) With engine “off”, remove plug (Fig. 28, Ref. 2) on integrated control circuit and install a 3000 psi gage with the necessary adapters to hook to a 1/4” SAE o ring port (04MB).

b) Disconnect the input hose to the rear integrated circuit (Fig. 24, Ref. 21), cap the adapter in the integrated circuit and insert an adapter with cap in the hose end.

c) The engine must be run at or above 950 RPM.

d) Set the relief valve pressure to 2000 psi.

e) If relief pressure cannot be obtained, shut down the engine, remove the cartridge and check for contamination or damaged cartridge pieces. Clean or replace as necessary.

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.

**WARNING**

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

1. Jack the machine up and securely support on stands with all four wheels off the ground. **Warning:** Be certain that machine is securely supported on stands. Wheels will be rotating under power and if they contact the ground or debris becomes lodged between the wheels and ground, the chips spreader could drive off the stands.

2. Disconnect the fuel solenoid wire at the engine, so that the engine can only be cranked and cannot be started. (Figure 30)

3. Disconnect pump stroker at the pump.

4. Remove 1/4” plug (Fig 28, Ref 7) on the brake/motor shift block on the hydraulic control plate on the inboard side of the right conveyor and insert a 600psi gage with the necessary adapters to hook to a 1/4” male JIC (04MB).

5. Remove suction filter elements: fill with hydraulic oil and reinstall. (Figure 31, Ref. 1)

6. Remove cap on tee on high side drain hose on pump and fill pump case with hydraulic oil. If a fill tank is used to supply oil, it should be positioned higher than the hydraulic tanks. If this is done, the entire system can be filled from this one location.
7. 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.

8. Hook up fuel solenoid valve.

9. 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. 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 between 150 and 300 psi.

10. The pump stroker (Figure 29, Ref. 1) null or zero should now be centered using the following procedure. This step only needs to be done if the pump or stroker has been changed.

   a) Loosen the null adjust locknut.

   b) Using a $\frac{3}{16}$ hex key, slowly turn the null adjust screw clockwise until the charge pressure begins to decrease (indicating the pump is going on stroke in one direction). Slowly turn the null adjuster counter-clockwise while counting the number of turns until the charge pressure begins to decrease (indicating the pump is going on stroke in the opposite direction).

   c) Turn the null adjuster clockwise half the amount observed in step b. This should be the center of neutral.

   d) Hold the null adjuster with the hex key and tighten the locknut to a torque of 14-18 lbs.

11. Check fluid levels in reservoirs and add if necessary.

12. Run the engine at 1000 to 1200 RPM. Charge pressure should be 200 to 300 psi and steady. Case pressure should be 15 to 30 psi. Return engine to idle and shut it down. Check the pressure by inserting a 100 psi gauge with adaptor at the port provided as shown in Figure 41.

13. Place range selector in low: place auto/manual selector in manual and reconnect the pump stroker.

14. Check for debris under all wheels.

15. Start engine and run at 1000 to 1200 RPM. Observe charge and case pressure. Charge pressure should be 190 to 230 psi above case pressure. Move the handle slowly to the full forward position and then full reverse. Repeat this cycle for about 5 minutes. When the pump is on stroke in either direction, the charge pressure should be 160 to 200 above the case pressure. In all cases, the difference between charge pressure and case pressure should be greater when in neutral than when the pump is on stroke in forward or reverse.

16. Slowly, in steps, run the engine up to full RPM while observing the charge pressure. Repeat step 16 with the engine at full RPM. At any sign of unsteadiness in the charge pressure, shut the engine down immediately and check for problems in the suction part of the system, such as clogged filter, leaks or blockage.

17. 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.

### Variable Hopper Gate Adjustment

1. Place the auto/park/manual selector is “Park”

2. Disconnect the red wire from each solenoid of both gate valves.

3. Start the engine and run it at about 1000 rpm.

4. Using the manual overrides on each gate solenoid valve, close the gates fully. There should be $\frac{1}{16}$" between each gate and the spread roll.

#### WARNING

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.

5. Shut the engine off and install a 1500 psi gage in each gate circuit.
6. Reconnect the red wire to each solenoid of the valve.

7. Disconnect the 16 pin connector from the main control box.

8. Check the resistance across sockets 5 & 6. The value should be nominally 18K ohms ±3K with the pedal up and 0 to 10 ohms with the pedal fully pressed. This is the right gate circuit. Check the distance across sockets 8 & 9. This value should be nominally 18K ohms ±3K with the pedal up and 0 to 10 ohms with the pedal fully depressed. This is the left gate circuit.

Also check the resistance across sockets 3 & 14. The value should be 110 ohms ±25 with the pedal up and 950 to 1200 ohms with the pedal fully depressed. The value of 110 ohms must start to increase immediately as the pedal is depressed. The actual value is not critical as long as it starts to increase immediately with movement of the pedal. This is a part of the speed circuit.

Open the junction box on the left side of the left conveyor. Remove the or/g wire that goes forward from terminal 3, remove the or/b wire that goes forward from terminal 2 and remove the or wire that goes forward from terminal 1. Check the resistance across the or/g and or/b wires. This value should be between 950 and 1200 ohms. Check the resistance across the or/b and or wires, it must be approximately 0 ohms. The actual values are not critical as long as the value changes immediately upon movement of the transducer pot. As long as the values are near these values you can reconnect the wires to their respective terminals. Remove the g/w wire that goes forward from terminal 4, remove the b/w wire that goes forward from terminal 5 and remove the r/b/w wire that goes forward from terminal 6. Check the resistance across the g/w and b/w wires. This value should be between 950 and 1200 ohms. Check the resistance across the g/w and r/b/w wires, it must be approximately 110 ohms. The actual values are not critical as long as the value changes immediately upon movement of the transducer pot. As long as the values are near these values you can reconnect the wires to their respective terminals.

9. Reconnect the 16 pin connector to the main control box.

If no components have been changed, skip step 10 and proceed directly to step 11.

10. Open the main control box. The gate boards are mounted on the side of the control box. There are five adjustment pots on each board, all of which have been factory set to an initial position. These initial positions are listed here for reference. Do not move from these initial positions before attempting to adjust the gate.

- Filter-full counterclockwise +11 turns
- Close-full counterclockwise +11½ turns
- Open-full counterclockwise +8½ turns
- Sensitivity-full counterclockwise +5 turns
- Override-full counterclockwise +19 turns

It should not be necessary to verify these initial positions, the adjustment procedure is normally started from these positions. If it is necessary to check these the pot should be rotated in the counterclockwise direction until a click is heard. There is no stop, you must listen for a slight clicking noise to know when you are fully to the end of electric travel.

If the values measured across the or and or/ wires and the r/b/w and b/w wires in step 8 above were within the acceptable range, skip steps 1 through 14 and proceed directly to step 15.

11. Start the engine and run it at full rpm. Externally both hoppers approximately 2 feet each and shut the engine down.

12. Remove the transducer covers on each hopper

13. Loosen the locking bolt on the gate shaft until the pin plate can be rotated against the position feedback pot.
14. Rotate the pin against the position feedback pot to obtain a reading within the range and retighten the locking bolt.

15. Recheck the reading and reconnect the wires to their respective terminals.

16. Turn the ignition key to the on position but do not start the engine.

17. Turn both gate opening set points on the main control box fully counterclockwise and turn the thumb switch on the handle off.

18. Adjust the “close” trim pot on each gate board, until both the green and red LED’s are blinking at about the same intensity. (Counterclockwise opens the gate, clockwise closes the gate)

19. Start the engine and run it at approximately 1000 rpm.

20. Set the gate opening to 2 1/2” (fully clockwise) and turn the thumb switch on the handle on. Adjust each “open” trim pot to obtain a true 2 1/2” opening measured at the gate, and be sure that both LED’s are blinking at about the same intensity. (Counterclockwise opens the gate, clockwise closes the gate) Verify with the pressure gage that the pressure is 0 at both the full open and the closed position and adjust as necessary to achieve this.

21. Set each gate opening to a setting of 2”. Repeatedly open and close each gate to this opening while adjusting the “sensitivity” counterclockwise until the onset of “hunting” occurs and then adjust the “filter” counterclockwise very finely until the “hunting” is eliminated. (Counterclockwise increases sensitivity, clockwise decreases sensitivity) (Counterclockwise increases filtering, clockwise decreases filtering)

22. Recheck each of the closed positions for equally blinking LED’s and readjust slightly if necessary to obtain this.

23. Recheck each of the open positions for 2 1/2” and readjust if necessary.

24. Check for repeatability of the gate setting. It should be within ± 1/16”. Check that with a setting of 1/2” the gate will open. If it does not, adjust the “filter” slightly clockwise until it does and then adjust the “sensitivity” slightly clockwise if necessary to eliminate “hunting” and then recheck the repeatability.

25. Turn the thumb switch on and adjust each gate opening to approximately 1 1/4” and depress each override button. Adjust each override pot to obtain a 2 1/2” opening and verify that the gate is not opening too far by having 0 pressure while holding down the override button. (Counterclockwise opens gate, clockwise closes gate)

26. Return the engine to idle and shut it off.

27. Reinstall both halves of each transducer cover.

Override Pedal Adjustment

Before starting any adjustments under this section, the hopper gates must be in proper adjustment as explained in the previous section.

**WARNING**

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

![Figure 34 Override Pedal Adjustment](image)

1. Manual Potentiometer
2. Override Pedal
3. Power Steering Control
4. Right Side Potentiometer
5. Seat Latch Pin
6. Operator Seat Assy
7. Control Box Foe/ Aft Adjust Slot
8. Tilt Wheel Bolts
9. Warning Light
10. Switch
11. Auto Potentiometer
1. Place auto/manual selector in “auto.” (Figure 3)
2. Place speed range selector in “lo.”
3. Disconnect the rear 16 pin connector from the control box.
4. Check the resistance across sockets 5 & 6. The value should be nominally 18K ohms ±3K with the pedal up, and 0 to 10 ohms with the pedal fully depressed. This is the right gate circuit. Also check the resistance across sockets 8 & 9. This value should also nominally be 18K ohms ±3K with the pedal up and 0 to 10 ohms with the pedal fully depressed. This is the left gate circuit. If the gates are properly set do not move this pot. Also check the resistance across sockets 3 & 14. This value should be 110 ohms ±25 with the pedal up and 950 to 1200 ohms with the pedal fully depressed. The value of 110 ohms must start to increase immediately as the pedal is depressed. The actual value is not super critical as long as it starts to increase immediately with movement of the pedal. This is the Auto pot which is located at the far left end of the pedal shaft.
5. Loosen the locking bolt pin plate on the pedal shaft until the pin plate can be rotated against the position feedback pot.
6. Rotate the pin against the position feedback pot to obtain a reading within the range and retighten the locking bolt.
7. Recheck the reading and reconnect the wires to their respective terminals.
8. Reconnect the 16 pin connector.

13. The limit switch with the r/b and w/r wires on it is the switch which releases the rear brakes. It should be set so that its contacts open the circuit just at the very bottom of the pedal stroke thus applying the brakes. There should be electrical continuity across sockets 10 & 11 when the pedal is up and when the pedal is fully depressed this continuity should be interrupted.
14. The limit switch with the g/w wire is the switch which turns the spread roll off as the gate is fully closed by interrupting the spread roll valve’s ground connection. It should be set so that its contacts open the circuit very near the bottom of the pedal stroke. There should be electrical continuity from socket 12 to ground when the pedal is up and when the pedal is fully depressed this continuity should be interrupted.
15. Drive the Chispreader to check the top speed in 2nd Auto. It should be 730 FPM on level ground with the command pot turned full clockwise. If it is not, use the trim pot at terminal 6 of the PID board to adjust the top speed to this value.

**Left Side Manual Potentiometer and Switch (Fig. 34)**

1. Place auto/manual selector in “manual.” (Figure 3).
2. Place speed range selector in “lo.”
3. Check the resistance across sockets 1 & 2. The value should nominally be 0 to 10 ohms with the pedal up and 350 ohms with the pedal down. It should become an open circuit just as the pedal is fully depressed. If it does not, or it opens much before the pedal is fully depressed, adjust the limit switch so that its contacts open just as the pedal is fully depressed. This will turn off the manual command to the pump as the other switch on the right side applies the rear brakes.

**Tach Calibration**

1. Turn ignition key “on” with engine not running.
2. Hold “select” switch down until “cal” is displayed (approx. 10 seconds).
3. Release switch to display present alternator setting.
4. Push and release switch to advance alternator setting.
5. When desired alternator setting is displayed, hold switch down until “cal” is redisplayed (approx. 10 seconds). This stores the new setting into memory.
6. When switch is released, new alternator setting is displayed for approximately 10 seconds.

7. Digital instrument panel will automatically reset for normal operation.

NOTE: Once unit is calibrated, recalibration is not necessary upon restart unless the chipspreader batteries have been disconnected.

Setting No. 1  Cummins 6BT or 6BTA with Chipspreader serial number K4800 or lower (14 pole alternator).

Setting No. 2  Caterpillar 3208 series engines.

Setting No. 3  Cummins 6BT or 6BTA with Chipspreader serial number K4867 or higher (12 pole alternator).

Setting No. 4  GMC 4.53 (12 pole alternator).

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**TOWING INSTRUCTIONS**

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**IMPORTANT**

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

---

If the engine is runable and pressure is available in the control pressure circuit, place the auto/manual selector in “manual” place the range selector in “travel”, start the engine and push the stick out of neutral slightly in the direction to be towed, in order to release the brakes. The chipspreader should only be towed to the side of the road or onto a trailer.

There must be electric power to the control box in order to freewheel the front motors. If the chipspreader batteries are dead, an auxiliary battery must be hooked to them in parallel to provide electric power to the control box.

If the engine is not runable, there is no power steering or pressure in the hydraulic control system. The key must be turned on to provide electric power, the range selector must be in “travel” to free wheel the front motors, auto/manual must be in “manual”, the control handle must be out of neutral and the rear brakes must be released by the following procedure.

---

**CAUTION**

The following procedure will release the brakes and may allow the chipspreader to roll! The chipspreader must be hooked to the tow vehicle or otherwise secured before proceeding further.

---

Screw a 16mm bolt into the hole in the center of the back of the brake. This hole is located on the inboard end of each rear motor. The bolt must be screwed in until it contacts the brake piston and then screwed in at least 1/16" more to fully release the brake.

The towing capabilities of the machine are not intended for any appreciable distance, but to be able to move it to a safely parked location where it may be worked on or from which it may be loaded onto a trailer for transportation to a suitable shop.
Relief and Reducing Valve Pressures

Front Pump Secondary Relief - 2250 psi

Rear Pump Relief Valve - 2000 psi
Charge Pressure - 470 Neutral
440 On Stroke
Power Steering Relief - 1800 psi
Hitch Release Pressure - 100 psi
Hydraulic Control Pressure Relief - 400 psi

Lt. Gate Relief - 900 psi
Rt. Gate Relief - 900 psi

Lt. Hopper Positioning - 2000 psi
Rt. Hopper Positioning - 2000 psi

Hopper Gate Relief - 1250 psi

Lt. Spread Roll - 2000 psi
Rt. Spread Roll - 2000 psi

Rt. Auger - 2000 psi
Lt. Auger - 2000 psi

Lt. Conveyor Relief - 2100 psi
Powered Seat Relief - 1200 psi
Rt. Conveyor Relief - 2100 psi
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**

- Front Hole Mounted Rear Hole Mounted
- 20\" if Rear Hole Mounted Hitch
- 16\" if Front Hole Mounted Hitch
- Minimum 2\"
- 8½\" Minimum
- Dump Truck Bed Representation
- 16\" if Rear Hole Mounted Hitch
- 12\" if Front Hole Mounted Hitch

---

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
CAUTION and INSTRUCTION PLATES
VARIABLE WIDTH HOPPER

⚠ For operator safety and possible liability protection, all Safety and Instruction plates should remain in place and be legible.

⚠ Should a plate be removed, lost, or become illegible, REORDER AND REPLACE IMMEDIATELY.

⚠ If plates become difficult to read because of material coating the surface, clean with solvent.

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**Check Weekly**

| Weekly | 21 Hydraulic Reservoirs | — | HD46 | Fill |
|        | 22 Hydraulic Oil Coolers | — | — | Clean A/R |

**Monthly**

| Monthly | 23 Gearbox | 1 | #90M-ATG | Fill |

**1 Year**

| 1 Year | 25 Return Filter | 1 | — | Filter Element |
|        | 26 Suction Filter | 2 | — | Filter Element |

**Yearly**

| Yearly | 27 Reservoir Breather | 1 | — | Filter Element |

**When Indicator Turns Red**

| 28 Engine Air Filter | 1 | — | Filter Element |

*On new machines change return line 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 filter elements anytime it is possible that contamination had been introduced into the System.*

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**Lubricants:**

- Texaco HD46
- Sunvis 40 or equal
- #2M-AG/Grease
- #90M-ATG/Molub-Alloy
- Transmission Lubricant
Safety Precautions

⚠️ CAUTION

Make certain everyone is clear of machine before starting engine or operation.

Always use steps, platforms and handrails provided.

Remain clear of moving or rotating parts.

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

Keep loose clothing away from conveyor area.

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

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

The seat must always be latched during travel.

To avoid potential damage to electrical components disconnect batteries before welding.

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

Do not transport ChipSpreaders with Variable Width Hoppers without mechanically securing the two movable hoppers. Extraordinary contamination of the hydraulic system may allow system oil leakage resulting in possible movement of the hopper sections.

⚠️ WARNING

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

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

Remain clear of all moving parts.

The fuel tank is part of the crosswalk. Do not drill or weld in this area.

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.

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

Shift in and out of “travel” only while stopped or moving at a very slow rate of speed. Shifts between “2nd” and “travel” are very abrupt and could cause personal injury.

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.

⚠️ IMPORTANT

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