CHIPSPREADER

OPERATION, MAINTENANCE and SAFETY MANUAL

2WD Hydrostatic Drive Units with Manual Controls

E.D. ETNYRE & CO., Oregon, Illinois 61061
CHIPSPREADER
OPERATION, MAINTENANCE AND SAFETY MANUAL

For 2WD Hydrostatic Drive Units
with Manual Controls

M-212-93

WARNING

UNSAFE OPERATION OF EQUIPMENT MAY CAUSE INJURY.
READ, UNDERSTAND AND FOLLOW THE MANUALS WHEN OPERATING OR PERFORMING MAINTENANCE.

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Safety Precautions

Hazard Seriousness Level

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

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

1. Conveyor Drive Assembly
2. Hydraulic Oil Coolers
3. Front Hydraulic Pump, Component System
4. Driveline - Hydraulic Pump
5. Power Gate Opener
6. Spread Roll Control Valve
7. Front Axle Assembly
8. Return Manifold
9. Filter - Return Line
10. Filter - Return Line
12. Rear Hydrostatic Pump - Drive System
13. Filter - Suction
14. Hydrostatic Control Assembly
15. Rear Wheel Drive Motors
16. Conveyor Tail Pulley
17. Spread Hopper Gates
18. Lights
19. Conveyor Deflectors
20. Covers - Conveyor and Engine
21. Conveyor Control Valves
22. Air Filter Assembly
23. Control Console
24. Operator Seat Assembly
25. Rear Deck Sections
26. Conveyor Flow Deflectors
27. Conveyor Flow Regulator Gates
28. Receiving Hopper
29. Truck Hitch
30. Fuel Tank
31. Conveyor Head Pulley
32. Spread Hopper
33. Segregator Assembly
34. Gate Actuating Lever Assembly
35. Hopper Material Level Mechanism
36. Power Seat Motor
37. Brake Actuator,
38. Front Brake Reservoir
39. Power Steering Motor
40. Gate Opening Transducer
41. Hitch Raise Cylinder
42. Throttle
43. Rear Differential Lock (optional)
44. Shuttle Valve
45. Engine Radiator
46. Power Steering Cylinder
47. Hitch Release Cylinder
48. Hopper Latch Pin
INTRODUCTION

The Etnyre Manual Hydrostatic chip spreader has been designed to improve the flexibility of chip spreading while improving productivity. This has been done by incorporating infinitely variable speed capabilities and precise gate opening control.

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.

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<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unsafe operation of equipment may cause injury.</td>
</tr>
<tr>
<td>Read, understand and follow the manuals when operating or performing maintenance</td>
</tr>
</tbody>
</table>

Important

1. The optional front hopper segregation screen should be up when the unit is traveling between job sites to avoid possible damage to the screen.

2. Keep machine on road or relatively uniform surface at all times to avoid loss of traction and/or possible damage to the front hopper 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. However, certain steep upgrade or downgrade conditions may require

the truck to assist the chip spreader. The chip spreader must pull the truck even while the truck is assisting. Do not attempt to push the chip spreader with the truck.

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

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

7. Avoid roading the machine with material in the hoppers if at all possible. Added weight in either 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 damage to the hydrostatic system.

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

10. Before operating the chip spreader, 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.

REPORTING SAFETY DEFECTS

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

If NHTSA receives similar complaints, it may open an investigation, and if it finds that a safety defect exists in a group of vehicles, it may order a recall and remedy campaign. However, NHTSA cannot become involved in individual problems between you, your dealer, and E.D. Etnyre & Co.
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, US. Department of Transportation, Washington, D.C. 20596. You can also obtain other information about motor vehicle safety from the hotline.

CHECK OUT

1. The following accessories are shipped with each chipspreader: grease gun, extra linkage rods for shortened truck hookup, agitator disconnect bolt, parts book and operation, maintenance and safety manual, engine parts and operator's manual, wiring diagram, and hydraulic diagram.

2. Best performance for most operating conditions is achieved when tire pressures are set to 55 to 60 PSI in front and 60 to 65 PSI in rear. However, various operating speeds, road bed conditions, truck pulling arrangements and other operating conditions may require different tire pressures.

WARNING

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

3. Grease all fittings and check all reservoir oil levels in accordance with the Chipspreader Lubrication Chart on the side of the toolbox back prior to operation.

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

Attaching Hopper to Unit

⚠️ SAFETY PRECAUTIONS:

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

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

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

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

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

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

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

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

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

5. Uncouple spread roll hoses and couple to hopper drive motor hoses. Use caution to wipe each half of each connector clean before connecting. DIRT AND CONTAMINANTS CAN CAUSE MAJOR DAMAGE TO THE HYDRAULIC SYSTEMS.

Figure 1

6. Attach the hopper reach rod (see Figure 3).

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 the gate opening cylinder rod clevis is fully screwed onto the cylinder rod.

With the hopper on the machine, start the engine and run it at a minimum of 2000 rpm. Set the gate opening to approximately 1 1/2 inch, and depress the right side of the “gate/spread roll” switch.

Depress the left side of the “gate/spread roll” switch. There should be 1/16” clearance between the gate and the spread roll. If this clearance is not constant across the full width of the hopper, it indicates that the spread roll is not straight. Contact the factory for straightening instructions.

---

Figure 4 Hopper Gates

Important

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

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

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

4. Traveling with the front 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.

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

### WARNING

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

Refer to figure 5 for identification of described features.

1. Power/Ignition Switch

Rotating from "off" to "on" supplies electric power to all systems and controls. Rotating the switch further to the right against the spring will engage the starter. When the engine runs, release the key and the switch will remain in the "on" position. SINCE ALL FUNCTIONS EXCEPT POWER STEERING, REAR BRAKES AND FRONT BRAKES ARE ELECTRICALLY CONTROLLED, TURNING THE KEY TO "OFF" RESULTS IN AN EMERGENCY STOP.

### WARNING

Turning ignition switch to "off" results in an emergency stop.

2. Range Selector-Lo/Travel/Park

A three position switch selects either "Lo", or "Travel" speed range with a "Park" position to the right.

In "Lo" the motors are in full displacement and in "travel" the motors are shifted to half displacement. On optional powered seat swing equipped units, this switch also supplies power to the seat shift switch only in "Lo".

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

The speed ranges are approximately:

**Operating Ranges**

<table>
<thead>
<tr>
<th>Setting</th>
<th>Speeds</th>
</tr>
</thead>
<tbody>
<tr>
<td>LO</td>
<td>0-730 FPM (8.3 MPH, 13.3 KPH)</td>
</tr>
<tr>
<td>TRAVEL</td>
<td>0-1470 FPM (16.7 MPH, 26.7 KPH)</td>
</tr>
</tbody>
</table>

**Actual Maximum Speed Possible**

<table>
<thead>
<tr>
<th>Setting</th>
<th>Speeds</th>
</tr>
</thead>
<tbody>
<tr>
<td>LO</td>
<td>760 FPM (8.6 MPH, 132.8 KPH)</td>
</tr>
<tr>
<td>TRAVEL</td>
<td>1530 FPM (17.4 MPH, 27.8 KPH)</td>
</tr>
</tbody>
</table>

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

The shift from "Lo" to "Travel" should be made only after positioning the seat full left or full right and the latch pin inserted since electric power is not available to move the seat after the switch has been positioned to "Travel". It is recommended that upshifts and downshifts be made only at very low speeds.

**THE CHIPSREADER SHOULD BE SHIFTED ONLY WHILE STOPPED OR MOVING AT A VERY SLOW RATE OF SPEED (i.e. under 100 FPM).**
Figure 5 Control Console Identification

1. Power/ignition Switch
2. Range Selector-Lo/Travel/Park
3. Max Speed Set-Potentiometer
4. Gate Opening Set Point
5. Fuses
6. Fuel Gage
7. Speed/Direction Control Handle
8. Gate/Spread Roll Switch
9. Turn Signal Switch (optional)
10. Right Turn Signal Indicator (optional)
11. Left Turn Signal Indicator (optional)
12. Hazard Flasher Switch (optional)
13. Headlight Switch (optional)
14. Engine oil pressure gage
15. Seat Shift Switch (optional)
16. Hitch Release Push-button
17. Throttle Lever
18. Engine coolant temperature gage
19. Right Conveyor Control Selector (optional)
20. Right Conveyor On/Off Switch-Driver’s (optional)
21. Left Conveyor On/Off Selector (optional)
22. Left Conveyor On/Off Switch-Driver’s (optional)
23. Hitch Height Switch
24. Hourmeter (optional)
25. Horn (optional)
26. Brake Release Switch (on trigger)
27. Voltmeter
28. Limited Slip Valve Switch (optional)
29. Gate Override
30. Seat Lock Pin
31. Tachometer

⚠️ WARNING

Shift in and out of "travel" only while stopped or moving at a very slow rate of speed. Shifts between "Lo" and "travel" are very abrupt and could cause personal injury
The optional rear side/side flow divider valve may be used to reduce the possibility of rear wheel spin. Use "Travel" only for moving the chipspreader by itself - never attempt to pull a truck in "Travel".

IF THE SELECTOR IS MOVED FROM "LO" OR "TRAVEL" TO "PARK" WHILE MOVING, THE CHIPSREADER WILL COME TO AN ABRUPT HALT. WHEN THE SELECTOR IS MOVED INTO "PARK" WHILE MOVING, THE PUMP OUTPUT WILL IMMEDIATELY GO TO ZERO AND THE REAR PARKING BRAKES WILL BE APPLIED RESULTING IN AN EXTREMELY QUICK STOP. THIS SHOULD NEVER BE DONE EXCEPT IN AN EXTREME EMERGENCY AS THE OPERATOR OR ANYONE RIDING ON THE CHIPSREADER CAN SUFFER SEVERE INJURY.

3. Max Speed Set Potentiometer

When the "Range Selector" is in the "Lo" position, this pot provides a setting for the speed which will be reached when the "Speed/Direction Control Handle" is moved to its full forward position. If the pot is turned full clockwise, when the control handle is pushed full forward, the chipspreader will reach a speed of approximately 750 fpm on level ground. As the pot is rotated counterclockwise (without pulling the control handle rearward) the speed will decrease to approximately 160 fpm with the pot fully counterclockwise. At a setting slightly less than halfway clockwise, the speed will be approximately 300 fpm. The speed is not maintained precisely and will vary somewhat as the chipspreader goes up and down hills similar to a mechanical drive chipspreader.

The approximate speeds for the settings are listed below.

<table>
<thead>
<tr>
<th>Setting</th>
<th>Speed (fpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2WD Lo</td>
</tr>
<tr>
<td>1</td>
<td>180</td>
</tr>
<tr>
<td>2</td>
<td>240</td>
</tr>
<tr>
<td>3</td>
<td>300</td>
</tr>
<tr>
<td>4</td>
<td>360</td>
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<tr>
<td>5</td>
<td>420</td>
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<tr>
<td>6</td>
<td>480</td>
</tr>
<tr>
<td>7</td>
<td>540</td>
</tr>
<tr>
<td>8</td>
<td>600</td>
</tr>
<tr>
<td>9</td>
<td>660</td>
</tr>
<tr>
<td>10</td>
<td>720</td>
</tr>
</tbody>
</table>

As an example-if a current Etnyre mechanical chipspreader (Eaton 4005A transmission and Spicer PR1300 axle) were operated in 2nd hi, the normal speed would be 346 fpm. However, when a hill was encountered, the increased load on the engine would cause 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 chipspreader has similar speed characteristics. It will slow down going uphill and can be compensated for, if desired, by turning this pot up slightly when going uphill and by pulling back slightly on the control handle when going downhill to counteract the internal leakage of the motors and the tendency of the engine to overspeed.

This hill climbing compensation is possible up to full engine horsepower available. If the required horsepower exceeds the available, the chipspreader will slow down and then recover to the preset speed as load (horsepower required) decreases.

4. Gate Opening Set Point (Figure 5)

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/spread roll switch (8) is activated.

5. Fuses

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

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

Conveyor fuse: Supplies power only to the conveyors.

Pump fuse: Supplies power to the control handle, the brake lights, the backup alarm and the brake release valve.

Motor fuse: Supplies power to the rear motors and the powered seat valve.
Gate fuse: Supplies power to the gate control board and the spread roll valve.

6. Fuel Gage (Figure 5)
Displays the fuel remaining in the tank.

7. Speed/Direction Control Handle (Figure 6)
The control handle provides both direction, (forward, neutral, reverse) and rate of speed.

8. Gate/Spread Roll Switch (Figure 6)
The rocker switch (8) 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. Centering the switch closes the gates, while depressing the right side opens the gates in the feathering mode. When used this way, the gates will go from closed to the preset opening or from the preset opening to closed as the stick is moved out of neutral to the full forward position and back to neutral. When the stick is in the full forward position, the gates will be open to the setting and as the stick is moved back toward neutral the gates will close down following the position of the stick. Depressing the left side of the switch will open the gates to the setting regardless of the position of the stick and they will remain at that opening until the rocker switch is centered.

9,10,11. Turn Signal Selector and Indicators (optional) (Figure 7)
Push the switch to the right to signal a right turn, and to the left to signal a left turn.

⚠️ CAUTION: Turn signals are not self canceling
12. Hazard Flasher Switch (optional) (Figure 7)
Pull up for "on" and push down for "off".

13. Headlight Switch (optional) (Figure 7)
Pull out for "on" and push in for "off".

14. Engine Oil Pressure Gage (Figure 7)
The engine oil pressure gage displays engine oil pressure when the engine is running.

15. Seat Shift Switch (optional) (Figure 7)

![Image of control panel]

**Figure 7. Control Panel**

9. Turn Signal Selector  
10. R1 Turn Signal Ind  
11. Lt turn Signal Ind  
12. Hazard Flasher Ind  
13. Headlight Switch  
14. Engine Oil Pressure Gage  
15. Seat Shift Switch  
16. Hitch Release Push-button

**WARNING**
Check local regulations and codes to determine the lighting and marking requirements for your usage.

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

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 chipping. This switch only receives power when the speed range selector is in Lo. Before traveling the machine, the seat must be moved to either the full left or full 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.**

16. Hitch Release Pushbutton (Figure 7)
Push the hitch release push-button to disengage the chipspreader from the supply truck. There must be some "slack" in the hitch (between the chipspreader and supply truck) in order for the latch to release. While pushing the hitch release push-button, one should momentarily pull the control handle back slightly to slow the chipspreader. This will cause the required "slack". The control handle should then be pushed full forward, while still depressing the hitch release push-button. Once the truck has separated from the chipspreader, the hitch release push-button can be released. A second hitch release push-button is provided for the front end operator's controls.

It is possible to stop with no "slack" in the hitch (between the chipspreader and supply truck). If this happens, the chipspreader must be backed up slightly to create the necessary "slack" and then driven forward while pushing the hitch release push-button.

In order to hook up to a supply truck, momentarily depress the hitch release push-button to open the hitch if it is not already open, and back into the truck. The hitch automatically closes and locks when it contacts the back of the truck.

17. Hand Throttle Cable (Figure 5)
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.

18. Engine Coolant Temperature Gage (Figure 7)
The gage displays engine coolant temperature when the engine is running.
28. Rear Flow Divider Valve (Limited Slip) (optional) (Figure 5)

An electrically controlled flow divider valve is operated by a toggle switch (Figure 5, Ref 28) on the control panel. When the switch is "on", the difference in rotational speed between the two rear wheels cannot exceed 10 to 15% at higher pump flows. This action is similar to a limited slip differential in a mechanical rear axle.

This feature is only operable in "Lo" forward range, it is automatically switched off in the reverse direction and in the "Travel" range.

19. Right Conveyor Selector (optional) (Figure 5)

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 operator's "on/off" selector switch allowing the front operator to turn the conveyors "on" or "off".

In the forward position, power is supplied to the auto paddle switch mounted below and along the inboard side of the conveyor hood. (See fig. 13) 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 (optional) (Figure 8)

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

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

23. Hitch Height Switch (Figure 8)

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 chipspreader the truck.

29. Gate Override Pushbutton (Figure 5)

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

THE FOLLOWING ITEMS ARE LOCATED AT THE FRONT OPERATOR'S STATION ON TOP OF THE RIGHT CONVEYOR.

30. Left Conveyor Switch

When the driver has selected "front" on the left conveyor selector switch (21) this switch will turn the left conveyor "on" or "off". If the optional "Auto Conveyors are not installed, this switch turns the left conveyor "on" and "off".

---

Figure 8. Conveyor Control

2. Range Selector  20. Right Conveyor On/Off
3. Max Speed Set  21. Left Conveyor Control
4. Gate Opening Set Point Selector
8. Gate/Spread Roll Switch  22. Left Conveyor On/Off
19. Right Conveyor Control Selector 23. Hitch Height Switch
29. Gate Override Switch
31. Right Conveyor Switch

When the driver has selected "front" on the right conveyor selector switch (19) this switch will turn the right conveyor "on" or "off". If the optional "Auto Conveyors are not installed, this switch turns the right conveyor "on" and "off".

32. Hitch Release Push-button

Push the hitch release push-button to disengage the supply truck from the chipspreader. (See item 16 of main control panel description)

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 re-tightening the bolts.

Tilt Wheel (Figure 9)

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 to the proper value.

Automatic Conveyor Control (optional) (Figure 5)

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. (Fig. 16)

Belt Speed Controls (optional) (Figure 10)

This feature allows the operator located on the right catwalk to vary the speed of each conveyor independently to provide a uniform distribution of material to the front hopper. Valves for this operation are incorporated in the integrated circuit block 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 feature is particularly useful in doing shoulder work or in operations requiring less than full hopper width. It is also useful in trying to smooth out delivery of material to match the rate being spread. (Fig. 15) When properly adjusted, the conveyors should run approximately 80% of the time with the hopper at maximum width and the chipspreader traveling at maximum speed for the particular job.

<table>
<thead>
<tr>
<th>CAUTION</th>
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<td>Keep loose clothing away from conveyor area when operating conveyors</td>
</tr>
</tbody>
</table>

Horn (Figure 11)

The horn is operated by depressing the push-button on the control panel.
Backup Alarm (Figure 11)

The electric backup alarm is automatically actuated when the speed/direction control handle (Fig. 11) is pulled to the rear of neutral.

Electro-hydraulic Powered Seat Assembly

An electrically controlled hydraulically powered positioner is operated by a spring centered toggle switch (Fig. 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 through 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 "Lo" 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 cause disorientation and possible loss of control. |

Extra Agitator

When sand or other small aggregate is being spread, an optional second agitator may be placed in the hopper so as to greatly reduce the possibility of bridging. This agitator should be disengaged normally and only used when bridging has been experienced.

Segregation Screen

When the aggregate is not of a uniform size, the optional front hopper segregation screen may be used to place larger chips on the asphalt ahead of smaller chips and fines. This helps prevent the smaller chips and fines from blotting out the larger material (Figure 12).
Before operating the Chipspreader, 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 or operating the machine.

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

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

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

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

SPEED/GATE OPENING SELECTION

Using chart 1 or 1A, depending on which type of conveyors the machine is equipped with, determine the maximum possible speed which the chipspreader could be operated at and still convey enough material to the front hopper. As an example, using chart number 1 to spread 25 lb./sq. yd. of 3/8" chips, enter from the left of the chart at 25 lb./sq. yd, horizontally to the hopper width being used, say 13 ft., read the speed vertically below the intersection to be 415 fpm. Some speed less than this should be used in order to allow some extra capacity for changing trucks.

For example, if 400 fpm was selected as the speed,
referring to chart number 2 at 25 lb./sq. yd. and 400 fpsm, the required gate opening is 1 7/16". This opening should be at least 2 times the size of the stone for reliable feeding therefore the stone should not be larger than 11/16".

While in chart number 2 note that for 3/8" chips the minimum gate opening should be 3/4". The speed to be used with 3/4" gate opening is approximately 200 fpsm.

The chip spreader can spread 25 lb./sq. yd. of 3/8" chips at any of the following combinations of settings:

<table>
<thead>
<tr>
<th>Gate Opening</th>
<th>Speed</th>
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<tbody>
<tr>
<td>3/4&quot;</td>
<td>200 fpsm</td>
</tr>
<tr>
<td>1&quot;</td>
<td>275 fpsm</td>
</tr>
<tr>
<td>1/8&quot;</td>
<td>300 fpsm</td>
</tr>
<tr>
<td>1/4&quot;</td>
<td>350 fpsm</td>
</tr>
<tr>
<td>1 7/16&quot;</td>
<td>400 fpsm</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 fpsm.)

You now have a selection of gate/speed combinations that will all spread 25 lb./sq. yd. of 3/8" chips.

If you choose a speed greater than 415 fpsm, 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 415 fpsm, the conveyors can keep up and the chip spreader should be able to run continuously providing there is a great enough supply of trucks to supply the required amount of chips.

Adjust the gate opener set point to 1 7/16", adjust the max speed set point a position that will give approximately 400 fpsm.

To start spreading at this combination:

a) Place the control handle in neutral.

b) Set the desired speed on the max speed set (3)

c) Set the speed range selector (2) in "Lo".

d) Turn the gate/spread roll switch (8) "off".

e) Set the desired gate opening on the gate set point (4)

f) Push speed/direction control handle (7) forward gradually controlling the acceleration until the handle is fully forward.

g) Upon reaching the starting line of spreading, depress the right side of the gate/spread roll switch (8) fully to turn the gates "on".

h) Upon reaching the ending line, center the gate/spread roll switch (8) to shut the gates "off".

i) Return the control handle to neutral controlling the deceleration smoothly. To avoid a sudden stop do not pull the handle into neutral until the chip spreader is very nearly completely stopped. Use the brake override switch on the trigger to keep the brakes from coming on as required, and then place the control stick in neutral and release the trigger to apply the rear brakes.

Speed changes may be made while moving by rotating the max speed set point (3) smoothly to the new speed. The chip 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.

**Stopping**

a) With space available to stop after running off the chipped surface:

1. Center the gate/spread roll switch (Ref. 8, Fig. 6) upon reaching the end of the newly chipped surface.

3. Return the control handle to neutral controlling the deceleration smoothly. To avoid a sudden stop do not pull the handle into neutral until the chip spreader is very nearly completely stopped. Use the brake override switch on the trigger to keep the brakes from coming on as required, and then place the control stick in neutral and release the trigger to apply the rear brakes.

b) Stopping with oil spread in front of chip spreader:

1. Return the control handle toward neutral controlling the deceleration smoothly.
2. When the speed is slow enough that the chipperspread can be fully stopped in about another 4 feet, center the gate/spread roll switch.

3. Fully return the control handle to "neutral". To avoid a sudden stop do not pull the handle into neutral until the chipperspread is very nearly completely stopped. Use the brake override switch on the trigger to keep the brakes from coming on as required, and then place the control stick in neutral and release the trigger to apply the rear brakes.

To back up from this stopped position:

1. Move the control handle out of neutral to the rear-the further rearward the handle is moved, the faster the machine will back up. The max speed set pot has no effect in reverse, therefore the full speed range of 750 fpm will be available in reverse.

2. 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 gate override push-button (Ref. 29, Fig. 5) 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 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.

Adjust chipperspread 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.

Conveyor flow deflectors should be used to achieve the desired material distribution in the front hopper (Fig. 13).

Conveyor hoods should be used to adjust the distribution to the front hopper, primarily to control the amount of material in the front hopper in the area in front of the conveyor. The amount of material in front of the conveyor will affect when the auto conveyor switch is tripped to shut off the conveyor. Generally, the larger the stone, the further forward the hood should be positioned. Approximately 1/2" gap is a good starting point for 3/8" to 1/2" chips.

Rear conveyor gates should be adjusted to feed material approximately equal to or slightly more than the rate at which material is being spread. If 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 14) When properly adjusted, the conveyors should run approximately 80% of the time with the hopper at maximum width and the chipperspread traveling at maximum speed for the particular job. (Fig.12)

---

![Chart 1. Standard Speed Conveyors with Standard Belts](chart1.png)

![Chart 1A. Hi-Speed Conveyors with Cleated Belts](chart1a.png)
Notes:
1) Min. gate opening should be 2X stone or greater
2) Speed Vs gate opening based on aggregate weight of 2400 lb./yd³

Chart 2

The operator may wish to disengage the front hopper agitator while spreading clean dry aggregate. This operation is performed by removing the agitator disconnect bolt. This will prevent unnecessary wearing of the agitator. (Figure 15)

<table>
<thead>
<tr>
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</table>

Figure 16 Material Level Paddle
1. Left Paddle
2. Right Paddle

Figure 14. Rear Conveyor Gate
1. Adjustment Bolt

Figure 13. Conveyor Hood and Flow Deflector
1. Conveyor Flow Deflector
2. Conveyor Hood
3. Hood Adjustment
4. Hood Adjustment Set Screw

Figure 15 Hopper Chain Drive
1. Drive Bolt Holder
2. Agitator Drive Sprocket
3. Sprocket Drive Bolt
OPERATING RANGES

For 2WD
ChipSpreader
with
190 HP Cummins 6BTA Engine

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

---

2WD LO RANGE
PV24, 116.6 CID REAR 2WD
6BTA CUMMINS, 190 HP @ 2200 RPM

---

2WD TRAVEL RANGE
PV24, 58.3 CID REAR 2WD
6BTA CUMMINS, 190 HP @ 2200 RPM
OPERATING RANGES

For Standard
2WD
ChipSpreader
with
152 HP Cummins 6BT Engine
142 HP CAT 3208 Engine

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

LO RANGE
PV24, 116 CID REAR 2WD
6BT CUMMINS, 152 HP @ 2200 RPM
3208 CAT, 142 HP @ 2200 RPM

TRAVEL RANGE
PV24, 58 CID REAR 2WD
6BT CUMMINS, 152 HP @ 2200 RPM
3208 CAT, 142 HP @ 2200 RPM
OPERATING RANGES

For 2WD
ChipSpreader
with
210 HP Cummins 6CT Engine

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

2WD
LO RANGE
PV24, 116 CID REAR 2WD
6CT CUMMINS, 210 HP @ 2200 RPM

2WD
TRAVEL RANGE
PV24, 58.3 CID REAR 2WD
6CT CUMMINS, 210 HP @ 2200 RPM
OPERATING RANGES

For 2WD

ChipSpreader

with

234 HP Cummins 6CTA Engine

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

⚠️ WARNING

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

⚠️ WARNING

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

⚠️ WARNING

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

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

⚠️ CAUTION

Always use steps, platforms and handrails provided.

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

Keep loose clothing away from conveyor area when operating conveyors.

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

Rear Hopper Flow Gate Adjustment (Figure 14)

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. Re tighten flow gate retaining bolts.

Hopper Spread Roll Wear Plate Adjustment (Figure 17)

Turn spread roll and conveyors "off".

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

2. Re tighten all the hold down bolts.

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

Figure 17. Spread Roll Wear Plate
(Viewed from top of hopper looking down)

1. Hold Down Bolts

2. Spread Roll Wear Plate

3.
Hopper Gate Wear Plate Adjustment (Figures 18/19)

Turn spread roll and conveyors "off".

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

2. Tighten hold down bolts.

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

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

Hopper Gate Linkage Adjustment

1. Loosen gate adjustment screw jam nuts.

2. With hopper removed from the spreader or the reach rod disconnected, each gate adjustment screw should be set so as to maintain 1/16" clearance between the gate wear plate and spread roll. (Ref 2, Fig 18/19)

3. Tighten gate adjustment screw jam nuts.

4. Adjust the gate linkage length by turning the control lever ball joint connector "in" or "out" until the control lever just touches the actuator bar stop while maintaining the 1/16" gate clearance. (Ref 7, Fig 20)

Conveyor Belt Adjustment

![Figure 18. Gate Wear Plate](image)

**WARNING**

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

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

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

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.

![Figure 19. Hopper Gates](image)


**WARNING**

Remain clear of all moving parts.
d) If belt runs to the right hand side of the conveyor, loosen the adjusting screws until the belt is centered on the head pulley.

e) If belt runs to the left hand side of the conveyor, tighten the adjusting screws until the belt is centered on the head pulley.

f) Re tighten adjusting screw jam nuts.

g) Stop the conveyor belt.

h) Tighten head pulley bearing bolts.

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 the time.

<table>
<thead>
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<tbody>
<tr>
<td>Remain clear of all moving parts.</td>
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</tbody>
</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) Re tighten adjusting screw jam nuts.

g) Stop the conveyor belt.

h) Tighten head pulley bearing bolts.

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

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

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<table>
<thead>
<tr>
<th>Figure 20 Hopper</th>
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<tbody>
<tr>
<td>1. Reach Rod</td>
</tr>
<tr>
<td>2. Jam Nut</td>
</tr>
<tr>
<td>3. Ball Joint</td>
</tr>
<tr>
<td>4. Control Arm and Shaft</td>
</tr>
<tr>
<td>5. Gate actuator Bar</td>
</tr>
<tr>
<td>6. Bar Spacer Block</td>
</tr>
<tr>
<td>7. Ball Joint Connector and Locknut</td>
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</tbody>
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<table>
<thead>
<tr>
<th>WARNING</th>
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</thead>
<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>

Never put hands near belts or drive joints with engine running as conveyor may start in "auto" at any time.

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.

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

1. Hopper Spread Roll Relief Valve (Figure 23)

   a) With engine off, uncouple the quick disconnects and install a 3000 psi gage with necessary adapters to hook to 3/4" female quick disconnect. (Ref. 5, Fig. 23).

   b) Leave the quick couplers uncoupled.

   c) Run the engine at governed RPM (approximately 2300 RPM)

   d) Use the manual override to actuate the valve. (Fig. 23, Ref. 1)

   e) Loosen locknut and using allen wrench, set the pressure to 1500 psi and retighten the locknut.

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

   g) Remove gage and reconnect the quick couplers to their respective hoses.

2. Power Gate Relief Valve (Figure 26A without power seat)

   a) With the engine off, remove cap (1) (Fig. 26A) and install a 3000 psi gage with necessary adapters to hook to a 1/2" JIC (08 MJ) male fitting. Disconnect the reach rod from the cylinder under the right catwalk.

   b) Disconnect the orange wire from one solenoid and the brown wire from the other solenoid.

   c) Loosen locknut on relief valve (2).

   d) Start the engine and run at 2300 RPM (governed speed)
e) Use the manual override button to activate the valve (Fig. 26A, Ref. 3)

f) Use a box wrench to adjust the cartridge in valve (2). This relief valve pressure should be set at 900 psi. Re tighten the locknut to hold the setting.

g) If relief pressure cannot be obtained, shut down the engine and remove power gate relief valve cartridges and check for contamination. Clean or replace as necessary.

h) Shut engine off.

i) Remove gage and reinstall cap.

j) Reconnect the electrical connectors and reconnect the reach rod.

2A. Power Gate Relief Valve (Figure 26B with power seat)

a) With the engine off, remove plug (1) at port "G1" and (2) at port "G3" and install 3000 psi gages with the necessary adapters to hook to 1/4" SAE O ring port (04MB). Disconnect the reach rod from the cylinder under the right catwalk.

b) Disconnect the orange wire from one solenoid and the brown wire from the other solenoid of the forward valve on the outboard (nearest to catwalk) integrated circuit.

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. 26B, Ref. 7)

g) Use a box wrench to adjust the cartridge in valve (4). This relief valve pressure should be set at 1500 psi at G1. Re tighten 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 900 psi at G3. Re tighten the locknut to hold the setting.

i) If relief pressure cannot be obtained, shut down the engine and remove power gate relief valve cartridges and check for contamination. Clean or replace as necessary.
j) Shut engine off.

k) Remove gages and reinstall plugs.

l) Reconnect the electrical connectors and reconnect the reach rod.

**B. Power Seat Relief Valve (Figure 26B)**

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

b) Start the engine and run it at full rpm. Place the speed range selector in Lo and then use the seat switch to position the seat either full left or right and insert the seat lock pin into the hole in the walkway.

c) Loosen locknut on relief valve (6).

d) Use the manual override button to activate the valve (Fig. 26B, Ref. 8)

e) Use a box wrench to adjust the cartridge in valve (6). This relief valve pressure should be set at 1200 psi at port "G2". Retighten the locknut to hold the setting.

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

g) Shut engine off.

h) Remove gage and reinstall plug.

*Use caution when doing this operation. Be sure the wrench is securely positioned on the U-joint and rotated by hand against supporting steel so it cannot rotate further.*

**3. Left Conveyor Relief Valve (Figure 26A Ref. 4)**

a) With engine off remove plug (5) at port "GL" and install a 3000 psi gage with necessary adapters to hook to a 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. 25)
c) The engine should be run at governed speed (approximately 2300 RPM).

d) Use the manual override to actuate the valve (Fig. 26A, Ref. 6).

e) Adjust this relief valve (Fig 26A, 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.

---

**Figure 26B Conveyor and Gates with power seat**

1. Pressure Check Port "G1"
2. Gate Pressure Check Port "G3"
3. Pwr Seat Pressure Port "G2"
4. Inlet Relief
5. Pwr Gate Relief Valve
6. Pwr Seat Relief Valve
7. Gate Control Valve
8. Pwr Seat Control Valve

*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.*

---

4. Right Conveyor Relief Valve (Figure 26A, Ref. 7)

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

b) Hold (lock) the right conveyor head pulley with a pipe wrench or other suitable tool. (Fig. 25)

---

5. Power Steering Relief Valve (At Hydraulic Control Assembly (Figure 27 Ref. 1))

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

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

c) Turn the front wheels full left or right until the wheels are against the stops.

---

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. 24). Remove cap (5), loosen locknut (6) and adjust relief valve (7) to 2250 psi (Fig. 24) while holding the wheels full left or right.

f) Return to the relief valve at the hydraulic control integrated circuit (Fig 27, 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.

6. Hydraulic Control Pressure Relief Valve  
(Fig 27 Ref. 3)

a) With the engine off, remove plug (4) at port "PP" 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 adjust pressure to approximately 600 psi (Fig 27, 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 250 psi and re tighten 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.

c) Loosen locknut and set reduced pressure to 100 psi (Fig 27, 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.

h) Shut engine off.

i) Remove gage and reinstall plug.

7. Hitch Release Pressure Reducing Valve  
(Fig 27 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.

1. Power Steering Relief Valve
2. Power Steering Check Port "MP"
3. Hydraulic Control Pressure Relief Valve
4. Hydraulic Control Pressure Check Port "PP"
5. Hitch Release Pressure Reducing Valve
6. Hitch Release Pressure Check Port "RP"
7. Plug (Pressure Check Port)
8. Brake/Motor Shift Block
Hydraulic System Start Up

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

1. Jack the machine up and securely support on stands with all four wheels off the ground.

   ![Warning](image)

   **WARNING**
   Be certain that machine is securely supported on stands. Wheels will be rotating under power & if they contact the ground or debris becomes lodged between the wheels & ground, the chip 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. (Fig 28, Ref 1)

3. Disconnect pump stroker at the pump.

4. Remove 1/4" plug (Ref 7, Fig 27) on the brake/motor shift block on the hydraulic control plate on the inboard side of the right conveyor and insert a 600 psi 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. (Fig 29)

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 (Fig 30) 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.

   ![Warning](image)

   **WARNING**
   Be certain that machine is securely supported on stands. Wheels will be rotating under power.
a) Loosen the null adjust locknut.

b) Using a 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 counterclockwise 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 ft-lb.

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.

13. Place range selector in Lo and reconnect the pump stroker.

14. Check for debris under any wheel.

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 15 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.

---

**Figure 31 Gate Opening Transducer**

1. Transducer
2. Cam Plate
3. Gate Actuation Cylinder (located under conveyor - right side, front)

---

**HOPPER GATE ADJUSTMENT**

1. Place the Lo/travel/park in "PARK"

2. Disconnect the g/b wire from each solenoid of the gate valve.

---

**WARNING**

Never put hands in between gate and spread roll or gate and rear of hopper to clear an obstruction. The gate could move at any time and cause severe injury.
3. Start the engine and run it at about 1500 rpm.

4. Using the manual overrides on the gate solenoid valve, close the gates fully. There should be 1/16" between the gates and the spread roll.

5. Shut the engine off and install a 1500 psi pressure gage in the gate circuit.

6. Reconnect the g/b wire to each solenoid of the gate valve.

7. Remove the floor plate to the right of the seat pivot and open the junction box. Remove the or/g wire that goes forward from terminal 13, remove the or/b wire that goes forward from terminal 14 and remove the or wire that goes forward from terminal 15. Check the resistance across the or/g and or/b wires. This value should be between 930 and 1100 ohms. Check the resistance across the or and or/b wires, it must be less than 300 ohms. If it measures within this range, reconnect the wires to their respective terminals.

If no components have been changed, skip step 8 and proceed directly to step 9.

8. Open the main control box. The gate board is mounted on the side of the control box. There are five adjustment pots on the 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 ccw +11 turns
Close -full ccw +1½ turns
Open —full ccw +8½ turns
Sensitivity-full ccw +5 turns
Override-full ccw +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 ccw 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 electrical travel.

If the value measured across the or/g and or/b wires in step 7 above was within the acceptable range, skip steps 9 through 12 and proceed directly to step 13.

9. Remove the transducer guard, located under the radiator cover.

10. Loosen the locking bolt on the gate opener shaft until it can be rotated against the position feedback pot.

11. Rotate the pin against the position feedback pot to obtain a reading within the range and re-tighten the locking bolt.

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

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

14. Turn the gate opening set point on the main control box fully counterclockwise and turn the thumb switch on the handle off.

15. Adjust the "close" trim pot on the gate board, until both the green and red LED's are blinking at about the same intensity. (CCW opens gate, CW closes gate)

16. Start the engine and run it at approximately 1500 rpm. Set the gate opening to 4" (fully clockwise) and turn the thumb switch on the handle on. Adjust the "open" trim pot to obtain a true 4" opening measured at the gate, and be sure that both LED's are blinking at about the same intensity. (CCW opens gate, CW closes 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.

17. Run the engine at full rpm. (approximately 2300 rpm)

18. Set the gate opening to a setting of 2". Repeatedly open and close the 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. (CCW increases sensitivity, CW decreases sensitivity) (CCW increases filtering, CW decreases filtering)

19. Recheck the closed position for equally blinking LED's and readjust slightly if necessary to obtain this.

20. Recheck the open position for 4" opening and also for equally blinking LED's and readjust slightly if necessary.

21. Check for repeatability of the gate setting. It should be within ±1/16". Check that with a setting of
½" the gate will open. If it does not, adjust the "filter" slightly cw until it does and then adjust the "sensitivity" slightly clockwise if necessary to eliminate "hunting" and then recheck the repeatability.

22. Turn the thumb switch on and adjust the gate opening to approximately 1¾" and depress the override button. Adjust the override pot to obtain a 4" opening and verify that the gate is not opening too far by having 0 pressure while holding down the override button. (CCW opens gate, CW closes gate)

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

24. Reinstall the transducer cover and reclose the radiator cover. Reclose the junction box under the floor plate and reinstall the floor plate. Remove the pressure gage.

25. Turn the ignition key on but do not start the engine. Depress the right side of the thumb switch on the control stick.

26. Connect the positive lead of a voltmeter to pin 1 of terminal board 2 on the gate board. Connect the negative lead of the voltmeter to pin 7 of terminal board 1 on the gate board.

27. Position the control handle slightly forward of the neutral position. This is to this is to guarantee that the gates will be closed when the control handle is in neutral. Adjust the "neutral null" pot until the meter reads +0.05 volts.

28. Move the negative lead of the voltmeter to pin 4 of terminal board 1 of the gate board.

29. Move the control handle to the full forward position. Adjust the "lever" pot until the meter reads 0.00 volts.

30. Move the negative lead of the voltmeter back to pin 7 of terminal board 1 of the gate board.

31. Return the control handle to neutral. The voltmeter should read less than +0.05 volts. If it is greater, then repeat steps 25 through 31.

32. Turn ignition key to "off"

Brake Adjustment

Front Brake Adjustment

Before beginning any adjustments to the operating mechanism under this section, the front wheel brake shoes must be adjusted for a slight drag on each front wheel. This is done by first jacking up and supporting the chipspreader securely on stands. (Fig. 32)

1. Remove oblong rubber caps and use brake adjusting tool to rotate ratchet wheel until a slight drag is felt when the wheel is rotated by hand. Adjust both front wheels to about the same drag.

2. Bleed the front brake lines.

3. Bleed the slave cylinder (Fig. 32, Ref. 2)

4. Refill the reservoir to the proper level as required (Fig. 32, Ref. 1)

5. Place range selector switch in "Lo" (Fig. 4, Ref. 18)

6. Start & run engine at about 950 RPM.

7. Open flow control on rod end of slave cylinder fully.

8. Move the control handle slowly towards neutral until all wheels stop rotating. With the handle pedal held in that position, adjust the micro switch so that the cam under the handle just trips the switch.

9. Adjust flow control so that slave cylinder takes 2 to 3 seconds to extend. Its retract speed is not adjustable.

10. Remove stands and test drive Chipspreader. With rapid movement of the stick into neutral or rapid depression of the override pedal, the pump should destartup before the front brakes come on. However, the front brakes should come on as soon as practical after the Chipspreader has stopped.
Seat Chain Adjustment (Fig 34)

1. Remove left floor plate alongside pivot arm.
2. Loosen locknuts and adjust jackscrew to adjust chain for proper tightness.
3. Retighten nuts and reinstall floor plate.

Towing Instructions

<table>
<thead>
<tr>
<th>Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do not tow the chipspread before reading the towing instructions contained in this manual. Improper towing may damage the hydraulic motors and rear brakes.</td>
</tr>
</tbody>
</table>

If the engine is runnable and charge pressure is available, 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 chipspread 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 chipspread 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 runnable, there is no power steering or charge pressure. The key must be turned on to provide electric power, the range selector must be in "travel", the control handle must be out of neutral and the rear brakes must be released by the following procedure.

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>The following procedure will release the brakes and may allow the chipspread to roll! The chipspread must be hooked to the tow vehicle or otherwise secured before proceeding further.</td>
</tr>
</tbody>
</table>

Place a strongback with a 5/8" hole in its center across the outer diameter of the brake housing.

Screw a 16 mm bolt, with a nut on top of the strongback, 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 the nut should be turned on top of the strongback to pull the housing out at least 1/16" 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.
HYDRAULIC PRESSURE SETTINGS

Hydrostatic Chipspreader with standard hopper

Spread Roll set - 1,500 psi
Front Pump Relief - 2,200 psi

Steering set - 1,950 psi
Pilot set - 250 psi
(Hydraulic Control Pressure)

Hitch Release set
90 to 100 psi

Charge Pressure - 470 psi neutral
440 psi on stroke

Main System Pressure Relief set
5,000 psi (forward)
5,000 psi (reverse)

Gates set - 900 psi
Seat set - 1,200 psi

Right Conveyor set - 2,100 psi
Left Conveyor set - 2,100 psi

(Transparent View)

(Shell View)
### LUBRICATION

**Weekly**

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<td>21</td>
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**1 Year**

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<td>Fill To Bottom Of Plug</td>
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<td>* Suction-Filter</td>
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**When Indicator Turns Red**

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**Yearly**

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*On new machines change return line filter elements after first 2 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.*

**Brake Fluid conforming to DOT 3, DOT 4, DOT 5, or SAE J-1703. Manufacturers include Dow Coming and Wagner.**

- #10ND Oil – #10 Non-Detergent Oil
- #90M-ATG – #90 Molub-Alloy Type HD46 – Texaco HD46, Sunvic 46
- Transmission Fluid, or equivalent
- #2M-AG – #2 Molub-Alloy Grease
TRUCK HITCH ARRANGEMENT

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

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

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

Truck Hitch Tow Bar Illustration

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

⚠️ 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.

---

**WARNING**

UNSAFE OPERATION OF EQUIPMENT MAY CAUSE INJURY.
READ, UNDERSTAND AND FOLLOW THE MANUALS WHEN OPERATING OR PERFORMING MAINTENANCE.

---

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<th>REF.</th>
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<th>QTY.</th>
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<td>Label-Spread Hopper, Hose Attach</td>
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</tr>
</tbody>
</table>

40
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 when operating conveyors.
⚠️ 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.

⚠️ 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.
⚠️ 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.