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

CHIPSPREADER
OPERATION, MAINTENANCE and SAFETY MANUAL

For Hydrostatic Drive Units

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

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For Hydrostatic Drive Units

M-209-88

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The Etnyre Hydrostatic Chipspreader has been designed to improve the accuracy of chipsreading by incorporating superior speed keeping capabilities together with precise gate opening control.

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

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

**IMPORTANT**

1. Optional front hopper segregation screen should be up when unit is travelling 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 Chipspreader should be allowed to tow the truck. However, certain steep upgrade or downgrade conditions may require the truck to assist the chipspreader. The chipspreader must 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 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 CHIPSREADER, DO AN INSPECTION OF THE MACHINE FOR CONDITION OF THE TIRES, FLUID LEAKS, FLUID LEVELS, FUEL LEVEL, LOOSE BOLTS, IMPROPER HOSE ROUTING, ETC. BE SURE THAT THE MACHINE IS IN A SAFE CONDITION TO OPERATE.*
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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.

2. Best performance for most operating conditions is achieved when tire pressures are set to 50 PSI in front and 60-65 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 Chipspreader Lubrication Chart on rear of seat 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.

5. 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:
   A. With hopper removed from the spreader or the reach rod disconnected, each gate adjusting screw should be set so as to maintain 1/16 inch clearance between the gate and spread roll.
   B. With the hopper attached to the spreader, disengage a 6 inch gate at each end and a 12 inch gate at the hopper center. Engage hopper. Spread roll rotation should not cause disengaged gate levers to move. However, if any gate levers do move, indicating that the spread roll is out of round or bent, contact factory for spread roll straightening instructions.

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 device 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 device 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.

6. Attach reach rod.

7. After proper setting of gate adjusting screws and feedback transducer has been established, only then if necessary, should the reach rod be adjusted to maintain 1/16 inch clearance between the gates and the spread roll.

**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 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. Travelling 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.

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, rear brakes and front brakes (2WD only) are electrically controlled, turning the key to “off” results in an emergency stop.

**2. Mode Selector - Manual/Auto.**
A two position switch selects either “manual” or “auto” operation.

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.

Mode of operation should be selected with machine stationary.

If the selector is moved from “MANUAL” to “AUTO” while moving, the chipspreader 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.

**3. Auto Speed Set - Potentiometer.**
When in the “Auto” position, 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 chipspreader 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 425 fpm; you must have the speed range control in 2nd in order to reach 425 fpm. The automatic controller will bring the chipspreader up to and maintain the set speed of 425 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 chipspreader (NP542 TML 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 chipspreader 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 chipspreader 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 chipspreader 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 chipspreader will slow down and then recover to the preset speed as load (HP required) decreases.

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**Figure 3. Control Console Identification**

1. Power/Ignition Switch
2. Mode Selector - Manual/Auto
3. Auto Speed Set - Potentiometer
4. Gate Opening Set Point
5. Fuses
6. Digital Instrument Panel
7. Manual Speed/Direction Control Handle
8. Gate/Spread Roll Switch
9. Turn Signal Selector
10. Right Turn Signal Indicator
11. Left Turn Signal Indicator
12. Hazard Flasher Switch
13. Headlight Switch
14. Hydraulic Tank Temperature Display Selector
15. Seat Shift Switch
16. Hitch Release Pushbutton
17. Throttle Switch
18. Speed Range Selector
19. Right Conveyor Control Selector
20. Right Conveyor On/Off Switch - Driver's
21. Left Conveyor Control Selector
22. Left Conveyor On/Off Switch - Driver's
23. Hitch Height Switch
24. Hourmeter
25. Horn (on trigger)
26. Override Pedal
27. Auto Speed Controller (internal, At front of box.)
28. Optional Differential Lock
29. Gate Override
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/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, the gate opener valve, and the engine throttle.
Conveyor fuse: Supplies power only to the conveyors.
Pump 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 (4WD only), and also the powered 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 “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 selected. In addition, an output is sent 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 warning light below the steering wheel will come on, and the FPM will continue to display. The same is true for any of the items monitored which have alarm points. The alarm points are as follows:

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<th>Value</th>
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<td>Low oil pressure</td>
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</tr>
<tr>
<td>High water temperature</td>
<td>220 F</td>
</tr>
<tr>
<td>Low fuel</td>
<td>15%—10 Gal.</td>
</tr>
<tr>
<td>High hydraulic oil temp.</td>
<td>180 F</td>
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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 magnetic pickup, which counts gears to generate the pulses. The pulses are fed to both the display unit and to the automatic speed controller. The signal is derived from a gear mounted on the drive adapter between the left rear hydraulic motor and planetary wheel drive.
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.

![Figure 5. Speed/Direction Control Handle](image)

7. Manual Control Handle
4. Gate Opening Set Point
8. Gate/Spread Roll Switch

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 optional 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 can cause the hydrostatic system to reverse the high and low pressure sides of the loop and 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 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 via 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 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 while simultaneously returning the handle to neutral to keep the gates closed. It will also set the rear brakes and disengage the speed and gate commands. 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. 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 thus releasing the brakes and release 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 thus releasing the brakes and release the pedal smoothly to the full up position controlling the acceleration up to the set point. To stop, the procedure is reversed. Depress the pedal, controlling the deceleration to a full halt and return the handle to the neutral position to disengage the command signal and set the rear brakes with the pedal depressed and then release the pedal 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 their position of the override pedal.

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."


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 chipping. This switch only receives power when the speed range selector is in either lo or chip. Before travelling 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.

CAUTION

THE SEAT MUST ALWAYS BE LATCHED DURING TRAVEL.
16. Hitch Release Pushbutton. (Figure 7)

Push the hitch release pushbutton to disengage the chipspreader from the supply truck. There must be some “slack” in the hitch (between the chipspreader and supply truck) in order for the latch to release. While pushing the hitch release pushbutton, one should momentarily depress the override pedal slightly to slow the chipspreader. 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 chipspreader, 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 chipspreader and supply truck). If this happens, the chipspreader must be backed up slightly to create the necessary “slack” and then driven forward while pushing the hitch release pushbutton.

In order to hook up to a supply truck, momentarily depress the hitch release pushbutton to open the hitch if it is not already open, and back into the truck. The hitch automatically locks when it is closed by pushing back on the truck.

17. Throttle Switch. (Figure 8)

Push forward to increase engine RPM, push rearward 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. Speed Range Selector. (Figure 8)

A three position switch selects the vehicle speed range by changing the rear motors’ displacement from large to intermediate to small and, on 4WD units, 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 chip.

The speed ranges are approximately:

Manual Operating Ranges
0-400 FPM (4.6 MPH, 7.3 KPH) 2 WD or 4 WD*
0-800 FPM (9.1 MPH, 14.6 KPH) 2 WD or 4 WD*
0-1650 FPM (18.8 MPH, 30.2 KPH) 2 WD or 4 WD*

Actual Maximum Speed Possible
470 FPM (5.3 MPH, 8.6 KPH) 2 WD or 4 WD*
850 FPM (9.7 MPH, 15.5 KPH) 2 WD or 4 WD*
1750 FPM (19.9 MPH, 32.0 KPH) 2 WD or 4 WD*

Auto Operating Ranges
0-400 FPM (4.6 MPH, 7.3 KPH) 2 WD or 4 WD*
0-700 FPM (8.0 MPH, 12.8 KPH) 2 WD or 4 WD*

* if so equipped

Since there are differences in operating characteristics between 2 and 4 WD machines, we will cover each in a separate paragraph below.

2 WD Only
The shift from “chip” 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”. Upshifts and downshifts may be made at any time whether moving or standing still. They will always be smooth due to the orifices in the control system.

4 WD Only
The shift from “chip” 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 “chip” may be made at any time whether moving or standing still. They will always be smooth due to the orifices in the control system.

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 “chip” to “travel” simultaneously disengages the front wheels while shifting the rear motors. 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.

**CAUTION** These upshifts and downshifts between “chip” 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 350 FPM use “lo”). If the desired operating speed is 450 FPM use “chip”. If additional torque is required to start off, use “lo” to get moving and, once moving, shift almost immediately to “chip” as this shift will take some time due to the orificing in the controls. When operating in “lo” there is more torque available than in “chip”, however the torque split is 70% rear and 30% front. Under some conditions this can result in rear wheelspin. If this situation arises, using “chip” will give less torque, and will change the torque split to 50% rear and 50% front. If the torque required is less than that which is available in “chip”, the system simply runs at a higher pressure than it would have in “lo”, but the torque is split nearly 50/50, thus reducing the possibility of wheelspin. Use “travel” only for moving the chipspreader by itself — **never attempt to pull a truck in “travel”**. The small displacement of the rear motors, necessary to get the higher travel speeds, will result in the pressure 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 magnetic pickup that feeds a signal to the digital display (6) also feeds its signal to the automatic speed controller. The automatic speed controller 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 adjustments 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) Place the control handle in neutral.
b) Set the desired speed on the auto speed set (3)
c) Set the speed range selector (18) appropriately (“lo” or “chip”) to reach the desired speed.
d) Turn the gate/spread roll switch (3) “off”.
e) Set the desired gate opening on the gate set point (4)
f) Depress the override pedal (26) fully.

g) Push speed/direction control handle (7) forward more than 3 degrees.
h) Release override pedal (26) smoothly and slowly until fully up.
i) Upon reaching the starting line of spreading, depress the right side of the gate/spread roll switch (8) fully to turn the gates “on”.
j) Upon reaching the ending line, center or depress the left side of the gate/spread roll switch fully (8) to shut the gates “off”.
k) Depress the override pedal smoothly to the fully depressed position.
l) Return the control handle to neutral.
m) 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 chipspreader 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 and while maintaining the desired spread rate.

**19. Right Conveyor Selector.** (Figure 9)

![Figure 9. Conveyor Control](image)

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 the spreader pyramid under the conveyor head pulley (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. (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 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 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 chip-spreader the truck.

25. Horn (Figure 16)
The horn is operated by depressing the trigger on the speed/direction control handle.

29. Gate Override Pushbutton. (Figure 3)
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.

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**CAUTION**

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

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Backup Alarm

The electric backup alarm is automatically actuated when the speed/direction control handle (Figure 16) is pulled to the rear of neutral.
OPERATION

WARNING

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

SPEED/GATE OPENING SELECTION

Using chart 1 or 1A depending on which kind of conveyors the machine is equipped with, determine the maximum possible speed which the chip spreader could be operated at and still convey enough material to the front hopper. As an example, using chart number 1 for standard speed conveyors to spread 25 lb./sq. yd. of 1/2" chips, enter from the left of the chart at 25 lb./sq. yd. horizontally to the hopper width fitted, 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 the selected speed, referring to chart number 2 at 25 lb./sq. yd. and 400 fpm, 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 5/8" to 11/16".

While in chart number 2 note that for 1/2" chips the minimum gate opening should be 1". The speed to be used with 1" gate opening is approximately 275 fpm.

The chip spreader can spread 25 lb./sq. yd. of 1/2" chips at any of the following combinations of settings:

- Gate Opening: 1"
  - Speed: 275 fpm
- Gate Opening: 1 1/8"
  - Speed: 300 fpm
- Gate Opening: 1 1/4"
  - Speed: 350 fpm
- Gate Opening: 1 7/16"
  - Speed: 400 fpm

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 1/2".

Adjust the gate opener set point at 1 7/16" adjust speed control set point to 400 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.
6. Run engine at governed speed. Normal operation of the chipspreader 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, Fig. 9)
9. Depress the override pedal fully.
10. Push speed/direction handle more than 3 degrees forward.
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, Fig. 9) 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, Fig. 9)

14. Stopping:
   a) With space available to stop after running off chipped surface:
      1. Center the gate/spread roll switch (Ref. 8, Fig. 9) 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 chipspreader:
      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:
   a) Switch auto manual selector to “manual” (Ref. 2, Fig. 9).
   b) Move handle out of neutral to the rear — the more rearward the handle the faster the machine will back up.
   c) To slow and stop the machine smoothly bring the handle toward and into neutral.

Should a place of foreign material become lodged in the gates, push the gate override pushbutton (Ref. 29, Fig. 3) to open the gate above the set point to allow the piece to pass. Releasing the override will return the gates to the previously set position.

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.

Adjust chipspreader hitch height as necessary to accommodate different individual trucks.
See “Truck Hitch Arrangement” section.
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. 10).

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 effect 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 1/2” gap is a good starting point for 1/2” chips (Fig. 10).
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 (Fig. 11).

The operator may wish to disengage the front hopper agitator while spreading clean dry aggregate. This operation is performed by removing the agitator sprocket drive belt (Fig. 12).

**Control Box**

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

**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.

**Figure 11. Rear Conveyor Gate**

1. Adjustment Bolt

**Figure 12. Hopper Chain Drive**

1. Drive Bolt Holder
2. Agitator Drive Sprocket
3. Sprocket Drive Bolt
OPERATING RANGES

For Standard
2WD Chip Spreader
with 152 HP Cummins, 150 HP Cat 3208 Engines

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

LO 2WD
PV 24 6.72 CID X 28.9
6BT, 152 HP @ 2500 RPM
3208, 150 HP @ 2400 RPM

CHIP 2WD
PV 24 3.7 CID X 28.9
6BT, 152 HP @ 2500 RPM
3208, 150 HP @ 2400 RPM

TRAVEL 2WD
1.82 CID X 28.9
6BT, 152 HP @ 2500 RPM
3208, 150 HP @ 2400 RPM
OPERATING RANGES

For 4WD ChipSpreader with 190 HP Cummins, 181 HP Cat 3208 Engines

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

For 4WD ChipSpreader

with 234 HP Cummins, 240 HP Cat 3208T Engines

ChipSpreader can be operated anywhere to the lower left of the appropriate gross weight curve.
Automatic Conveyor Control (Figure 9)
In the forward position power is supplied to the auto paddle switch mounted below the spreader pyramid under the conveyor head pulley. 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 13).

Belt Speed Controls
This option 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 panel on top of the right conveyor, inboard of each conveyor’s solenoid valve. Each valve has a lever with a knob and a locking screw.

With the lever in the full counter-clockwise position, the conveyor will run at its highest speed. Rotation 90 degrees clockwise will completely shut off the conveyor. The lever may be positioned anywhere in between and locked down at the desired speed.

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 14).

Extra Agitator
When sand or other small aggregate is being spread, on optional second agitator may be placed in the spread 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 segregator 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 15).

Differential Lock (Positraction)

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%. This action is exactly like a limited slip deferential in a mechanical rear axle.

This feature is only operable in “lo” and “chip” ranges, it is automatically switched off in the travel range.

To avoid damage due to high oil temperature, this feature should be manually turned “off” when making sharp turns with the chipspreader.
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

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

CAUTION

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

Rear Hopper Flow Gate Adjustment (Figure 11)

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 Gate Wear Plate Adjustment (Figure 17/17A)

Turn spread roll and conveyors “off”.
1. Loosen wear plate hold down bolts and extend the plate 1/32” past the gate edge along the entire gate width.
2. Tighten hold down bolts.
3. As plate wear occurs, additional adjustment will be necessary.
4. When one side of a plate has been worn away, it is possible to turn the plate over and use the opposite side.

Figure 17. Hopper Gates

Figure 17A. Gate Wear Plate

Figure 17B. Spread Roll Wear Plate
(Viewed from top of hopper, looking down)
1. Hold Down Bolts 2. Spread Roll Wear Plate
Hopper Spread Roll Wear Plate Adjustment
(Figure 17B)

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. 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 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. 17/17A)
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. 18)

Conveyor Belt Adjustment

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. 19) it will then be necessary to adjust the head pulley as outlined below (Fig. 20).
   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.

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) 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.

### WARNING

**REMAIN CLEAR OF ALL MOVING PARTS.**

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

### 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.

### CAUTION

**All lines downstream of check valve 6601969 (between check valve and brake cylinders) are charged to 700 psi at all times. This pressure must be discharged before opening any line or fitting in the area. To discharge accumulator, use a temporary jumper wire from the positive terminal of the battery to the brake solenoid valve 6601869 to release the brakes. Break the connection to apply the brakes. Repeat as many times as necessary until the brake cylinders no longer move.**

Before starting to discharge accumulator, securely chock the chipspreader wheels to prevent accidental movement of chipspreader.

### 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 at least 110 degrees.

#### 1. Hopper Spread Roll Relief Valve (Figure 21)

a) With engine off, remove cap (1) and install a 3000 psi gage with necessary adapters to hook to $\frac{1}{8}"$ JIC (12 MJ) male fitting (Ref. 1, Fig. 22).
b) Disconnect hopper hoses and leave uncoupled.
c) The engine should be run at governed speed (approximately 2400 to 2600 RPM). (This will vary slightly depending on make of engine.)

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**Figure 20. Conveyor Head Pulley Adjustment**

1. Left Conveyor  
2. Jam Nut  
3. Adjusting Screw  
4. Bearing Bolts  
5. Hood Adjustment  
6. Hood Adjustment Set Screws
d) Use the manual override to actuate the valve (Ref. 1, Fig. 21).

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

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

_adapters to hook to a ¾ JIC (12 MJ) male fitting._

b) Hold (lock) the left conveyor head pulley with a pipe wrench or other suitable tool (Fig. 23).

---

**CAUTION**

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 2400 or 2600 RPM). (This will vary slightly depending on make of engine.)

d) Use the manual override to actuate the valve (Fig. 24, Ref. 2).

e) This relief should be set at 1700 psi for regular conveyors, 2000 psi for high speed conveyors (Fig. 24, Ref. 3 & 4) and 2100-2200 psi for any conveyor equipped with full length flashing.

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.

---

2. **Left Conveyor Relief Valve** (Figure 24, Ref. 1)

   a) With engine off remove cap (2) (Fig. 22, Ref. 2) and install a 3000 psi gage with necessary adapters to hook to a ¾ JIC (12 MJ) male fitting.

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3. **Right Conveyor Relief Valve** (Figure 22 & 24)

   a) With engine off, remove cap (3) and proceed the same as the left conveyor.
4. Power Gate Opener/Powered Seat Relief Valve (Figure 24)

a) With the engine off remove cap (3) (Fig. 22) and install a 3000 psi gage with necessary adapters to hook to ½” JIC (08 MJ) male fitting. Disconnect the two cylinder hoses and install ½” JIC caps 9403374 on the male fittings on the top of the valve (if it is a single spool valve-gate opener only). Or, if it is double spool valve (gate opener inboard and powered seat outboard) disconnect the cylinder hoses from the inboard spool and install the caps on the male fittings.

b) Disconnect the orange wire from one solenoid and the brown wire from the other solenoid (single spool valve or the inboard spool of double valve).

c) The engine should be run at governed speed (approximately 2400 to 2600 RPM). (This will vary slightly depending on make of engine.)

d) Use the manual override button to actuate the valve (Fig. 24, Ref. 10).

e) Use an allen wrench to adjust the cartridge. This relief valve should be set to 1250 psi for single spool valve or 1900 psi for double spool valve (Fig. 24, Ref. 11).

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

5. Power Steering Relief Valve (At Hydraulic Control Assembly) (Figure 25, Ref. 1)

a) With engine “off”, remove cap (4) on pump (Fig. 22) and install a 3000 psi gage with necessary adapters to hook up to a ½” JIC (08 MJ) male fitting.

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 (2WD) or the cylinder is full stroked (4WD).
d) While holding the wheels full left or right set the relief valve pressure to 1950 psi.
e) If the relief valve pressure cannot be reached, the secondary relief valve within the pump may be set below 1950 psi. To verify and set this relief valve (Fig. 22) remove cap (5), loosen locknut (6) and adjust relief valve (7) to 2000 psi (Fig. 22) while holding the wheels full left or right.
f) Return to the relief valve at the hydraulic control assembly and repeat steps 6b, c and d.
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.

6. Hydraulic Control Pressure Relief
(Figure 25, Ref. 3)
a) With the engine off, remove pipe plug (5) and insert a 3000 psi gage.
b) Run the engine at or above 950 RPM.
c) Loosen locknut and adjust pressure to approximately 600 psi (Fig. 25, 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 700 psi and retighten locknut.
g) If relief pressure cannot be obtained, shut down the engine and remove pressure relief valve cartridge and check for contamination or damaged cartridge pieces. Clean or replace as necessary.

7. Hitch Release Pressure Reducing Valve
(Figure 25, Ref. 2)
and Hitch Relief Valve (Figure 25, Ref. 4)
a) With the engine off, remove pipe plug (Ref. 9) and insert a 1000 psi gage.
b) Run the engine at or above 950 RPM.
c) Loosen locknut and set reduced pressure to 250 psi (Fig. 25, Ref. 2).
d) Shut engine down, remove pipe plug (Ref. 10) and insert a 600 psi gage.
e) Run the engine at or above 950 RPM.
f) Loosen locknut and set relief pressure to 130 psi (Fig. 25, Ref. 4); retighten locknut.
g) Return to the pressure reducing valve loosen locknut and reset reduced pressure from 250 psi down to 100 psi and retighten locknut.
h) If reduced and/or relief pressures cannot be set, shut down engine and recheck hydraulic control pressure to be sure it is at 700 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.

Hydrostatic System Startup

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

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

⚠️ 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 chisproader 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. 26).

Figure 26. Engine - Left Side

1. Fuel Solenoid

3. Disconnect pump stroker at the pump.
4. Insert a 600 psi gage in the charge pressure gage port on the left side of the pump.
5. Remove suction filter elements; fill with hydraulic oil and reinstall.
6. Remove high side drain hose on pump and fill pump case with hydraulic oil and reinstall hose.
7. Remove top drain connector from each rear motor; fill motor with hydraulic oil and reinstall drain hoses.
8. 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.

9. Hook up fuel solenoid valve.

10. Turn ignition key to “start” and release, letting engine run at 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.

11. The pump stroker (Fig. 28) 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 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 adjustor 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 adjustor clockwise half the amount observed in step b. This should be the center of neutral.

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

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

13. 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.

14. Place range selector in low; place auto/manual selector in manual and reconnect the pump stroker.

15. Check for debris under any wheel.

16. 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.

17. 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.

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

**Gate Adjustments**

1. Disconnect reach rod from gate cylinder to hopper level (Figure 18).

2. Hopper gates should be closed and properly adjusted on the hopper itself before starting this procedure.

3. Loosen set screws on 72T pulley until it is free (Figure 29).
4. Loosen set screws on 16T pulley; rotate transducer so that drilled set screw lock is straight up. Retighten 16T pulley being certain that one set screw is going into the drilled depression and the other set screw is pointing forward.

5. Check the cylinder extension which should be approximately 5¾". The front edge of the cylinder rod clevis should be approximately flush with the front plate of the chipspreade frame (Figure 30).

6. If it is not, turn gate/spread roll thumb switch (Figure 7) off, start engine and run at about 1500 to 1800 RPM. Insert a screwdriver in the slot in the end of the transducer shaft. Turn the shaft slightly clockwise to extend the cylinder further and counterclockwise to retract the cylinder. When the cylinder is in the desired position, check to be sure neither solenoid is still acti-
vated. If one is still activated, rotate the transducer shaft very slightly one way or the other to center in the dead band. When neither solenoid is activated, tighten the set screws on the 72T pulley.

7. Run engine at governed speed (full RPM). Set potentiometer to about 2" and turn on thumb switch. The cylinder should retract smoothly and stop.

   Due to the difference in volume on each end of the cylinder, the rear flow control will have to be opened more than the rod end flow control in order to achieve equal open and close speeds. Adjust the flow controls to achieve the desired opening and closing speeds. Retighten lock nuts while holding stems. Before proceeding further be sure to check override pedal adjustment procedure. The auto speed override pedal must be in proper adjustment before going any fur-
ther. See “Override Pedal Adjustment”.

8. Turn pot setting full clockwise; turn thumb switch “on” and depress override pedal. Cylinder should extend to the dimension measured in step 6. If it does not open to that dimension, the dual potentiometer under the right foot rest must be adjusted (Fig. 35, Ref. 4).

   If the chipspreade is currently stopping properly in the “auto” mode, do not proceed further with these instructions, but rather proceed to “Override Pedal Adjustment,” “Right Side Potentiometer”, Step 15.

9. Remove right foot rest, depress override pedal fully and hold it down. Loosen set screw, rotate the potentiometer shaft slightly as necessary to extend the cylinder to the dimension established in step 6 and retighten set screws securely before releasing override pedal.

10. Check that cylinder extends to same dimension, no matter where the setting, by turning off thumb switch or depressing override pedal fully. The difference should not exceed 1/16".

11. With thumb switch “off”, install reach rod on gate opener arm and tighten (Fig. 18).

12. Loosen reach rod ball joint connector jam nuts.

13. Turn the reach rod ball joint connector in or out as required until it fits squarely into the gate opener arm with no slack or a very slight pull. Tighten ball joint connector jam nut and rein-
stall ball joint onto gate opener arm.

14. Tighten all jam nuts and cycle gates open and closed to check out.
Brake Adjustment

**CAUTION**

All lines downstream of check valve 6601969 (between check valve and brake cylinders) are charged to 700 psi at all times. This pressure must be discharged before opening any line or fitting in the area. To discharge accumulator, use a temporary jumper wire from the positive terminal of the battery to the brake solenoid valve 6601869 to release the brakes. Break the connection to apply the brakes. Repeat as many times as necessary until the brake cylinders no longer move.

Before starting to discharge accumulator, securely chock the chipsreader wheels to prevent accidental movement of chipsreader.

1. Disconnect the 9 pin connector on the left side (towards the rear) of the control box.
2. Start engine and run at approximately 1000 RPM.
4. Place range selector in “lo”.
5. Push stick forward slightly. Chipsreader should not move but brakes should release. (Brake cylinders should retract fully.)
6. Put the stick in neutral. Cylinders should extend approximately 2” with new brakes.
7. Cycle the brakes “on” and “off” a few times to make sure that all air has been removed and that the brakes are applying simultaneously.
8. Place the stick in neutral thus applying the brakes. With the brakes hydraulically applied, the external springs should be adjusted equally to a dimension of 11” minimum inside to inside of hooks.
9. Cycle the brakes “on” and “off” a few times and recheck this dimension on each side. When properly adjusted, tighten down locknuts.
10. Place stick in neutral and shut “off” ignition.
11. Reconnect 9 pin connector.

It should be noted that the 11” dimension will decrease with brake wear and will require adjustments to keep at or above that dimension. It should also be noted that if the control stick is moved into neutral rapidly, the brakes will come “on” before all hydrostatic braking has normally brought the machine to a halt, thus causing premature wear of the shoes and requiring more frequent adjustment.

![External Brake Springs](image)

Figure 31. Brake Cylinder - 2WD and 4WD
(Right Side Shown)

**Tach Calibration**

1. Turn ignition key “on” with engine not running.
2. Hold “select” switch down until “cal” is displayed (approx. 10 seconds).

![Digital Instrument Panel](image)

Figure 32. Digital Instrument Panel

1. "Select" Switch
2. Digital Display Area
3. Bargraph - Engine Oil Pressure
5. Release switch to display present alternator setting.
6. Push and release switch to advance alternator setting.
7. 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 serial number K4800 or lower (14 pole alternator).
Setting No. 2  Caterpillar 3208 series engines.
Setting No. 3  Cummins 6BT or 6BTA with serial number K4867 or higher (12 pole alternator).
Setting No. 4  GMC 4.53 (12 pole alternator).

**Powered Seat Speed Adjustment**

1. Seat speed adjustments must be made with the engine at governed speed.
2. The range selector must be in either “lo” or “chip”.
3. Loosen the flow control locknuts (Fig. 33).
4. Retract the lock pin at the rear of the seat (Fig. 34).
5. Since each flow control sets the speed in one direction only, it is necessary to adjust the rotation speed in one direction with one valve and the rotation speed in the opposite direction with the other valve.
6. With the engine at governed speed, the speed being set will be the maximum speed that the seat will move. Adjust for a comfortable maximum speed and for equal speed in both direction.
7. Note that this speed will only be available at governed speed and as engine RPM is lowered, the seat will move slower. At about 1100 RPM the seat may no longer move.
8. When the speed has been satisfactorily adjusted, retighten the lock nuts while holding the stem of the flow control valve.
9. The seat also has a fore and aft seat adjustment operated by a pull lever under the left side of the seat.

![Figure 34. Operator Seat Support](image)

- 1. Lock Pin
- 2. Override Pedal
- 3. Left Side Potentiometer Location
- 4. Front Brake Reservoir (2WD only)
- 5. Master Cylinder (2WD only)
- 6. Master Cylinder Actuating Rod (2WD only)
- 7. Seat Adjust Lever (Fore & Aft)

**Override Pedal Adjustment**

Before beginning any adjustments to the operating mechanism under this section, the chipspreader must be jacked up and securely supported on stands.

---

**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 chipspreader could drive off the stands.
If it is a 2 WD chipspreader the brakes must first be adjusted per “Front Brake Adjustment” before proceeding.

If it is a 4 WD chipspreader override pedal procedure may be immediately started.

**Left Side Potentiometer - Manual**  
(Figure 35, Ref. 1)

1. Place auto/manual selector in “manual” (Figure 3).
2. Place speed range selector in “lo”.
3. Start and run engine about 900 RPM.
4. Depress override pedal fully and clamp down.
5. Slowly push control handle to full forward position.
6. No wheel should begin to rotate. If a wheel rotates, loosen set screw and rotate potentiometer slowly clockwise until wheel rotation stops.
7. Retighten set screw.
8. Check for reverse rotation by bringing control handle from full forward through neutral to full rearward position.
9. If rotation occurs in only one direction, recheck pump null adjustment for center.

---

**Figure 35. Override Pedal Adjustment**

1. Left Side Potentiometer  
2. Override Pedal  
3. Power Steering Control  
4. Right Side Potentiometer  
5. Seat Latch Pin  
6. Operator Seat Assembly  
7. Control Box Fore/Aft Adjustment Slot  
8. Tilt Wheel Adjustment Bolts

---

**Right Side Potentiometer - Auto**  
(Figure 35, Ref. 4)

1. Place auto/manual selector in “auto” (Figure 3).
2. Place speed range selector in “lo”.
3. Start and run engine about 900 RPM.
4. Set auto command set point full clockwise to maximum speed.
5. Push control handle forward to engage command.
6. Depress override pedal fully.
7. No wheel should rotate. If a wheel still rotates, return control handle to neutral; release the override pedal and shut off engine. Since the gate and auto overrides are controlled by different sections of the same potentiometer, adjusting the position of the potentiometer will affect the gates.
8. Disconnect the read rod (Figure 18).
10. Engage “auto” by pushing the control handle forward, depress pedal and clamp down.
11. Loosen set screw and rotate potentiometer counter-clockwise to stop wheel rotation and retighten set screw.
12. Release override pedal and return control handle to neutral.
13. Since this potentiometer has been moved, it may have affected the gates.
14. Run the engine about 2000 RPM.
15. Set the gate command set point to more than 2°.
16. Set thumb switch off.
17. Depress override pedal and observe gate actuation cylinder for movement (Figure 30). There should be very little to no further extension when the override pedal is depressed.
18. If there is more than 1 / 16°, loosen the set screws on the 72T pulley, rotate the transducer (Figure 29) shaft slightly clockwise and return it to deenergize the solenoid. This should extend the cylinder further. Retighten set screws on 72T pulley.
19. Depress override pedal and check for movement.
20. When no further extension of cylinder is observed by depression of override pedal, loosen ball joint connector jam nuts.
21. Turn the read rod ball joint connector (Figure 18) in or out, as required, until it fits squarely into the gate opener arm with no slack or a very slight pull. Tighten ball joint connector jam nuts and reinstall ball joint onto gate opener arm.

---

**Seat Chain Adjustment** (Figure 37)

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.
Front Brake Adjustment (2 WD Only)

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 chipspreadere securely on stands (Figure 36).

1. Remove oblong rubber caps and use brake adjusting tool to rotate rachet wheel until a slight drag is felt when the wheel is rotated by hand. Adjust both front wheels to about the same drag.
2. Fill reservoir under seat to proper level with *hydraulic oil* (Figure 34).
3. Fill the power brake booster to proper level with *brake fluid* (Figure 36, Ref. 1).
4. Bleed the front brake lines.
5. Bleed both the master cylinder (Figure 34, Ref. 5) and the slave cylinder (Figure 36, Ref. 2).
6. Refill the reservoir to the proper level as required (Figure 34, Ref. 4).
7. Place range selector switch in “lo” (Figure 3).
8. Place auto/manual switch in “manual”.
9. Start and run engine at about 950 RPM.
11. Depress override pedal slowly until brake pedal begins to feel noticeably harder. Just as the brake pedal firms up, the rear wheels should be stopped. If the rear wheels have not quite stopped, the master cylinder actuating rod must be shortened (Figure 34).
12. Remove pin from clevis, loosen lock nut, adjust clevis and retighten lock nut.
13. If the rear wheels stop before the pedal firms up, the master cylinder actuating rod must be lengthened.
14. Bleed front brake lines and recheck adjustment.

**Figure 36. Front Brake - 2WD**
1. Brake Reservoir 2. Slave Cylinder 3. Right Front Wheel

**Figure 37. Seat Chain Adjustment**
TOWING INSTRUCTIONS

IMPORTANT

REAR WHEEL HUBS MUST BE DISENGAGED BEFORE TOWING TO AVOID DAMAGE TO HYDRAULIC MOTORS

Release rear wheels by loosening the three bolts in the center of the hub, rotate the cap slightly counterclockwise and take it off. Turn it over so that the center bump is toward the center of the machine and reinstall.

The chipspreader must have electric power to be towed. If the chipspreader batteries are dead, an auxiliary battery must be supplied to provide power.

If the engine is not runnable, there is no power steering. 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 charge pressure switch must be jumpered to release the rear brakes.

HOOKUP AND TOW NOT EXCEEDING 15 MPH.

The towing capabilities of the machine are not intended for long distance towing 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.

Whenever towing a chipspreader, use the hazard flashers on the chipspreader as a warning. During towing operation be sure brake lights and turn signals of the towing vehicle are visible or provide a trailing vehicle for that purpose.
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**

- 20” if Rear Hole Mounted Hitch
- 16” if Front Hole Mounted Hitch
- 8½” Minimum
- Minimum 2½”
- Front Hole Mounted
- Rear Hole Mounted
- Loaded Bed 18”
- Weld

---

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.

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Specify Unit Serial No., Part No., & Part Description
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| When Indicator Turns Red | 27 | Engine Air Filter | 1 | Filter Element |

### Yearly

| Yearly | 28 | Reservoir Breather | 1 | Filter Element |

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*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 has been introduced into the system.

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

#10NG Oil—#10 Non-Detergent Oil

#90M-ATG—#90 Molub-Alloy Transmission

Type A TF—Type A Transmission Fluid

#2M-AG—#2 Molub-Alloy Grease
WIRING DIAGRAM - HYDROSTATIC DRIVE CHIPSREADER

Note: Diagram contains both standard and optional equipment.
WIRING DIAGRAM - HYDROSTATIC DRIVE CHIPSREADER

Note: Diagram contains both standard and optional equipment.
WARNING!

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

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

⚠️ Always use steps, platforms and handrails provided.

⚠️ Remain clear of all moving or rotating parts.

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

⚠️ Keep loose clothing away from conveyor area when operating.

⚠️ Always install locking control box cover and chock wheels when leaving machine unattended.

⚠️ The operator seat must always be latched during travel.

⚠️ A 4 wheel drive machine should be shifted in and out of "Travel" only while stopped or moving at a very slow rate of speed.

⚠️ 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.

⚠️ The fuel tank is part of the crosswalk behind operator. Do not drill or weld in this area.
### DECIMAL EQUIVALENT CHART

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### HYDRAULIC FITTING CODE

**LETTER DESIGNATION**

- **MP** - Male Pipe Thread
- **FP** - Female Pipe Thread
- **MB** - Male "O" Ring Boss
- **MJ** - Male JIC, 37
- **FJ** - Female JIC, 37
- **FL** - "O" Ring Flange
- **MS** - Male SAE, 45
- **FS** - Female SAE, 45
- **C** - Compression Fitting (Ferrule Type)
- **X** - Swivel

**SIZE**

Size is represented in sixteenths of an inch. One inch equals 16, one half inch equals 08.

- 02 - 1/8
- 04 - 1/4
- 06 - 3/8
- 08 - 1/2
- 10 - 5/8
- 12 - 3/4
- 14 - 7/8
- 16 - 1
- 18 - 1 1/8
- 20 - 1 1/4
- 24 - 1 1/2
- 28 - 1 3/4

**EXAMPLE:** The description for a "1/2" 90 degree Hydraulic Elbow, Male NPT to Female NPT Swivel, would be as follows:

**ELBOW - HYDR, 90, 08MP - 08FPX**

- 90 Degrees
- Size, 1/2"
- Male Pipe Thread
- Female Pipe Thread
- Size, 1/2"
- Swivel