

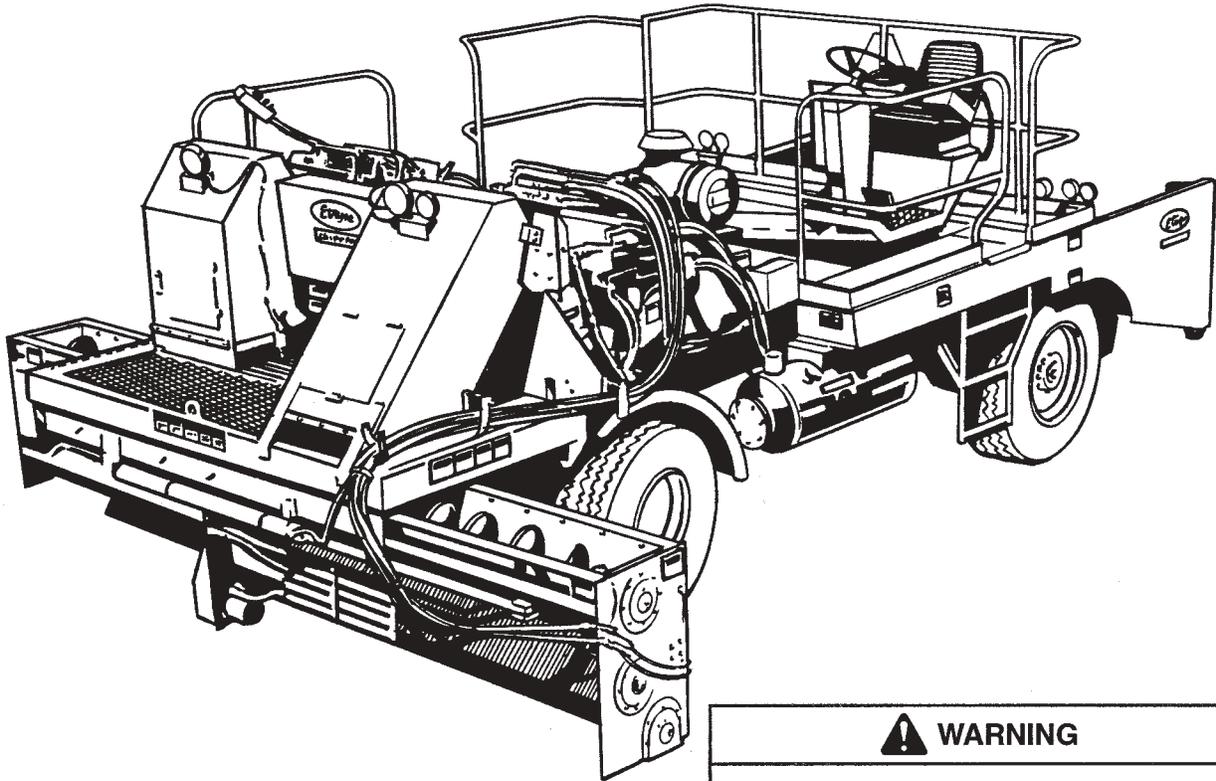
M-210-91

For Units with Serial Numbers  
K-5126 and After



# CHIPSREADER Variable Width Spread Hopper

## Operation, Maintenance and Safety Manual for Hydrostatic Drive Units with Variable Width Hopper



**! WARNING**

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

# Safety Precautions

## CAUTION

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

Always use steps, platforms and handrails provided.

Remain clear of moving or rotating parts.

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

Keep loose clothing away from conveyor area.

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

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

The seat must always be latched during travel.

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

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

Do not transport ChipSpreaders with Variable Width Hoppers without mechanically securing the two movable hoppers.

Extraordinary contamination of the hydraulic system may allow system oil leakage resulting in possible movement of the hopper sections.

## WARNING

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.

# **CHIPSPREADER**

## **Operation, Maintenance and Safety Manual**

### **for Hydrostatic Drive Units with Variable Width Hopper**

**M-210-91**

For Units with Serial Numbers K-5126 and After

## **WARRANTY**

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

**THE COMPANY EXCLUDES ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THERE ARE NO WARRANTIES, EXPRESS OR IMPLIED, WHICH EXTEND BEYOND THE DESCRIPTION OF THE GOODS CONTAINED IN THIS CONTRACT.**

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

This warranty does not apply to:

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

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



**E.D. ETNYRE & CO.,** Oregon, Illinois 61061-9705

1333 South Daysville Road • Phone 815/732-2116 • Fax 815-732-7400 • Cable "EDECO"  
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# INTRODUCTION

The Etnyre Variable Hopper Hydrostatic chip-spreader has been designed to improve the accuracy of chipping while improving productivity. This has been done by incorporating superior speed keeping capabilities, precise gate opening control and the ability to do most roads in a single pass.

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

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

## Important

1. The front hopper should be fully closed up and latched when the unit is traveling between job sites to avoid possible damage to the outer ends of the hoppers.

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

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

4. Under most operating conditions the Chip-spreader should be allowed to tow the truck. However, certain steep upgrade or downgrade conditions may require the truck to assist the chip-spreader. The chip-spreader **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 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 and 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.

## CAUTION

**The front hopper should be fully closed up and latched when the unit is traveling between job sites to avoid possible damage to the outer ends of the hoppers.**

## Reporting Safety Defects

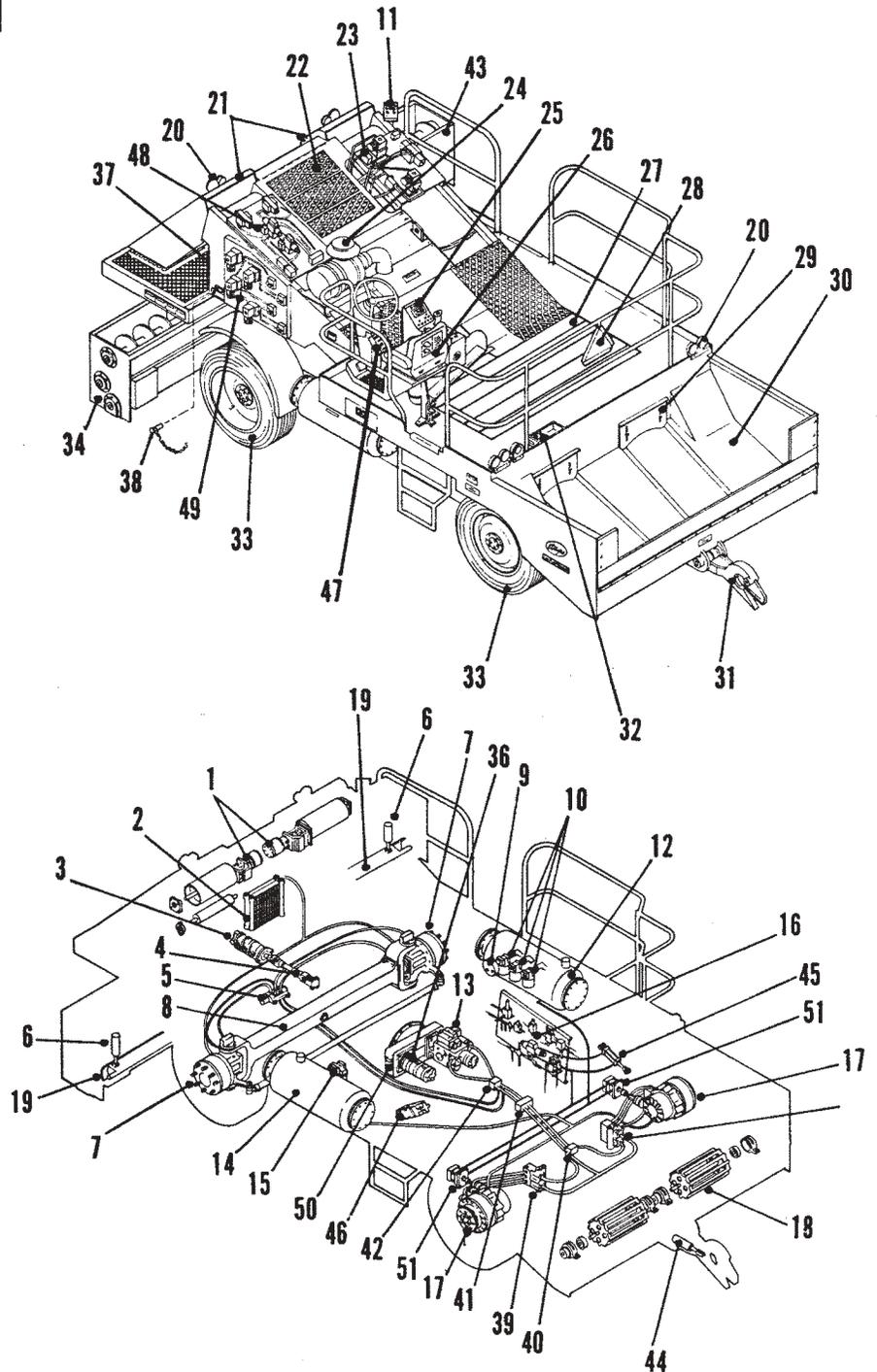
If you believe that your vehicle has a defect which could cause a crash or could cause injury or death you should immediately inform the National Highway Traffic Safety Administration (NHTSA) in addition to notifying E. D. Etnyre & Co.

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, or E. D. Etnyre & Co.

To contact NHTSA, you may either call the Auto Safety Hotline toll-free at 1-800-424-9393 (or 366-0123 in Washington, D.C. area) or write to NHTSA, U.S. Department of Transportation, Washington, D.C. 20696. You can also obtain other information about motor vehicle safety from the hotline.

# General Identification — Variable Hopper Units

Ref.	Qty.	Description
1	1	Conveyor Drive Assembly
2	2	Hydraulic Oil Coolers
3	1	Hydraulic Pump Component System
4	1	Driveline-Hydraulic Pump
5	1	Valve-Front Drive Motors
6	1	Gate Actuating Cylinder
7	2	Front Wheel Drive Motors-4WD
8	1	Front Axle ASM-4WD
9	1	Return Manifold
10	1	Filter-Return Line
11	1	Front End Man Hopper Controls
12	1	Reservoir-Hyd/Component System
13	1	Hydraulic Pump Drive System
14	1	Reservoir-Hyd/Drive System
15	1	Filter-Suction
16	1	Hydrostatic Control Assembly
17	2	Rear Wheel Drive Motors
18	1	Conveying Arrangement
19	AR	Spread Hopper Gates
20	AR	Lights
21	2	Conveyor Deflectors
22	9	Covers-Conveyor and Engine
23	2	Conveyor Control Valves
24	1	Air Filter ASM
25	1	Control Console
26	1	Operator Seat ASM
27	5	Rear Deck Sections
28	1	Slow Moving Vehicle Emblem
29	2	Conveyor Flow Regulator Gates
30	1	Receiving Hopper
31	1	Truck Hitch
32	1	Fuel Tank
33	AR	Tires and Wheels
34	1	Spread Hopper-Left
36	1	Pump
37	2	Hopper Material LVL Mechanism
38	2	Latch Pin
39	2	Motor Shift Valves
40	1	Rear Differential Lock Valve (Optional)
41	1	Front/Rear Differential Lock Valve (Optional)
42	1	Shuttle Valve
43	1	Spread Hopper-Right
44	1	Hitch Release Cylinder
45	1	Hitch Raise Cylinder
46	1	Radar Speed Sensor
47	1	Driver Hopper Controls
48	1	Upper Valve Plate ASM
49	1	Side Valve Plate ASM
50	1	Gearbox
51	2	Brake Cylinder



# INITIAL START-UP

## Check Out

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

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

3. Grease all fittings and check all reservoir oil levels in accordance with the Chipsreader 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.



## Safety Precautions

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

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

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

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

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

## Attaching Hopper to Unit

1. By hooking a lifting sling into the two rear lifting eyes, the hopper can be tilted forward while

being raised, allowing the hopper carrying shafts to engage the hopper carrying arms on the chipsreader. (Figure 1 & 2) Lower hopper slowly until lifting sling can be disconnected.

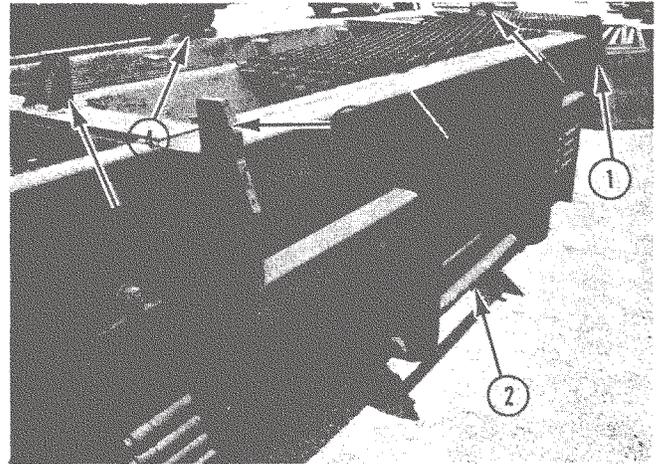


Figure 1

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

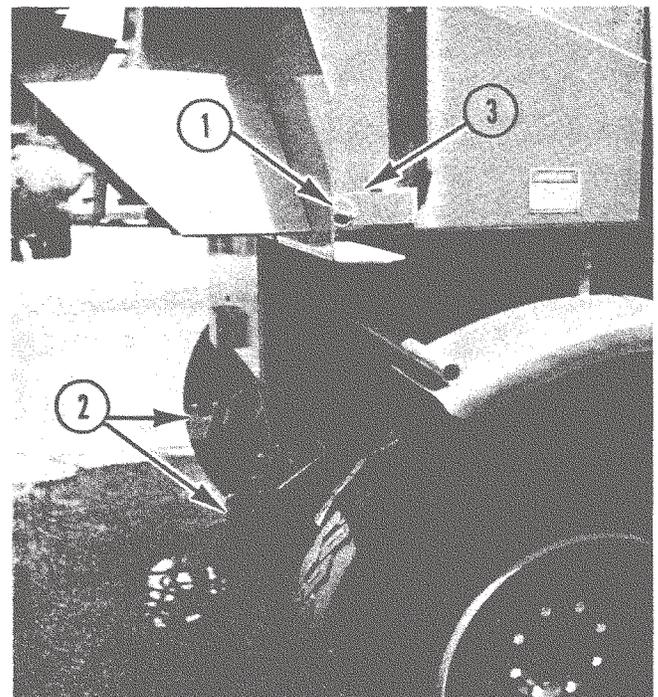


Figure 2

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

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

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

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

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

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

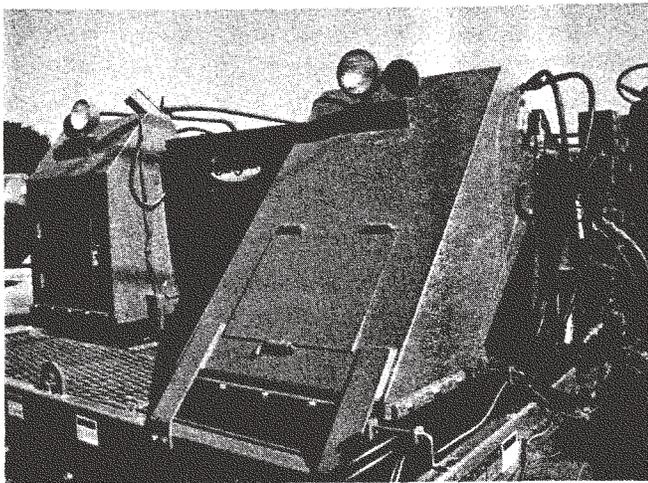


Figure 2a. Install Conveyor Hoods

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

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

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

With the hopper on the machine, start the engine and run it at a minimum of 2000 rpm and extend the hoppers fully. Set the gate opening to approximately 1 1/2 inch, turn both spread roll arming switches "on" and depress the right side of the "gate/spread roll" switch.

Depress the override pedal fully. With the override pedal fully depressed, there should be 1/16" clearance between the gate and the spread roll.

Release the override pedal and depress the left side of the "gate/spread roll" switch. There should also be 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 either the gate and/or the spread roll is not straight. Contact the factory for straightening instructions.

## Important

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

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

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

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

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

## Identification and Function of Controls

Refer to figure 3 for identification of the following descriptions.

### 1. Power/Ignition Switch.

Rotating from “off” to “on” supplies electric power to all systems and controls. Rotating the switch further to the right against the spring will engage the starter. When the engine runs, release the key and the switch will remain in the “on” position. Since all functions except power steering, and rear brakes are electrically controlled, turning the key to “off” results in an emergency stop.

### 2. Mode Selector—Manual/Park/Auto.

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

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

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

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



Figure 3. Control Console Identification

**Mode of operation must be selected with machine stationary.**

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

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

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

### 3. Auto Speed Set—Potentiometer.

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

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

The hydrostatic chipperspreader 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 chipperspreader 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 chipperspreader 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 chipperspreader will slow down and then recover to the preset speed as load (HP required) decreases.

### 4. Gate Opening Set Point.

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

### 5. Fuses

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

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

Conveyor fuse: Supplies power only to the conveyors.

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

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

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

### 6. Digital Instrument Panel. (Figure 4)

All instrumentation is included in the digital/bargraph panel. The left bargraph displays engine oil pressure. The right bargraph displays engine coolant temperature. The digital display area displays the following items: feet per minute, engine RPM, battery voltage, hydraulic oil temperature (selectable left or right tank) and fuel level. The displayed item is selectable by pressing the “select” area (6A) on the display. Pushing “select” once will cause the display to change from the current item to the next in the order. Pressing “select” again will change the display to the next item, etc. When hydraulic oil temperature is selected, toggle switch (14) is used to select which tank temperature is to be displayed.

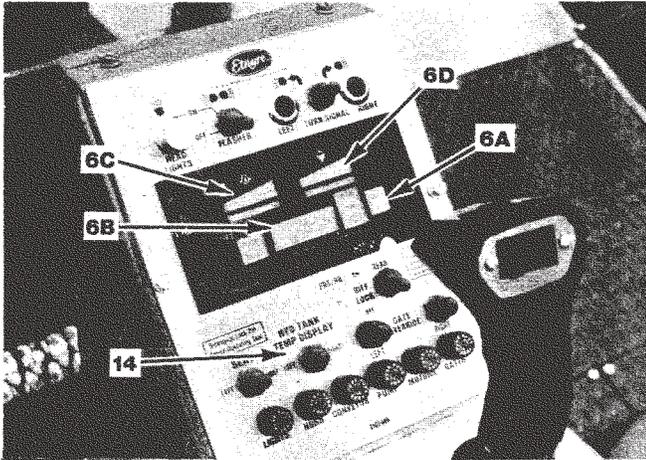


Figure 4. Digital Instrument Panel

- |                                  |   |
|----------------------------------|---|
| 6A. Select Switch                | 6D. Engine Coolant Temperature Bargraph     |
| 6B. Digital Display Area         | 14. Hydraulic Oil Temperature Tank Selector |
| 6C. Engine Oil Pressure Bargraph |   |

An alarm function is built into the instrument panel. If an item sensed by the display reaches its built in alarm condition, the appropriate word will appear and flash regardless of what item is currently selected and displayed. In addition, an output is sent to the buzzer and also to the warning light mounted below the steering wheel hub. For instance, the normal use will be to have speed (FPM) on display—this will automatically be displayed on starting the engine. If the fuel level gets down to the alarm level (approximately 15% or 10½ gallons), the word “fuel” will flash in its location within the display, the buzzer will sound and the warning light below the steering wheel will come on, and the FPM will continue to be displayed. The same is true for any of the items monitored which have alarm points. The alarm points are as follows:

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

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

When chipping, the right tank should be selected for about 15 seconds minimum every 30 minutes or so. If the right tank is above 180 degrees F. the alarm will come on and “oil temp” will flash as well as the

red light below the steering wheel. It is not necessary to display oil temperature to connect the monitor system to the right tank, but you may wish to view the actual temperature. After checking the right tank be sure to return the switch to the left tank.

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

A digital readout of speed, reading to the nearest foot per minute, is provided. The display uses a ground speed radar (Figure 4a.) to generate pulses. The pulses are fed to both the automatic speed controller and a conditioning circuit which then feeds the signal to the digital display.

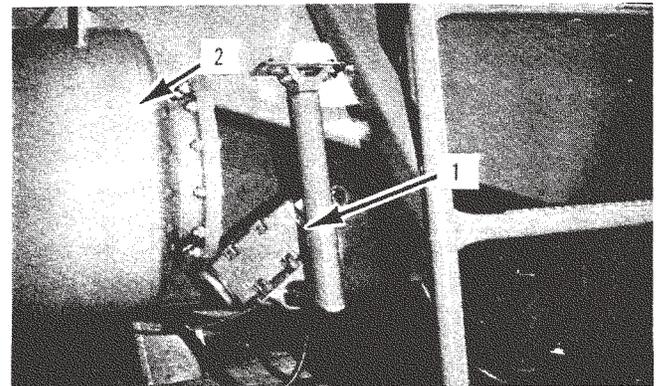


Figure 4A. Ground Speed Radar

1. Ground Speed Radar Unit
2. Left Side Hydraulic Tank

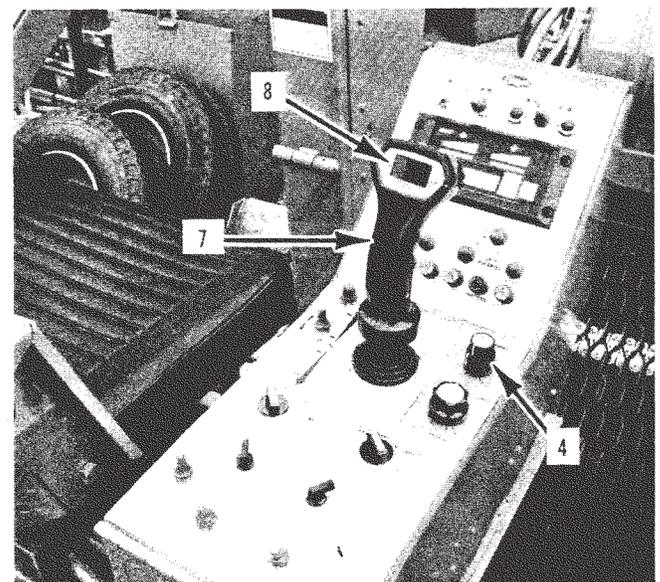


Figure 5. Speed/Direction Control Handle

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

## 7. Manual Speed/Direction Control Handle (Figure 5)

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

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

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

With the mode selector in "auto," the control handle will operate as follows: moving the handle rearward out of the neutral position approximately 3 degrees will activate the optional backup alarm and release the brakes. ***The chipseader 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 chipseader to the preselected speed at a non-adjustable rate. Acceleration and deceleration should be modulated by the override pedal which will be explained under that title heading (26). The speed range control must be appropriately set in order to reach the desired speed. Further displacement of the control handle will have no additional effect. Adjustments to speed are made using the "Auto Speed Set" potentiometer.

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

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

The rocker switch activates the spread roll and also the command circuit for the gates. The gate opening is set by the gate opening set point (4) to the desired opening. The gates are then opened or closed with the rocker switch. Depressing the left side of the switch closes the gates, while depressing the right side opens the gates. When used this way the gates will go from closed to the preset opening or from the preset opening to closed.

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

## 26. Override Pedal (Figure 6)

The override pedal is used to accelerate and decelerate the chipseader 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,

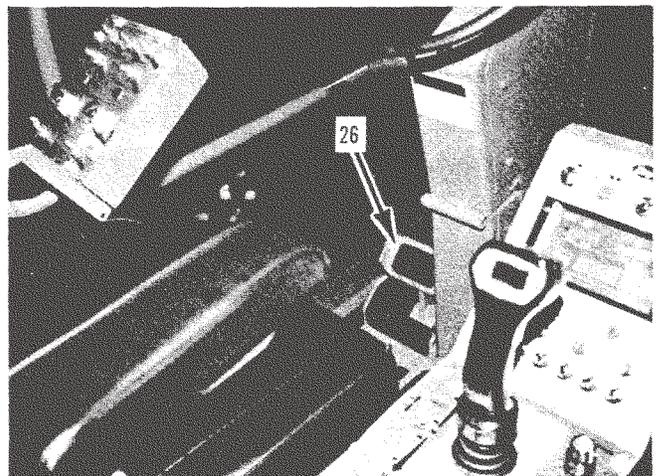


Figure 6. Override Pedal Location  
26. Override Pedal

when it is fully depressed, it reduces the given command signal to zero and applies the rear brakes. In effect it works like slipping the clutch on a mechanically driven machine, enabling the driver to have full control over the acceleration and deceleration of the machine. *However, unlike a mechanical machine, partial depression of the pedal does not cause any accelerated wear and can be used for unlimited time with no adverse effect.*

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

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

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

**9. Turn Signal Selector** (Figure 7)

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

**12. Hazard Flasher Switch** (Figure 7)

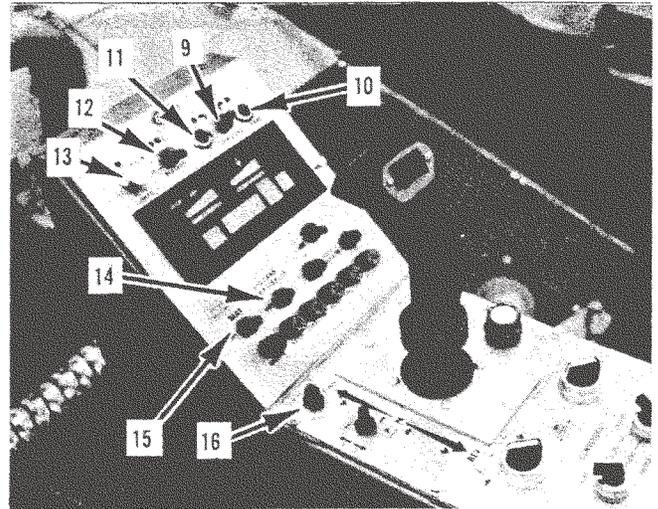
Push up for “on” and push down for “off.”

**13. Headlight Switch** (Figure 7)

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

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

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



**Figure 7. Control Panel**

- |                                 |   |
|---------------------------------|---|
| 9. Turn Signal Selector         | 14. Hydraulic Tank Temperature Display Selector |
| 10. Right Turn Signal Indicator | 15. Seat Shift Switch                           |
| 11. Left Turn Signal Indicator  | 16. Hitch Release Pushbutton                    |
| 12. Hazard Flasher Switch       |   |
| 13. Headlight Switch            |   |

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

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

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

<b>CAUTION</b>
<b>The seat must always be latched during travel.</b>

**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 chipsreader, 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 chipsreader and supply truck). If this happens, the chipsreader 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.

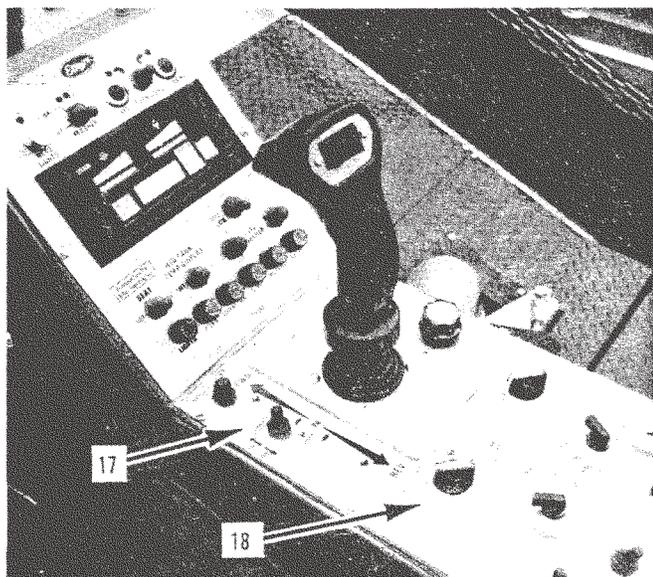


Figure 8.

17. Throttle Switch

18. Speed Range Selector

### 18. Speed Range Selector. (Figure 8)

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

The speed ranges are approximately:

#### Manual Operating Ranges

LO 0-650 fpm (7.4 mph, 11.9 kph) 4 WD  
 2ND 0-800 fpm (9.1 mph, 14.5 kph) 4 WD  
 TRAV 0-1650 fpm (18.8 mph, 30.2 kph) 2 WD

#### Actual Maximum Speed Possible

LO 700 fpm (8.0 mph, 12.8 kph) 4 WD  
 2ND 850 fpm (9.7 mph, 15.5 kph) 4 WD  
 TRAV 1750 fpm (19.9 mph, 32.0 kph) 2 WD

#### Auto Operating Range

0-700 fpm (8.0 mph, 12.8 kph) 4 WD

### **⚠ WARNING**

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

The shift from 2nd to travel should be made only after positioning the seat full left or right and the latch pin inserted since electric power is not available to move the seat after the switch has been positioned to “travel.” Upshifts and downshifts between “lo” and “2nd” may be made at any time whether moving or standing still. 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 “2nd” to “travel” disengages the front wheels to a free wheeling mode. The engagement valve must shift very quickly by necessity of function. This results in a rather abrupt shift which is particularly evident when high flow rates are in use. It also causes rather high pressure spikes to occur in the hydrostatic system which can cause eventual damage. ***These upshifts and downshifts between “2nd” and “travel” are very abrupt and could cause personal injury.***

Selection of speed range should be based on the desired operating speed—generally you should use the lowest speed range that will give the desired operating speed (i.e. if the desired speed is 650 FPM or less, use “low”). If the desired operating speed is 750 FPM use “2nd.” If additional torque is required to start off, use “low” to get moving and, once moving, shift to “2nd.” When operating in “lo” there is more torque available and the torque split is 50/50 allowing the use of the optional front/rear diff lock in addition to the optional rear side/side diff lock, thus reducing the possibility of wheelspin. Use

“travel” only for moving the chipspreader by itself—*never attempt to pull a truck in “travel.”* The small displacement of the rear motors alone, necessary to get the higher travel speeds, will result in the 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 ground speed radar (Figure 4a.) that feeds a signal to the conditioning circuit for 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) Put the auto/manual selector in “auto.”
- b) Place the control handle in neutral.
- c) Set the desired speed on the auto speed set (3)
- d) Set the speed range selector (18) appropriately (“lo” or “2nd”) to reach the desired speed.
- e) Turn the gate/spread roll switch (8) “off.”
- f) Set the desired gate opening on the gate set point. (4)
- g) Depress the override pedal (26) fully.
- h) Push speed/direction control handle (7) forward more than 3 degrees.
- i) Release override pedal (26) smoothly and slowly until fully up.
- j) Upon reaching the starting line of spreading, depress the right side of the gate/spread roll switch (8) fully to turn the gates “on.”
- k) Upon reaching the ending line, center or depress the left side of the gate/spread roll switching fully (8) to shut the gates “off.”
- l) Depress the override pedal smoothly to the fully depressed position.
- m) Return the control handle to neutral.
- n) Release the override pedal.

Speed changes may be made while moving by rotating the auto speed set point (3) smoothly to the new speed. The 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 in order to maintain the desired spread rate.

## 19. Right Conveyor Selector (Figure 9)

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

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

In the forward position, power is supplied to the auto paddle switch mounted below and along the 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.

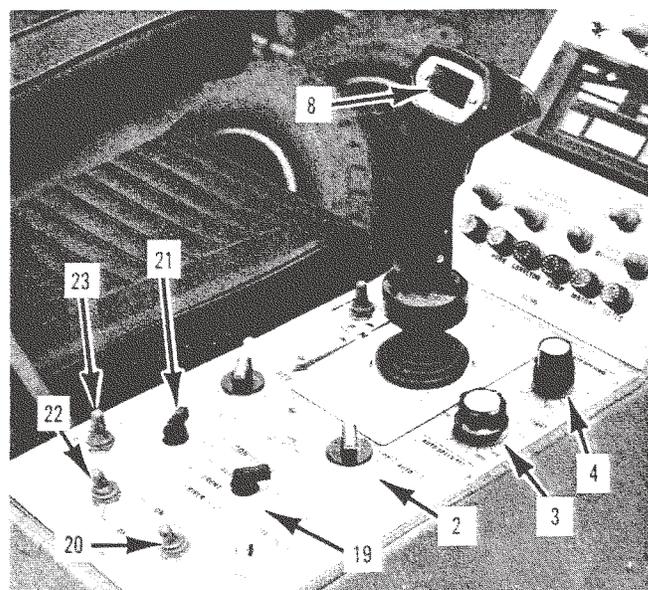


Figure 9. Conveyor Control

- |                                     |                                    |
|-------------------------------------|------------------------------------|
| 2. Mode Selector Manual/park/auto   | 20. Right Conveyor On/Off          |
| 3. Auto Speed Set                   | 21. Left Conveyor Control Selector |
| 4. Gate Opening Set Point           | 22. Left Conveyor On/Off           |
| 8. Gate/Spread Roll Switch          | 23. Hitch Height Switch            |
| 19. Right Conveyor Control Selector |                                    |

## 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 chipspreader and truck.

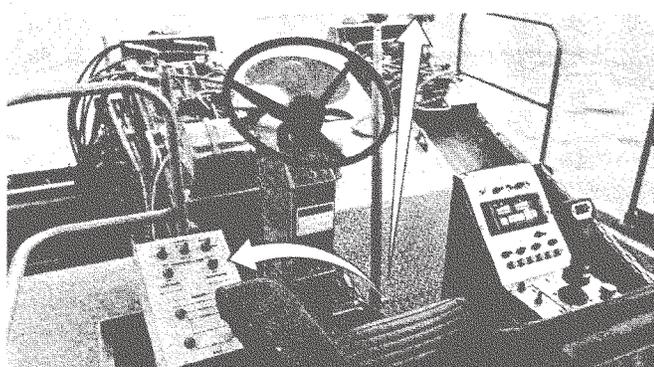
**29. Left Gate Override Pushbutton (Figure 3)**

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

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

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

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



Hopper controls located at both driver seat and right front station.

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

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

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

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

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

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

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

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

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

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

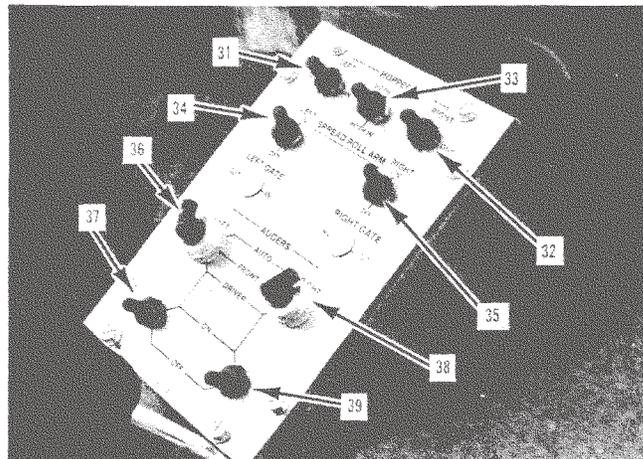
**36. Left Auger Selector (Figure 11)**

In the rearward position, power is supplied to the

driver's "on/off" switch (37) allowing the driver to turn the left auger "on" or "off."

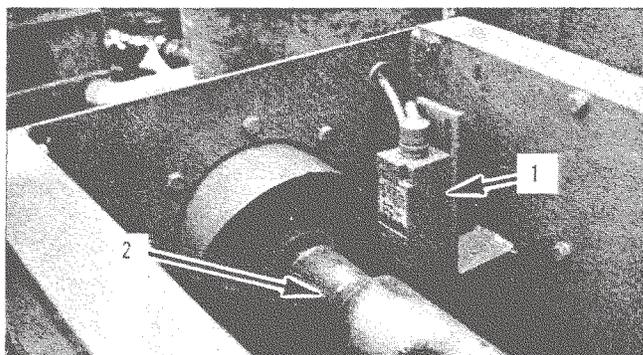
In the center position, power is supplied to the front end man's "on/off" switch allowing the front end man to turn the left auger "on" or "off."

In the forward position, power is supplied to the auto switch located at the outboard end of the left hopper (see Figure 11a). When this switch is tripped by material moving the spring finger, the auger will shut off and conversely when it is untripped by a lack of material, it will start the auger attempting to fill the outer end of the hopper.



**Figure 11. Driver Hopper Controls**

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



**Figure 11a. Auger Auto On/Off Switch**  
1. Switch 2. Auger

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

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

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

In the rearward position, power is supplied to the driver's "on/off" switch (39) allowing the driver to turn the right auger "on" or "off."

In the center position, power is supplied to the front end man's "on/off" switch allowing the front end man to turn the right auger "on" or "off."

In the forward position, power is supplied to the auto spring switch located at the outboard end of the right hopper (See Figure 11a). When this switch is tripped by material moving the spring finger, the auger will shut off and conversely when it is untripped by a lack of material, it will start the auger attempting to fill the outer end of the hopper.

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

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

Items 39 thru 47 are located in the front end man's control box. (Figure 12)

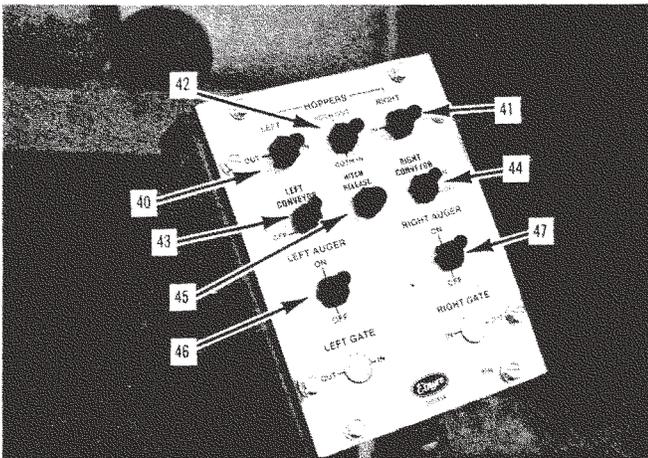


Figure 12. Front End Man Control Panel

- |                          |                              |
|--------------------------|------------------------------|
| 40. Left Hopper Switch   | 44. Right Conveyor Switch    |
| 41. Right Hopper Switch  | 45. Hitch Release Pushbutton |
| 42. Both Hopper Switch   | 46. Left Auger Switch        |
| 43. Left Conveyor Switch | 47. Right Auger Switch       |

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

## WARNING

Unsafe operation of equipment may cause injury.

Read, understand and follow the manuals when operating or performing maintenance.

# OPERATION

## WARNING

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

Remain clear of all moving parts.

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

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

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

## CAUTION

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 engine or operation.

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

Keep loose clothing away from conveyor area when operating conveyors.

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

## IMPORTANT

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 1A, 1B, or 1C 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 1C to spread 25 lb./sq. yd. of  $\frac{3}{8}$ " chips, 22 ft. wide enter from the left of the chart at 25 lb./sq. yd. horizontally to the hopper width being used, 22 ft., read the speed vertically below the intersection to be 285 fpm. Some speed less than this should be used in order to allow some extra capacity for changing trucks.

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

While in chart number 2 note that for  $\frac{3}{8}$ " chips the minimum gate opening should be  $\frac{3}{4}$ ". The speed to be used with  $\frac{3}{4}$ " gate opening is approximately 225 fpm.

The chipspreader can spread 25 lb./sq. yd. of  $\frac{3}{8}$ " chips at any of the following combinations of settings:

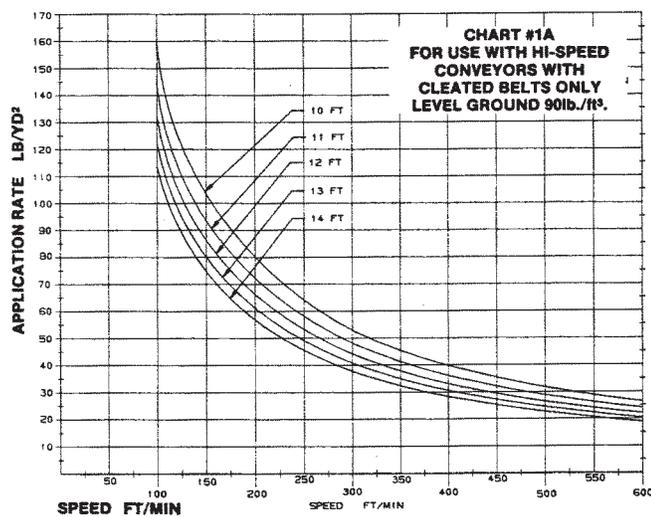
Gate Opening	Speed
$\frac{3}{4}$ "	225 fpm
1"	275 fpm
$1\frac{1}{8}$ "	300 fpm
$1\frac{1}{4}$ "	350 fpm
$1\frac{7}{16}$ "	400 fpm

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.)

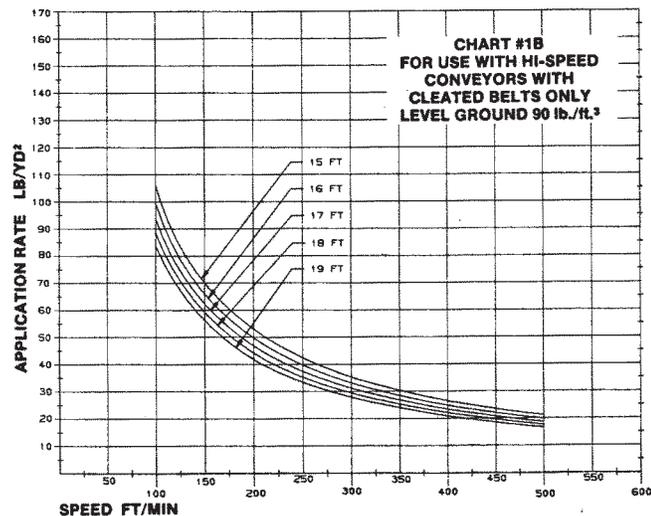
You now have a selection of gate/speed combinations that will all spread 25 lb./sq. yd. of chips that are  $\frac{3}{8}$ ". If you choose a speed greater than 285 fpm,

the conveyors may not be able to transfer the material fast enough resulting in having to stop or slow down occasionally to allow them to catch up. If you choose a speed less than 285 fpm, the conveyors can keep up and the chipperspreader should be able to run continuously providing there is a great enough supply of trucks to supply the required amount of chips.

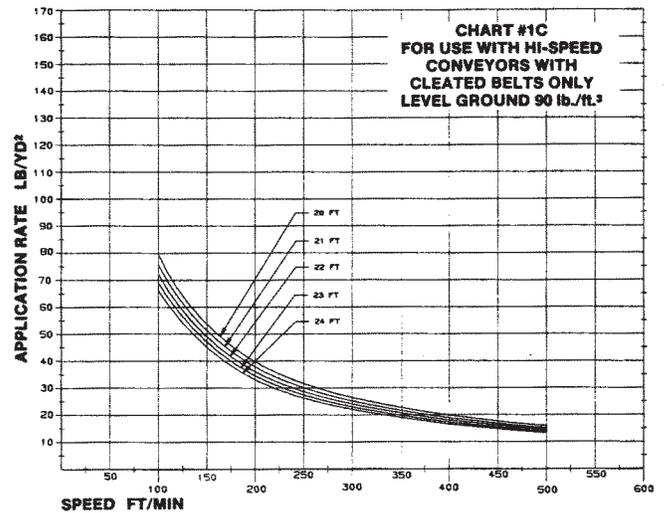
While 275 fpm may appear to be slower than previously used speeds, remember that since the entire road is being covered in a single pass it is really the equivalent of a non-variable hoppers machine chipping in excess of 550 fpm since it does not have to return for a second pass.



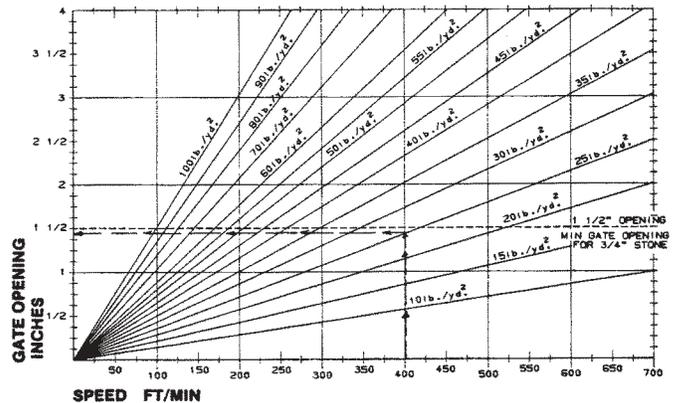
**CHART #1A**  
10 - 14 ft Spread Width



**CHART #1B**  
15 - 19 ft Spread Width



**CHART #1C**  
20 - 24 ft Spread Width



**Chart 2. GATE OPENING**

**NOTES:**

- 1) MINIMUM GATE OPENING SHOULD BE APPROXIMATELY 2X STONE OR GREATER.
- 2) SPEED VS GATE OPENING BASED ON AGGREGATE WEIGHT OF 2400 lb./yd<sup>2</sup>.

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

To start spreading at this combination:

1. Turn ignition key to "on."
2. Retard throttle to "low idle."
3. Place control handle in "neutral."
4. Turn ignition key to "start."

5. Check engine oil pressure and coolant temperature after display has made its initial self-check. Allow the engine to reach normal operating temperature before placing any significant load on the engine.

6. Run engine at governed speed. Normal operation of the chipperspreader is at full governed rpm.

## WARNING

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

7. Select speed range appropriate to the desired working speed. In this case “lo” for maximum torque and best controllability.

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

9. Depress the override pedal fully.

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

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

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

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

14. Stopping:

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

1. Center the gate/spread roll switch (Ref. 8, Figure 3) upon reaching the end of the newly chipped surface.

2. Depress the override pedal smoothly to the fully depressed position.

3. Return the control handle to “neutral”.

4. Release the override pedal.

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

1. Depress the override pedal smoothly to the fully depressed position.

2. Center the gate/spread roll switch.

3. Return the control handle to “neutral”.

4. Release the override pedal.

15. To back up from this stopped position:

1. Switch auto manual selector to “manual”. (Ref. 2, Figure 3)

2. Move handle out of neutral to the rear—the more rearward the handle is moved, the faster the machine will back up.

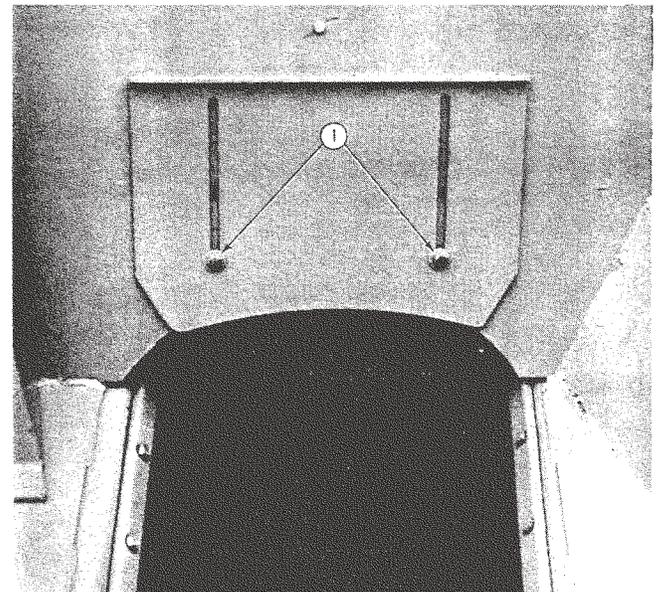
3. To slow and stop the machine smoothly, bring the handle toward and into neutral.

Should a piece of foreign material become lodged in the gates, push the override pushbutton (Ref. 29 or 33, Figure 3) to open the appropriate gate above the set point to allow the piece to pass. Releasing the override will return the gates to the previously set position. **Never put hand in between gate and spread roll or gate and rear of hopper to clear obstruction. The gate could move at any time and cause severe injury.**

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

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

Rear conveyor gates should be adjusted to feed material approximately equal to or slightly more than the rate at which material is being spread. Since the machine is equipped with conveyor belt speed controls, these gates should be set to deliver as much material as possible into the conveyor without spillage and then the conveyor speed should be adjusted to deliver the required amount to the front hopper. (Figure 13)

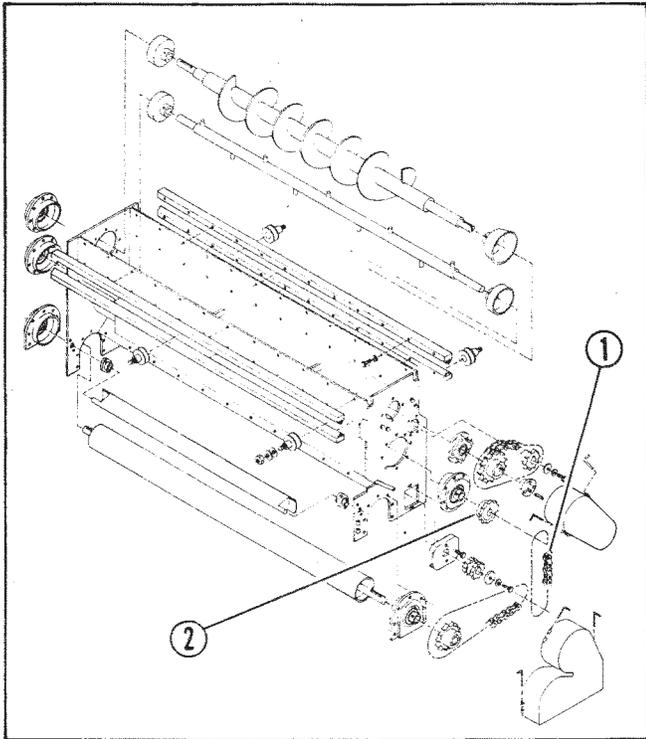


**Figure 13. Rear Conveyor Gate**  
1. Adjustment Bolt

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

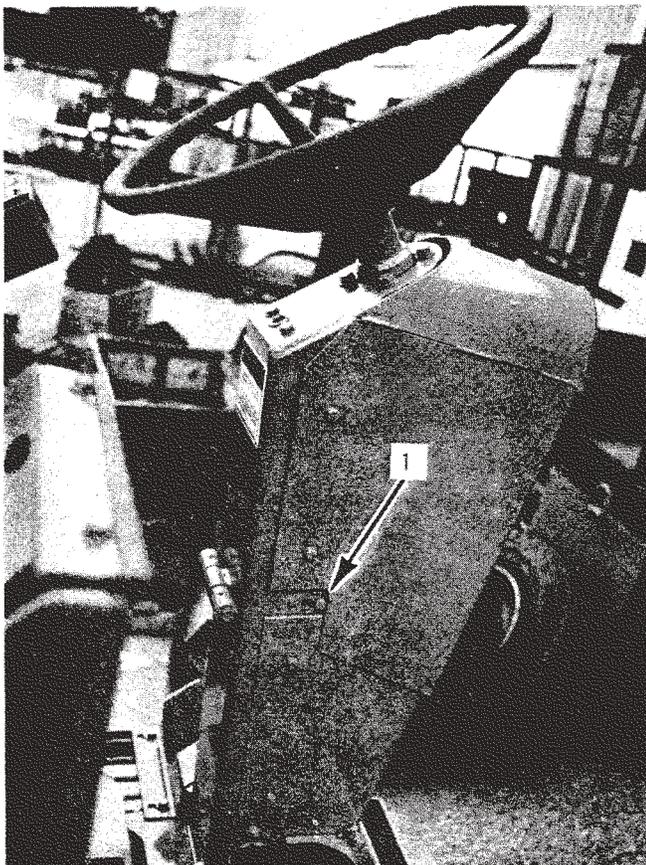
## Control Box

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



**Figure 14.**

- 1. Agitator Drive Chain
- 2. Agitator Drive Sprocket



**Figure 15. Tilt Wheel**

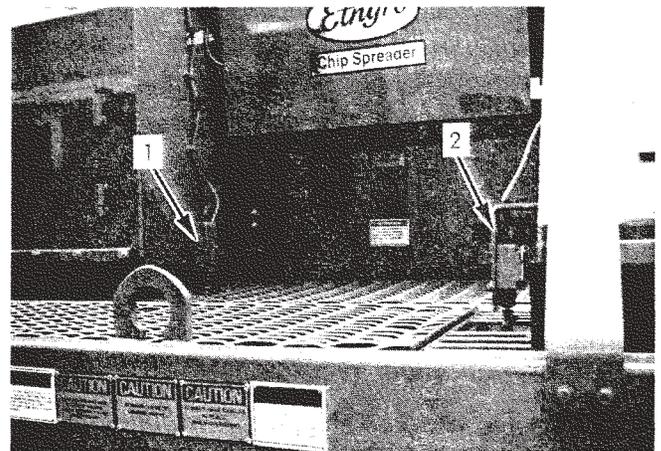
- 1. Tilt wheel adjustment bolts (one on each side of steering column).

## Tilt Wheel

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

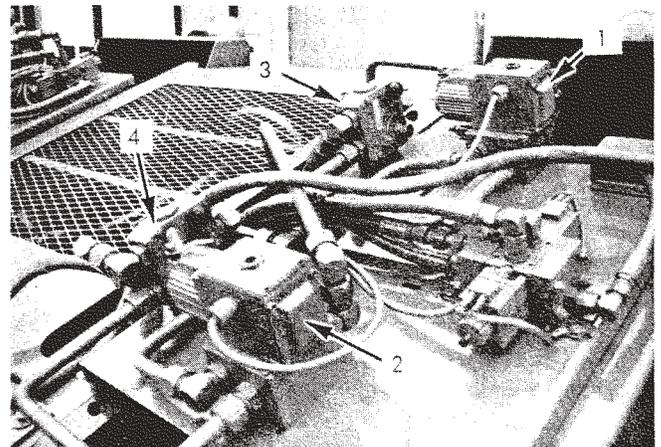
## Automatic Conveyor Control (Figure 9)

In the forward position power is supplied to the auto paddle switch mounted below and along the inboard side of the conveyor hood. When this switch is tripped by material moving the paddle, the conveyor will shut "off" and conversely when it is untripped by lack of material it will start the conveyor, attempting to fill the hopper. (Figure 16)



**Figure 16. Conveyor Paddle Switches**

- 1. Right Paddle Switch
- 2. Left Paddle Switch



**Figure 17. Belt Speed Controls**

- 1. Rt. Conveyor Solenoid Valve
- 2. Lt. Conveyor Solenoid Valve
- 3. Rt. Speed Control Valve
- 4. Lt. Speed Control Valve

## Belt Speed Controls (Figure 17)

This feature allows the operator located on the right catwalk to vary the speed of each conveyor independently to provide a uniform distribution of material to the front hopper. Valves for this operation

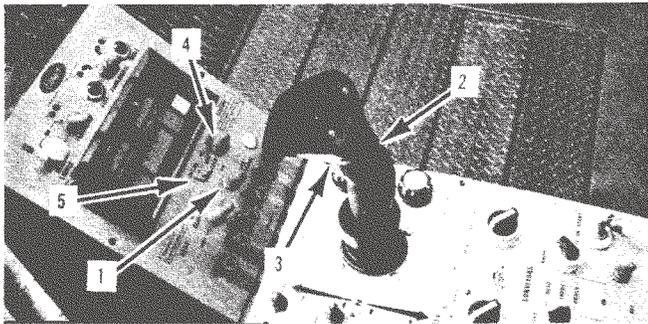
are incorporated in the panel on top of the right conveyor, inboard of each conveyor's solenoid valve. Each valve has a lever with a knob and a locking screw.

With the lever in the full clockwise position, the conveyor will run at its highest speed. Rotating the lever 90 degrees counter-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 17)

### Horn (Figure 18)

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

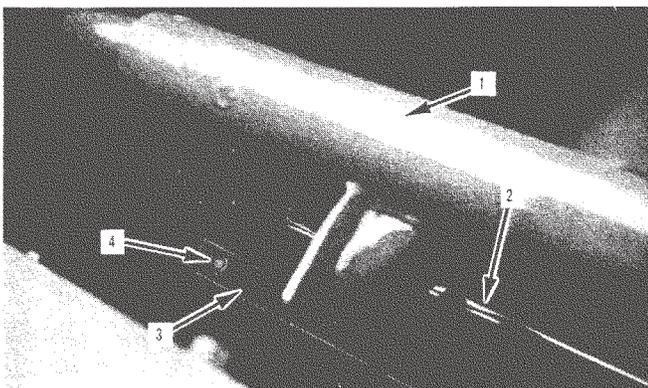


**Figure 18. Control Panel**

- |                                   |  |
|-----------------------------------|--|
| 1. Gate Override                  | 3. Horn Trigger                        |
| 2. Speed/Direction Control Handle | 4. Rear Differential Lock Switch       |
|                                   | 5. Front/Rear Differential Lock Switch |

### Backup Alarm

The electric backup alarm is automatically actuated when the speed/direction control handle (Ref. 2, Figure 18) is pulled to the rear of neutral.



**Figure 19. Spread Roll Wear Plate**  
(View from top of hopper, looking down)

- |             |                           |
|-------------|---------------------------|
| 1. Auger    | 3. Spread Roll Wear Plate |
| 2. Agitator | 4. Adjustment Bolts       |

## Optional Equipment

### Rear Differential Lock (Positraction) (Ref. 4, Figure 18)

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

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

### Front/Rear Differential Lock (Positraction) (Ref. 5, Figure 18)

An electrically controlled flow divider valve is operated by a toggle switch on the control panel. When the switch is "on", the difference in rotational speed between the front wheels and the rear wheels cannot exceed 10%. This action is exactly like the limited slip in a full time four wheel drive vehicle.

This feature is only operable in "lo" range and is automatically switched off in "2nd" and "travel" ranges.

### Electro-hydraulic Powered Seat Assembly

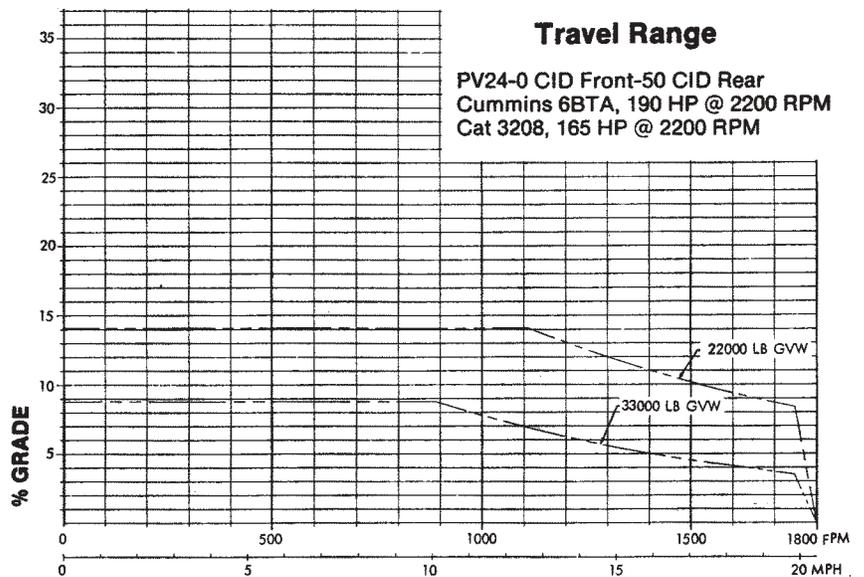
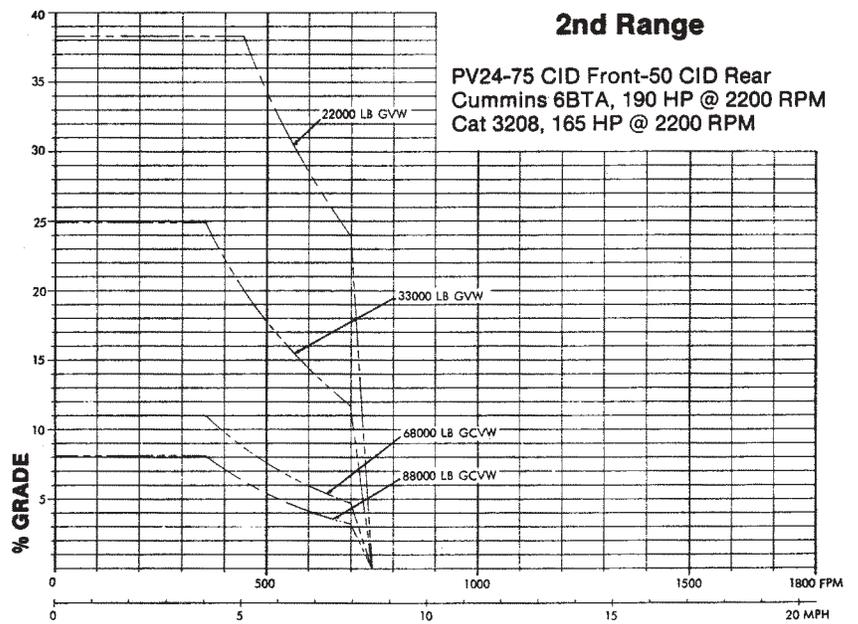
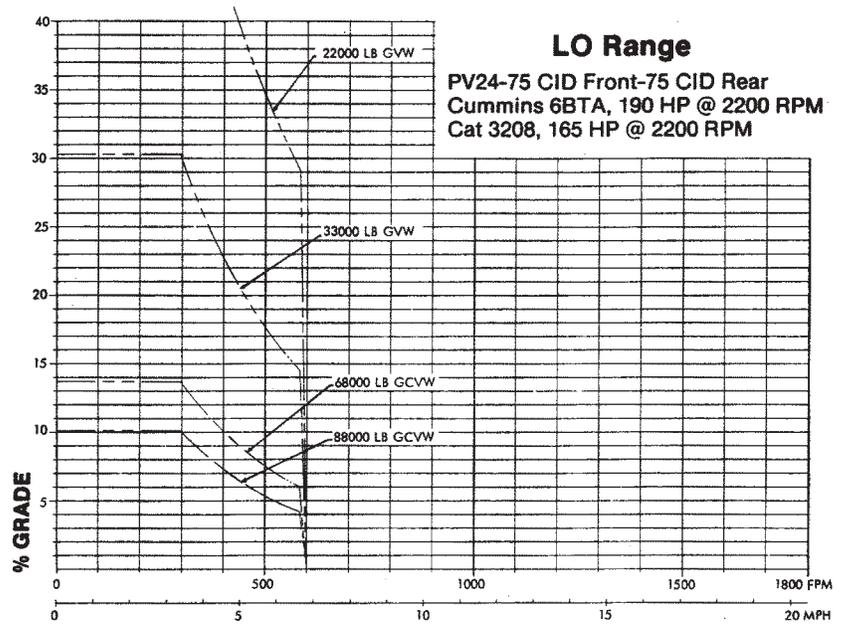
An electrically controlled hydraulically powered chain drive is operated by a spring centered toggle switch (Figure 7 Ref. 15). The seat has a manually operated lock pin securing the seat either full left or right travel. The lock pin must be released and locked in the up position before using the electric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

#### **WARNING**

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

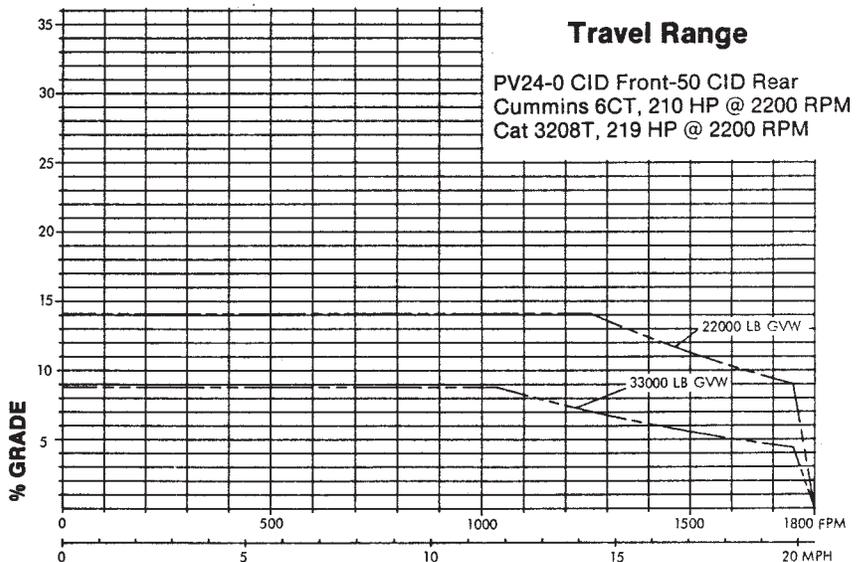
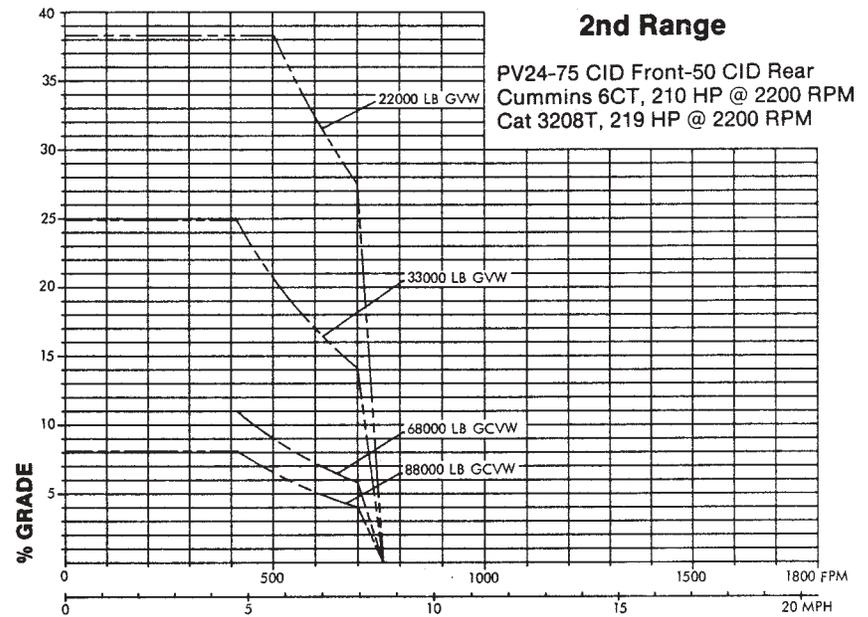
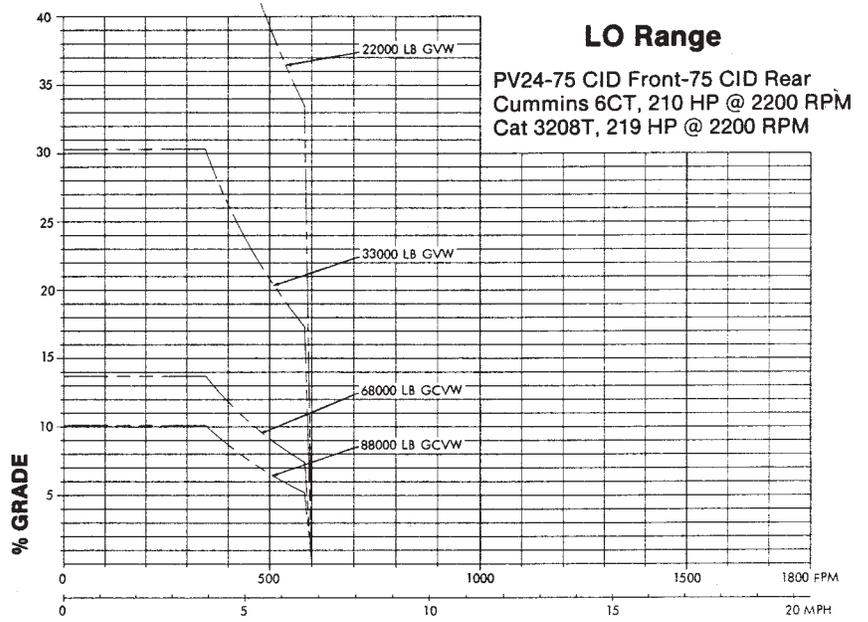
**OPERATING RANGES**  
**For 4WD ChipSpreader with**  
**190 HP Cummins 6BTA Engine**  
**165 HP Cat 3208 Engine**

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



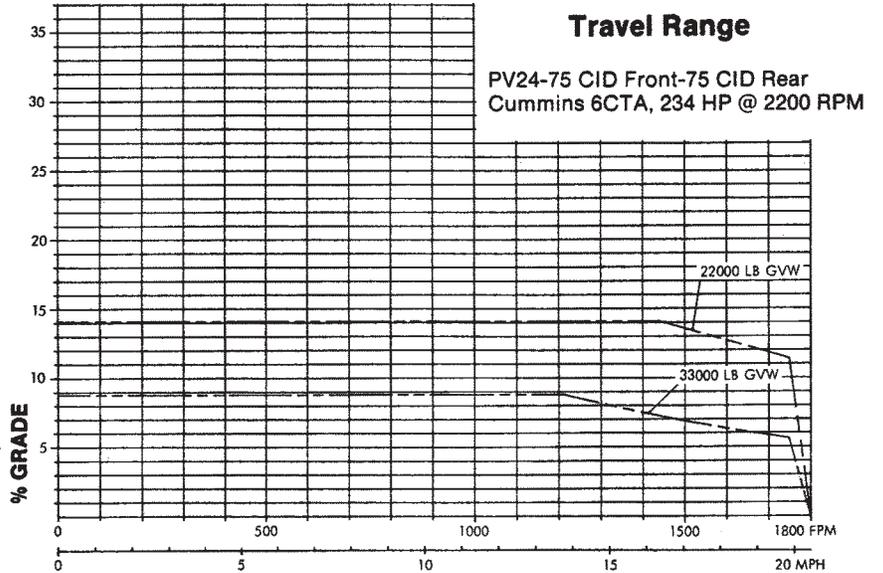
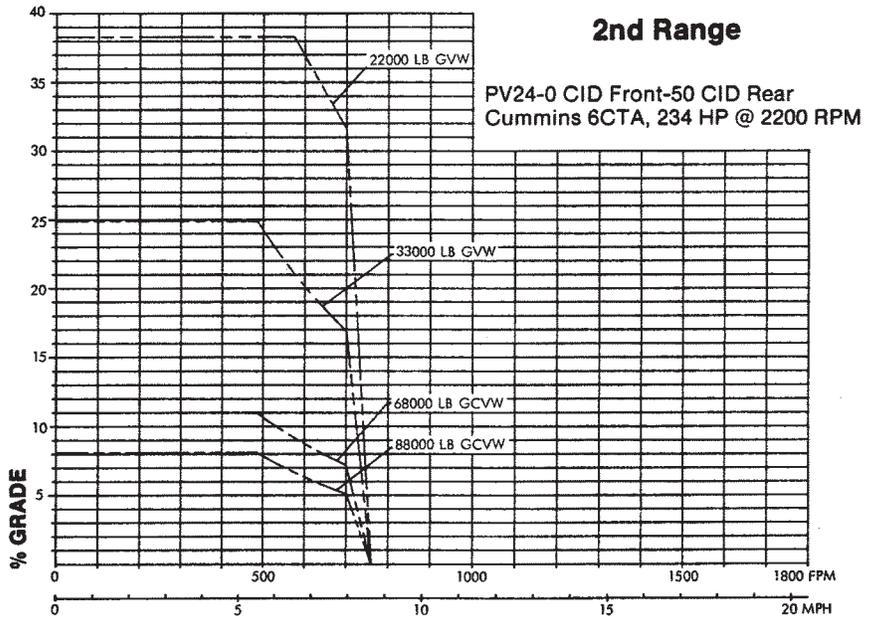
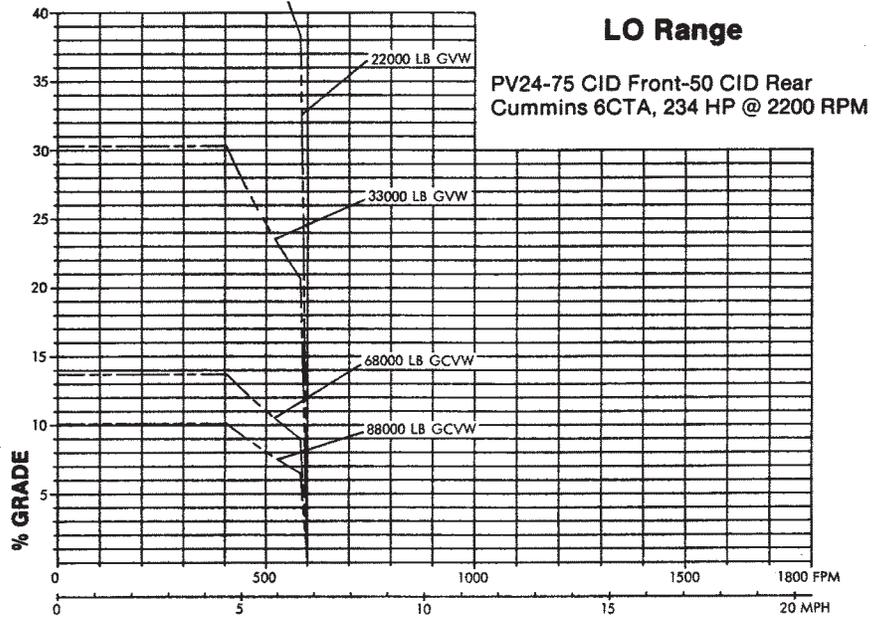
**OPERATING RANGES**  
**For 4WD ChipSpreader with**  
**210 HP Cummins 6CT Engine**  
**219 HP 3208T Cat Engine**

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



**OPERATING RANGES**  
**For 4WD 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.

### Rear Hopper Flow Gate Adjustment (Figure 13)

Turn spread roll and conveyors "off".

1. Loosen flow gate retaining bolts.
2. Raise gate to increase conveyor flow to front hopper.
3. Lower gate to decrease conveyor flow to the front hopper.
4. Retighten flow gate retaining bolts.

### Hopper Spread Roll Wear Plate Adjustment (Figure 19)

Turn spread roll and conveyors "off".

1. Loosen all spread roll wear plate hold down bolts and adjust the wear plate until a nominal  $1/16$ " clearance exists between the wear plate and the spread roll for the entire hopper width.
2. Retighten all the hold down bolts.
3. When one side of a plate has worn away it is possible to turn the plate over and use the opposite side.

### Hopper Gate Wear Plate Adjustment (Figure 20)

Turn spread roll and conveyors "off".

1. Loosen wear plate hold down bolts and extend the plate  $1/32$ " 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.

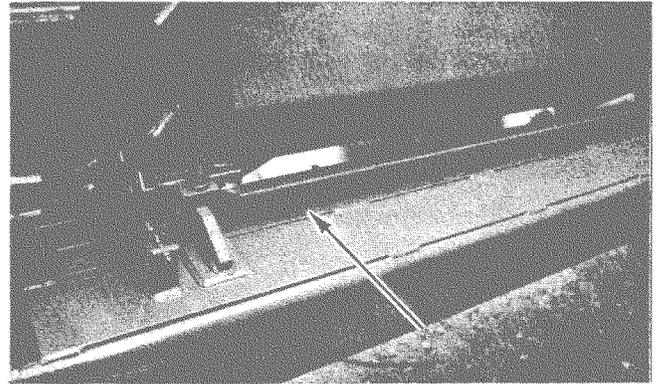


Figure 20. Hopper Gate Wear Plate

### Conveyor Belt Adjustment

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

## **⚠ WARNING**

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

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

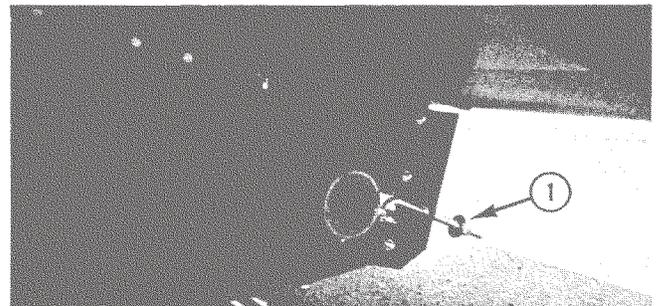


Figure 21. Conveyor Tail Pulley

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

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.**

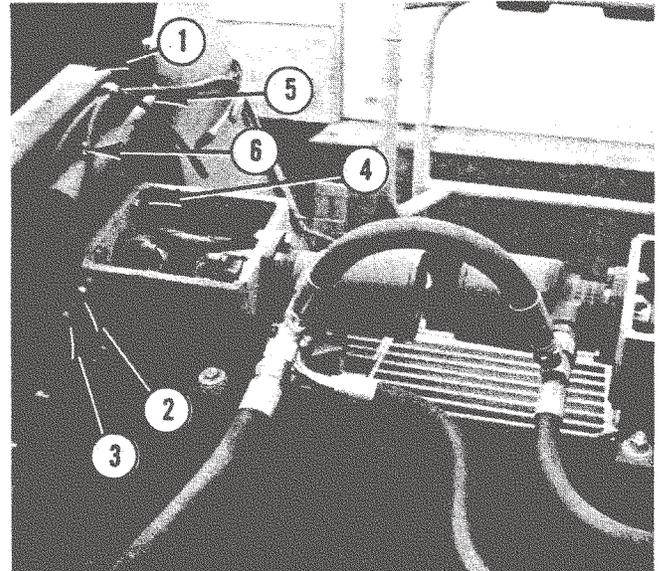
d) If belt runs to the right side of the conveyor, tighten the adjusting screws until the belt is centered on the head pulley.

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.



**Figure 22. Conveyor Head Pulley Adjustment**

- |                    |                               |
|--------------------|-------------------------------|
| 1. Left Conveyor   | 4. Bearing Bolts              |
| 2. Jam Nut         | 5. Hood Adjustment            |
| 3. Adjusting Screw | 6. Hood Adjustment Set Screws |

**WARNING**

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

**CAUTION**

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

## 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.

**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.**

## 1. Left Hopper Spread Roll Relief Valve (Figure 23)

- a) With engine off, remove hose (1) and install a 3000 psi gage with necessary adapters to hook to  $\frac{3}{4}$ " quick coupler (Ref. 2, Figure 23).
- b) Start the engine and run at governed speed (2300 RPM).
- c) Use the manual override to actuate the valve (Ref. 3, Figure 23).
- d) Loosen locknut and using allen wrench set pressure to 2000 psi and retighten locknut.
- e) 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.

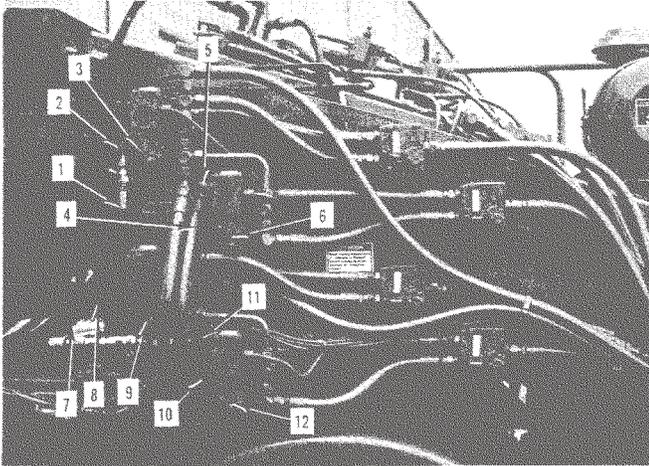


Figure 23. Side Valve Plate

- |  |                                     |
|--|-------------------------------------|
| 1. Hose                                    | 7. Hose                             |
| 2. Quick Coupler                           | 8. Quick Coupler                    |
| 3. Manual Override Lever - Rt. Spread Roll | 9. Left Auger Manual Override Lever |
| 4. Hose                                    | 10. Hose                            |
| 5. $\frac{3}{4}$ JIC Elbow                 | 11. $\frac{3}{4}$ JIC Elbow         |
| 6. Left Spread Roll Manual Override Lever  | 12. Rt. Auger Manual Override Lever |

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

- a) With engine off, remove hose (4) and install a 3000 psi gage with necessary adapters to hook to  $\frac{3}{4}$ " male JIC (Ref. 5, Figure 23).
- b) Start the engine and run at governed speed (2300 RPM).
- c) Use the manual override to actuate the valve (Ref. 6, Figure 23).
- d) Loosen locknut and using allen wrench set pressure to 2000 psi and retighten locknut.
- e) 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.

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

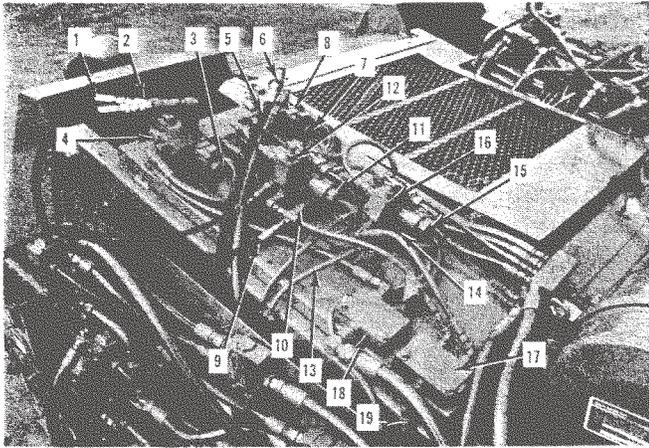
- a) With the engine off, disconnect hose (7) at quick coupler and install a 3000 psi gage with necessary adapters to hook to  $\frac{3}{4}$ " quick coupler (Ref. 8, Figure 23).
- b) Start the engine and run at governed speed (2300 RPM).
- c) Use the manual override to activate the valve (Ref. 9, Figure 23).
- d) Loosen locknut and using allen wrench set pressure to 2000 psi and retighten locknut.
- e) If relief pressure cannot be obtained, shut down the engine and remove auger relief valve cartridge and check for contamination. Clean or replace as necessary.

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

- a) With the engine off, disconnect hose (10) at quick coupler and install a 3000 psi gage with necessary adapters to hook to  $\frac{3}{4}$ " male JIC (Ref. 11, Figure 23).
- b) Start the engine and run at governed speed (2300 RPM).
- c) Use the manual override to activate the valve (Ref. 12, Figure 23).
- d) Loosen locknut and using allen wrench set pressure to 2000 psi and retighten locknut.
- e) If relief pressure cannot be obtained, shut down the engine and remove auger relief valve cartridge and check for contamination. Clean or replace as necessary.

## 5. Left Hopper Positioning Relief Valve (Figure 24)

- a) With engine off, disconnect hose (1) at quick coupler and install a 3000 psi gage with necessary adapters to hook to  $\frac{1}{2}$ " quick coupler (Ref. 2, Figure 24).
- b) Start the engine and run at governed speed (2300 RPM).
- c) Use the manual override to actuate the valve (Ref. 3, Figure 24).
- d) Using allen wrench set relief valve pressure to 2000 psi (Ref. 4, Figure 24).
- e) 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.



**Figure 24. Upper Valve Plate ASM**

- |                    |                     |                            |
|--------------------|---------------------|----------------------------|
| 1. Hose            | 8. Relief Valve     | 15. Manual Override        |
| 2. Quick Coupler   | 9. Hose             | 16. Relief Valve           |
| 3. Manual Override | 10. Quick Coupler   | 17. Rear Splitter Valve    |
| 4. Relief Valve    | 11. Manual Override | 18. Forward Splitter Valve |
| 5. Hose            | 12. Relief Valve    | 19. Hose                   |
| 6. Quick Coupler   | 13. Hose            |                            |
| 7. Manual Override | 14. ¼ Pipe          |                            |

## 6. Right Hopper Positioning Relief Valve (Figure 24)

a) With engine off, disconnect hose (5) at quick coupler and install a 3000 psi gage with necessary adapters to hook to ½" quick coupler (Ref. 6, Figure 24).

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

c) Use the manual override to actuate the valve (Ref. 7, Figure 24).

d) Using allen wrench set relief valve pressure to 2000 psi (Ref. 8, Figure 24).

e) 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.

## 7. Left Hopper Gate Relief Valve (Figure 24)

a) With the engine off, disconnect hose (9) at quick coupler and install a 3000 psi gage with necessary adapters to hook to ¼" quick coupler (Ref. 10, Figure 24). Disconnect the electrical connectors from the valve.

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

c) Use the manual override to actuate the valve (Ref. 11, Figure 24).

d) Loosen locknut and using hex wrench set relief valve pressure to 1000 psi and retighten locknut (Ref. 12, Figure 24).

e) 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.

f) Reconnect the electrical connectors.

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

a) With the engine off, disconnect hose (13) at quick coupler and install a 3000 psi gage with necessary adapters to hook to ¼" pipe (Ref. 14, Figure 24). Disconnect the electrical connectors from the valve.

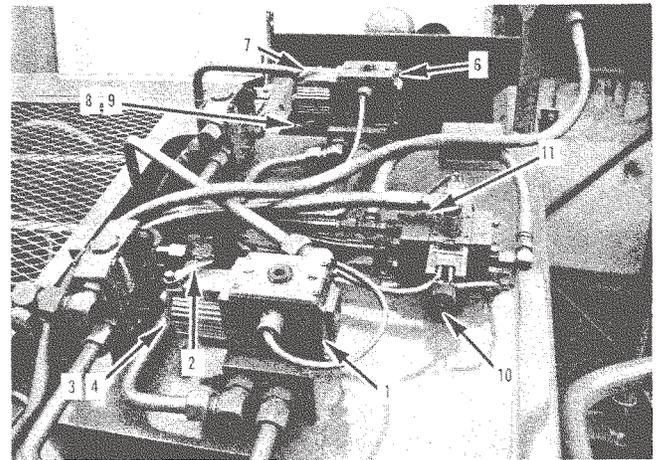
b) Start the engine and run at governed speed (2300 RPM).

c) Use the manual override to activate the valve (Ref. 15, Figure 24).

d) Loosen locknut and using hex wrench set pressure to 1000 psi and retighten locknut (Ref. 16, Figure 24).

e) 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.

f) Reconnect the electrical connectors.



**Figure 25. Conveyor Control**

- |                                |                                |
|--------------------------------|--------------------------------|
| 1. Lt. Conveyor Valve          | 7. Manual Override - Rt. Conv. |
| 2. Manual Override - Lt. Conv. | 8. Locknut                     |
| 3. Locknut                     | 9. Relief Set Location         |
| 4. Relief Set Location         | 10. Manual Override Button     |
| 5. Rt. Conveyor Valve          | 11. Cartridge Adjust Point     |

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

a) With engine off remove cap (2) (Figure 26, Ref. 2) and install a 3000 psi gage with 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. (Figure 27). **Use caution when doing this operation. Be sure wrench is securely positioned on U-joint & rotated by hand against supporting steel so it cannot rotate further.**

c) The engine should be run at governed speed (approximately 2300 RPM).

d) Use the manual override to actuate the valve (Figure 25, Ref. 2).

e) This relief should be set at 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.

### 10. Right Conveyor Relief Valve (Figure 25, Ref. 9)

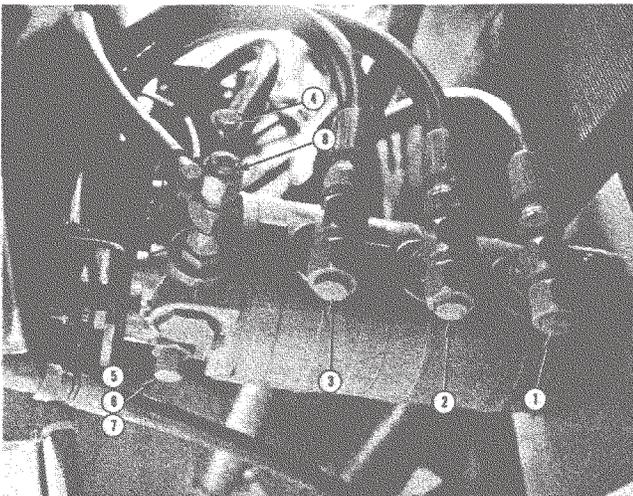
a) With engine off, remove cap (3) and proceed the same as the left conveyor.

### 11. Powered Seat Relief Valve (Figure 25)

a) With the engine off remove cap (8) (Figure 26) and install a 3000 psi gage with necessary adapters to hook to 1/2" JIC (08 MJ) male fitting.

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

c) Use the manual override button to actuate the valve (Figure 25, Ref. 10).

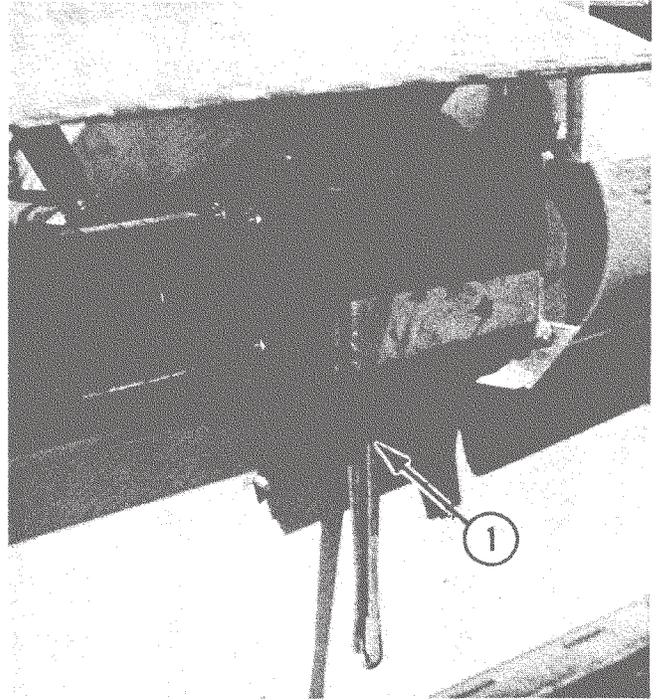


**Figure 26. Front Hydraulic Pump**

- |                           |  |
|---------------------------|--|
| 1. Cap (1) Spread Roll    | 5. Cap (5) Secondary Power Steering Relief |
| 2. Cap (2) Lt. Conveyor   | 6. Locknut (6)                             |
| 3. Cap (3) Rt. Conveyor   | 7. Power Steering Relief Valve             |
| 4. Cap (4) Power Steering | 8. Cap (8) Power Gate/Seat                 |

d) Use an allen wrench to adjust the cartridge. This relief valve should be set to 1900 psi. (Figure 25, Ref. 11).

e) 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.



**Figure 27. Lock Left Conveyor Head Pulley**  
1. Large Pipe Wrench Secure Against Unit Frame

### **CAUTION**

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

### 12. Power Steering Relief Valve (At Hydraulic Control Assembly) (Figure 28, Ref. 5)

a) With engine "off", remove cap (4) on pump (Figure 26) and install a 3000 psi gage with necessary adapters to hook up to a 1/2" JIC (08 MJ) male fitting.

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

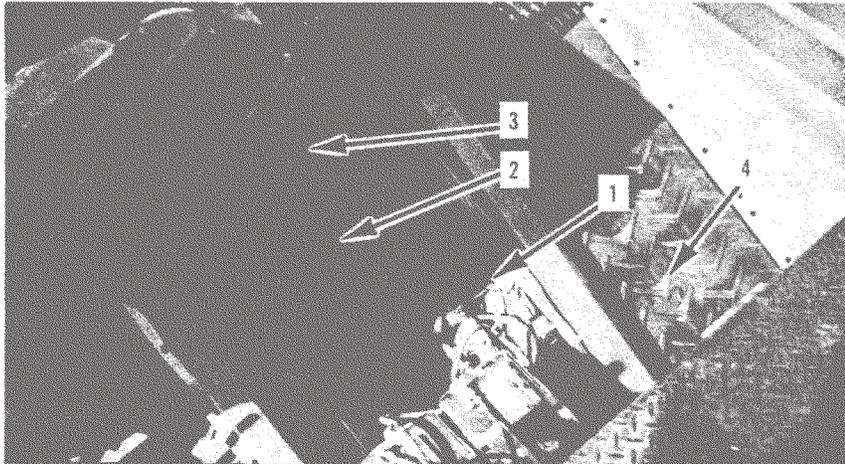
c) Turn the front wheels full left or right until the cylinder is fully stroked.

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 (Figure 26) remove cap (5), loosen locknut (6) and adjust relief valve (7) to 2000 psi (Figure 26) while holding the wheels full left or right.

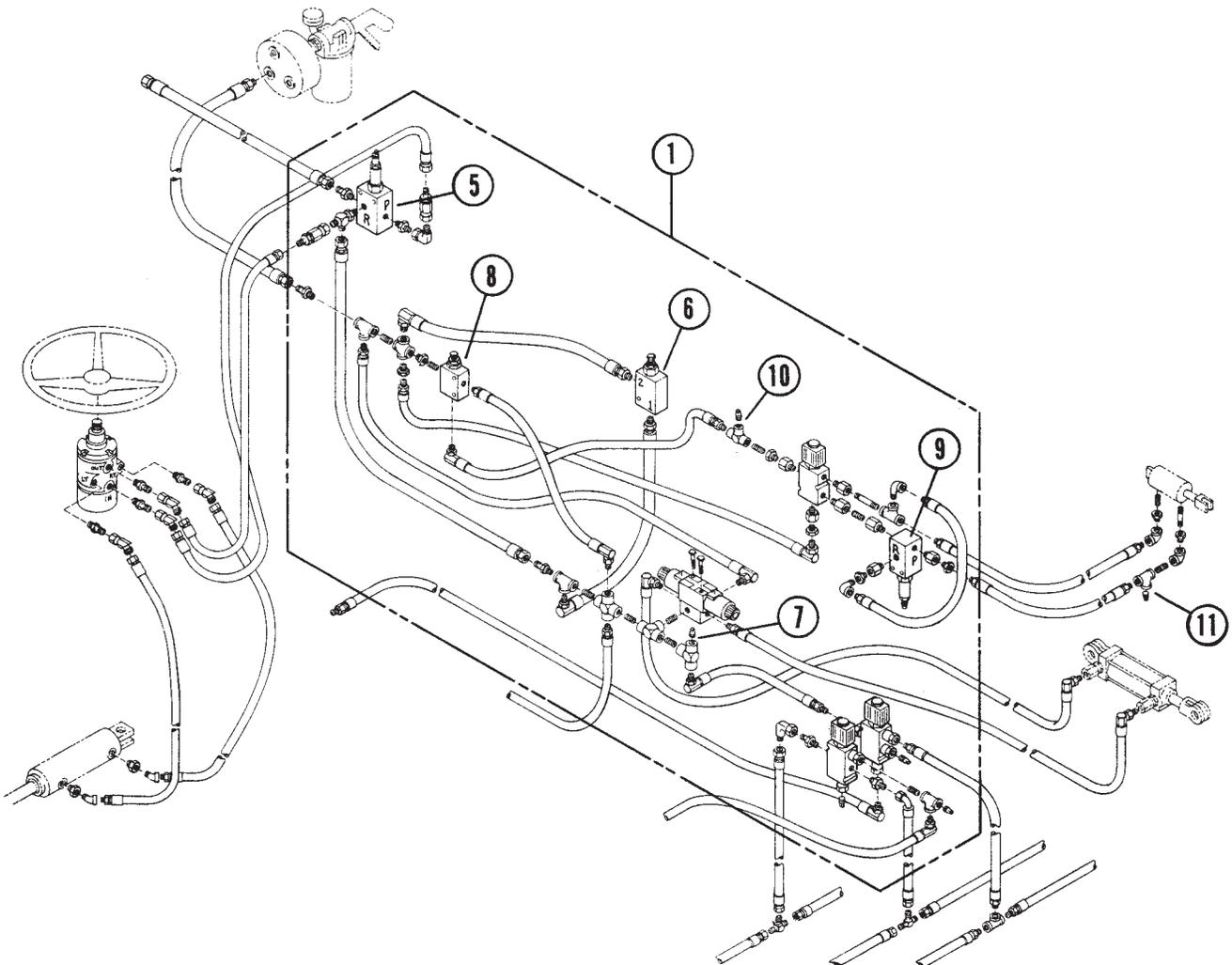
f) Return to the relief valve at the hydraulic control assembly and repeat steps 12b, c and d.

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.



**Figure 28.**  
**Hydraulic Control Assembly,**  
**4 Wheel Drive**

1. Hydraulic Control Assembly
2. Hydrostatic Pump
3. Engine
4. Right Conveyor
5. Power Steering Relief Valve
6. Hydraulic Control Pressure Relief Valve
7. Control Pressure Check Port
8. Hitch Pressure Reducing Valve
9. Hitch Pressure Relief Valve
10. Hitch Pressure Check Port
11. Hitch Pressure Relief Check Port



### 13. Hydraulic Control Pressure Relief (Figure 28, Ref. 6)

- a) With the engine off, remove pipe plug (7) 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 (Figure 28, Ref. 6).
- d) Shut engine down, remove 3000 psi gage, and install 1000 psi gage.
- e) Restart engine and run at or above 950 RPM.
- f) Adjust relief valve to 400 psi and retighten locknut.
- g) If relief pressure cannot be obtained, shut down the engine and remove the control pressure relief valve cartridge and check for contamination or damaged cartridge pieces. Clean or replace as necessary.

### 14. Hitch Release Pressure Reducing Valve (Figure 28, Ref. 8)

#### Hitch Relief Valve (Figure 28, Ref. 9)

- a) With the engine off, remove pipe plug (Ref. 10) 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 (Figure 28, Ref. 8).
- d) Shut engine down, remove pipe plug (Ref. 11) 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 (Figure 28, Ref. 9); 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 400 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.

### 15. Rear Pump Built in Relief Valve (Figure 29, Ref. 4)

- a) With engine "off", remove hose (Figure 24, Ref. 29) from rear splitter valve (Figure 24, Ref. 17) and install a 3000 psi gage in the hose with

necessary adapters to hook up to a 1/2" JIC (08 FJ) female fitting.

- b) Plug the valve body.
- c) The engine must be run at or above 950 RPM.
- d) Set the relief valve pressure to 2000 psi.
- e) If relief pressure cannot be obtained, shut down the engine, remove the cartridge and check for contamination or damaged cartridge pieces. Clean or replace as necessary.

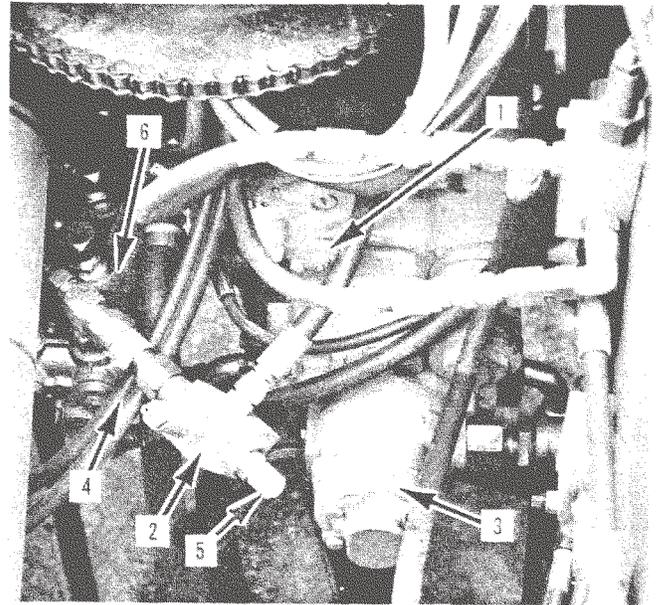


Figure 29. Rear Pump

- |                          |  |
|--------------------------|--|
| 1. Null Adjuster         | 4. Built in Relief Valve (hidden by hoses in this view, located on right side of pump near bottom) |
| 2. External Relief Valve | 5. Cap   |
| 3. Hydrostatic Pump      | 6. Rear Pump   |

### 16. Rear Pump External Relief Valve (Figure 29, Ref. 2)

- a) With engine "off", remove cap (5) on external relief valve (Figure 29) and install a 3000 psi gage with necessary adapters to hook up to a 1/2" JIC (08 MJ) male fitting.
- b) Disconnect the input hose to the forward splitter valve (Figure 24, Ref. 18), plug the valve body and cap the hose.
- c) The engine must be run at governed RPM.
- d) Set the relief valve pressure to 2150 psi.
- e) If relief pressure cannot be obtained, shut down the engine, remove the cartridge and check for contamination or damaged cartridge pieces. Clean or replace as necessary.

## Hydrostatic System Startup

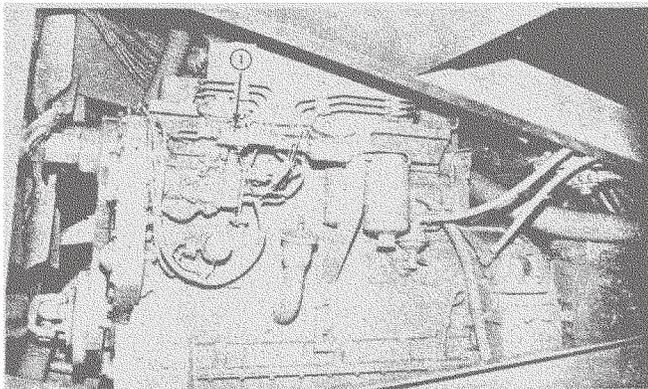
After any work has been done on the hydrostatic ground drive system which involved opening up the circuit in any way, the following startup procedure should be used.

### **WARNING**

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

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

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



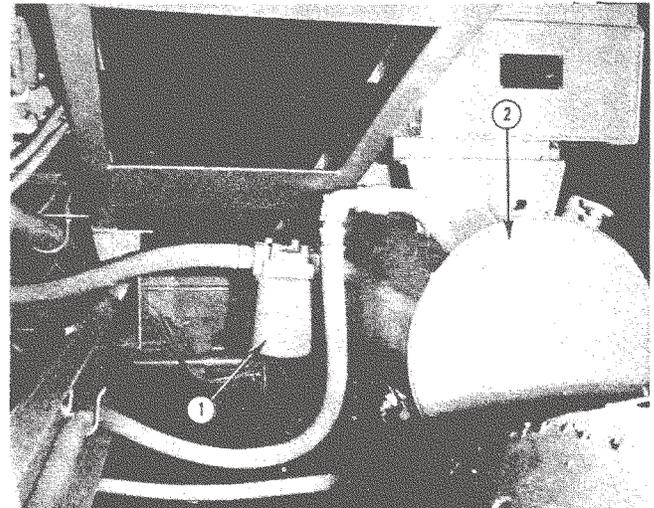
**Figure 30. Engine - Left Side**  
1. Fuel Solenoid

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. (Figure 31, Ref. 1)
6. Remove cap on tee on high side drain hose on pump and fill pump case with hydraulic oil. If a fill tank is used to supply oil, it should be positioned higher than the hydraulic tanks. If this is done, the entire system can be filled from this one location.
7. Turn ignition key "on" and retard throttle to idle. Turn key to "start" and crank engine with starter until seeing at least 40 to 60 psi on the charge pressure gage. **Do not crank for more than 30 seconds.** Wait at least 2 minutes before cranking again. If no pressure reading can be obtained after 2

or 3 attempts, the starter may not be cranking the engine fast enough to develop charge pressure.

8. Hook up fuel solenoid valve.

9. Turn ignition key to "start" and release, letting engine run at idle. Observe the charge pressure for a reading within 30 seconds. Once a reading is seen, allow the engine to idle for about 10 minutes. During filling of all lines and components, the charge pressure can surge between 50 and 500 psi. As the system fills, surging will decrease and the charge pressure should settle down to a steady reading between 150 and 300 psi.



**Figure 31. Suction Filters**

1. Suction Filters                      2. Hydraulic Reservoir

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

a) Loosen the null adjust locknut.

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

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

12. Run the engine at 1000 to 1200 RPM. Charge pressure should be 200 to 300 psi and steady. Case

pressure should be 15 to 30 psi. Return engine to idle and shut it down. Check the pressure by inserting a 100 psi gauge with adaptor at the port provided as shown in Figure 41.

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

14. Check for debris under 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 16 with the engine at full RPM. At any sign of unsteadiness in the charge pressure, shut the engine down immediately and check for problems in the suction part of the system, such as clogged filter, leaks or blockage.

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

### Variable Hopper Gate Adjustment

1. Place the auto/park/manual selector in "Park"
2. Disconnect the red wire from each solenoid of both gate valves.
3. Start the engine and run it at about 1000 rpm.

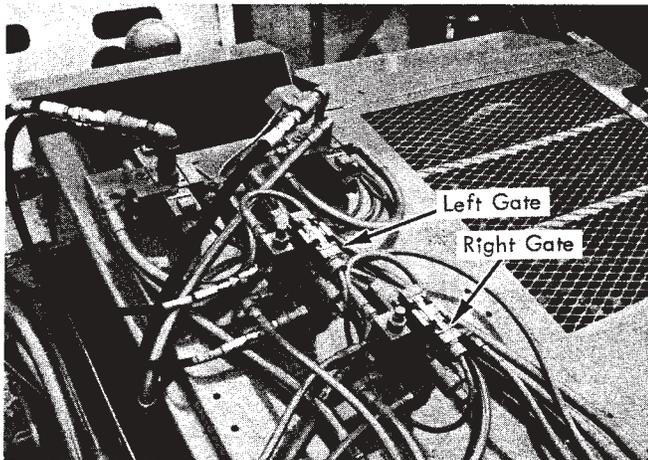


Figure 32. Gate Solenoids

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

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

6. Reconnect the red wire to each solenoid of the gate valves.

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

8. Check the resistance across sockets 5 & 6. The value should be nominally 18K ohms  $\pm$  3K with the pedal up and 0 to 10 ohms with the pedal fully depressed. This is the right gate circuit. Check the resistance across sockets 8 & 9. This value should also be nominally 18K ohms  $\pm$  3K with the pedal up and 0 to 10 ohms with the pedal fully depressed. This is the left gate circuit. Also check the resistance across sockets 3 & 4. This value should also nominally be 18K ohms  $\pm$  3K with the pedal up and 0 to 10 ohms with the pedal fully depressed. This is a part of the auto speed circuit. 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 3, remove the or/b wire that goes forward from terminal 2 and remove the or wire that goes forward from terminal 1. Check the resistance across the or and or/b wires. This value should be between 930 and 1100 ohms. Check the resistance across the or/b and or/g wires, it must be less than 20 ohms. If it measures within this range, reconnect the wires to their respective terminals. Remove the g/w wire that goes forward from terminal 4, remove the b/w wire that goes forward from terminal 5 and remove the r/b/w wire that goes forward from terminal 6. Check the resistance across the r/b/w and b/w wires. This value should be between 930 and 1100 ohms. Check the resistance across the b/w and the g/w wires, it must be less than 20 ohms. If it measures within this range, reconnect the wires to their respective terminals.

*Remove floor plate to the right of the seat pivot and open the junction box. Remove the or/g wire that goes forward from terminal 3, remove the or/b wire that goes forward from terminal 2 and remove the or wire that goes forward from terminal 1. Check the resistance across the or and or/b wires. This value should be between 930 and 1100 ohms. Check the resistance across the or/b and or/g wires, it must be less than 20 ohms. If it measures within this range, reconnect the wires to their respective terminals.*

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

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

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

- Filter-full counterclockwise +11 turns
- Close-full counterclockwise +11½ turns
- Open-full counterclockwise +8¼ turns
- Sensitivity-full counterclockwise +5 turns
- Override-full counterclockwise +19 turns

It should not be necessary to verify these initial positions, the adjustment procedure is normally started from these positions. If it is necessary to

+ 01 - .05 VDC

check these the pot should be rotated in the counter-clockwise 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 values measured across the or and or/b wires and the r/b/w and b/w wires in step 8 above were within the acceptable range, skip steps 11 through 14 and proceed directly to step 15.

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

12. Open the transducer cover on each hopper.

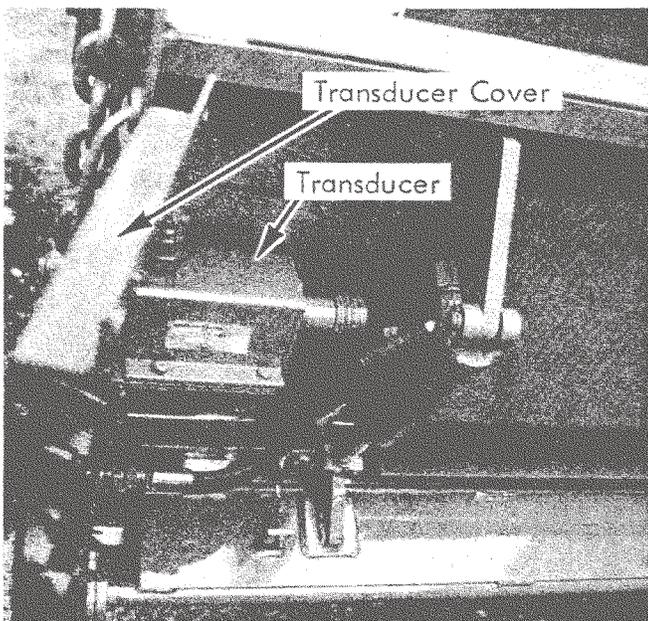


Figure 33. Left Side Transducer

13. Check the wire wrapped around each transducer pulley. It should be wrapped counterclockwise a minimum of two turns when viewed from the shaft end.

14. Remove the connector from each transducer and rotate the transducer to obtain a reading within the range across pins D & F. Reconnect the cable to each transducer.

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

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

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

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

19. Set the gate opening to 2½" (fully clockwise) and turn the thumb switch on the handle on. Adjust each "open" trim pot to obtain a true 2½" opening measured at the gate, and be sure that both LED's are blinking at about the same intensity. (Counterclockwise opens the gate, clockwise closes the gate) Verify with the pressure gage that the pressure is 0 at both the full open and the closed position and adjust as necessary to achieve this.

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

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

22. Recheck each of the open positions for 2½" and readjust if necessary.

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

24. Turn the thumb switch on and adjust each gate opening to approximately 1¼" and depress each override button. Adjust each override pot to obtain a 2½" opening and verify that the gate is not opening too far by having 0 pressure while holding down the override button. (Counterclockwise ~~opens~~ <sup>opens</sup> gate, clockwise ~~closes~~ <sup>closes</sup> gate)

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

26. Close each transducer cover and reinstall spring pins.

### Brake Adjustment

1. Disconnect the pump stroker connector at the pump.

2. Start engine and run at approximately 1000 RPM.

### CAUTION

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

3. Be sure to place auto/manual selector in manual.

4. Place range selector in "lo".

5. Push control stick forward slightly. Chipspreader should not move but brakes should release. (Brake cylinders should extend fully). See Figure 34.

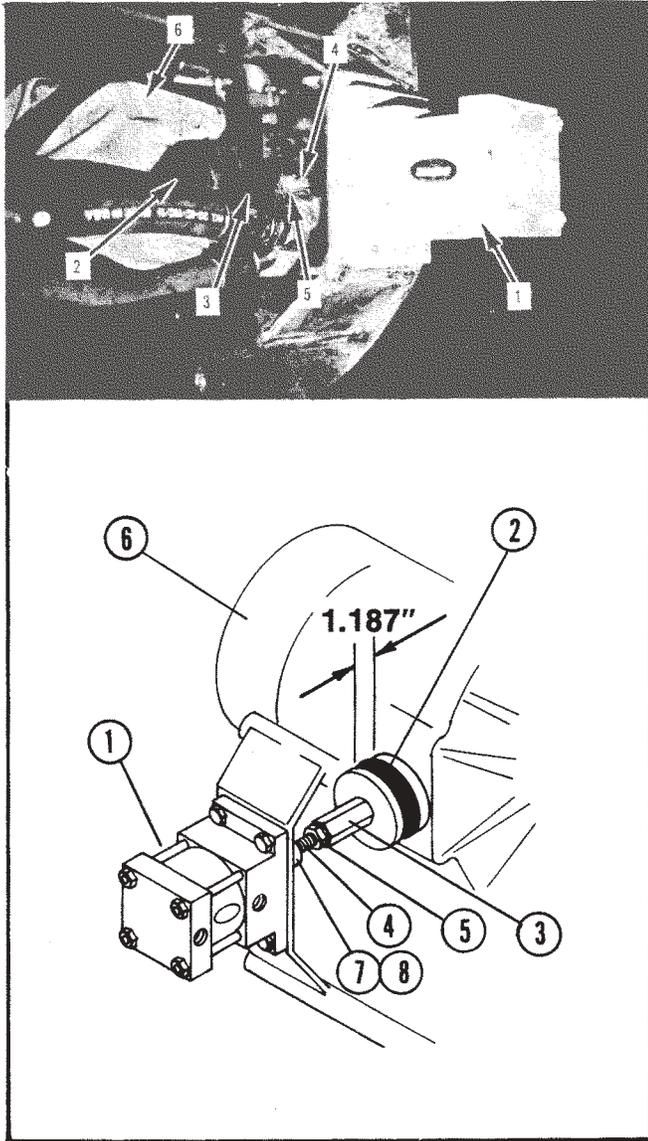


Figure 34. Brake Cylinder - 2WD and 4WD  
(Right Side Shown)

- |                       |                           |
|-----------------------|---------------------------|
| 1. Brake Cylinder     | 5. Locknut                |
| 2. Elastomer Spring   | 6. Wheel Motor            |
| 3. Hex Brake Adjuster | 7. Adjusting Bolt Locator |
| 4. Adjusting Bolt     | 8. Locator Locknut        |

6. Put the stick in neutral. Cylinders should retract approximately 0.2" with new brakes. With the cylinder forced back to its fully retracted position, there should be 0.8" between the end of the cylinder rod itself and the top of the adjusting bolt on the spring adjuster.

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 applied, the elastomer springs should be adjusted equally to a dimension of 1.187" to 1.200" from end to end.

9. Cycle the brakes "on" and "off" a few times and recheck this dimension on each side. When properly adjusted, tighten down locknuts.

It should be noted that the 1.187" to 1.200" dimension will increase with brake wear and will require adjustments to keep at that dimension. The elastomer spring will take a set with time and lose some of the applied braking force. About 1/2 turn clockwise of the hex brake adjuster will restore the full braking force. The adjusting bolt that extends toward the cylinder out of the top of the adjuster must be backed out the same amount the adjuster was turned in order to insure proper brake release and the locknut retightened. To insure that proper braking force is available, the elastomer springs should be changed once a year. If the brakes appear to be dragging, do not raise the brake release pressure. First, check that the cylinder is extending 0.2", if it is not then check that with the cylinder forced back to its full retracted position, there is 0.8" between the top of the bolt head and the cylinder rod proper. If there is not, then adjust the bolt to get that dimension. If there is, then loosen the hex adjuster 1/4 turn and screw the bolt in 1/4 turn to keep the proper clearance and try the brakes again.

When changing the springs, so as not to disturb the fully extended cylinder adjustment, unbolt the cylinder from the mount and slide it forward out of the mount and then unscrew the adjuster from the brake rod, install a new spring and tighten the adjuster to compress the elastomer spring to 1.187" to 1.200" height. 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 discs and requiring more frequent adjustment.

10. Place stick in neutral and shut "off" ignition.

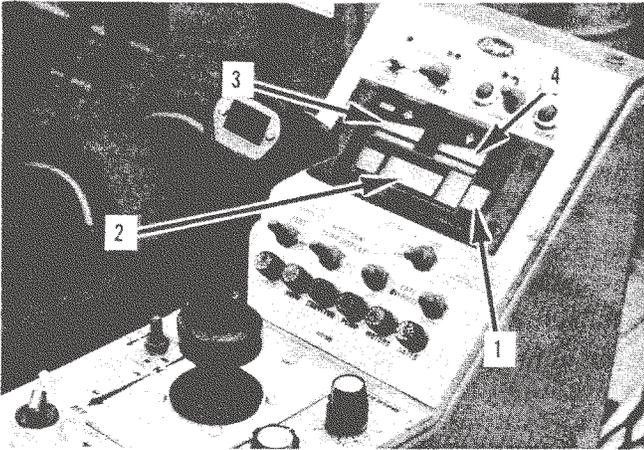
11. Reconnect 16 pin connector.

## Tach Calibration

1. Turn ignition key "on" with engine not running.

2. Hold "select" switch down until "cal" is displayed (approx. 10 seconds).

3. Release switch to display present alternator setting.



**Figure 35. Digital Instrument Panel**

1. "Select" Switch
2. Digital Display Area
3. Bargraph - Engine Oil Pressure
4. Bargraph - Engine Coolant Temp.

4. Push and release switch to advance alternator setting.

5. When desired alternator setting is displayed, hold switch down until "cal" is redisplayed (approx. 10 seconds). This stores the new setting into memory.

6. When switch is released, new alternator setting is displayed for approximately 10 seconds.

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

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

Setting No. 2 Caterpillar 3208 series engines.

Setting No. 3 Cummins 6BT, 6BTA, 6CT, 6CTA (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 "1o" or "2nd".

3. Loosen the flow control locknuts (Figure 36).

4. Retract the lock pin at the rear of the seat (Figure 3, Ref. 31).

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.

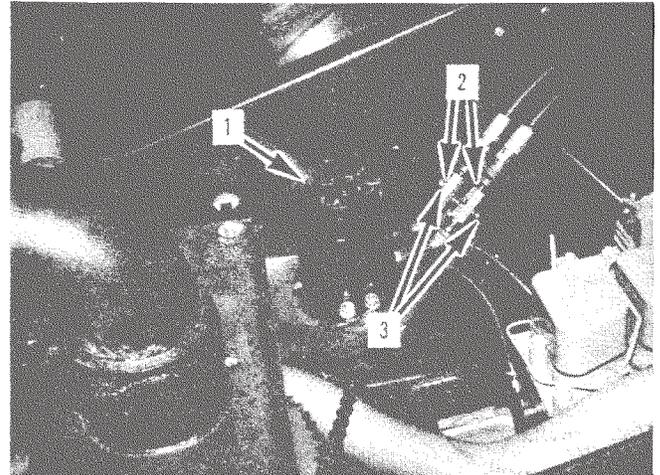
6. With the engine at governed speed, the speed being set will be the maximum speed that the seat

will move. Adjust for a comfortable maximum speed and for equal speed in both directions.

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 36. Power Seat Adjustment**

1. Motor-Seat
2. Flow Controls
3. Locknuts

### Override Pedal Adjustment

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

#### **! WARNING**

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

### Left Side Manual Potentiometer, Switch and Auto Range (Figure 38, Ref. 1)

1. Place auto/manual selector in "manual." (Figure 3).

2. Place speed range selector in "1o."

3. Check the resistance across sockets 1 & 2. The

value should nominally be 0 to 10 ohms with the pedal up and 350 ohms with the pedal down. It should become an open circuit just as the pedal is fully depressed. If it does not, or it opens much before the pedal is fully depressed, adjust the limit switch so that its contacts open just as the pedal is fully depressed. This will turn off the manual command to the pump as the other switch on the right side applies the rear brakes.

4. Inside the control box, disconnect the blue wire on terminal 7 of the auto speed controller.

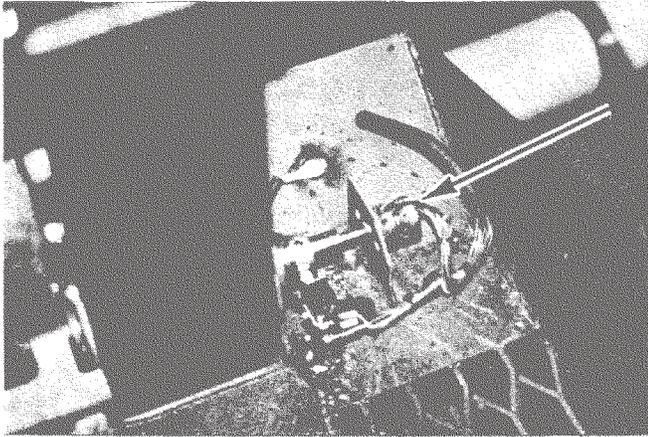


Figure 37. Override Pedal Potentiometer

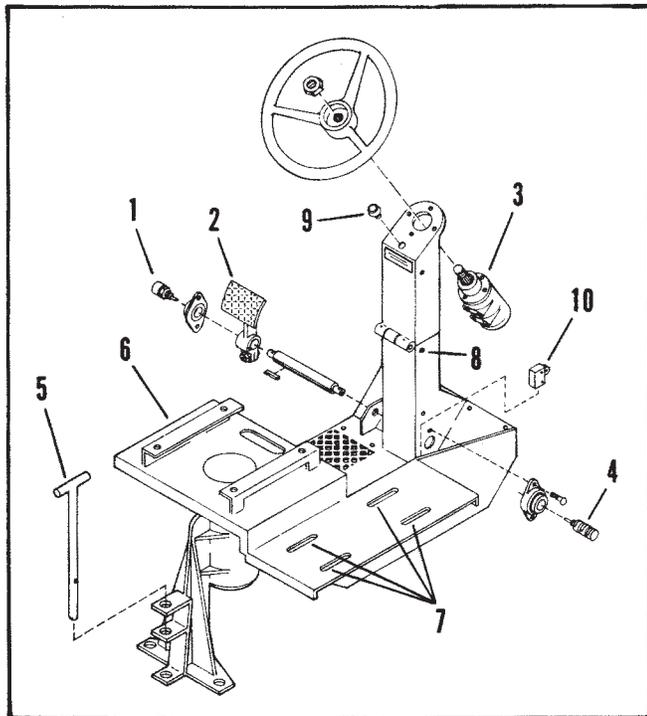


Figure 38. Override Pedal Adjustment

- |                             |   |
|-----------------------------|---|
| 1. Left Side Potentiometer  | 6. Operator Seat Assembly               |
| 2. Override Pedal           | 7. Control Box Fore/Aft Adjustment Slot |
| 3. Power Steering Control   | 8. Tilt Wheel Adjustment Bolts          |
| 4. Right Side Potentiometer | 9. Warning Light                        |
| 5. Seat Latch Pin           | 10. Switch                              |

5. Adjust the trim pot attached to the wiper terminal of the auto speed command pot to a value equal to approximately  $\frac{1}{4}$  of the value measured across terminals 3 & 4 of the connector measured in step 4 of the right side pedal adjustment. Reattach the blue wire to terminal 7 of the auto speed controller.

6. Reconnect the 16 pin connector.

7. Turn on the ignition key but do not start the engine.

8. Place the auto/park/manual selector in "auto" and turn the speed command pot full clockwise. Push the handle out of neutral in the forward direction and measure the voltage between terminals 7 & 3 of the auto speed controller. The voltage should be 2.92 volts with the pedal up. If it is not, adjust the trim pot on terminal 6 of the auto speed controller to get this voltage.

9. Depress the pedal fully and measure the voltage between terminals 7 & 3. It must be less than 0.16 volts.

### **⚠ WARNING**

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

### **Right Side Auto Potentiometer and Switches (Figure 38, Ref. 4)**

1. Place auto/manual selector in "auto." (Figure 3)

2. Place speed range selector in "lo."

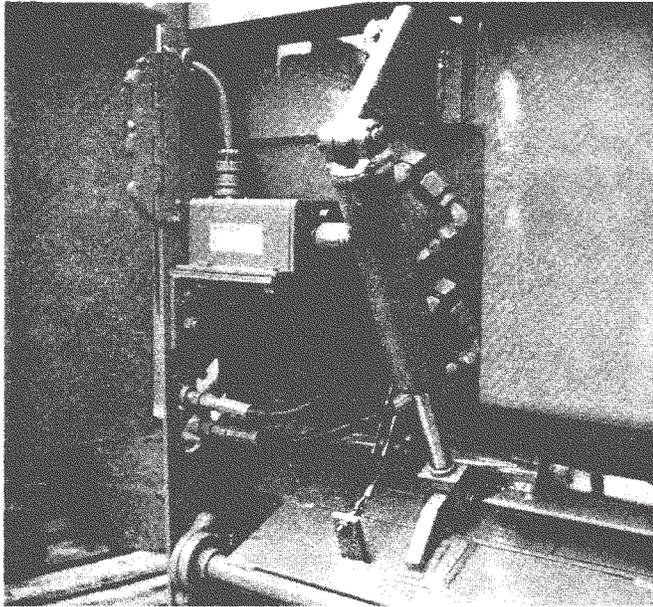
3. Disconnect the rear 16 pin connector from the control box.

4. Check the resistance across sockets 5 & 6. The value should be nominally 18K ohms  $\pm$  3K with the pedal up and 0 to 10 ohms with the pedal fully depressed. This is the right gate circuit. Also check the resistance across sockets 8 & 9. This value should also nominally be 18K ohms  $\pm$  3K% with the pedal up and 0 to 10 ohms with the pedal fully depressed. This is the left gate circuit. Also check the resistance across sockets 3 & 4. This value should also nominally be 21K ohms  $\pm$  3K with the pedal up and 0 to 10 ohms with the pedal fully depressed. If the gates are properly set do not move this pot.

5. The limit switch with the r/b and w/r wires on it is the switch which releases the rear brakes. It should be set so that its contacts open the circuit just as the very bottom of the pedal stroke thus applying the

brakes. There should be electrical continuity across sockets 10 & 11 when the pedal is up and when the pedal is fully depressed this continuity should be interrupted.

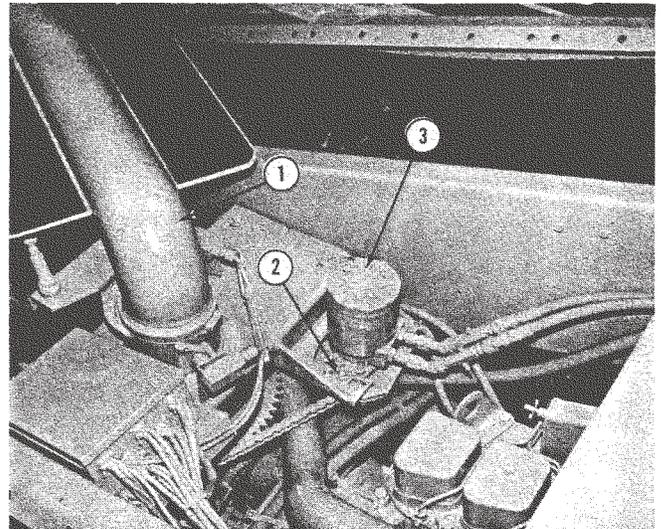
6. The limit switch with the g/w wire is the switch which turns the spread roll off as the gate is fully closed by interrupting the spread roll valve's ground connection. It should be set so that its contacts open the circuit very near the bottom of the pedal stroke. There should be electrical continuity from socket 12 to ground when the pedal is up and when the pedal is fully depressed this continuity should be interrupted.



**Figure 39. Gate Actuation Cylinder**

## Seat Chain Adjustment

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.

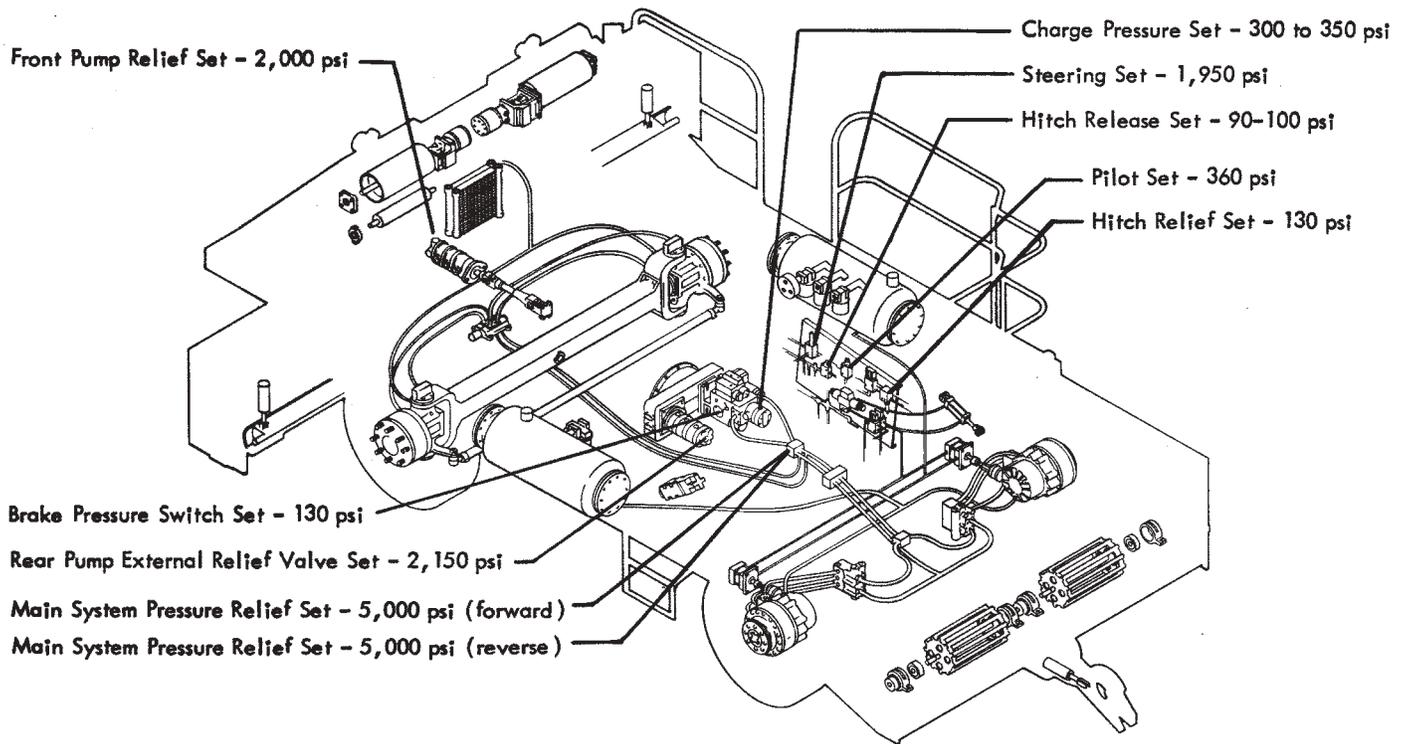


**Figure 40. Seat Chain Adjustment**

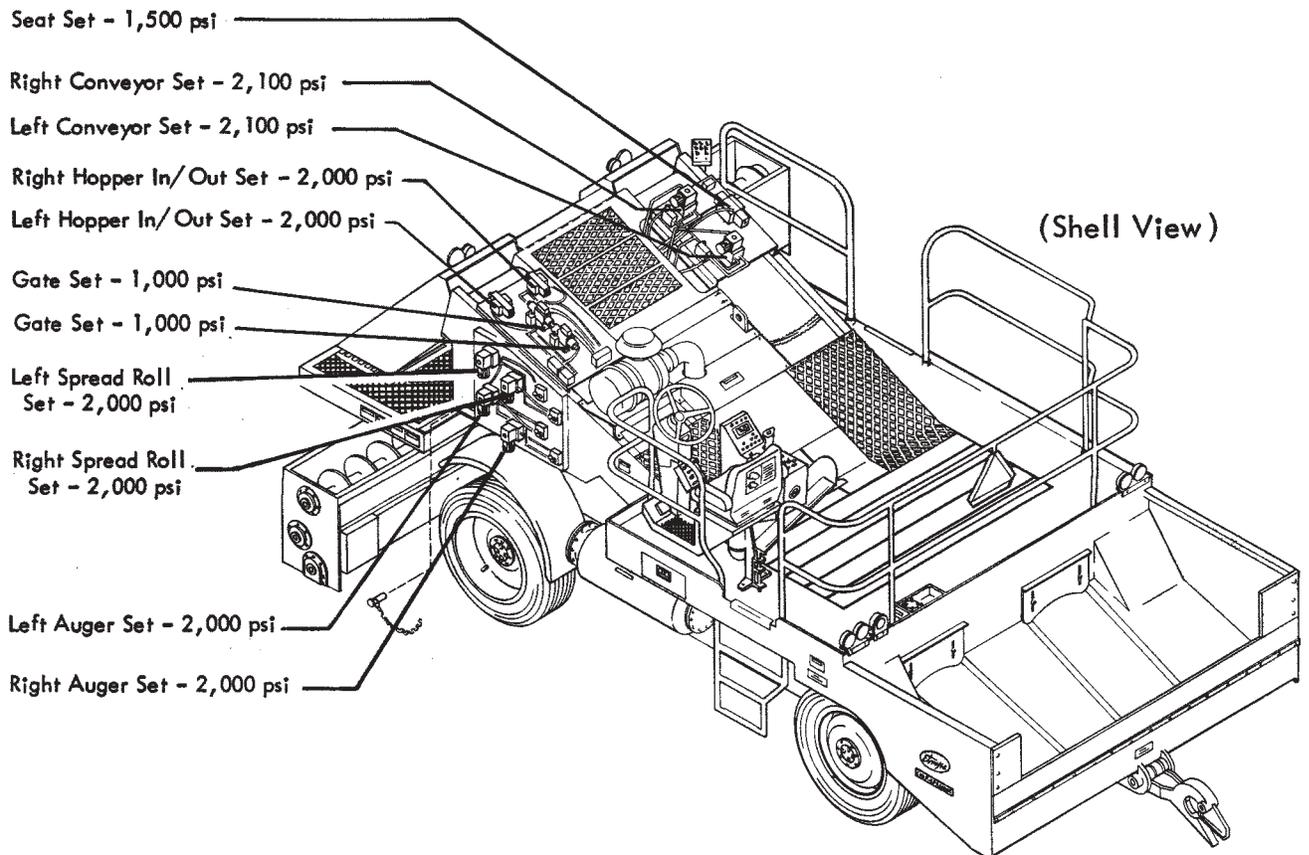
1. Seat Pivot Arm    2. Locknut    3. Seat Pivot Motor

# HYDRAULIC PRESSURE SETTINGS

## Hydrostatic Driven ChipSpreader with Variable Width Hopper



(Transparent View)



(Shell View)

# TOWING INSTRUCTIONS

## **IMPORTANT**

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

If the engine is runable and pressure is available in the control pressure circuit, place the auto/manual selector in "manual" place the range selector in "travel", start the engine and push the stick out of neutral slightly in the direction to be towed, in order to release the brakes. The chispsreader 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 chip-sreader batteries are dead, an auxiliary battery must be hooked to them in parallel to provide electric power to the control box.

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

the rear brakes must be released by the following procedure.

## **CAUTION**

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

Disconnect the 1/4" feed hose at the tee which feeds to both brake cylinders. Cap the hose temporarily to keep dirt out and stop fluid from draining. Insert the output hose from an Enerpac or Portapower into the tee. Be sure to use a long enough hose to allow the pumping device to be operated from alongside or on the chispsreader (where the operator can observe the brake cylinders while pumping) and pump, watching the brake cylinders until fully extended thus releasing the brakes.

**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.**

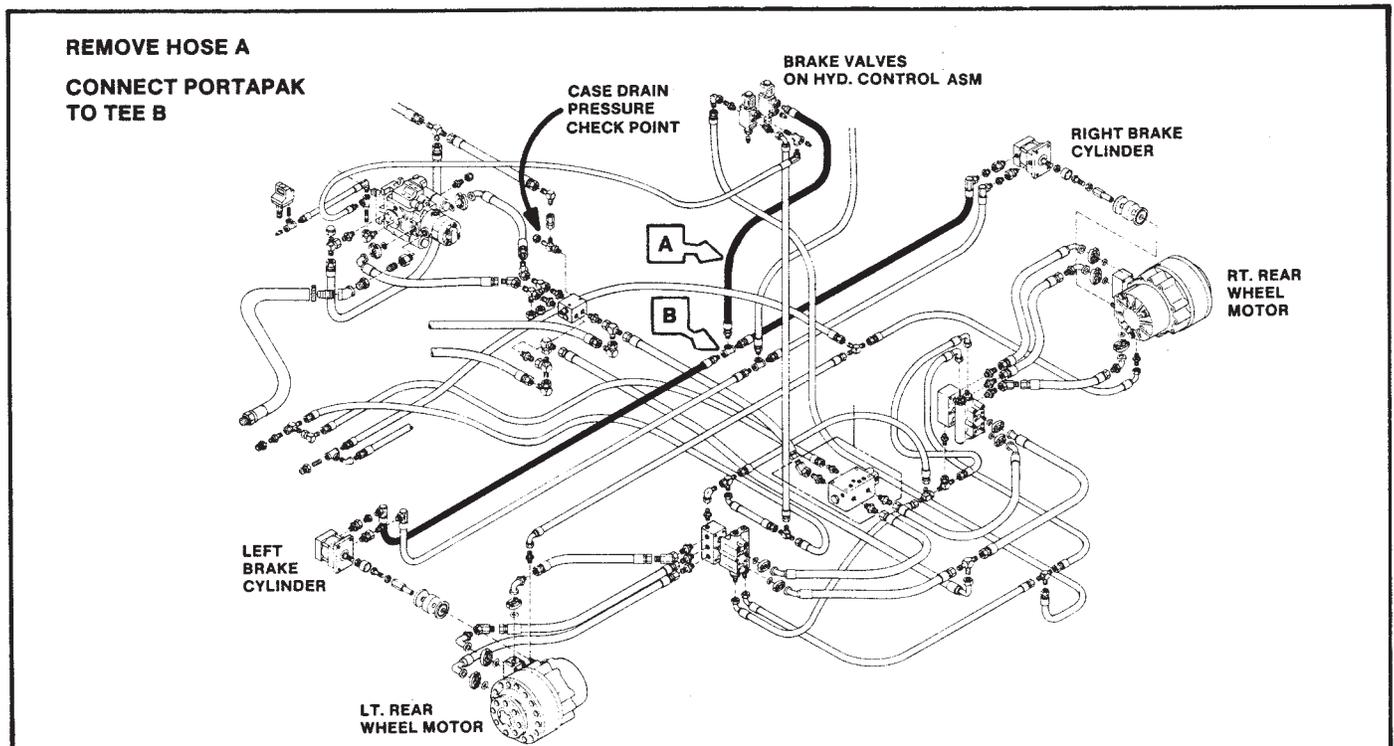


Figure 41. Portapower connection for brake release

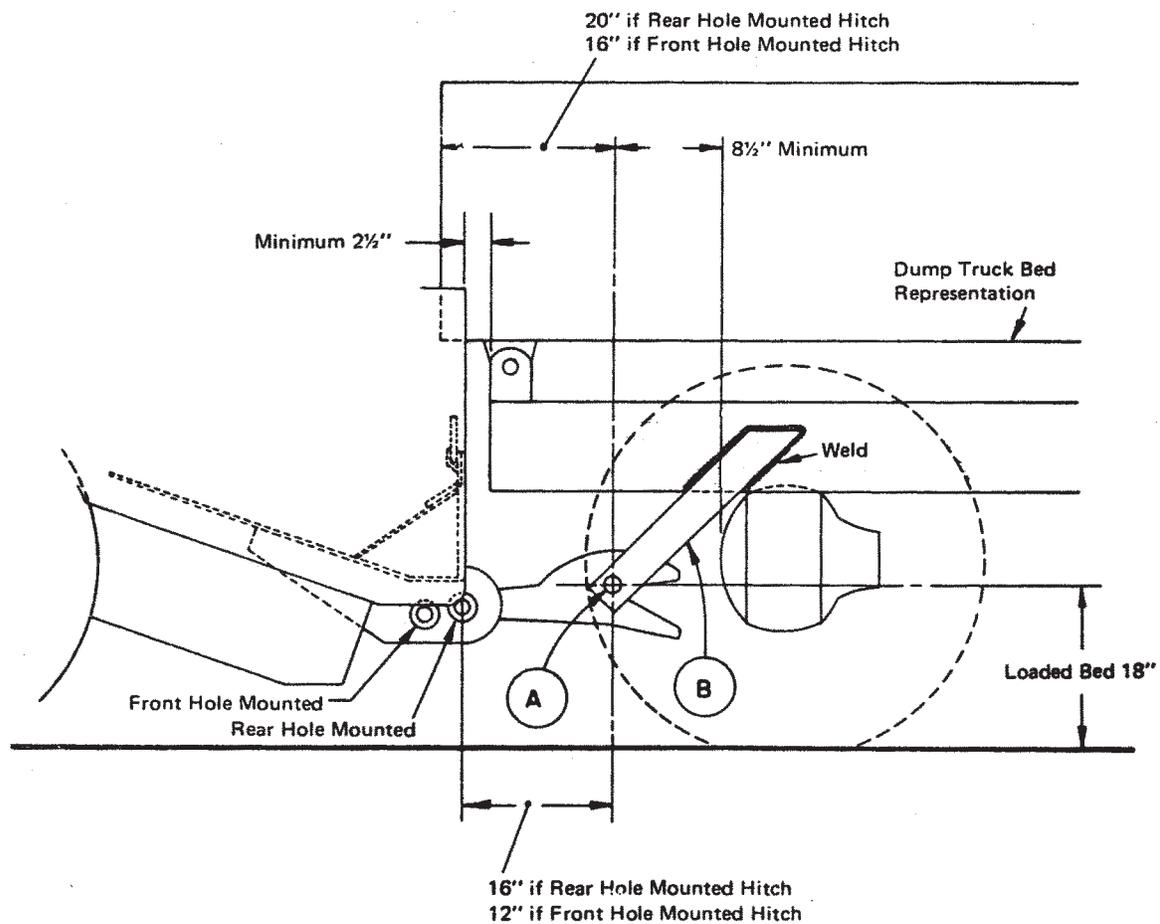
# TRUCK HITCH ARRANGEMENT

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

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

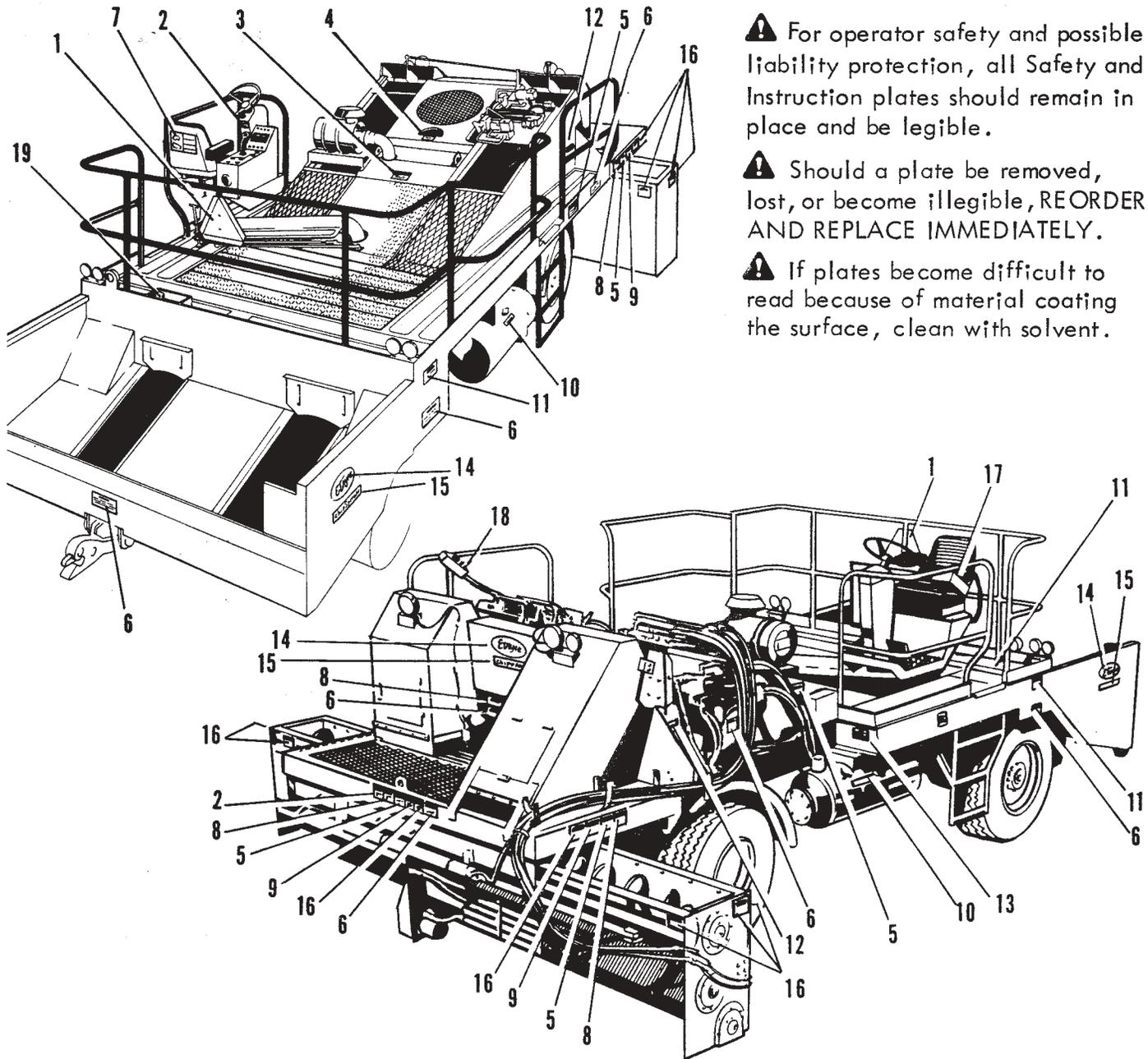
3. For truck hitch arrangement, see truck hitch tow bar illustration below.

**Truck Hitch Tow Bar Illustration**



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

## CAUTION and INSTRUCTION PLATES VARIABLE WIDTH HOPPER



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

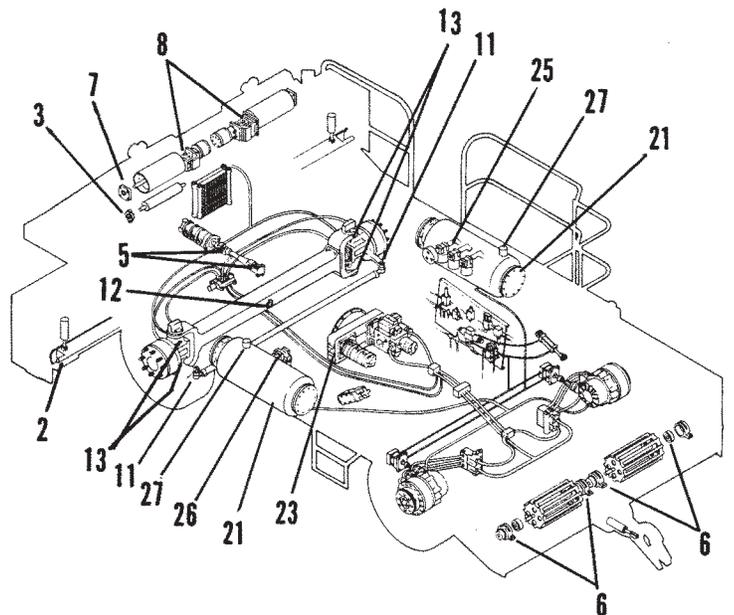
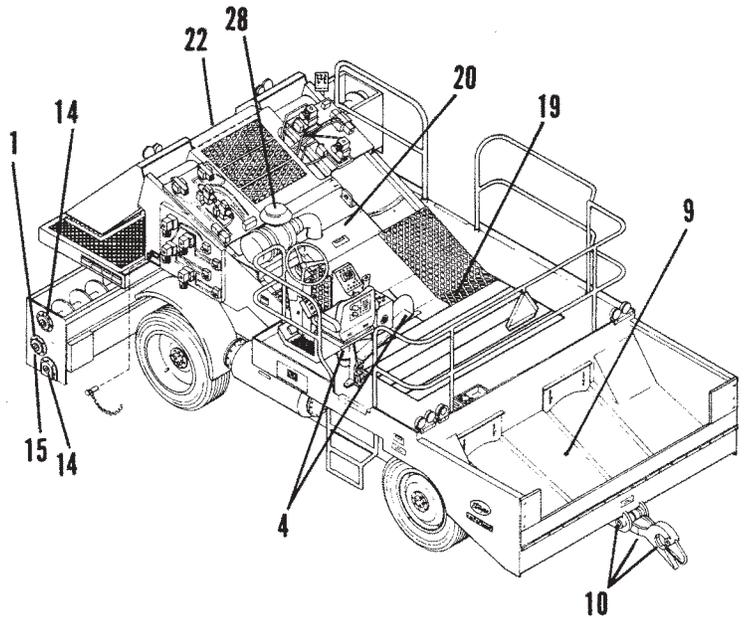
⚠ Should a plate be removed, lost, or become illegible, REORDER AND REPLACE IMMEDIATELY.

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

REF.	PART NO.	QTY.	DESCRIPTION	REF.	PART NO.	QTY.	DESCRIPTION
1	6000758	1	Emblem-Vehicle, Slow Moving	11	3101247	3	Plate-Warning, No Drill or Weld
2	3390620	3	Plate-Warning, Read Manuals	12	4421557	2	Tag-Grease Daily
3	3100716	1	Plate-Caution, Chips, General	13	3100689	1	Name Plate-Chipspreader, Brass
4	3100766	1	Tag-Anti-Freeze	14	3390191	3	Decal-Oval, Etyre
5	3561028	2	Plate-Caution, Remain Clear	15	3100446	3	Decal-Chipspreader
6	3101652	5	Plate-Hydro, Towing Warning	16	3190505	9	Plate-Warning, Auger
7	3101452	1	Chart-2WD & 4WD Lubrication	17	3101513	1	Decal-Control Box, Variable Hopper
8	3561029	4	Plate-Caution, Shields in Place	18	3101514	1	Decal-Elec. Box, Variable Hopper
9	3561027	3	Plate-Caution, Before Starting	19	3360180	1	Plate-Fill With Diesel Fuel Only
10	3390605	2	Plate-Instr, Hydraulic Oil Spec				

# LUBRICATION

Interval	Point	Identification	No. of Points	Lubricant	Quantity
	1	Bearing-Disconnect	1	#2M-AG	Sparingly
	3	Return Idler Flange Bearing (Both Conveyors)	4	#2M-AG	Sparingly
	4	Seat Pivots	4	#2M-AG	Sparingly
	5	Universal Joints-Pump Driveshaft	2	#2M-AG	Sparingly
<b>Weekly</b>	6	Tail Pulley Bearings (Both Conveyors)	4	#2M-AG	Sparingly
	7	Flange Bearings	4	#2M-AG	Sparingly
	8	Double Universal Joint (Both Sides)	4	#2M-AG	Sparingly
	9	Rear Hitch Levers	2	#2M-AG	Sparingly
	10	Rear Hitch	4	#2M-AG	Sparingly
	11	Tie Rod	2	#2M-AG	Sparingly
	12	Center-Axle Pivot Shaft	1	#2M-AG	Sparingly
	13	Spindle Assembly Both Sides	4	#2M-AG	Sparingly
	14	Cartridge Bearing (Both Ends)	2	#2M-AG	Sparingly
	15	Cartridge Bearing (Both Ends)	2	#2M-AG	Sparingly
	19	Engine Battery	1	Water	Add When Low
	20	Engine Oil	1	Engine Original	Engine Manual
<b>Check Weekly</b>	21	Hydraulic Reservoirs	—	Type A TF	Fill
	22	Hydraulic Oil Coolers	—	—	Clean A/R
<b>Monthly</b>	23	Gearbox	1	#90M-ATG	Fill
<b>1 Year</b>	25	Return Filter	1	—	Filter Element
	26	Suction Filter	2	—	Filter Element
<b>Yearly</b>	27	Reservoir Breather	1	—	Filter Element
<b>When Indicator Turns Red</b>	28	Engine Air Filter	1	—	Filter Element



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

#10ND Oil—#10 Non-Detergent Oil  
 #2M-AG—#2 Molub-Alloy Grease  
 Type A TF—Type A Transmission Fluid  
 #90M-ATG—#90 Molub-Alloy Transmission Lubricant

### DECIMAL EQUIVALENT CHART

Decimal	Fraction	Decimal	Fraction	Decimal	Fraction
.06	1/16	.31	5/16	.69	11/16
.09	3/32	.38	3/8	.75	3/4
.12	1/8	.44	7/16	.81	13/16
.16	5/32	.50	1/2	.88	7/8
.19	3/16	.56	9/16	.94	15/16
.25	1/4	.62	5/8	1.00	1

### HYDRAULIC FITTING CODE

#### LETTER DESIGNATION

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

#### SIZE

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

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

