Nordberg
Railway Equipment Division

Nordberg Super "B" Spiker

Rail Gang Spiker Model B

Rexnord

HAZARDOUS MATERIAL DATA

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P.O. Box 1562
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FOREWORD

This manual is provided for use by the qualified personnel who will supervise, operate or service the equipment described herein. The manual includes sections on functional and equipment description, operation, and maintenance. A Component Data section at the back of the manual contains all available information on the equipment supplied with the machine, but not manufactured by Nordco.

Personnel responsible for the operation and maintenance of this equipment should thoroughly study the manual and the Component Data section before commencing operation or maintenance procedures.

Additional copies of this manual are available, at a nominal cost, through our Sales or Service Department.

We ask that if you have any comments or suggestions about this manual, let us hear from you. We are here to be of service to you — our customers.

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NORDCO

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SUPER B HYDRA-SPIKER
SPECIFICATIONS

ENGINE MODEL	General Motors, Model DDAD 5033 7001
ENGINE OPERATING SPEED	2250 RPM
RELIEF VALVE 3-20 GPM Pump System	2000 PSIG
RELIEF VALVE 7.5 GPM Pump System	2350 PSIG
RELIEF VALVE Nipper System	1000 PSIG
MACHINE TOTAL LENGTH	19'-6"
MACHINE WHEEL BASE	11'-0"
MACHINE HEIGHT	8'-2"
MACHINE WIDTH	8'-0"
MACHINE WEIGHT (With Options)	17,500 LBS.
MACHINE TRAVEL SPEED	30 M.P.H.
HYDRAULIC OIL TANK CAPACITY	38 GALS.
ENGINE FUEL TANK CAPACITY	50 GALS.

TABLE OF CONTENTS

SUPER B
HYDRA-SPIKER

DESCRIPTION

The Nordberg Model Super "B" Hydra-Spiker is a totally new spiker in concept and design. With complete emphasis on simplicity the Super B Hydra-Spiker is easier to operate and simpler to maintain.

Four spiking guns, two at each side of the machine, are electronically controlled through a logic system that is programmed to insure precise and proper sequential operation. Two joysticks control spotting the two gun sets, one at each side of the machine, through four proportional valves. A trigger box which is integral with each joystick lever is responsible for initiating and stopping the spiking sequence individually at each spiking gun. Hydraulic spiking cylinders drive the spikes without impact at a force up to 10,000 lbs. Four rail clamps, two at each side of the machine, automatically hold the machine to the rails against the opposition of the spiking force whenever any one spiking gun is set at the ready position. A hydraulic motor coupled to the rear axle through a chain drive propels the machine at speeds ranging from a slow crawl to 30 M.P.H. Spring set dual tread type brakes are automatically set and released through an electrical signal from the propulsion valve linkage to hold the machine on grade or for deceleration when propelling. A large diameter long stroke set off cylinder is permanently mounted at the center of balance to raise the machine for turn around or for set off.

Hydraulic nippers electronically controlled by a thumb button at the gun trigger box will raise a low tie or hold ties resting on loose ballast tightly against the rail base during spiking.

Various optional equipment is also available to provide easier and faster spiking operations. A hydraulically operated winch lifts spike kegs onto the operator's platform with ease. For proper gage setting in rail renewal or regaging operations a fixed or variable gager is also available.

ENGINE CONTROLS AND GAUGES

THROTTLE CONTROL. The throttle control lever is located just to the right of the gauge panel. See Figure 1. Engine speed is increased by pushing the throttle handle up and decreased by pulling the handle down. For normal operation, the engine should be run at high idle speed (2250 RPM) or with the throttle handle pushed completely up.

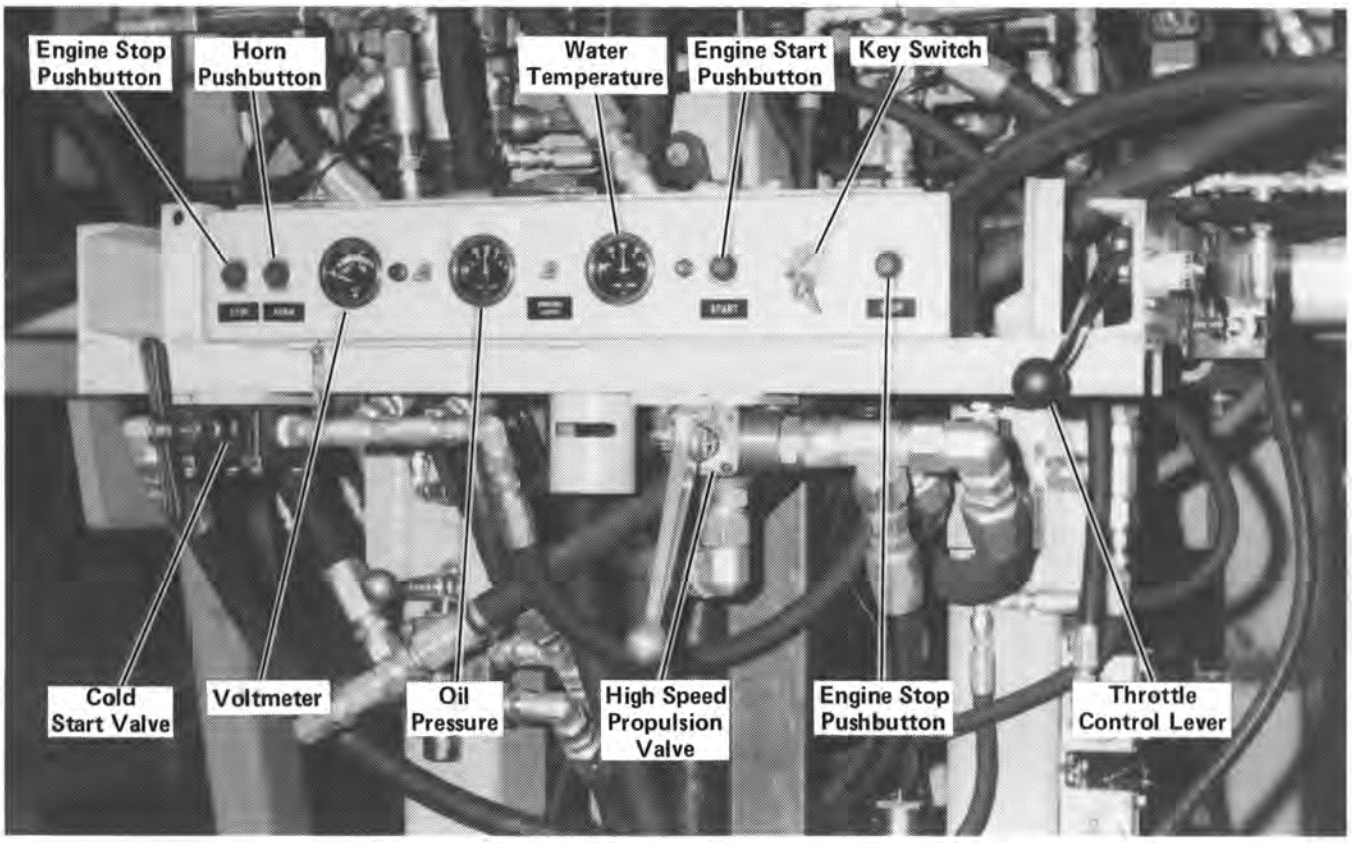


Figure 1

ELECTRICAL SYSTEM KEY SWITCH. The electrical system key switch is located to the right on the engine gauge panel next to the engine stop pushbutton. The electrical system is energized by turning the key to the right. See Figure 1. Turning the key to the right will energize the gauges at the gauge panel, the logic system and the starting system. Turning the key switch to the left or upright position will shut off electrical power to all electrical system devices with the exception of the engine stop circuit and the horn circuit.

ENGINE START PUSHBUTTON. The pushbutton to the left of the key switch at the engine gauge panel is the engine start pushbutton. See Figure 1. With the key switch closed and the throttle lever cracked open the engine may be started by depressing the engine start button. Once the engine fires the start button must be released.

COLD START VALVE. The shut off valve located below the engine gauge panel at the left-hand operators station is the cold start valve. See Figure 1. The manually operated valve is provided to divert the oil from the main hydraulic pump directly to tank. This reduces the burden on the engine and permits a faster engine turnover during cold weather starts. To dump the oil directly to tank turn the valve handle counterclockwise or outward. Once the engine has warmed up, close the valve by turning the handle clockwise or inward.

ENGINE NORMAL STOP PUSHBUTTON. The pushbuttons at the extreme left and right ends on the engine gauge panel are the engine normal stop pushbuttons. Depressing either pushbutton will energize a solenoid that will place the engine fuel racks in the "no fuel position". Once the engine is stopped, release the pushbutton and the fuel racks will return back to governor control.

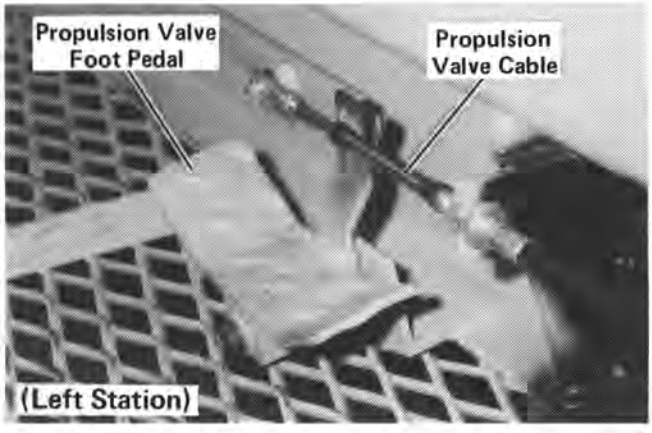
EMERGENCY STOP HANDLE. An air shutoff valve is installed within the air inlet housing to shutoff intake air in the event of an abnormal condition. If the engine should continue to run after the normal stop pushbutton is depressed or if the engine overspeeds due to a combustible gas introduced through the intake air system, the emergency stop handle, located on engine cowling or shroud wall, if so equipped, must be pulled all the way out to stop the engine. The emergency stop handle must be pushed back in and the shutoff valve reset before another start is attempted. Refer to the instructions under Emergency Shutoff Valve Reset Handle.

EMERGENCY SHUTOFF VALVE RESET HANDLE. Whenever the Emergency Stop Handle has been pulled out to stop the engine, the air shutoff valve in the air inlet manifold must be reset before another start can be carried out. First the EMERGENCY STOP HANDLE must be pulled all the way inward. Then the Emergency Shutoff Valve Reset Handle must be pushed all the way down and released. This will reset the shutoff valve in the open position allowing intake air to enter the intake manifold permitting the engine to start.

GAUGES. The electrical system, the engine water temperature, and the engine lubricating oil pressure can all be monitored by watching the gauges mounted on the gauge panel. The voltmeter is at the left, the oil pressure gauge is at the center, and the water temperature gauge is at the right.

MAIN OPERATING CONTROLS

PROPULSION VALVE FOOT PEDAL. The foot pedal in the deck well at the left and right hand operator's station controls the propulsion valve which directs oil to the propulsion motor for propelling the machine. See Figure 2. When the pro-



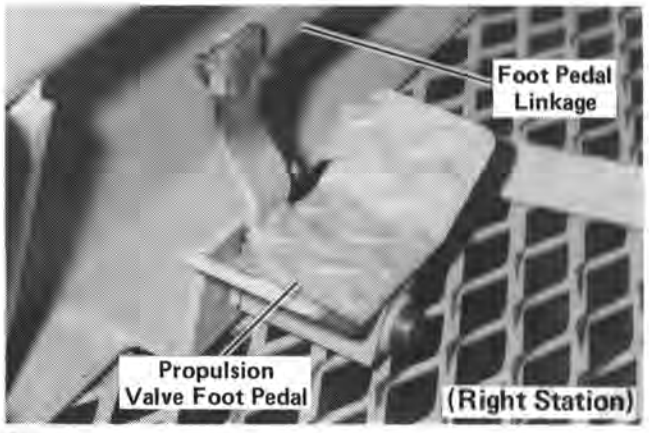


Figure 2

pulsion valve foot pedal is depressed in either direction, a cable actuates the propulsion valve handle shifting the valve.

An electrical opto switch then transmits a signal to the logic system which raises the rail hooks and releases the brakes. Depressing the left side of the foot pedal releases the brakes, raises the rail hooks and propels the machine forward. Depressing the right side of the foot pedal releases the brakes, raises the rail hooks and propel the machine backward. Releasing the foot pedal will stop the propulsion motor and set the brakes.

HIGH SPEED PROPULSION VALVE. The lever operated valve located directly below the engine gauge panel near the right hand operators station is the HIGH SPEED PROPULSION VALVE. See Figure 1. This manually operated valve is provided to allow the machine to be propelled up to a maximum travel speed of 30 mph. To operate this valve, it is necessary to first depress the left side of the foot pedal. This will propel the machine to maximum working speed. The high speed propulsion valve handle is then pushed away from the operators station, completely extending the valve spool. As the spool extends to the maximum position the machine travel speed will increase to 30 mph.

LEFT HAND SPOTTING VALVE. The valve mounted to the transverse beam in front of the left hand operator's station is the LEFT HAND SPOTTING VALVE. The spotting valve lever pivots on a ball and socket type mounting and actuates four individual valve spools. Each valve spool directs hydraulic oil to one of two spotting cylinders which move the spiking gun carriage ahead, back, to the left, to the right, or obliquely. The spotting cylinders are operated by placing each hand around the control handles with the trigger finger through the trigger guard. Tilting the control handle assembly will move the spiking gun carriage in the same direction toward which the control handle is tilted.

RIGHT HAND SPOTTING VALVE. The valve mounted to the transverse beam in front of the right hand operator's station is the RIGHT HAND SPOTTING VALVE. See Figure 3. The spotting valve lever pivots on a ball and socket type mounting and actuates four individual valve spools. Each valve spool directs hydraulic oil to one of two spotting cylinders which move the spiking gun carriage ahead, back, to the left, to the right, or obliquely. The spotting cylinders are operated by placing each hand around the control handles with the trigger finger through the trigger guard. Tilting the control handle assembly will move the spiking gun carriage in the same direction toward which the control handle is tilted.

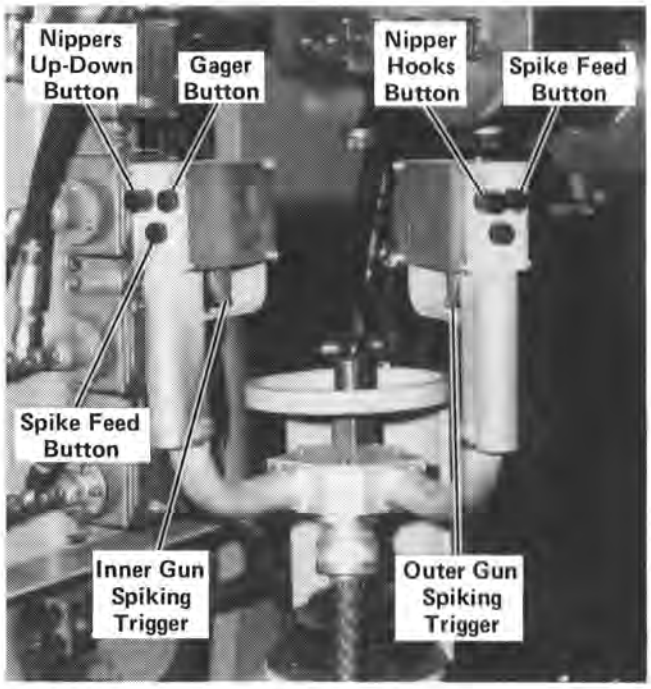


Figure 3

GUN CONTROL TRIGGERS. All four gun control triggers operate identically. See Figure 3. Each trigger has three positions. There are two opto switches (gun retract and gun drive) which are either exposed or obstructed as the triggers are moved to alternate positions. When the triggers are in the normal free released position, the "Drive" opto switch and the "Retract" opto switch are obstructed. Obstructing the retract and drive opto switches energizes the "Gun up" solenoid and the gun will be in the full "Up" position.

Moving the trigger to the mid-position will expose the retract opto switch which transmits a gun down output signal. The gun lowers and the gun down signal also initiates a hooks down signal lowering the rail hooks. The guns descend until the spike is between one and two inches above the tie plate at which time the gun ready opto switch de-energizes the gun down solenoid and the gun stops movement and remains in that set position. The trigger at this time can be released while spotting the guns as the logic system will be unaffected by any input signal other than that transmitted by the gun drive signal in trigger position three.

Moving the trigger to the full back position (position three) exposes the "Drive" opto switch and

obstructs the "Retract" opto switch. Exposing the "Drive" opto switch energizes the gun down solenoid and the driving cylinder drives the spike. When the spike has been driven, the trigger is released and returns by spring force to the free released position. The "Drive" opto switch will be obstructed de-energizing the gun down solenoid and the "Retract" opto switch will be obstructed energizing the "Gun up" solenoid. The gun will come to the full up position. The "Gun up" side of the driving cylinder will remain pressurized until the"Gun Up" opto on gun is obstructed.

NIPPERS DOWN THUMB BUTTON. The "Nippers Down" thumb button is located at the back side of the left hand trigger box at each gun control assembly. See Figure 3. The tie nippers can be operated from either operator's station. The "Nippers Down" thumb button has two positions. There is one opto switch, (Nippers Down), that is exposed or obstructed as the button is moved to its alternate positions. In the free released position the "Nippers Down" opto switch is obstructed. Depressing the button exposes the opto switch and an input signal is sent to the logic system. Depressing the "Nippers Down" button alone will energize the nippers down solenoid and the nippers will lower. Releasing the "Nippers Down" button will stop the movement of the nipper frame and it will remain in a set position.

HOOKS CLOSE THUMB BUTTON. The "Hooks Close" thumb button is located at the back side of the right hand trigger box at each gun control assembly. See Figure 3. The "Hooks Close" thumb button has two positions. There is one opto switch (Hooks Close) that is exposed or obstructed as the button is moved to its two alternate positions. In the free released position, the "Hooks Close" opto switch is obstructed. Depressing the thumb button exposes the "Hooks Close" opto switch and a

"Hooks Close" input signal is transmitted to the logic system. Depressing the "Hooks Close" thumb button alone energizes the "Hooks Close" solenoid and hooks will close. Releasing the "Hooks Close" thumb button will discontinue the "Hooks Close" output signal and pressure to the close side of the hooks cylinder will be discontinued. To open the hooks the "Hooks Close" thumb button is released and then depressed. The logic control system is designed to energize the "Close" solenoid and then the "Open" solenoid in alternate sequence each time the "Hooks Close" thumb button is released and depressed. Depressing the "Hooks Close" thumb button to close hooks and then depressing the nipper down button will raise the nipper frame to pull up the ties against the rail base. After spiking, depressing the "Hooks Close" button only will open hooks and raise nipper frame.

SPIKE FEED THUMB BUTTON. The "Spike Feed" thumb button is the lowest button located at the back side of each trigger box at each gun control assembly. See Figure 3. The left gun is controlled by the left hand button and the right gun controlled by the right hand button at each gun control assembly. Each "Spike Feed" thumb button has two positions. There is one opto switch (Spike Load) that is exposed or obstructed as the button is moved to its two alternate positions. In the free released position the spike load opto switch is obstructed. Depressing the thumb button exposes the opto switch and an input signal is sent to the logic system. Depressing the "Spike Feed" thumb button will energize the "Spike Load" solenoid and a spike will be pushed from the ready position by the pusher block into the spike jaws for driving. Releasing the spike feed thumb button will retract the pusher block and activate the spike escapement cam which allows the next spike to slide down the tray into the ready position in the feeder frame in front of the pusher block.

AUXILIARY CONTROLS

SET OFF CYLINDER VALVE. The valve mounted near the right hand spiking gun area on the main frame is the SET OFF CYLINDER VALVE. See Figure 4. To lower the cylinder ram and raise the machine move the lever to the upward position. To

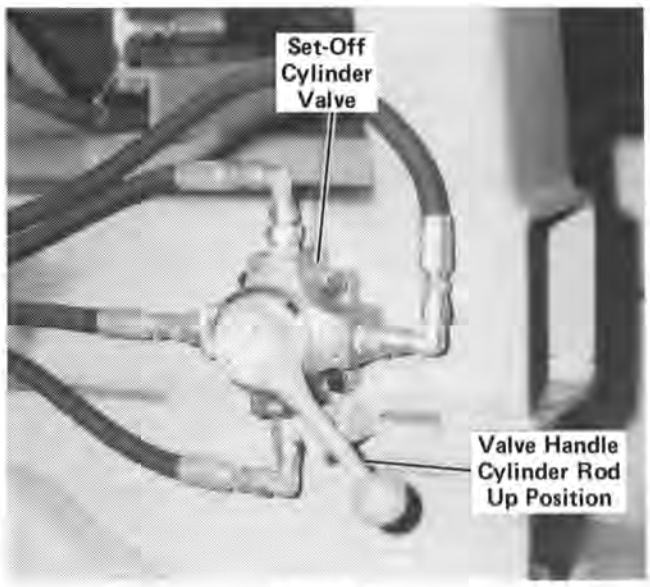


Figure 4

raise the cylinder and lower the machine place the valve lever in the lower position against the valve lever stop. Whenever the set off cylinder is not being used, the valve lever must remain against the lower valve lever stop. This maintains pressure to the "Up" side of the cylinder and keeps the cylinder ram from creeping downward. When not in use, a padlock is placed through the set off cylinder valve stop bar and around the valve handle.

WINCH MOTOR CONTROL VALVE (Optional Equipment). The valve mounted to the winch boom is the winch control valve. See Figure 5. Moving the control valve lever upward will reel the cable onto the winch spool and raise the load. Moving the valve lever to the midway position will stop the winch and the load will be held in a set position. Moving the valve lever downward will lower the load.

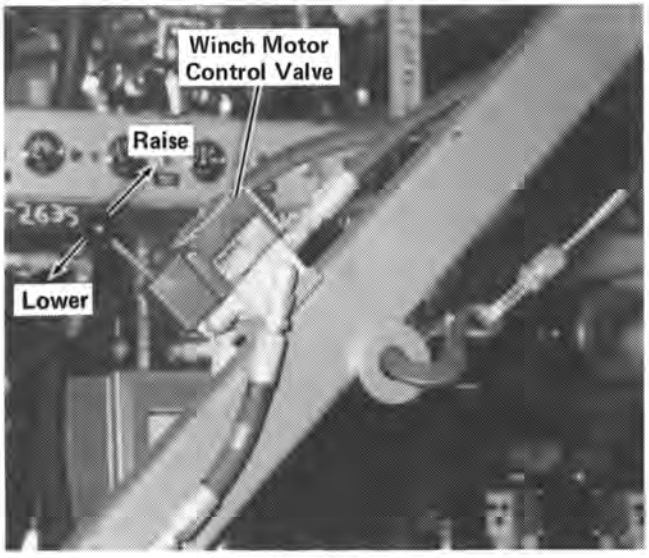


Figure 5

HAND PUMP. An auxiliary hand pump is permanently attached to the machine near the engine. See Figure 6. The hand pump can be used to perform certain functions when there is loss of hydraulic or engine power. See HAND PUMP under OPERATING PROCEDURES. The pump produces pressure by moving the lever with the ball grip downward and pumping the long lever with the bicycle grip in quick successive strokes. Pressure can be relieved by moving the lever with the ball grip all the way backward.

ADJUSTMENTS

SPIKE PATTERN ADJUSTMENTS. The position of the inner and outer gun, of each gun set, in relationship to each other can be changed to align with different tie plate hole arrangements or new spike patterns can be selected. The guns can either be spaced wider apart, closer together, or the guns can be located one ahead of the other for diagonal spiking patterns. The inner and outer drive guns must simultaneously align with a selected set of holes on each side of the rail. To adjust the spiking pattern proceed as follows:

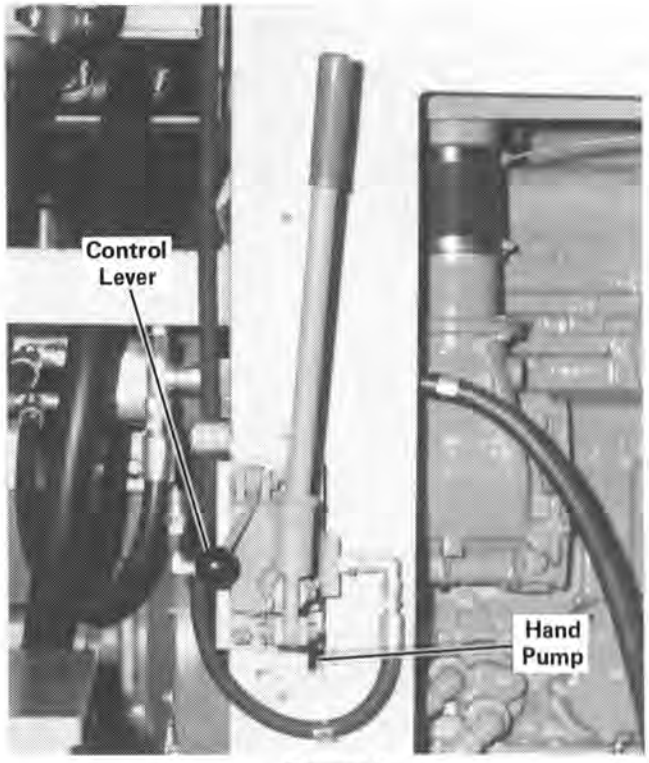
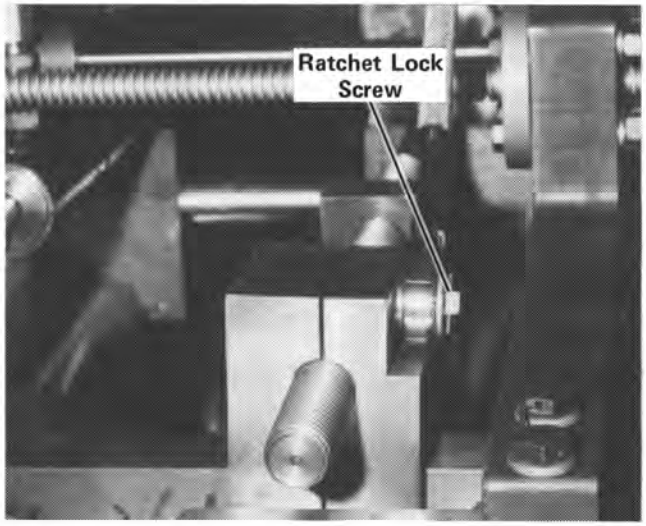


Figure 6

1. With the spotting valve control lever, spot the guns so that they are approximately centered both forward, backward and laterally.

2. Spot the machine so that the guns are in approximate alignment with the tie plate holes.

3. Loosen the ratchet lock screw for fore and aft adjustment. See Figure 7. Turn the adjustment wheels until the inner and outer guns are centered with the desired tie plate holes. The small diameter wheel at the inboard side controls the lateral spread between guns. Turning the small wheel to the right (clockwise) will move the guns further apart and turning the wheel to the left (counterclockwise) will move the guns closer together. The large diameter wheel at the outboard side controls the fore and aft spread of the guns. Turning the wheel to the right



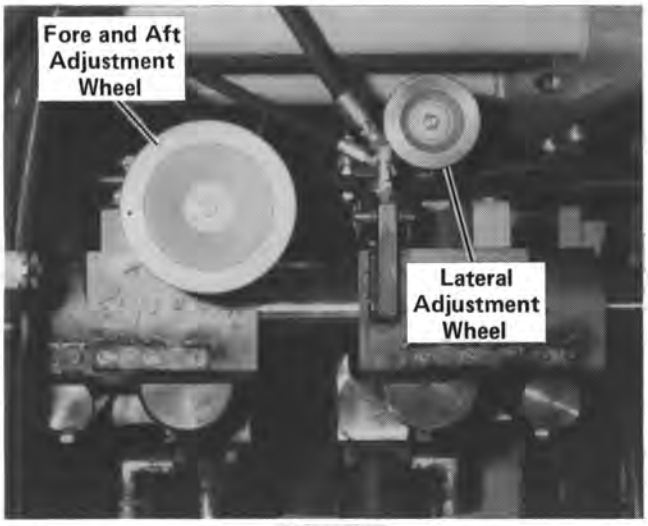


Figure 7

(clockwise) moves the guns farther apart and turning the wheel to the left moves the guns closer together. When the adjustment has been completed tighten the ratchet lock screw.

JAW RELEASE TIMING. The exact point at which the jaws release the spike is controlled mechanically and different rail heights will effect the timing. The jaws should release the spike when approximately one inch of the spike is driven into the tie. If the rail height has increased, the guide rod clamp should be positioned higher on the rod and tightened. If the rail height has decreased, the guide rod clamps should be repositioned lower on the rod and tightened. See Figure 8.

NIPPER FRAME UP pressure. The pressure setting valve at the top of the frame directly in front of the right operator's station is the "Nipper Frame Up" pressure regulating valve. See Figure 9. The "Nipper Frame Up" pressure regulating valve sets

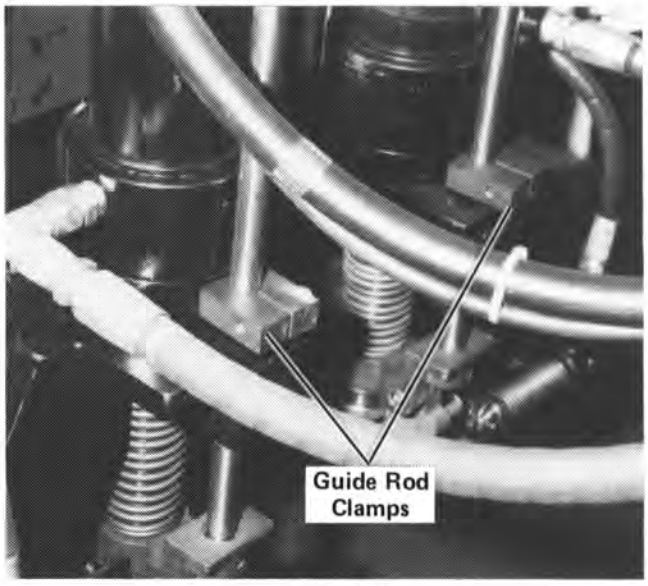


Figure 8

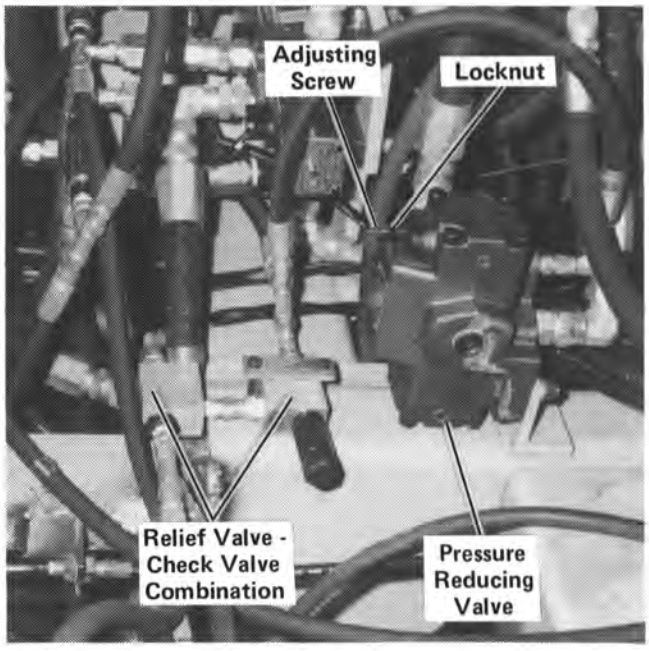


Figure 9

the pressure at which the ties are held against the rail base. When handling ties of softer wood, it may be necessary to reduce the "Nipper Frame Up" pressure to avoid any damage to the ties. If the upward force of the nipper frame cylinder is excessive so as to break, crack or weaken the tie, the pressure must be reduced. To adjust the nipper frame up pressure proceed as follows:

1. Install the pressure gauge in the pressure tap at the relief valve — check valve combination. See Figure 9. Hold the nipper hooks close button, at the back side of the right hand trigger box,

in to energize the nipper up solenoid. The gauge will immediately indicate the nipper frame up system relief pressure.

2. The pressure should be approximately 1000 psi or if less pressure is required, it should be set at the maximum pressure that will not damage the tie.

3. Loosen the locknut on the pressure reducing valve and turn the adjusting screw inward (clockwise) to increase pressure or outward (counterclockwise) to decrease pressure.

4. When the pressure has been properly adjusted, tighten the locknut.

PROPULSION CHAIN. Due to the shock loading and reversal of rotation which the propulsion chain is subject to, the chain should be adjusted nearly taut with just a slight amount of slack, The propulsion motor is mounted to a pivot bracket that is raised or lowered by turning an adjusting screw. See Figure 10. Raising the bracket lengthens the distance between sprockets and the chain is tightened. Lowering the bracket reduces the distance between sprockets and the chain is loosened. To adjust the propulsion chain proceed as follows:

1. Back off the adjusting screw locknut.

2. Turn the adjusting screw clockwise to tighten the chain span or counterclockwise to loosen the chain.

3. Tighten the adjusting screw locknut.

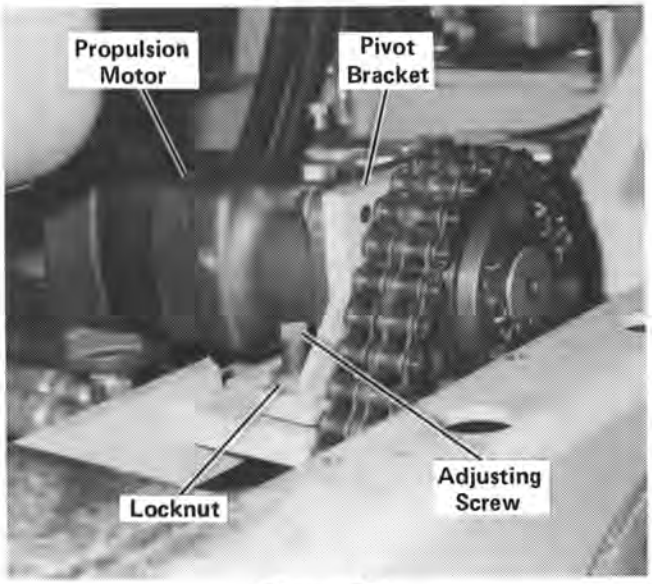


Figure 10

OPTO ENCODER SWITCHES

GENERAL. The "opto" switches are comprised principally of a transmitter and a receiver. The transmitter has an infra-red light which is on all the time that the key switch is on. The receiver has a light sensitive photo transistor which when exposed to the light from the transmitter sends an input signal to the logic system.

RAIL CLAMP OPTO SWITCH. A vane is connected to the propulsion valve linkage that obstructs an opto switch when the propulsion pedal is not depressed and is clear of the opto switch when the pedal is depressed. See Figure 11. When the propulsion pedal is depressed in either direction, a signal is sent to the logic system which energizes the "Rail Hooks Up" solenoid and valve shifts to its normal rail hooks up position.

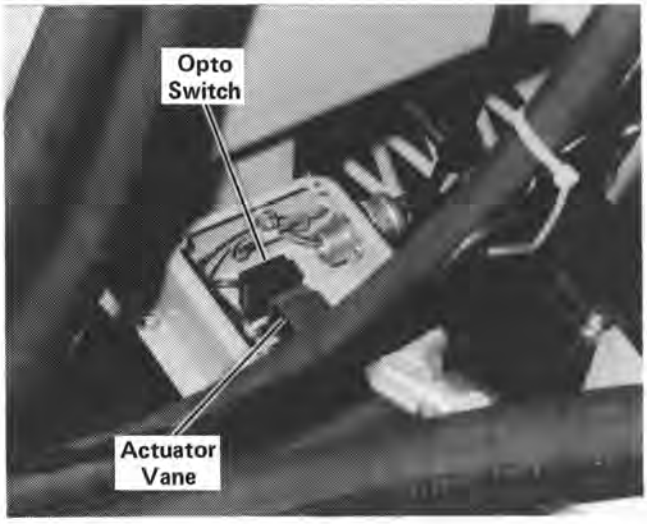


Figure 11

GUNS READY OPTO SWITCHES. The "Guns Ready Opto Switches" tell the logic system that the spiking guns have lowered to where the end of the spike is one to two inches above the tie plate. When the logic system receives the "Gun Ready" input signal, the driving cylinder is stopped at a set position which enables the guns to be accurately spotted. A vane type actuator is attached to the drive cylinder guide rod. See Figure 12. When the drive cylinder rod extends to a point where the spike is approximately one to two inches above the tie plate, the actuator vane will be between the transmitter and receiver obstructing the infra-red light. A special inversion circuit transmits a signal when the transmitter light is blocked. To adjust the "Gun Ready Opto Switch" at each spiking gun proceed as follows:

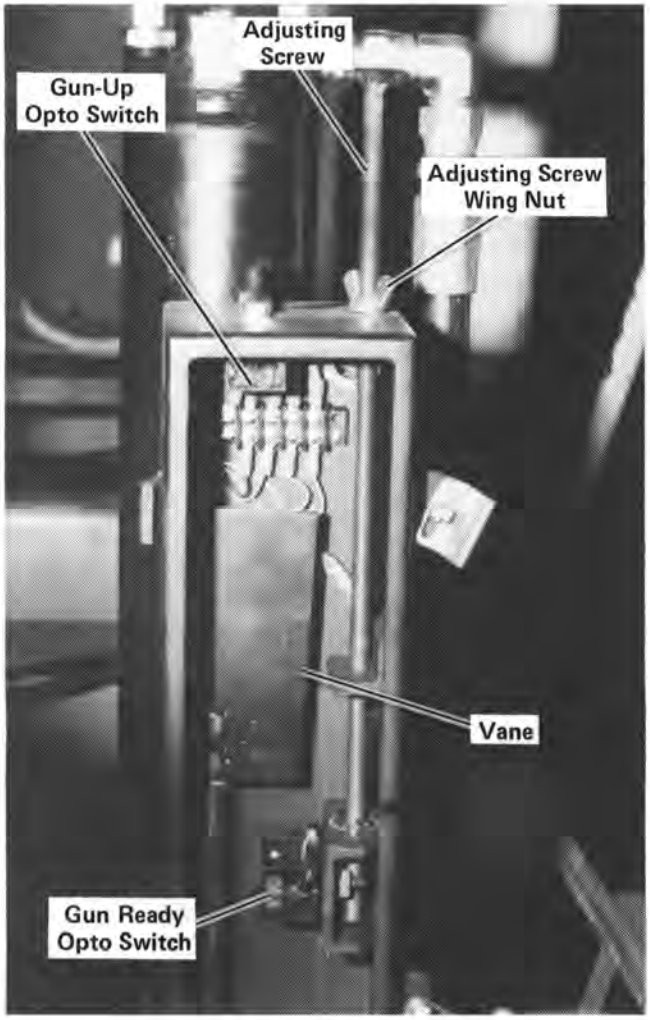


Figure 12

1. Spot the machine so that the spiking guns are approximately aligned with a tie plate.

2. With the engine running and control power on depress the gun trigger to the midway position at the trigger box of the spiking gun to be checked or adjusted.

3. Check the distance between the spike and the top of the tie plate. This distance should be between one and two inches to provide enough clearance between varying tie plates and yet close enough to provide accurate spotting.

4. If the distance is insufficient or excessive turn off the electrical power key switch and:
   a. Back off the adjusting screw wing nut.
   b. Turn the adjusting screw clockwise to decrease the distance and counterclockwise to increase the distance.
   c. Tighten the adjusting screw wing nut.

   The distance the switch is moved will be equivalent to the increase or decrease in distance between the spike and tie plate.

5. With the engine running and control power on initiate a gun ready signal by depressing the gun trigger to the midway position. Recheck the distance between the spike and tie plate. Readjust if necessary.

6. With the engine running and control power on initiate a gun ready signal by depressing the gun trigger to the midway position. Recheck the distance between the spike and tie plate. Readjust if necessary.

GUNS UP OPTO SWITCH. The "Guns Up Opto Switches" tell the logic system that the spiking guns have been retracted to the full up position. When the spiking gun has fully retracted, the actuator vane on the cylinder guide rod obstructs the opto switch light and sends a signal to the feeder logic system which allows a spike to be released into the spike jaws when the spike feeding thumb button is depressed. See Figure 12.

RELEASE THE BRAKES. The brakes can be released hydraulically, mechanically or in combination. If the machine is to be moved a short distance, the brakes can be released hydraulically. If the machine is to be towed for a long distance, the mechanical brake release bolts must be installed to prevent any possible creeping of the cylinder rod. See PREPARATIONS FOR TOWING later in this section for detailed instructions on installing the Brake Release Bolts. The hydraulic hand pump can also be used to relieve spring pressure on the adjustment nuts when installing the Brake Release Bolts. The brake cylinder at each end of the machine must be actuated to release the brakes on all four wheels. Each brake cylinder is released in the same manner as follows:

1. Connect the hose from the hand pump to the disconnect at the brake valve. See Figure 13.

2. Manually shift the brake valve by pushing the manual override pin until it is completely retracted.

3. Move the hand pump control lever downward and begin pumping the hand pump until the spring is compressed and the brake shoes are

released. The brake release bolts can now be installed.

WARNING

When installing the mechanical BRAKE RELEASE BOLTS with the spring compressed hydraulically, be certain not to place fingers or hands between the adjustment nut or any other brake component where the spring could inadvertently extend and cause bodily harm.

4. Disconnect the hose and return it to the tool box.

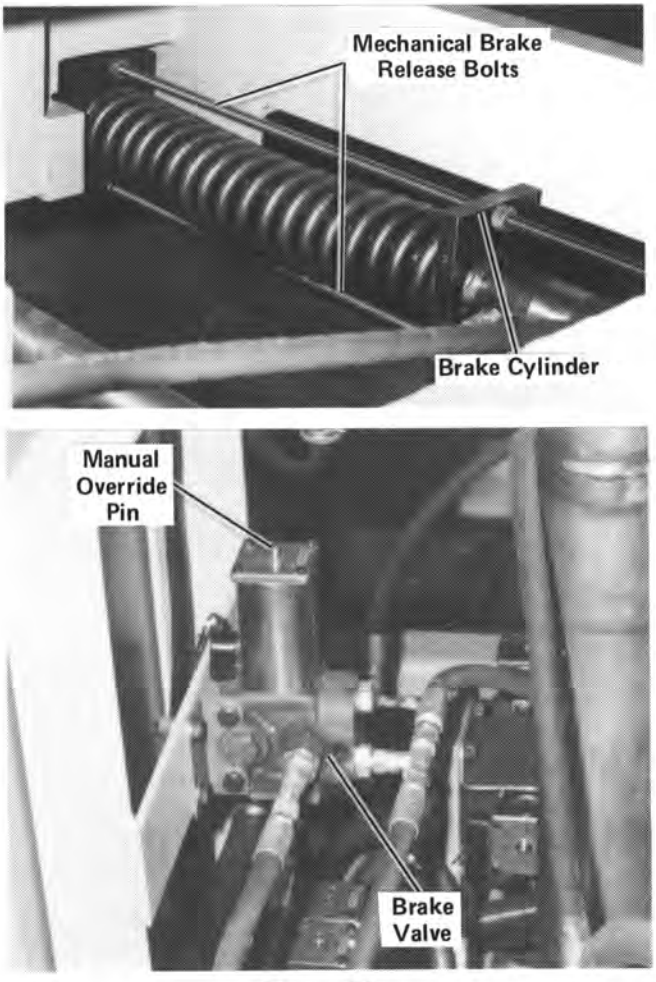


Figure 13

LOWER SET OFF CYLINDER. To lower the set off cylinder and raise the machine proceed as follows:

1. Connect the hose from the hand pump to the disconnect at the top of the set off cylinder. See Figure 14.

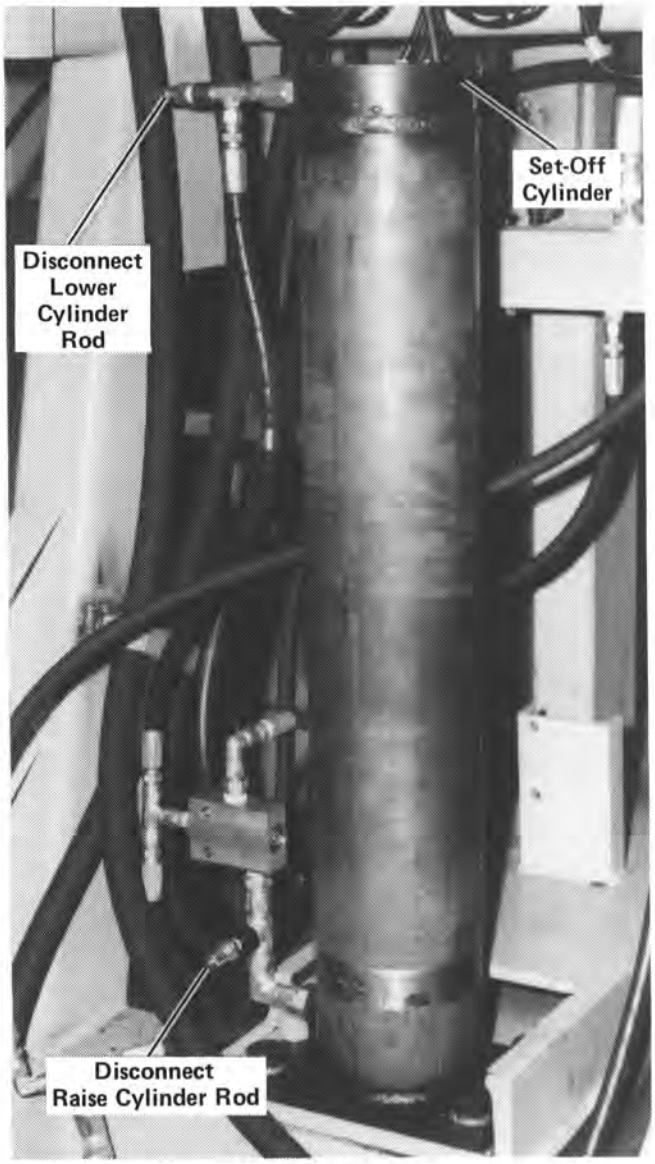


Figure 14

2. Shift the set off cylinder valve handle to the upper detent position. See Figure 4. Pump the hand pump until the machine is raised to the desired distance. The machine can be lowered by moving the hand pump control lever to the upward position.

3. Disconnect the hose and return it to the tool box.

RAISE THE SET OFF CYLINDER. To raise the set off cylinder to clear the ties and ballast proceed as follows:

1. Connect the hose from the hand pump to the disconnect at the bottom of the set off cylinder. See Figure 14.

2. Shift the set off cylinder valve handle to the lower detent position. See Figure 4. Pump the hand pump until the cylinder rod retracts to the full up position. A pilot operated check valve will prevent the cylinder rod from drifting downward.

3. Disconnect the hose and return it to the tool box.

When the set off cylinder is not being raised or lowered hydraulically it is important that the set off cylinder valve handle remain in the lower detent position and securely fastened to the frame lock to prevent accidental extending of the set off cylinder rod.

PREPARING MACHINE FOR PROPELLING OR TOWING

To prepare the machine for propelling or towing long distances proceed as follows:

PROPULSION OR TOWING

Raise the rail hooks and insert the Rail Hook Lock Pins. See Figure 15. The rail hooks will raise to their full up position automatically when the machine is propelled or when control power is first applied. If the rail hooks are not in the up position, the machine can either be propelled a short distance or the key switch can be momentarily turned off and then turned back on. The pins are inserted through the pivot bracket and the main frame. The pivot latch must extend through the frame and pivoted at right angle to pin body to hold the pins in place.

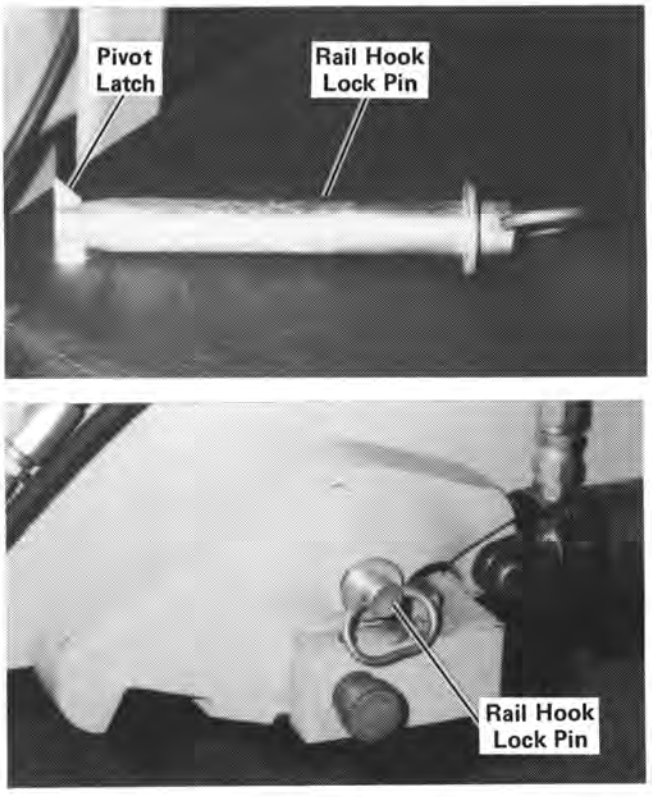


Figure 15

The nipper frames must be locked in the up position. Raise the nipper frame and install the nipper frame lock pin. See Figure 16. Insert a locking pin in nipper frame and turn the pin so that the lockbar is in the channel bracket.

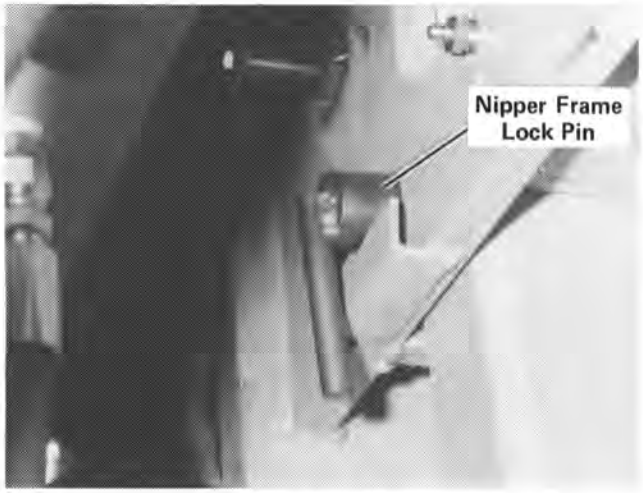


Figure 16

TOWING ONLY. In addition to the items under PROPULSION OR TOWING the following steps must be taken if the machine is to be towed:

1. Leave the propulsion pedal in the released position. Do not depress the pedal while towing even though the engine is not running and the key switch is off. In the center released position the oil pressure that would be generated by the rotating hydraulic motor is circulated directly to tank without any buildup of pressure.

2. While the machine is being towed, leave the key switch in the "OFF" position.

3. Install the "Brake Release Bolts" at each brake cylinder as follows:

   A. Insert the two threaded brake release bolts through the holes in the cylinder plate so that the bolts extend through the plate several inches. See Figure 17.

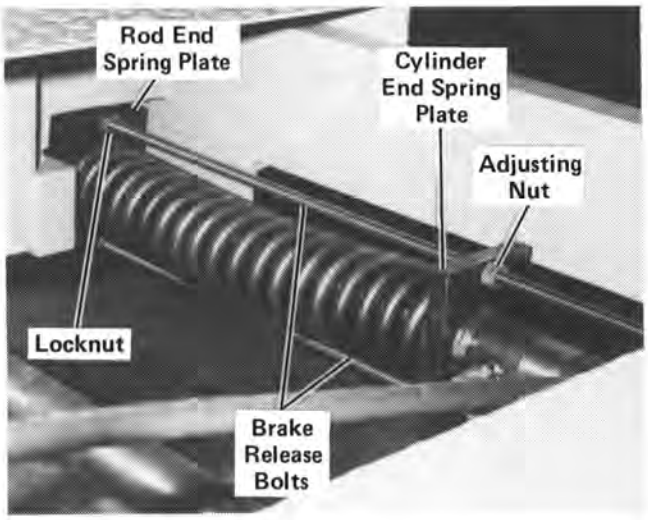


Figure 17

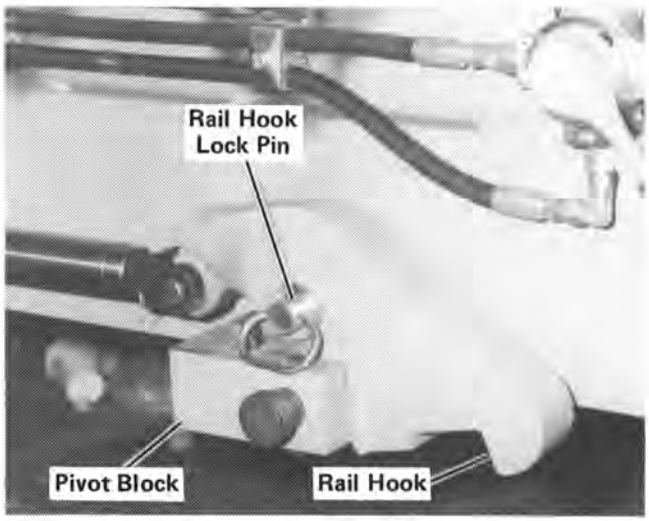


Figure 18

B. Install a locknut onto each end of the threaded brake release bolt that extends through the cylinder plate.

C. Turn the locknuts up on the adjusting bolts so that a minimum of one inch of threads are exposed at each bolt.

D. Thread the ends of the adjusting bolts into the threaded holes of the rod end spring plate. Tighten the locknut.

E. Place an adjusting nut onto the free end of each adjusting bolt and turn (clockwise) until the spring is compressed coil on coil and the brakes are released.

PREPARING MACHINE FOR OPERATION AFTER PROPELLING OR TOWING

PROPULSION OR TOWING. If the machine has just been propelled or towed to the work site, remove the rail hook lock pins from the four rail hooks. See Figure 18. Pull the pins out from the pivot bracket side.

The nipper frame lock pins must be removed from both nipper frames. Remove the locking pin by rotating the pin so that the lockbar is free of the channel bracket and pulling the pin outward. See Figure 16.

TOWING ONLY. If the machine has just been towed to the work site remove the "Brake Release Bolts" as follows:

1. Remove the adjusting nuts from each bolt.

2. Loosen the locknuts.

3. Turn the "Brake Release Bolts" out of the "Rod End Spring Plate".

4. Remove the locknuts off the "Brake Release Bolts".

5. Remove the "Brake Release Bolts" and put all parts in the tool box.

SPIKING PROCEDURE

After all preparations have been made as listed under "PREPARING MACHINE FOR OPERATION AFTER PROPELLING OR TOWING" and all necessary adjustments have been made as described under "ADJUSTMENTS", spiking operations may begin as follows:

1. Energize the electrical system, start the engine and set the throttle to the high idle normal run position. With the electrical system energized all four spiking guns will raise to their full up position in response to a momentary input signal to the logic system. The rail hook valve will be in "Hooks Up" position raising the rail hooks.
2. Propel to the tie location and align the tie with the nipper hooks. The tie nippers are used to raise a tie that is either below the rail base or is not resting on well tamped firm ballast. When a tie is low or not on a solid base, it must be held securely to the rail base so that the spikes will be fully driven into the tie. The nipper sequence is correlated into the spike driving sequence following Step 2. To nip the tie proceed as follows:

A. Depress the "Hooks Close" thumb button on the right hand trigger box to insure that the hooks are open and nipper frame is in the maximum up position. See Figure 19.

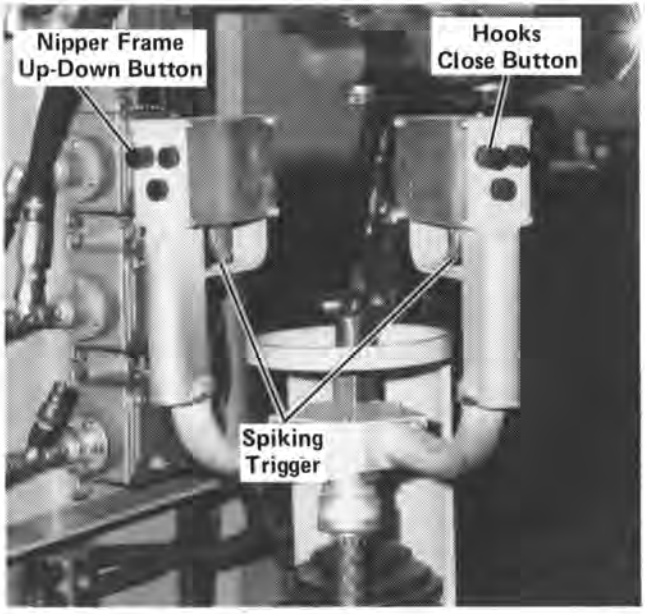


Figure 19

B. Propel the machine so that the hooks will be in a position to fully straddle the tie.

C. Depress the "NIPPER FRAME" thumb button and hold in this position until the nipper hooks are properly positioned around the tie then release the thumb button. The "NIPPER FRAME" cylinder will stop in the position to which it has progressed at the time the button is released.

D. Depress the "HOOKS CLOSE" thumb button and hold in this position. When the hooks are fully clamped around the tie, depress the "NIPPER FRAME" thumb button. This must be done while the "HOOKS CLOSE" thumb button is also depressed. The combination of these two signals will cause a "NIPPER FRAME UP" output which will raise the nipper frame and pull the tie against the rail base. Once the tie has been raised firmly against the rail base both the "NIPPER FRAME UP" thumb button and the "HOOKS CLOSE" thumb button should be released.

E. After the spikes have been driven, steps 3 through 6, under "Spiking Procedures", depress the "HOOKS CLOSE" thumb button. The recycle flip-flop will energize the "HOOKS OPEN" and the "NIPPER UP" output signals releasing the tie and raising the nipper frame. Once the maximum up position of the nipper frame is reached, release the "HOOKS CLOSE" thumb button.

3. Pull the trigger at any one of the four trigger boxes back to the detent position. This is approximately the midway position and is located by the feel of slight resistance. Hold the trigger in the detent position until the gun stops automatically with the spike a few inches above the tie plate. The gun drive output signal at any of the guns will actuate the rail hook cylinders and the rail hooks will now engage the rail. The gun trigger can now be released as the gun ready input signal will hold the gun in a set position until the logic receives the drive signal.

4. Spot the guns so that the spikes protruding out of the spike jaws are in alignment with the proper holes in the tie plate.

5. Drive the spikes at all four guns by pulling the finger trigger all the way backward and hold until the spike at each gun as been driven flush with the tie plate.

NOTE

Due to variance in tie plate hole location or in the position of the tie plate itself, both driving guns at either rail may not always line up with both tie plate holes. For this reason, it may be necessary to operate each gun separately and further align the second gun after the first spike is driven. In the case of single shoulder plates, drive the inside spikes first. If the machine and rail lifts up when the spikes are driven simultaneously, drive one spike slightly ahead of the second spike.

6. When the spike heads are driven flush with the tie plates, release the trigger at each gun. Releasing the triggers will shut off the gun drive input signal and the spiking guns will automatically return to their up position. Once the spiking guns have fully retracted the spike feeder thumb button can be depressed and released to load one spike into the jaws and another into the ready position.

7. Propel to the next tie location. Depressing the

propulsion pedal will release the brakes, release the rail hooks, and propel the machine.

8. When the machine has reached the new tie location, repeat the procedure.

SETTING THE MACHINE OFF THE TRACK

To set the Hydra-Spiker off the track proceed as follows:

1. Select a solid area upon which to build the set-off crib, or erect the set-off stand, if so equipped.

2. If possible locate the crib or the set-off stand so that its center aligns between two good level ties on which the turntable can straddle.

3. Place the set-off rails squarely on the crib or the set-off stand.

4. Spot the Hydra-Spiker on the track so that the turntable aligns with the center of the set-off rails and will straddle two ties. If the ties are of unequal height, it may be necessary to shim one tie so that the turntable will bear on a level surface. If two ties cannot be straddled, level and tamp a suitable area between the ties.

5. The operator raises the machine on the turntable by moving the set-off cylinder selector valve lever to the upward position. This will lower the cylinder and raise the machine. When the machine is raised to full height, it is manually turned 90 degrees.

6. Place the run-off rails in the proper position under the wheels and connect the run-off rails to the set-off rails.

7. Place the tie bars in position on the set-off and run-off rails.

8. Move the set-off cylinder selector valve lever to the downward position. This will withdraw the cylinder and lower the machine onto the run-off rails.

9. Run the machine off onto the crib under its own power and block the wheels.

10. Remove the run-off rails to clear the track.

11. Place the padlock through the set-off cylinder valve stop bar and around the valve handle. The padlock insures that the valve will be in the cylinder pressure up position when not in use.

MACHINE MAINTENANCE

HYDRAULIC SYSTEM

The hydraulic system uses SAE-10W non-detergent regular engine oil. The oil tank should be filled with 38 gallons of oil. When the oil tank is filled properly, the oil level will be at the full mark on the oil tank dipstick. It is important that the hydraulic system be kept clean and free from dirt and moisture. There are three oil filters in the hydraulic system which should be changed when conditions warrant. The three filters consist of: the large pump and small pump suction filter, the small pump in line pressure filter and the large pump return line filter. See Figure 20.

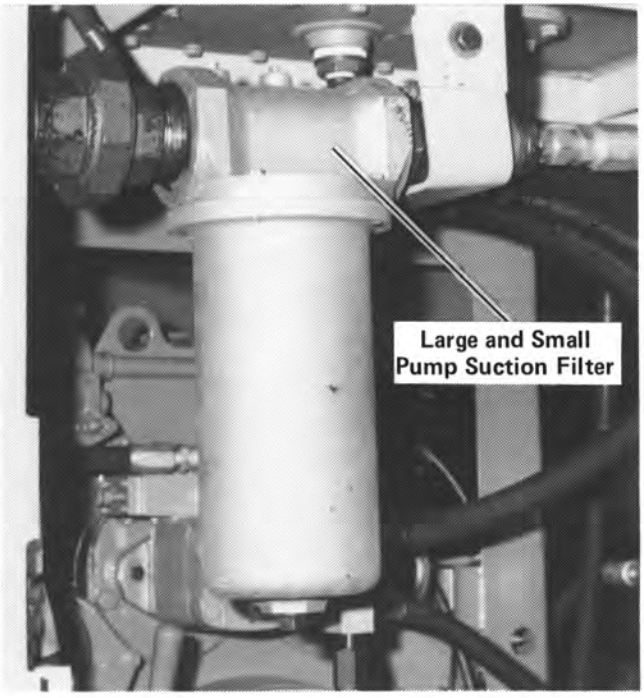
A periodic inspection must be made to determine whether the filters are starving the pumps of their proper oil supply which would slow down the function of the machine. Inspect the filters after the first 40 hours of operation and monthly thereafter. These inspections will determine any change in frequency of inspections which are necessary.

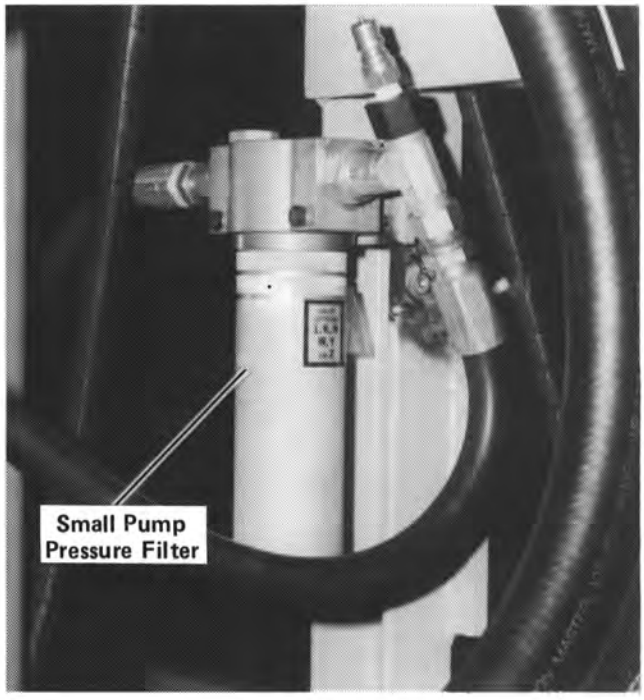
ENGINE

Follow the instructions given in the engine manufacturer's manual as to type and grade of oil, frequency of changing the level for both the crankcase and the air cleaner.

RIGHT ANGLE GEAR DRIVE

Two fittings one at each drive. Grease lubricated. See Note 1.


Large and Small
Pump Suction Filter


Small Pump
Pressure Filter

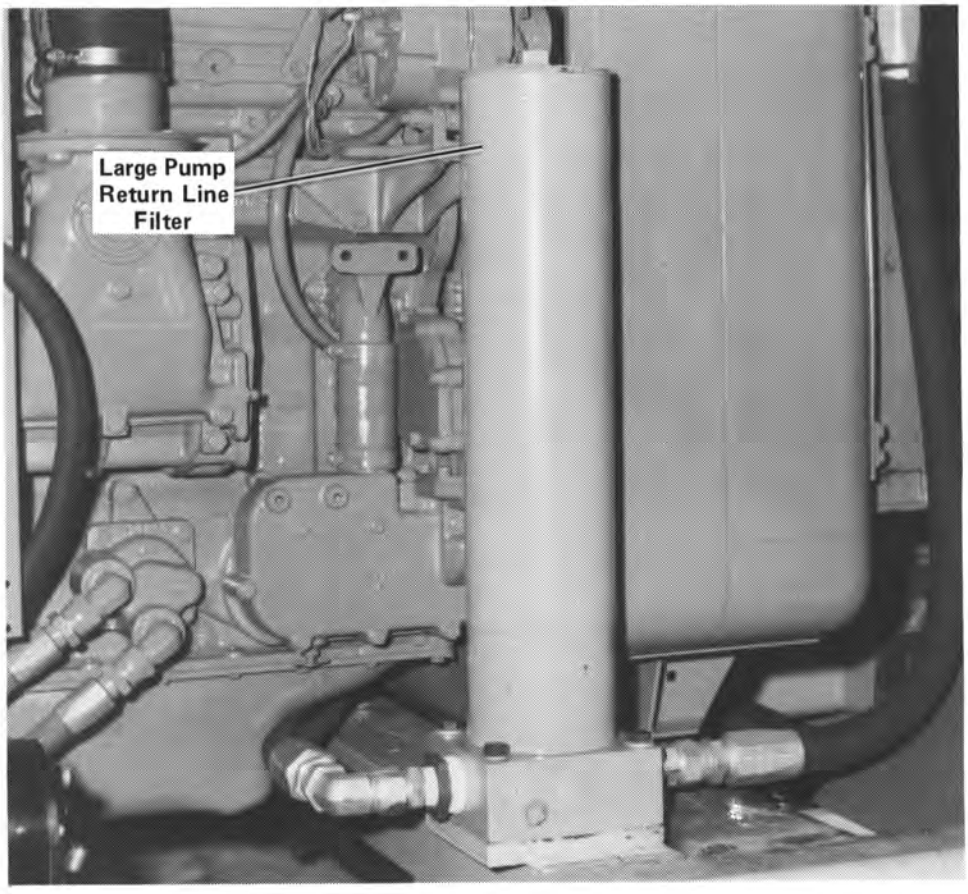

Large Pump
Return Line
Filter

Figure 20

Lubricate with pressure grease gun every 3 months or 500 hours of operation. Add grease until the old grease is forced out around shaft openings. See Figure 21.

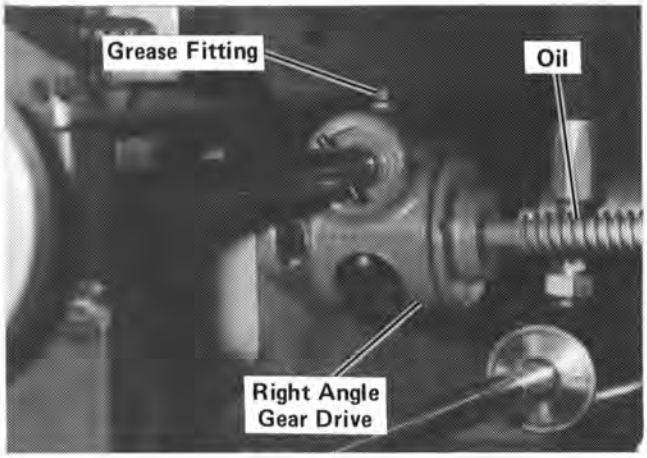


Figure 21

BRAKE SYSTEM

To assure maximum braking efficiency, periodic inspection of the brake shoes must be made to determine the amount and type of wear at each wheel. Although designed for minimum wear, inspection of each brake shoe on a 6 month basis is suggested. Brake shoes must be replaced when the lining material approaches 1/4 inch thickness.

PROPULSION PEDAL PIVOT PIN

Oil lubricated. See Note 2.

Weekly or every 40 hours of operation apply oil around each end of the propulsion pedal pivot pin at both propulsion pedals. See Figure 22.

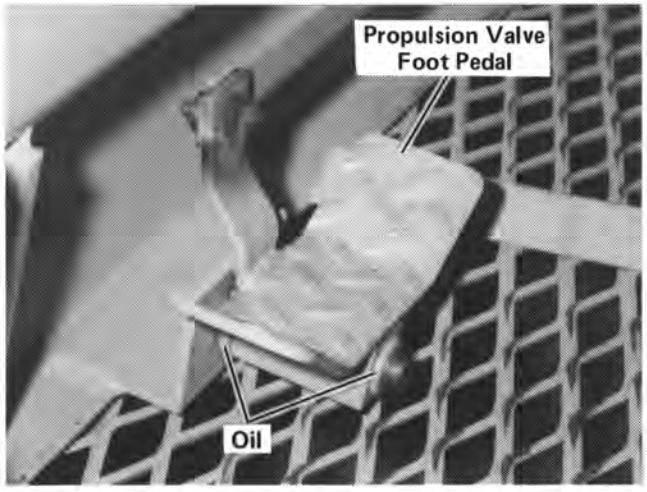


Figure 22

PROPULSION ROLLER CHAIN

Oil lubricated. See Note 2.

Monthly or every 200 hours of operation apply a liberal coat of oil to the roller chain links and pins with brush soaked in oil. See Figure 23.

PROPULSION CHAIN ADJUSTING SCREW

Grease lubricated. See Note 1.

Monthly or very 200 hours of operation apply a coat of grease to the propulsion chain adjusting screw threads. See Figure 23.

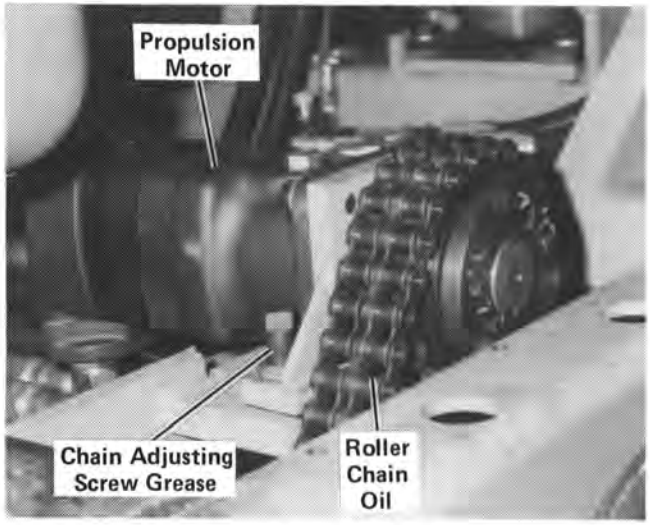


Figure 23

AXLE PILLOW BLOCK

Four fittings, one each pillow block. Grease lubricated. See Note 1.

Every 3 months or every 1000 hours of operation lubricate the axle pillow block anti-friction bearings. The pillow block will contain the correct amount of grease when the lubricant begins to come out the seals. See Figure 24.

NIPPER FRAME AND NIPPER HOOKS

Grease lubricated. See Note 1.

Four fittings, one on each nipper hook, plus one fitting nipper frame guide.

Every 3 months or every 1000 hours of operation lubricate with a pressure grease gun the four nipper hooks and the nipper frame. Add grease until the

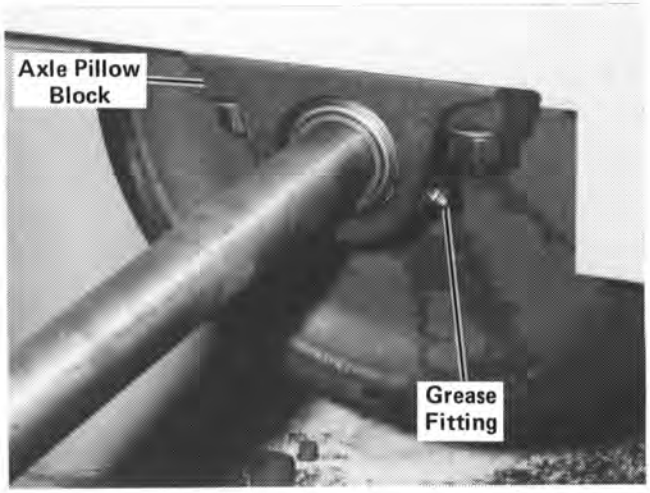


Figure 24

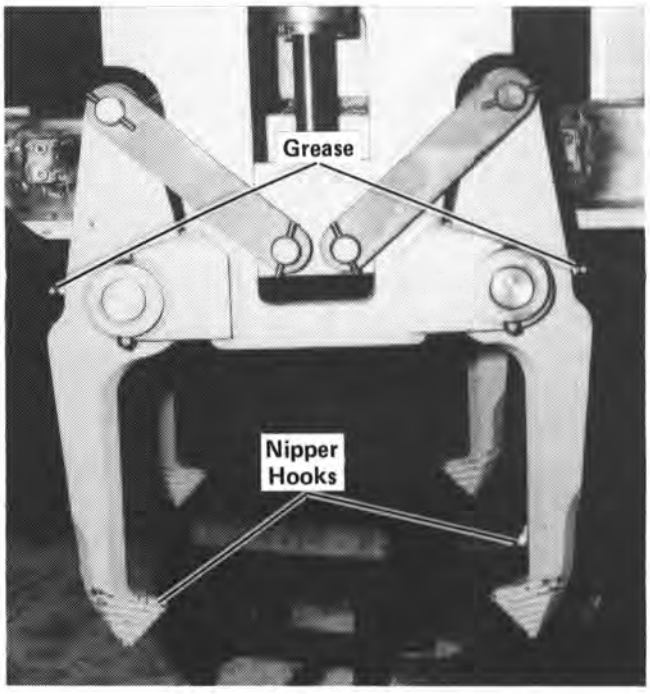
old grease is forced out around shaft openings. See Figure 25.

NOTE 1

GREASE FITTINGS — The grease fittings should be serviced with a multipurpose type grease suitable for anti-friction and sleeve bearing applications. Check with your local supplier for recommendations on the proper lubricant. The grease fittings should be wiped clean before servicing. When servicing sleeve bearing fittings, inject a sufficient quantity of lubricant to force the old grease out until the new clean grease is visible. When servicing anti-friction bearings encased in housings, the bearing cavity will contain the correct amount of grease when the lubricant begins to come out the seals.

NOTE 2

OIL LUBRICATED COMPONENTS — Engine oil should be applied to the oil lubricated components at the friction surfaces of the moving parts.



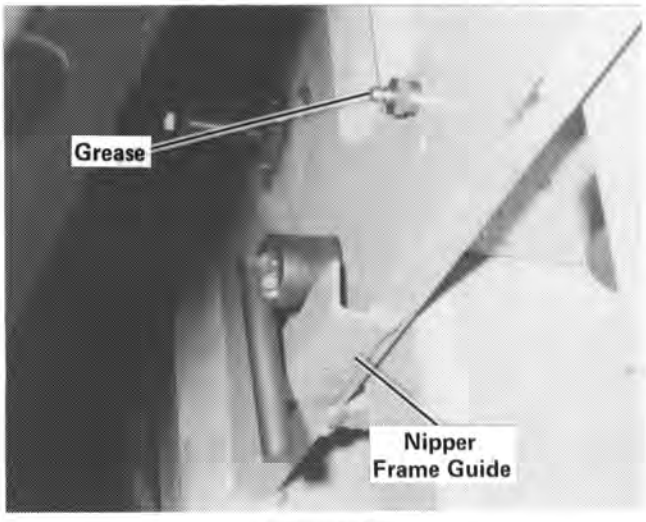


Figure 25

HYDRAULIC SYSTEM

DESCRIPTION

The hydraulic system utilizes two engine driven pumps to supply oil under pressure to the various hydraulic cylinders and motors. The pilot pump is connected to the individual devices in the system in a parallel type hookup. That is, the pressure inlet of each individual valve is connected directly to the pump and the outlet side of the valve is connected directly to tank. Since the inlet of one valve is not connected to the outlet of a preceding valve in the circuit, the valves can be operated simultaneously.

The main pump is connected to individual devices in the system in a series type hook up. That is, the pressure inlet of one valve is connected to the outlet side of the previous individual valve in sequence. Therefore, all functions performed with oil from the main pump can only be started when the previous function has been completed.

Flow from the large pump is divided into separate flows which are simultaneously directed to: the rail

clamp cylinders, and left hand and right hand driving cylinders, the hi-speed propulsion, the nipper frame and nipper hook cylinders. The small pump directs oil to the brake cylinders, left hand and right hand spotting cylinders, feeder and escapement, set-off cylinder and working speed propulsion.

The brakes are spring set with hydraulic release. The brakes are hydraulically released in response to an electrical signal from the propulsion system.

Operation of the driving cylinders, the nipper cylinders and the rail hook cylinders are controlled through a logic system in response to input signals received from various opto switches and pressure switches. The remaining cylinders are controlled by manually operated hydraulic valves.

Pressure to various devices in the system are held at levels controlled by relief valves. It is important that the pressures are accurately maintained at the levels recommended for safe and proper operation of the machine. A detailed testing and adjusting procedure is given under TEST PROCEDURE. Read and follow these instructions carefully.

TEST PROCEDURE

GENERAL. In order that the test procedure can be accurately conducted, the following steps must be taken:

1. Check to be sure that the manually operated shut-off valve from the tank is fully open. There is one shut-off valve for the large and small pump systems.

2. Start the engine and run at idle speed, 1100 RPM, for 15 minutes.

3. If the cold start valve is opened prior to starting the engine, make certain it is closed tightly.

4. Position the throttle at operating speed 2250 RPM.

PILOT PUMP SYSTEM PRESSURE. To test and adjust the small pump system pressure proceed as follows:

1. Install the pressure gauge on the pressure tap at the small pump pressure filter as shown in Figure 26.

2. Loosen the locknut on the small pump compensator and turn the adjusting screw outward (counterclockwise). See Figure 27.

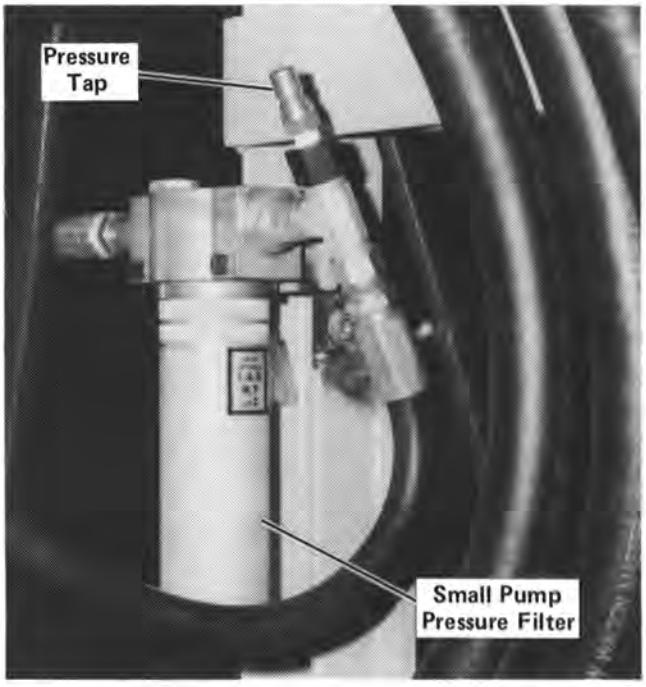


Figure 26

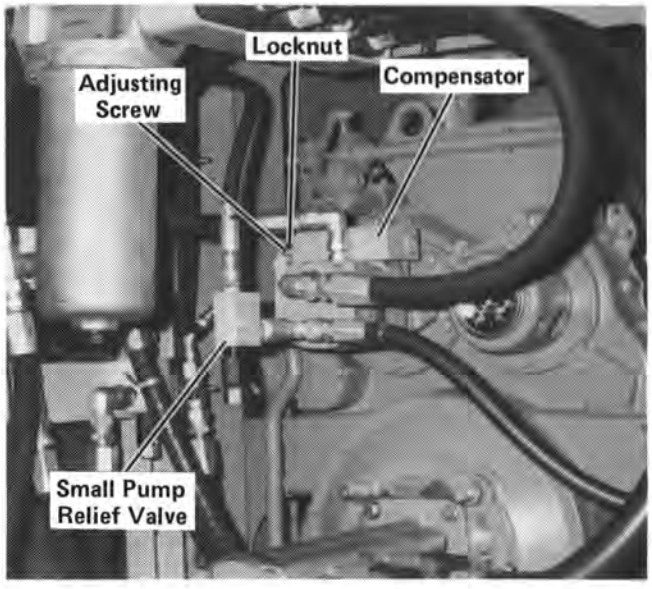


Figure 27

3. At the small pump system relief valve, loosen the locknut and turn the adjusting screw all the way inward (clockwise).

4. Start the engine and begin turning the small pump compensator adjusting screw inward (clockwise) until the pressure at the gauge reads 2350 psi.

5. Turn the small pump system relief valve adjusting screw outward (counterclockwise) until the pressure at the gauge begins to lower. Tighten the relief valve adjusting screw locknut.

6. At the small pump compensator turn the adjusting screw outward (counterclockwise) until the pressure at the gauge reads 2000 psi. Tighten the locknut.

MAIN PUMP PRESSURE. To test and adjust each section of the main pump proceed as follows:

1. Install the pressure gauge on the pressure tap at the first pump section, (nearest pump shaft) relief valve. See Figure 28.

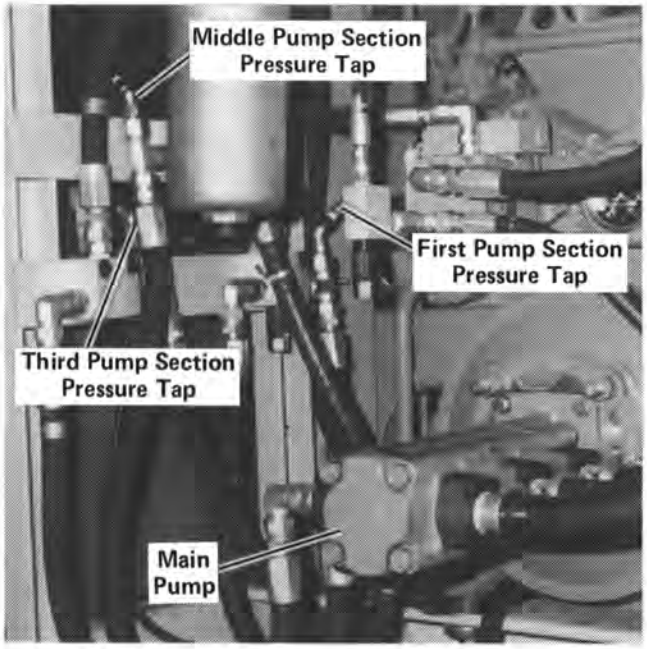


Figure 28

2. Loosen the locknuts on all three main pump relief valves and turn the adjusting screws outward (counterclockwise).

3. To set the main pump system pressures the oil flow from each pump section must be blocked. On the first pump section this can be accomplished by performing the following:

   A. With engine at full rpm, manually extend a driving cylinder on the right side of the machine (viewed from engine end). By pushing the manual override pin on the driving valve until it is completely retracted. See Figure 29.

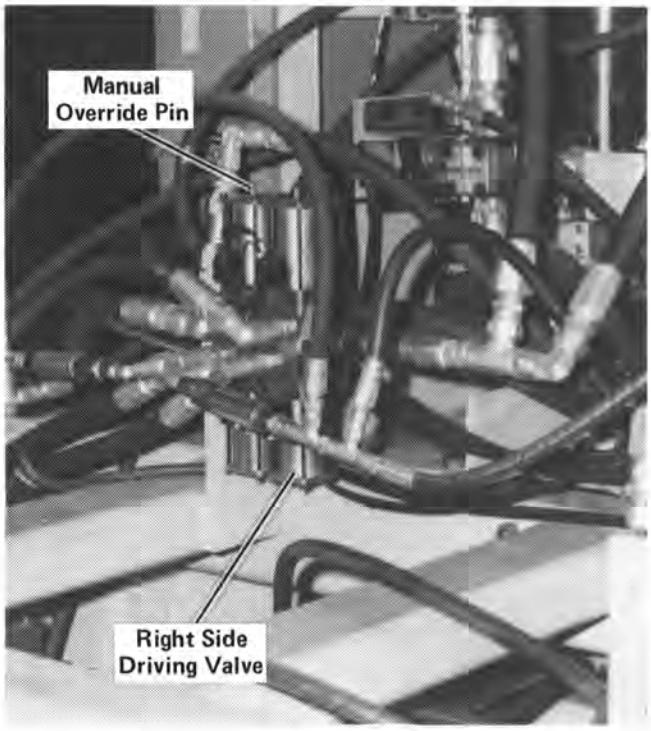


Figure 29

   B. While holding the override pin in begin turning the first pump section relief valve adjusting screw inward (clockwise) until the pressure at the gauge reads 2000 psi. Tighten the adjusting screw locknut.

4. Install the pressure gauge on the pressure tap at the middle pump section relief valve. See Figure 28.

   A. With the engine at full rpm, manually extend a driving cylinder on the left side of the machine (viewed from engine end) by pushing the manual override pin on the driving valve until it is completely retracted. See Figure 30.

   B. While holding the override pin in begin turning the middle pump section relief valve adjusting screw inward (clockwise) until the pressure at the gauge reads 2000 psi. Tighten the adjusting screw locknut.

5. Install the pressure gauge on the pressure tap at the third pump section relief valve. See Figure 28.

   A. With the engine at full rpm, manually open or close the nipper hooks by pushing the manual override pin on the nipper valve

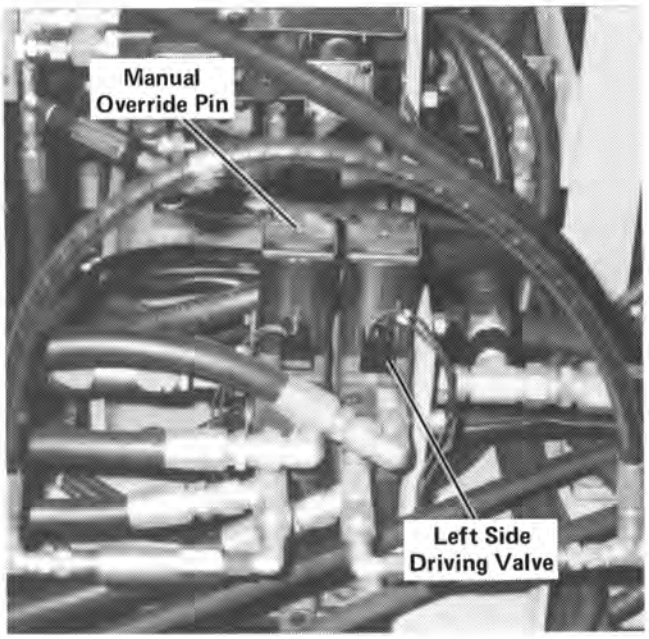


Figure 30

until it is completely retracted. See Figure 31.

B. While holding the override pin in begin turning the third pump section relief valve adjusting screw inward clockwise until the pressure at the gauge reads 2000 psi. Tighten the adjusting screw locknut.

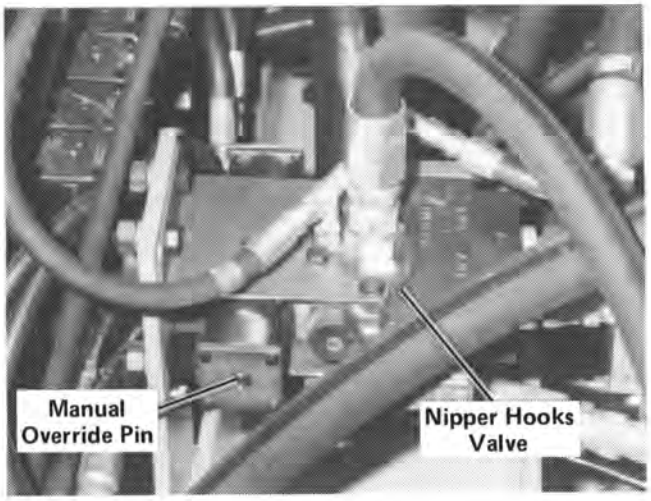


Figure 31

PROPULSION SYSTEM. To assure sufficient pressure to both propel the machine and release the brakes, it is necessary to adjust the propulsion system flow control valve.

1. Loosen the locking screw and turn the knob inward (clockwise) until it stops. See Figure 32.

2. Turn the knob outward (counterclockwise) three complete turns. Tighten the locking screw.

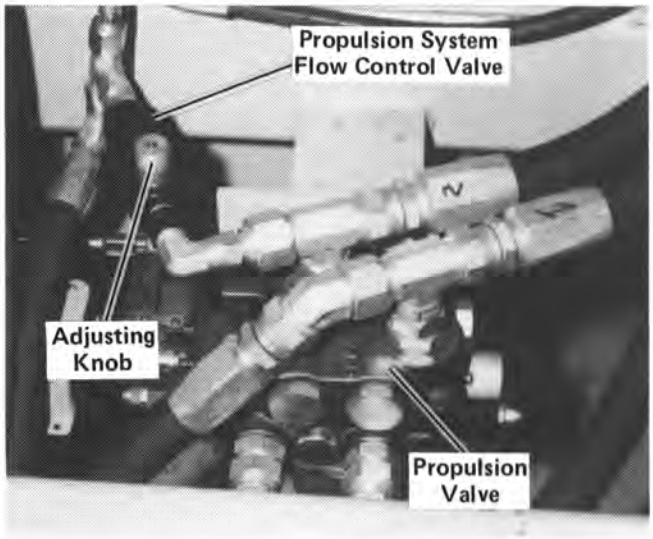


Figure 32

RAIL HOOKS DOWN PRESSURE & CLAMPS LOW PRESSURE SWITCH SETTING. The rail hooks do not clamp the rail but instead hook the rail under the rail ball. Since the hooks engage the rail without meeting any resistance high rail hooks down pressure unnecessary. To test and adjust the rail hooks down pressure proceed as follows:

1. Install the pressure gauge on the pressure tap at clamps low pressure switch. See Figure 33.

2. Turn the clamps low pressure switch adjusting wheel to a setting of approximately 1000 psi.

3. Lower the rail hooks by briefly placing one of the gun triggers in the detent position. The logic system will maintain the valve in a "Hooks Down" pressurized state after the gun trigger is released. The clamps low pressure switch shuts off the clamps down solenoid.

4. Loosen the locknut on the clamps pressure reducing valve and turn the adjusting screw inward (clockwise) to increase the pressure or outward (counterclockwise) to decrease the pressure until the pressure on the gauge reads 300 psi. Tighten the locknut. See Figure 34.

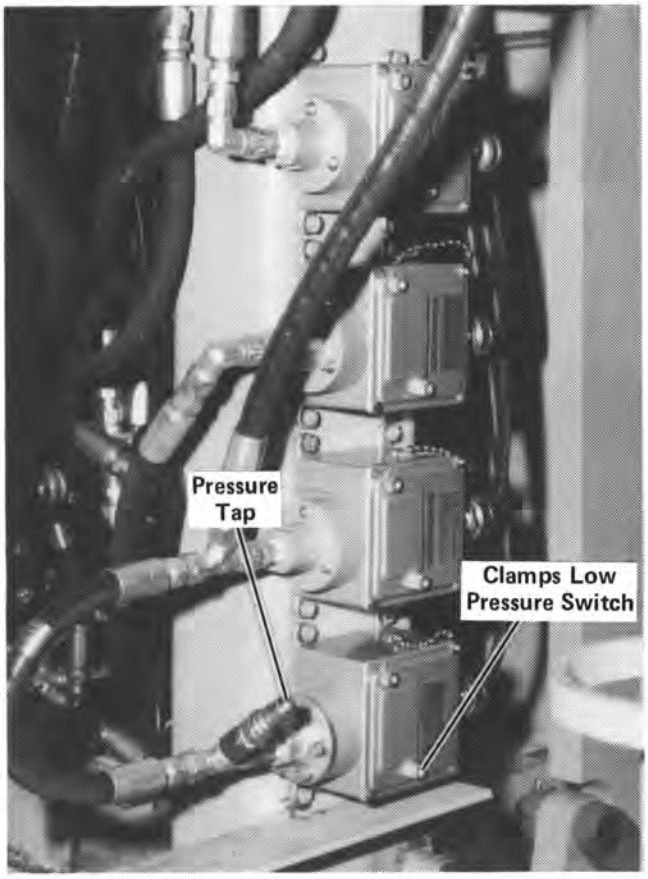


Figure 33

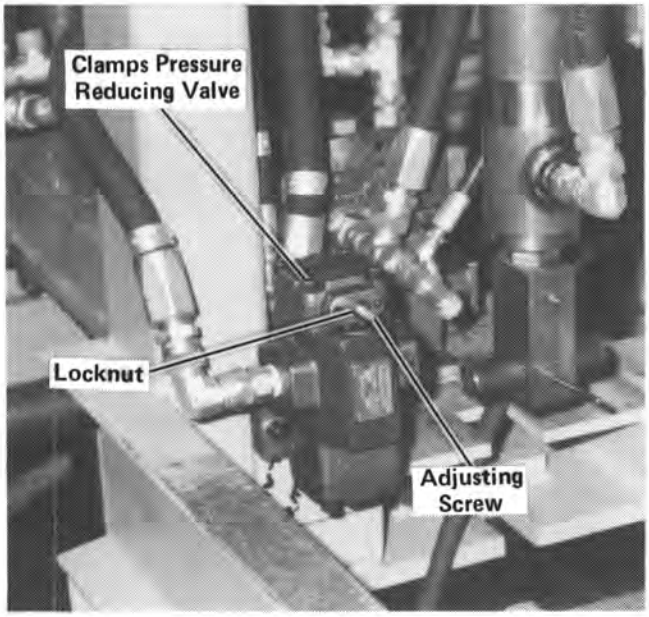


Figure 34

5. Turn the clamps low pressure switch adjusting wheel until the clamps down output light on the logic board goes off.

NIPPER FRAME DOWN PRESSURE. The nipper frame cylinder requires sufficient down side pressure to force the nipper hooks through the ballast and around the tie. To test and adjust the nipper frame down pressure proceed as follows:

1. Install the pressure gauge on the pressure tap at the top of the nipper frame cylinder. See Figure 35.

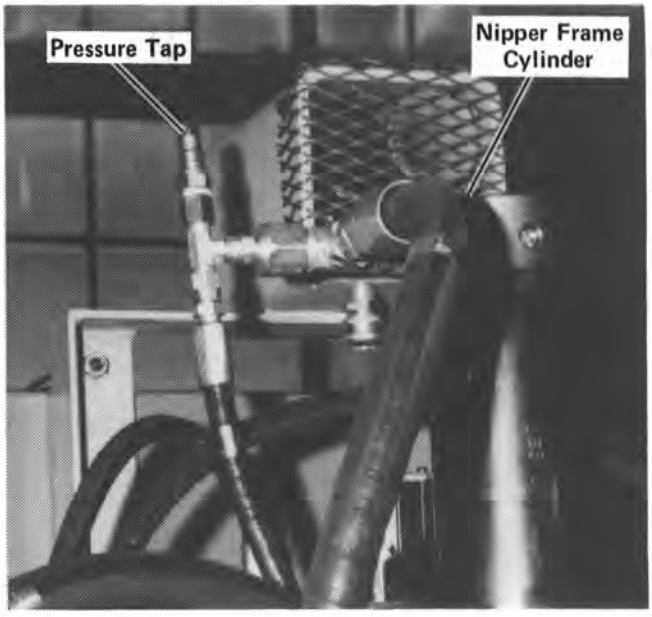


Figure 35

2. Spot the machine so that the nipper hooks will straddle a tie.

3. Depress and hold the nipper frame thumb trigger inward.

4. If the pressure is less or greater than 1200 psi, loosen the locknut and turn the adjusting screw inward (clockwise) to raise pressure and outward (counterclockwise) to lower pressure.

5. When the pressure has been adjusted to 1200 psi, tighten the adjusting screw locknut.

NIPPER FRAME UP PRESSURE. Refer to the ADJUSTMENTS Section for full information on adjusting the nipper frame up pressure. Since the nipper frame up pressure will vary with the hardness and condition of tie that is being handled, the adjustment of this valve is included in the ADJUSTMENTS Section.

ELECTRICAL SYSTEM

TERMINOLOGY

OPTO SWITCHES. A photocell device which generates a small current when detecting light. The opto switches are responsible for transmitting input signals to the logic system when mechanical members of the machine are at their desired positions. See opto switches in the ADJUSTING INSTRUCTIONS section for more detailed information.

PRESSURE SWITCHES. The pressure switches are activated on rising pressure and will transmit an input signal when the prescribed rise in pressure has been reached. The input signal will remain on as long as the pressure is equal or above the prescribed contact closing pressure. Once the pressure is removed or reduced below the contact closing pressure the input signal will be discontinued.

PILOT LIGHTS. The pilot lights at the logic board show the progress of the operating sequence. The input pilot lights are lit when a function has been initiated and completed and the output pilot lights are lit when a function is in progress.

INPUT SIGNAL. A signal from the opto switches or pressure switches to the logic. The input signals tell the logic that a particular function has been satisfactorily completed and the next sequenced function can begin. When an input signal is transmitted, the corresponding pilot light at the left side of the logic board is lit. The pilot light will remain lit as long as the mechanical device maintains its position.

LOGIC. The logic is a system of semiconductor switching devices which are referred to as gates. When the gate is opened or on, an output signal is transmitted. The opening of the gate will depend on receiving the right combination of input signals or in some cases the absence of the right combination of input signals will transmit an output signal.

In some instances all input signals have to be present to open a gate and in other cases only the one signal need be present to open the gate. The logic reads the input signals and decides when and what output signal should be transmitted in response to the input signals.

FLIP-FLOP. The flip-flops are an integral part of the control logic. The flip-flops will be turned on when they each receive their own prescribed combination of input signals. The flip-flops will remain on even after the input signals, which turned them on, are discontinued. The flip-flops can only be turned off by receiving a set of input signals which are specifically designated to turn them off.

OUTPUT SIGNALS. The output signals originate from the logic and are directed to various solenoid valves. The output signals tell the machine to carry out an operation. When an output signal is transmitted the corresponding pilot light at the right side of the logic board is lit.

SOLENOID VALVES. The solenoid valves are controlled by the output signals from the logic. The solenoid valves are shifted when the solenoid is energized. Hydraulic oil is then directed to a hydraulic cylinder and a function is performed. When the solenoid is de-energized the valve centers and cylinder rod travel is stopped.

LOGIC SEQUENCE CHART. The logic sequence chart enable the operator to identify what the machine is doing by the "Off/On" condition of the pilot lights. The "Conditions" area indicates what devices are energized and what hydraulic cylinders are activated in relation to the energized or de-energized condition of the pilot lights. The sequence chart describes one complete operating cycle step-by-step as it occurs during actual operation.

DESCRIPTION

Both fixed and variable gager are designed to gage or regage on old or new rail conditions. Although both gagers perform the same function, how it is accomplished varies with each unit. Each optional gager is electronically controlled and easily integrated into the basic spiking operations as the whole gaging sequence is completed after one of the hand controller triggers is pulled to the detent position.

Each gager sets the rails at the proper gage in two separate and distinct steps. The first step involves moving the unspiked rail inward to a position where the rails are slightly under gage. This insures that if the rails are over gage they will be set in a position within the extension limits of the center linkage. During the second step the center cylinder and linkages push the unspiked rail outward to precise gage. An electronic logic system directs the various electrical devices through the sequence and automatically monitors any abnormal conditions.

MAIN OPERATING CONTROLS

HI-LOW PRESSURE SELECTOR VALVE. The lever operated valve located on the frame member at the left hand operators station is the Hi-Low Pressure Selector Valve. See Figure 36. This manually operated valve is provided to select the proper pressure range available to the gaging side cylinders during either the spiking or gaging operations. To direct high pressure oil to the gaging side cylinder, the valve handle must be pushed upward, completely extending the valve spool. The selector valve is detented and the handle will remain in this position when released. To properly move the rail to less than gage with the side cylinder the valve handle must remain in the up position. When not gaging, but rather using the side cylinder levers as rail clamps, the low pressure circuit is used to prevent tipping or pushing the rail to less than gage. During this operation move the valve handle downward or to the horizontal position completely retracting the valve spool. As in the gaging operation the valve handle must remain in this position during the clamping operating or when the side cylinder levers are pinned in the up position.

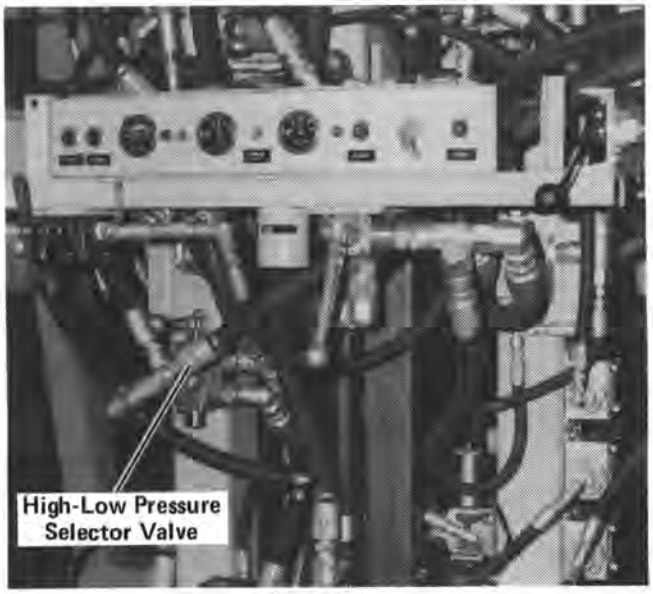


Figure 36

GAGER CONTROL THUMB BUTTON. The "Gager Control" thumb button is located at the back side of the left hand trigger box at each gun control assembly. See Figure 3. The gager controls can be operated from either operators station. The "Gager Control" thumb button has two positions. There is one opto switch (gager on), that is exposed or obstructed as the button is moved to its alternate positions. In the free released position the "Gage Control" opto switch is obstructed. Depressing the button exposes the opto switch and an input signal is sent to the logic system. This input signal indicates to the logic that the arms high pressure switch will now control the movement of the center section allowing the rail to be pushed to gage. Depressing the "Gager Controls" button to expose the opto switch will place the logic in the gager mode indicated by the green light on the main logic box or the meter box assembly being lit.

AUXILIARY CONTROLS

PRESSURE SWITCHES. There are two pressure switches used on the standard machine, two additional switches used on the optional variable gager and three additional on the optional fixed gager. See Figure 37. The clamps low and the arms high pressure switches are used on the gager equipped machines as well as the standard machines and are adjusted the same on either machine. The pressure switches indicate when a function has been completed or that an abnormal condition may exist. It is the responsibility of the pressure switches to de-energize a particular solenoid valve when the pressure at the switch reaches the prescribed set point sending an input signal to the logic system. There is always a sharp rise in pressure when a cylinder is first actuated due to the increased force necessary to overcome the initial resistance of

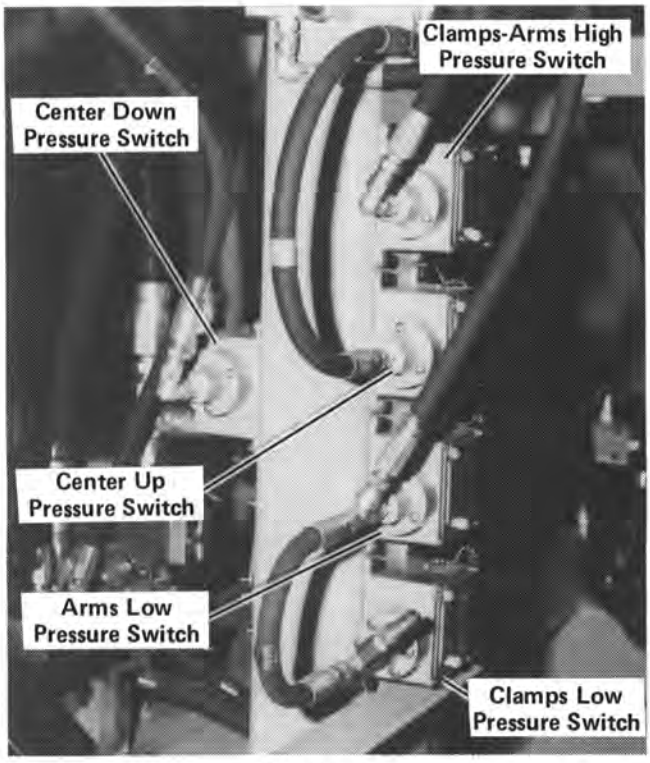


Figure 37

inertia. The pressure settings that are given in the adjusting instructions have taken into account the various pressure peaks during normal operation. It is important that these pressure settings are followed to avoid a false operating signal.

OPTO SWITCHES

ARMS "OK" OPTO SWITCHES. The arms "OK" Opto Switches are mounted to a plate in the deck well at the left and right hand operators station. See Figure 38. The right and left arms "OK" opto switches in conjunction with the arms low pressure switch tell the logic system that the gager side cylinder levers are either bearing against the rail web or against a joint bar. If the gager were permitted to push against a rail joint bar the rail would be positioned significantly over gage. If the gager levers are against the rail web the opto switches send a signal to the logic system and the sequence will go to completion. If the side cylinder begins to extend and either lever contacts a joint bar the opto switches cannot send a signal to the logic system and it is determined that the side cylinder levers are not positioned properly and the sequence is aborted. It is necessary to then move the machine to a new position where a joint bar will not be contacted.

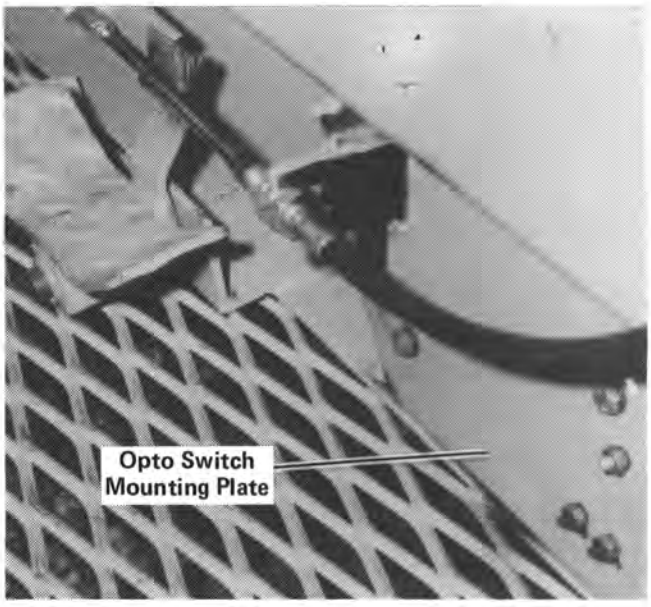


Figure 38

A vane attached to the movable side cylinder levers passes between the receiver and transmitter which are fixed to the frame. See Figure 39. When the cylinder extends a prescribed amount the vane will be between the transmitter and the receiver obstructing the light and transmitting an input signal to the logic system. At each opto switch there are two groups of holes for mounting the opto switch. These two positions will provide locations necessary to gage all rail sizes and conditions. A determination prior to actual gaging must be made as to which mounting best covers each operation.

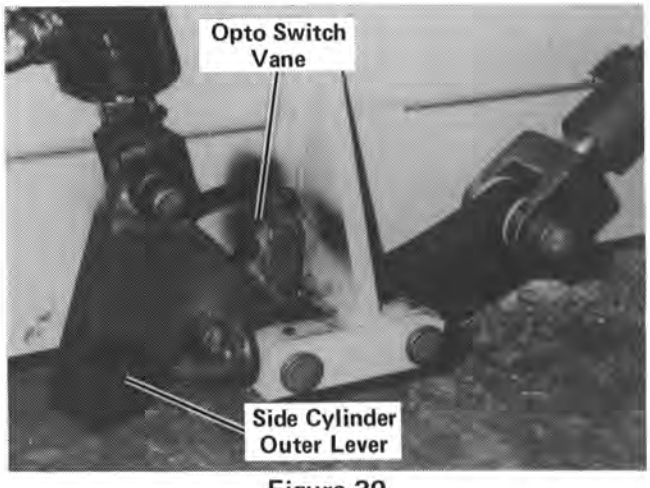


Figure 39

ADJUSTMENTS

FIXED GAGER ADJUSTMENT. To determine the proper gage distance between rail bases and to adjust the fixed gager linkage proceed as follows:

1. Move the machine to a section of unspiked rail where gaging is to be done and place the logic system in the gaging mode by depressing the gager button at either operators station. See Figure 3.

2. Position the High-Low Selector Valve handle into the high or up position completely extending the spool. See Figure 40.

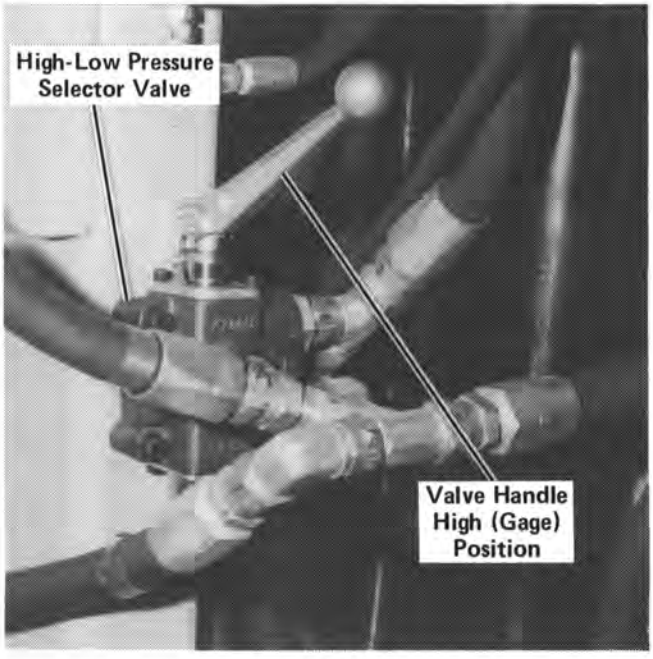


Figure 40

3. With the engine at full rpm, manually extend the gager side cylinders by pushing the manual override pin on the clamp valve until it is completely retracted. See Figure 41. Measure the distance between the inboard side of each rail at a point 5/8" down from the top of the rail. This distance should be approximately 56" or 1/4" to 1/2" less than the required gage.

4. If the gage measurement is not within the recommended 1/4" to 1/2" less than gage it will be necessary to adjust the movable outer lever pad to a position which will give the specified measurement. See Figure 42. The edge of the lever body and mating pad are serrated and each serration will move the pad 1/16". The pad is adjusted by loosening the hex head capscrew until the pad can be moved along the slots in the pad.

5. Reset the gager side cylinders to their completely collapsed position by turning the engine key off and then on again.

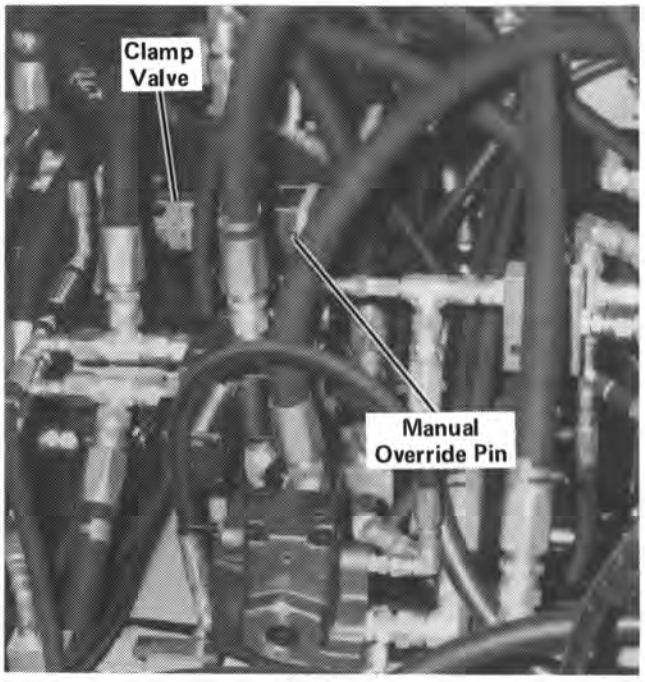


Figure 41

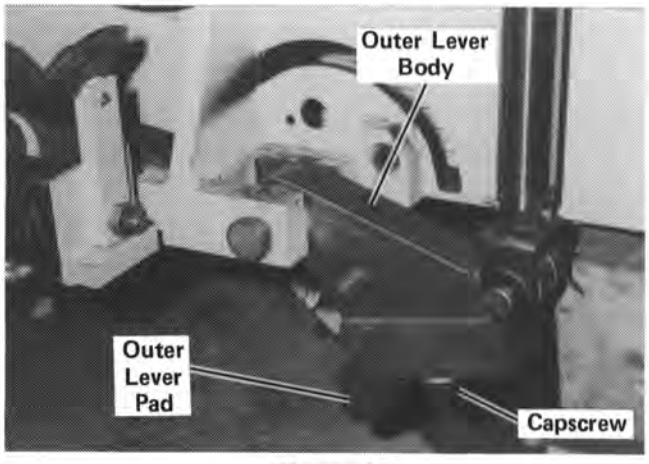


Figure 42

Initiate an operating sequence to extend the gager center cylinder, pushing the rail outward the full distance. Measure the distance between the inboard side of each rail at a point 5/8" down from the top of the rail. This distance should be the required gage.

6. If the distance is longer or shorter than the required gage, the hexagonal toggle links must be lengthened or shortened accordingly. If any adjustment is to be made it must be done equally at each toggle link and not at one arm only, for each flat adjustment made on either toggle link will result in a length change of .027", or .16" for one full turn. After the adjustment is made

lock the toggle links in place with the lock pins. See Figure 43.

7. If all the above conditions have been met, initiate an operating sequence to check if the proper gage is obtained. It is important at this time to check to be sure that the gager center cylinder is at the fully extended position.

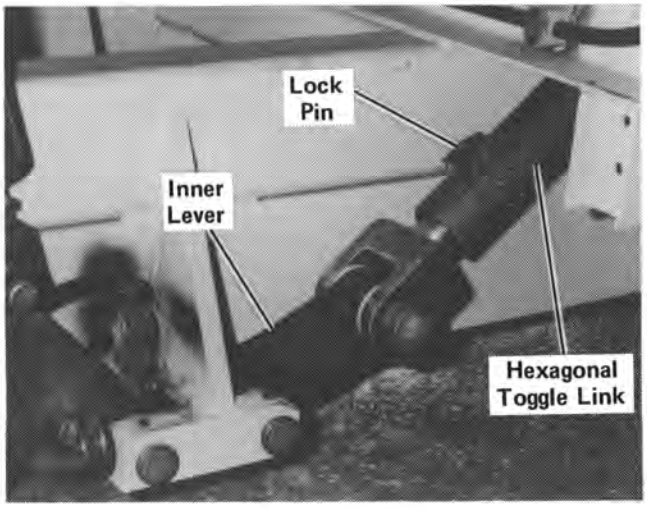


Figure 43

VARIABLE GAGER ADJUSTMENT. The optional variable gager provides the operator with the opportunity, at any time, to electrically vary the desired gage at either right or left hand operators station. Because the gage adjustment by the center cylinder is done electrically rather than mechanically proceed as follows:

1. Determine the proper outer lever pad setting for the required gage as outlined in Steps 1 thru 5 of the Fixed Gager Adjustment Section.

2. Position the variable gager buggy on the rails with the guide rollers contacting the inboard side of each rail at a point 5/8" down from the top of the rail. The buggy supports are slotted to allow the gager buggy to be positioned up or down along the rail head to obtain the proper location or to miss the rail flow on worn rail.

3. Measure the distance between the inboard side of each rail, 5/8" down from the top of the rail. Loosen the locknut on the calibration potentiometer and set at the mid position. See Figure 44.

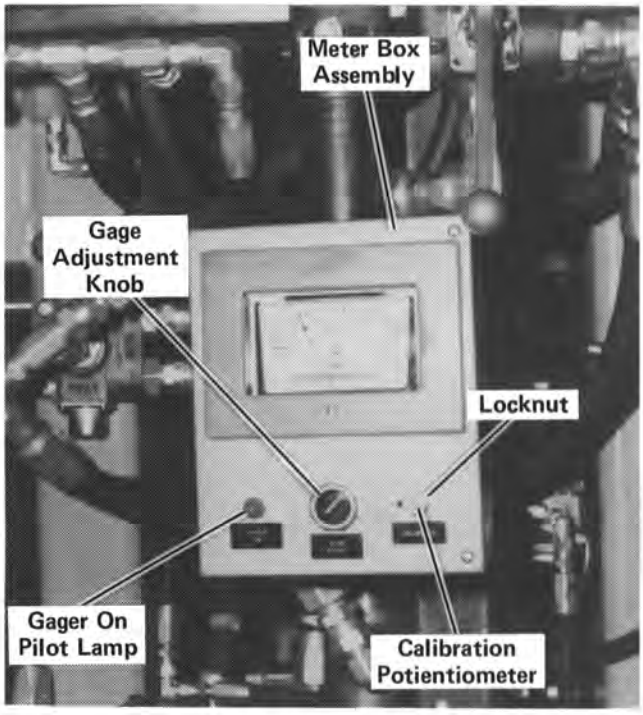


Figure 44

4. Check the voltage from wire #130 to wire #2. Move the LVDT housing until the meter reads the voltage corresponding to the gage measurement obtained from step 3 (see chart). See Figure 45.

Measurement	Voltage	Size
56-1/2"	2.9	———
56-3/8"	2.27	1/8" Narrow
56-1/4"	1.65	1/4" Narrow
56-1/8"	1.02	3/8" Narrow
56"	.4	1/2" Narrow

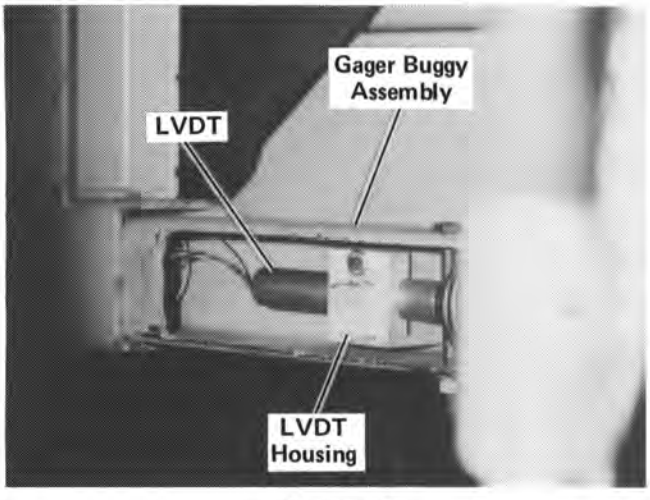


Figure 45

5. Adjust calibration potentiometer until the needle indicates the corresponding gage.

6. Initiate an operating sequence to see if all adjustments have been made correctly and required gage is obtained.

7. To vary the gage wider than required, during the gaging sequence, with the center gager cylinder extended turn the large adjustment knob on the meter box until the needle indicates the required variation. To vary the gage narrower requires that the gager sequence be recycled and started from the initial operations after the meter has been adjusted. See Figure 44.

When towing or propelling the machine for any considerable distance, the clamps, and gager outer lever safety pins and the center cylinder lock up brackets must be in place. See Figure 46.

GAGING PROCEDURE

After all preparations have been made as listed under "Preparations for Operation After Propelling or Towing" and all necessary adjustments have been made as described under "Adjustments" spiking/gaging operations may begin as follows:

1. Energize the electrical system, start the engine and set the throttle to the high idle normal run position. With the electrical system energized all four spiking guns, rail hooks, center gager cylinder and the gager outer levers will raise to their full up position in response to a momentary input signal to the logic system.

2. Position the High-Low Pressure Selector Valve handle in the gaging or up position. See Figure 40. Depress the gager button on the back side of the left hand trigger box at either right hand or left hand gun control assembly. See Figure 3. Depressing this button will light the green pilot lamp on either the main logic box or the meter box assembly indicating that the logic system is in the gaging mode.

3. Propel to the gaging location and align the machine so that the gager side cylinder levers will not contact a joint bar. When the cylinder extends, lower the gager buggy guide rollers and check to see that they are properly positioned against the inside of the rail head.

4. Pull the trigger at any one of the four trigger boxes back to the detent position. This is approximately the midway position and is located by the feel of slight resistance. Hold the trigger in this position until the gun stops automatically with the spike a few inches above the tie plate. At this time the gager side cylinders, the gager center cylinder and the rail hooks cylinder have extended and are in position. The gun

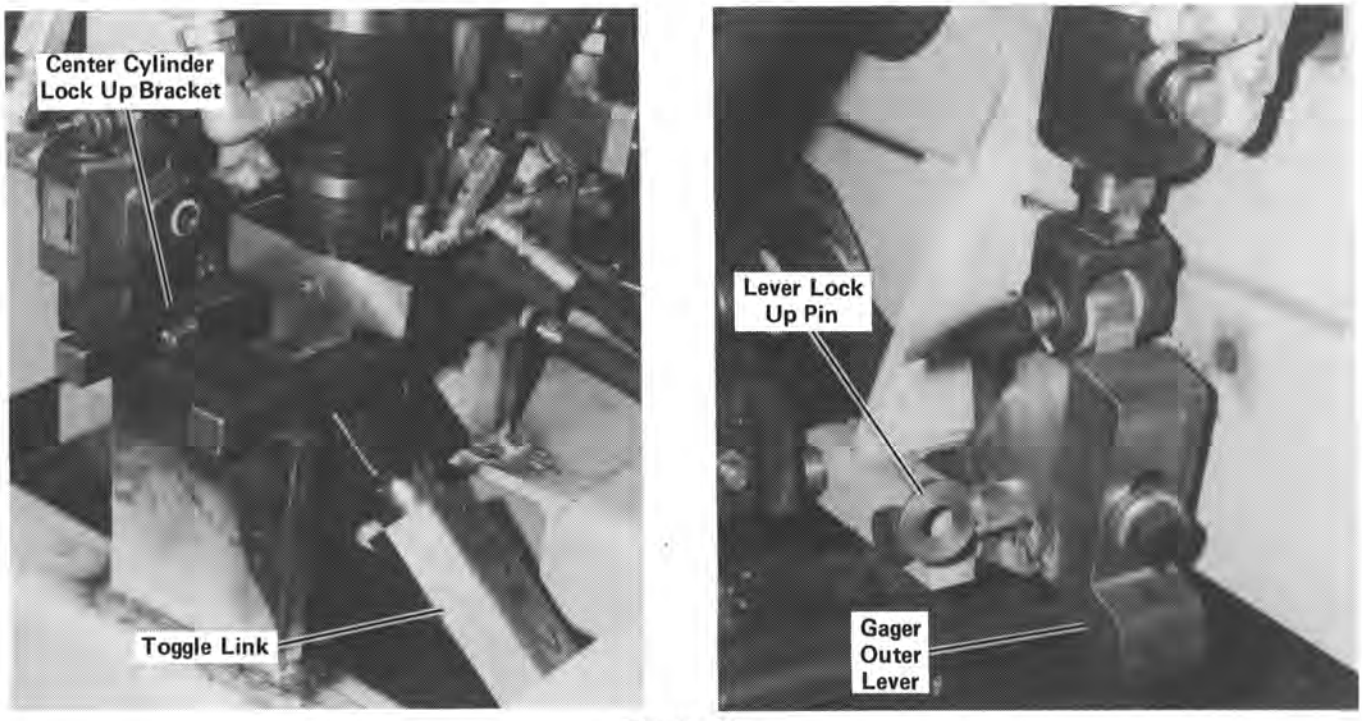


Figure 46

trigger can now be released as the gun ready input signal will hold the gun in a set position until the logic receives the drive signal.

5. On the variable gager, turn the black gage adjusting knob on the meter box assembly to widen the gage until the needle indicates the desired dimension. If the gage must be narrowed, depress the propulsion pedal to recycle the sequence, turn the gage adjusting knob to a narrower setting and pull the trigger to the detent position. The operating sequence will then begin again as described in Step 4.

6. Once the proper gage dimension has been obtained, spot the guns and drive the spikes by pulling the trigger all the way backward and holding until the spike at each gun has been driven.

7. Release the trigger for each gun and propel to the next gaging location by depressing the propulsion pedal.

8. When the machine has reached the new gaging location repeat the spiking procedure.

HYDRAULIC SYSTEM

VARIABLE GAGER SIDE CYLINDER RELIEF VALVE. The variable gager side cylinder relief valve is set at approximately 500 PSI. The center cylinder extends and pushes the unspiked rail out to gage against the resistance of the opposing pressure as set by the side cylinder relief valve. The oil which otherwise would be trapped in the lines between the cylinders and the control valve is directed back to the tank when the pressure against the side cylinders exceeds the relief setting. In this manner the rail is tightly clamped between the center cylinder and the side cylinders while spiking. To test and adjust the side cylinder relief valve proceed as follows:

1. Install the pressure gage on the pressure tap at the clamps low pressure switch. See Figure 47.

2. Loosen the locknut on the side cylinder relief valve and turn the adjusting screw outward (counterclockwise). See Figure 48.

3. With the engine at full RPM, manually extend the gager center cylinder by pushing the manual override pin on the center down valve until it is completely retracted. See Figure 48.

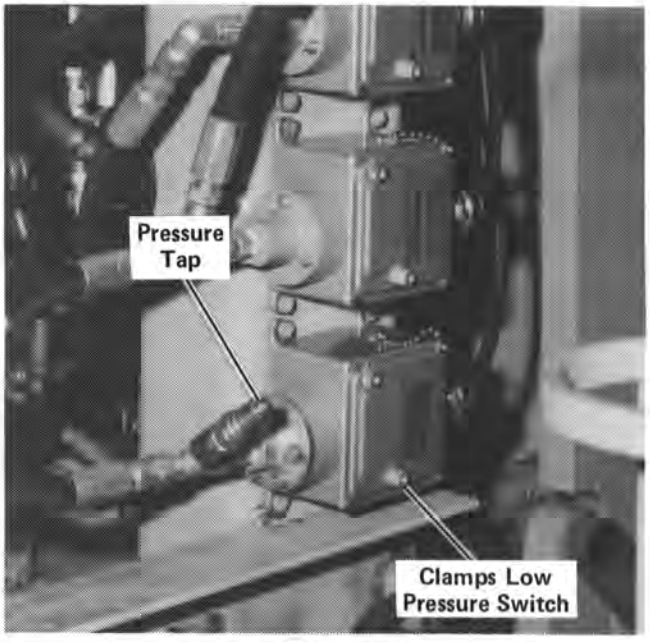


Figure 47

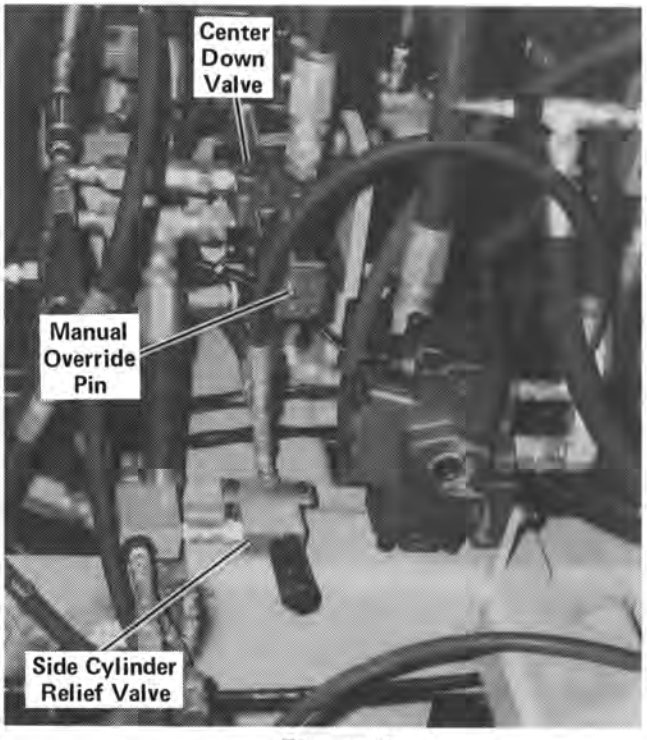


Figure 48

4. Manually extend the gager side cylinders by pushing the manual override pin on the clamp valve until it is completely retracted. See Figure 41.

5. While holding both override pins in begin turning the side cylinder relief valve adjusting screw inward (clockwise) until the pressure at the gage reads 500 PSI. Tighten the locknut.

FIXED GAGER SIDE CYLINDER RELIEF VALVE. The fixed gager side cylinder relief valve is set at a pressure somewhat greater than the system pressure. The center cylinder extends and pushes the unspiked rail out to gage against the resistance of the opposing pressure as set by the side cylinder relief valve. The oil which otherwise would be trapped in the lines between the cylinders and the control valve is directed back to the tank when the pressure against the side cylinders exceeds the relief setting. In this manner the rail is tightly clamped between the center cylinder and the side cylinders while spiking. To test and adjust the side cylinder relief valve proceed as follows:

1. Install the pressure gage on the pressure tap at the clamps low pressure switch. See Figure 47.

2. Loosen the locknut on the side cylinder relief valve and turn the adjusting screw completely inward (clockwise). See Figure 48.

3. With the engine at full RPM, manually extend the gager side cylinders by pushing the manual override pin on the clamp valve until it is completely retracted. See Figure 41. At this time the reading at the gage should indicate system pressure.

4. Continue to depress the manual override pin while slowly turning the adjusting screw outward (counterclockwise) until the pressure at the gage begins to fall.

5. Once the pressure starts to fall release the manual override pin on the clamp valve and turn the side cylinder relief valve adjusting screw inward (clockwise) one half turn. Tighten the adjusting screw locknut.

PRESSURE SWITCH ADJUSTMENT

The standard machine is equipped with two pressure switches that control the rail hooks in both the extended and retracted positions. These two switches, clamps low and clamps-arms high, and their functions are described below.

CLAMPS LOW. The Clamps Low Pressure Switch, located on the frame tube near the right operators station, is the lowest switch in the group of two. See Figure 49. The Clamps Low Pressure Switch will actuate when the rail clamps cylinder reaches the completely extended position and the pressure builds to approximately 250-300 PSI. When the

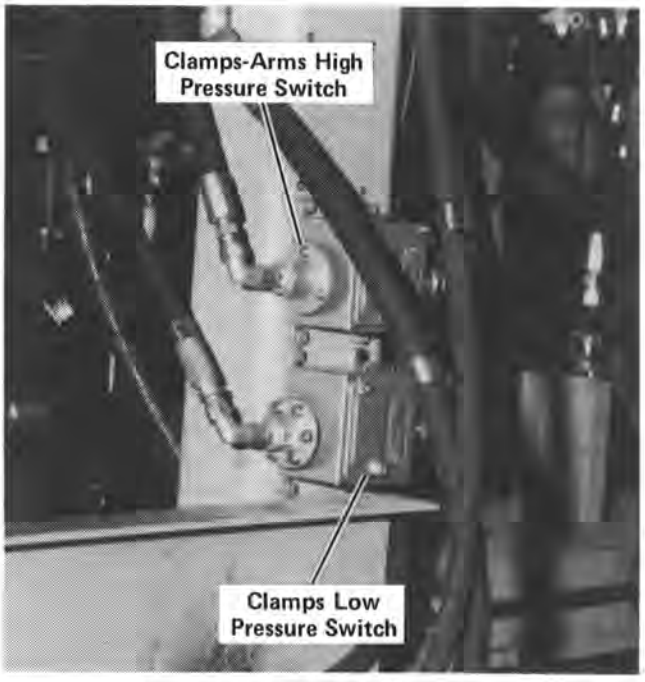


Figure 49

pressure switch is actuated the normally open contact points close and de-energize the clamp valve. To check and adjust this pressure switch proceed as follows:

1. Open the pressure switch adjustment cover.

2. Rear the pressure setting at the top surface of the adjustment wheel. The pressure setting should be approximately 500 PSI. Adjust if necessary.

3. Position the High-Low Pressure Selector Valve handle into the low or horizontal position. See Figure 50.

4. Activate a gun trigger at any trigger box to extend the rail clamps cylinder and to lower rail clamps to rail. At this time the clamps down output light on the main circuit board should be lit.

5. Begin to reduce the pressure setting by turning the adjusting wheel clockwise until the clamps down output light goes out.

6. Replace the adjustment cover and initiate an operation sequence to be sure switch is functioning properly.

CLAMPS-ARMS HIGH. The Clamps-Arms High Pressure Switch, located on the frame tube near the right operators station, is the top switch in

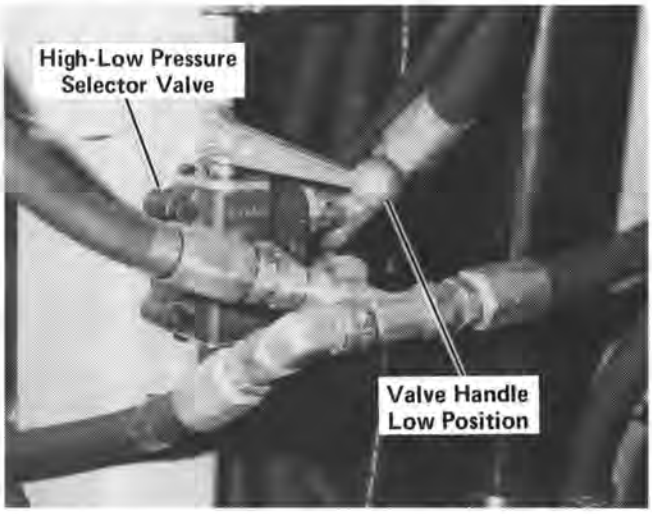


Figure 50

the group of two. See Figure 49. The Clamps-Arms High Pressure Switch will actuate when the clamp cylinder reaches the completely collapsed position and the system pressure builds up to approximately 1800 PSI. When the pressure switch is actuated the normally open contact points close and de-energize the clamps up valve. To check and adjust this pressure switch proceed as follows:

1. Open the pressure switch adjustment cover.

2. Read the pressure setting at the top surface of the adjustment wheel. The pressure setting should be approximately 1900 PSI. Adjust if necessary.

3. Position the High-Low Pressure Selector Valve handle into the low or horizontal position. See Figure 50.

4. Turn the Engine Key Switch to the on position raising the rail clamps and completely collapsing the rail clamps cylinder.

5. Begin to reduce the pressure by turning the adjusting wheel clockwise until the clamps up output light on the main circuit board goes out.

NOTE

The pressure setting on the Clamps-Arms High Pressure Switch should be 1800 PSI. If the pressure setting is below 1800 and the clamps up output light does not go out, check to see if the clamp cylinder has reached the fully collapsed position.

6. Replace the adjustment cover and initiate an operating sequence to be sure the switch is functioning properly.

On machines equipped with optional fixed or variable gager, additional pressure switches are used to control functions of the standard machine, clamps low and clamps-arms high; plus the functions necessary for the gaging operations. These include center up and arms low on the variable gager, and center down on the fixed gager. The location, function and adjustment of these switches is described below.

CLAMPS-ARMS HIGH. The Clamps-Arms High Pressure Switch, located on the frame tube near the right operators station is the upper most switch in the group of four. See Figure 37. The Clamps-Arms High Pressure Switch will actuate when the gager side cylinders reach either the fully extended or collapsed position and the system pressure builds to approximately 1800 PSI. When the pressure switch is actuated the normally open contacts close and de-energize the clamp valve indicating that the unspiked rail has been moved to the under gage position. To check and adjust this pressure switch proceed as follows:

1. Open the pressure switch adjustment cover.

2. Read the pressure setting at the top surface of the adjustment wheel. The pressure setting should be approximately 1900 PSI. Adjust if necessary.

3. Position the High-Low Pressure Selector Valve handle into the high or up position with the spool completely extended. See Figure 40.

4. Turn the key switch to the on position, raising the gager outer levers and completely collapsing the gager side cylinders.

5. Begin to reduce the pressure by turning the adjusting wheel clockwise until the clamps-arms high output light on the main circuit board goes out.

NOTE

The pressure setting on the clamps-arms high pressure switch should be 1800 PSI. If the pressure setting is below 1800 and the clamps-arms output light does not go out, check to see if the gager side cylinders have reached the fully collapsed position.

6. Replace the adjustment cover and initiate an operating sequence to be sure the switch is functioning properly.

CENTER UP. The Center Up Pressure Switch, located on the frame tube near the right operators station, is the second switch in the group of four. See Figure 37. The center up pressure switch will actuate when the center gager cylinder reaches the completely collapsed position and the system pressure builds up to approximately 1800 PSI. When the pressure switch is actuated the normally open contacts close and de-energize the center up valve. To check and adjust this pressure switch proceed as follows:

1. Open the pressure switch adjustment cover.

2. Read the pressure setting at the top surface of the adjustment wheel. The pressure setting should be approximately 1900 PSI. Adjust if necessary.

3. Position the High-Low Pressure Selector Valve handle into the high or up position with the spool completely extended. See Figure 40.

4. Turn the engine key switch to the on position raising the center gager cylinder to the completely collapsed position.

5. Begin to reduce the pressure by turning the adjusting wheel clockwise until the center up output light on the main circuit board goes out.

NOTE

The pressure setting on the clamps-arms high pressure switch should be 1800 PSI. If the pressure setting is below 1800 and the center up output light does not go out, check to see if the center cylinder has reached the fully collapsed position.

6. Replace the adjustment cover and initiate an operating sequence to be sure the switch is functioning properly.

ARMS LOW. The Arms Low Pressure Switch, located on the frame tube near the right operators station, is the third switch in the group of four. See Figure 37. When the gager side cylinders are extending and they meet the resistance of the rail a rise in system pressure will occur. When this rise in pressure reaches approximately 800 PSI the switch will actuate the normally open contacts closed and de-energize the clamp valve. If the low pressure switch is actuated and the opto switches have not sent an "OK" signal to the logic system the sequence will abort and the gager center and side cylinder will return to their retracted positions. The pressure setting of the switch should only be high enough to exceed the momentary rise that occurs when the cylinder is first actuated. The signal is only to indicate that the gager outer levers have met solid resistance. To check and adjust this pressure switch proceed as follows:

1. Open the pressure switch adjustment cover.

2. Read the pressure setting at the top surface of the adjustment wheel. The pressure setting should be approximately 1000 PSI. Adjust if necessary.

3. Position the High-Low Pressure Selector Valve handle into the high or up position with the spool completely extended. See Figure 40.

4. Initiate an operating sequence to extend the gager side cylinders. If the gager side cylinders extend momentarily and then retract, gradually increase the pressure by turning the adjusting wheel counterclockwise until the side cylinders extend.

5. Position machine so that either gager side cylinder contacts a joint bar when extended. Initiate an operating sequence to check that the pressure setting is correct and switch is functioning properly.

CENTER DOWN. The Center Down Pressure Switch is located on the inside of the frame tube near the right operators station. See Figure 37. The center down pressure will actuate when the center down cylinder reaches the completely extended position and the system pressure builds to approximately 1800 PSI. When the pressure switch is actuated the normally open contacts are closed and de-energize the center down valve. This condition indicates that the center cylinder has moved the unspiked rail to gage and is ready for spiking. To check and adjust this pressure switch proceed as follows:

1. Open the pressure switch adjustment cover.

2. Read the pressure setting at the top surface of the adjustment wheel. The pressure setting should be approximately 1900 PSI. Adjust if necessary.

3. Position the High-Low Pressure Selector Valve handle into the high or up position with the spool completely extended. See Figure 40.

4. Initiate an operating sequence to check if the switch is functioning properly. At this time the center cylinder should be at its completely extended position and the center down output light on the main circuit board is out.

5. If the output light does not go out with the center cylinder remaining at its fully extended position begin reducing the pressure by turning the adjusting wheel clockwise until the center down output light does go out.

6. Replace the adjustment cover.

DRIVING GUN SEQUENCE CHART

	INPUTS							FLIP FLOPS		OUTPUTS					
	RETRACT	DRIVE	READY	UP	LOAD	CLAMPS HIGH	PROPEL	Y_1 ON	Y_2 ON	GUN UP	GUN DRIVE	LOAD	CLAMPS UP	CLAMPS DOWN	BRAKES OFF
FUNCTION	X_1	X_2	X_3	X_4	X_5	X_{12}	X_{13}			Z_1	Z_2	Z_3	Z_7	Z_8	Z_{23}
Power On								●	●	●			●		
Gun Coming – Clamps Up						●		●	●	●					
Gun Up				●				●	●						
Load Spike				●	●			●	●			●			
Release Load Button				●				●	●						
Pull Trigger To Detent	●			●							●			●	
Gun Going To Ready Clamps Going Down	●										●			●	
Clamps Down	●					●					●				
Gun At Ready Height	●		●												
Gun At Ready			●												
Drive Spike		●	●					●			●				
Release Trigger*	●		●					●							
Gun Coming Up								●	●	●					
Gun Up				●				●	●						
Depress Propel Pedal				●			●	●	●				●		●
Clamps Up				●		●	●	●	●						●
Propelling				●			●	●	●						●
Release Propel Pedal				●				●	●						

*Retract light comes on momentarily when trigger is released.

Rev. A

The blackened circles indicate the "Light On" condition.

NIPPERS SEQUENCE CHART

	INPUTS					OUTPUTS			
	NIPPER BUTTON	HOOK BUTTON	FLIP FLOPS	Y_{13} ON	Y_{14} ON	NIPPERS UP	NIPPERS DOWN	HOOKS CLOSE	HOOKS OPEN
FUNCTION	X_{24}	X_{25}				Z_{15}	Z_{16}	Z_{17}	Z_{18}
Board On				●					
Nipper Down	●						●		
Hooks Close		●			●			●	
Hooks Close – Nipper Up	●	●		●	●	●		●	
Hooks Close – Nipper Up	●			●	●	●			
Tie Held For Spiking				●	●				
Hooks Open		●		●					●
Nipper Up Delayed		●		●		●			●
Release Button				●					

The blackened circles indicate the "Light On" condition.

Rev. A

VARIABLE GAGER SEQUENCE CHART

	INPUTS										FLIP FLOPS									OUTPUTS					
	DRIVE	CLAMPS HIGH	PROPEL	LEFT ARM DOWN	RIGHT ARM DOWN	ARMS LO	CENTER UP	CENTER DOWN	GAGER ON-OFF	AT GAGE	Y_9	Y_{10}	Y_{11}	Y_{12}	Y_{15}	Y_{16}	Y_{17}	Y_{18}	Y_{19}	CLAMP ARMS UP	CLAMP ARMS DOWN	CENTER DOWN FAST	CENTER DOWN GAGE	CENTER UP	REGENERATE
FUNCTION	W_1-W4	X_{12}	X_{13}	X_{26}	X_{27}	X_{28}	X_{29}	X_{30}	X_{31}	X_{32}										Z_7	Z_8	Z_{19}	Z_{20}	Z_{21}	Z_{22}
Power On											●	●						●		●				●	
Arms Up		●									●							●						●	
Center Up							●				●														
Gager On									●		●				●										
Ready											●		●	●	●										
Arms Down	●												●	●	●	●					●	●			●
Left Arm Down				●									●	●	●	●					●	●			●
Right Arm Down				●	●								●	●	●	●			●		●	●			
Pushing Rail In				●	●	●							●	●	●	●			●		●	●			
Rail Pushed In		●		●	●	●									●	●			●			●			
Center Down				●	●										●	●			●			●			
Gaging				●	●			●							●	●	●		●				●		
At Gage				●	●			●		●					●	●	●		●						
Propel			●	●	●						●	●			●		●	●	●	●				●	
Arms Up		●									●				●		●	●	●					●	
Center Up							●				●				●										
Ready											●		●	●	●										
Arms Down	●												●	●	●	●									
Left Down				●		●							●	●	●						●	●			
Abort				●								●			●			●		●				●	
Arms Up		●													●										
Ready											●		●	●	●										

The Blackened Circles Indicate The "Light On" Condition.

RGS-B/HS SUPER B
TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	REMEDY
1. Engine does not crank.	1.1 Key switch off.	1.1.1 Turn switch on.
	1.2 Circuit breakers tripped.	1.2.1 First determine cause of electrical overload and correct. Then reset the circuit breaker.
	1.3 Battery dead.	1.3.1 Check acid level in each cell and add water if required. Recharge battery, recheck acid level.
	1.4 Starter defective.	1.4.1 Repair or replace.
2. Engine cranks but does not run.	2.1 Emergency stop handle pulled out.	2.1.1 Reset the emergency stop valve on engine air intake.
	2.2 Engine not getting fuel.	2.2.1 Check fuel level fuel tank and fill if necessary.
		2.2.2 Check fuel line shut-off valve on bottom of fuel tank to make certain it is open.
		2.2.3 Check for plugged or broken fuel hoses. Clean or replace hose.
		2.2.4 Check fuel filters for water. Drain if necessary.
		2.2.5 Check fuel filter elements for dirt. Replace if clogged.
	2.3 Engine defective.	2.3.1 Refer to engine manual for troubleshooting engine.
3. Pump does not develop pressure.	3.1 No hydraulic oil in tank. (Note: If pump is run without oil in tank, pump damage may result.)	3.1.1 Add sufficient oil to tank to bring oil level above the add mark on the dipstick.
	3.2 Suction line valve closed. (Note: Running pump with valve closed may result in pump damage.)	3.2.1 Open valve completely.
	3.3 Engine cold start valve open (main pump only).	3.3.1 Close valve.
	3.4 Main relief valve bypassing. (Note: Any oil blowing past any relief valve will cause oil to overheat.)	3.4.1 Increase pressure setting on relief valve.
	3.5 Small pump compensator setting too low.	3.5.1 Increase compensator setting.
	3.6 Defective pump.	3.6.1 Refer to pump manual for troubleshooting pump.

PROBLEM	POSSIBLE CAUSE	REMEDY
4. Machine will not propel.	4.1 Small pump not developing pressure.	4.1.1 See Section 3.
	4.2 Brakes not releasing.	4.2.1 See Section 5.
	4.3 Propulsion relief setting too low.	4.3.1 Increase relief setting.
	4.4 Defective motor.	4.4.1 Replace motor.
5. Brakes will not release.	5.1 Small pump not developing pressure.	5.1.1 See Section 3.5.
		5.1.2 Check pump for wear or damage.
	5.2 Brake valve not shifting.	5.2.1 Check valve spool for free motion and that solenoid is being energized.
	5.3 Propulsion opto switch obstructed.	5.3.1 Inspect switch and clean if necessary.
	5.4 Defective opto switch.	5.4.1 Replace switch.
	5.5 Brake cylinder bypassing oil.	5.5.1 Inspect and repack cylinder.
6. Brakes will not apply.	6.1 Brake valve not shifting.	6.1.1 Check valve spool for free motion and that solenoid is being deenergized.
	6.2 Broken brake spring.	6.2.1 Inspect spring and replace if necessary.
	6.3 Propulsion opto switch uncovered.	6.3.1 Inspect switch and vane. Clean or readjust if necessary.
	6.4 Brake shoes worn.	6.4.1 Inspect shoes and replace if necessary.
	6.5 Defective opto switch.	6.5.1 Replace switch.
7. Guns, nippers and rail hooks do not operate.	7.1 Power switch off.	7.1.1 Turn power switch on.
	7.2 Circuit breaker tripped.	7.2.1 Determine cause of electrical overload and correct.
	7.3 Engine cold start valve open.	7.3.1 Close valve.
	7.4 Logic board fuse blown.	7.4.1 Determine cause of electrical overload and correct.
8. Gun does not stop at ready position.	8.1 Driving valve not centering.	8.1.1 Check valve spool for free motion and that solenoid is being deenergized.
	8.2 Guide rod clamps set to low.	8.2.1 Raise clamps.
	8.3 Broken trigger detent spring.	8.3.1 Inspect and replace if necessary.
	8.4 Guns ready opto switch not covered.	8.4.1 Inspect actuator adjust if necessary.

PROBLEM	POSSIBLE CAUSE	REMEDY
	8.5 Defective opto switch.	8.5.1 Replace switch.
	8.6 Faulty logic board.	8.6.1 Contact Rexnord Inc. Railway Equipment Division, Milwaukee, WI.
9. Gun will not retract when trigger is released.	9.1 Guns ready opto switch vane going past switch.	9.1.1 Reset guide rod clamps.
	9.2 Driving valve not shifting.	9.2.1 See Section 8.
	9.3 Faulty logic board.	9.3.1 Contact Rexnord Inc. Railway Equipment Division, Milwaukee, WI.
	9.4 Trigger not going to maximum return position.	9.4.1 Inspect return spring in controller and replace if necessary.
10. Spike will not feed when button is depressed.	10.1 Guns up opto switch uncovered.	10.1.1 Inspect opto switch and actuator. Clean and adjust if necessary.
11. Spikes turning in jaws.	11.1 Bent jaws.	11.1.1 Inspect jaws and replace if necessary.
	11.2 Lead angle on jaws different.	11.2.1 Inspect and replace with long lead angle jaws.
	11.3 Feeder frame bent.	11.3.1 Inspect frame and repair or replace if necessary.
12. Spikes not feeding completely into jaws.	12.1 Bent jaw.	12.1.1 Inspect jaws and replace if necessary.
	12.2 Jaw pin bushings worn.	12.2.1 Inspect bushings and replace if necessary.
	12.3 Jaw assembly not completely retracted.	12.3.1 Inspect opto assembly and actuator. Clean or readjust if necessary.
13. Nippers do not penetrate ballast.	13.1 Nipper down pressure set too low.	13.1.1 Turn relief valve adjusting screw clockwise to increase pressure.
14. Ties being broken during nipping.	14.1 Nipper up pressure set too high.	14.1.1 Turn pressure reducing valve adjusting screw counterclockwise to decrease pressure.
15. Rail clamps do not extend.	15.1 Propulsion opto switch uncovered.	15.1.1 Inspect switch and actuator. Clean or adjust if necessary.
	15.2 Clamp valve not shifting.	15.2.1 Check valve spool for free motion and that solenoid is being energized.
	15.3 Low pressure switch setting too low.	15.3.1 Increase switch pressure setting gradually until clamps extend.

RGS-B/HS SUPER B (Continued)
TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	REMEDY
16. Rail clamps do not retract.	16.1 Clamp pilot check valve not shifting.	16.1.1 Clean valve in solvent and blow dry. 16.1.2 Replace valve.
	16.2 Propulsion opto switch obstructed.	16.2.1 Inspect switch and actuator. Clean or readjust if necessary.
	16.3 Clamp valve not shifting.	16.3.1 Check valve spool for free motion and that solenoid is being energized.
	16.4 High pressure switch setting too low.	16.4.1 Increase switch pressure setting to 1800 PSI.
17. Rail clamps pushing rail in.	17.1 Clamp pressure reducing valve set too high.	17.1.1 Turn valve adjusting screw counterclockwise to decrease pressure. Set at 250 PSI using clamps only; 400 SPI using gaging side arms and clamps.
18. Engine lugging down.	18.1 High speed propulsion valve not shifted properly.	18.1.1 Shift valve handle to up position.
	18.2 Clamps up solenoid not shutting off.	18.2.1 Decrease clamps high pressure switch setting to 1800 PSI.
19. Gager center cylinder will not retract.	19.1 Center up valve not shifting.	19.1.1 Check valve spool for free motion and that solenoid is being energized.
	19.2 Center up pressure switch set too low.	19.2.1 Increase switch pressure setting to 1800 PSI.
20. Gager center cylinder will not extend.	20.1 Center down valve not shifting.	20.1.1 Check valve spool for free motion and that solenoid is being energized. 20.1.2 Decrease arms high switch pressure setting to 1800 PSI.
	20.2 Center down pressure switch set too low.	20.2.1 Increase switch pressure setting to 1800 PSI.
21. Rail not being pushed to gage.	21.1 Main relief valve bypassing.	21.1.1 Increase pressure setting on main relief valve to 2000 PSI.
	21.2 Center down pressure switch set too low.	21.2.1 Increase switch pressure setting to 1800 PSI.
	21.3 Side arm pressure set too high.	21.3.1 Turn relief valve adjusting screw counterclockwise to decrease pressure to 2100 PSI.
	21.4 Toggle linkage length set incorrect.	21.4.1 Refer to operating manual for proper setting.

RGS-B/HS SUPER B (Continued)
TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	REMEDY
22. Center down fast not coming on.	22.1 Center down fast valve not shifting.	22.1.1 Check valve spool for free motion and that solenoid is being energized.
		22.1.2 Decreased arms high switch pressure setting to 1800 PSI.
	22.2 Center down fast opto switch obstructed.	22.2.1 Inspect switch and actuator. Clean or readjust if necessary.
23. Center down slow not coming on.	23.1 Side arms not pushing rail below gage setting.	23.1.1 Reset adjustable outer lever stop.
	23.2 Down slow valve not shifting.	23.2.1 Check valve spool for free motion and that solenoid is being energized.
24. Meter not indicating proper gager.	24.1 LVDT set incorrect.	24.1.1 Readjust LVDT if necessary. Refer to operating manual for proper setting.
	24.2 Defective meter movement.	24.2.1 Replace meter.
25. Side gager cylinders will not extend.	25.1 Clamp/side arm valve not shifting.	25.1.1 Check valve spool for free motion and that solenoid is being energized.
	25.2 Arms high pressure switch set too low.	25.2.1 Increase switch pressure setting to 1800 PSI.

INSTRUCTIONS FOR ORDERING REPAIR PARTS

This parts book completely identifies all parts comprising your NORDBERG Railway Machine in three ways: 1) By part number; 2) By part name; and 3) By appearance.

The parts list contains a breakdown of the equipment into its major assemblies, subassemblies, and detail parts. To aid in identifying a part by appearance, each part is indexed to an illustration of the assembly of which it is a part. The first column of the parts list contains item numbers, which serve as a cross reference between the listed parts, and the same parts as illustrated.

Indention

The indention of a part in the "description" column indicates the relationship of that part to the assembly of which it is a part. For example: Any part indented beneath an assembly is available either as a detail part, or as a portion of the assembly under which it is indented, unless specified "NP" (not procurable separately).

Quantities

The quantities listed are determined as follows:

1. The quantity listed for an assembly indicates the number of these assemblies used per machine, with the exception of subassemblies, which are treated as detail parts.
2. The quantity listed for a detail part indicates the number of these detail parts used per assembly.

Prompt Service Information

When ordering parts, always include the following information:

1. The machine serial number from machine nameplate.
2. The exact quantity of assemblies or detail parts desired. Identify these parts by part number and part name.
3. Specify the method of shipment desired.

Rush Orders

If a shipment of repair parts is urgently needed, make out a separate order for the needed parts. Forward the rush order separately from any other order, requesting separate shipment.

To avoid delays, please avoid reference to other matters in letters forwarded primarily for ordering repair parts. Forward all repair orders to the following address:

NORDCO

P.O. Box 1562
Milwaukee, WI 53201
TELEX 26601
FAX 414/481-3199
414/769-4607
or
414/769-4608