TRIPP MODEL "C"

W/Tier 2 Engines

Operation and Maintenance Manual

Applies to S/N 760220 and Above
Reorder Part: 4945 7601
Last Revision: Rev. -
APRIL 2006

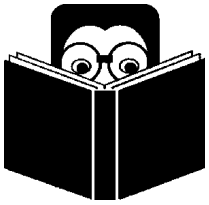
Read and fully understand the precautions contained in this manual before operating or servicing this machine. Refer to Section 1 for important safety information.

Component Troubleshooting can now be found on the blue pages behind each tab.

This manual is a guide for the operation and routine maintenance of a NORDCO Railroad Maintenance Machine. It covers product technical information, basic operating and maintenance procedures, and safety information and is provided for use by the qualified personnel who will supervise, operate or service the equipment described herein.

Measurements in this manual are given in both metric and customary U.S. unit equivalents.

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



This manual should be considered a permanent part of your machine and should remain with the machine at all times.

Additional copies of this manual are available either as a part (Operation Manual only) or a whole (operation and parts manual), at a nominal cost, through our Part Sales Department. Additional service information, parts, and application information is available through these Nordco product support resources:

NORDCO Sales:	**Milwaukee, Wisconsin** (414) 766-2180 sales@nordco.com
NORDCO Parts:	**Milwaukee, Wisconsin** 1-800-647-1724 parts@nordco.com **Oshawa, Ontario, Canada** (905) 579-4058, Ext. 224 oshsales@nordco.com
NORDCO Service:	1-800-445-9258 service@nordco.com

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. Direct your comments and inquiries to:

Technical Documentation Department
NORDCO Inc.
245 W. Forest Hill Avenue
Oak Creek, WI 53154

HAZARDOUS MATERIAL DATA

In an effort to provide information necessary for your employee safety training program and to meet the requirements of OSHA Hazard Communication Standard 1910.1200, we have OSHA Form 20 Safety Data Sheets available that cover the material contained in this machine.

If you are interested in receiving this information, please refer to the Name, model, and Serial Number of your machine when calling or writing, and direct your inquiries to:

Vice-President of Operations
NORDCO Inc.
245 W. Forest Hill Avenue
Oak Creek, WI 53154

Fax: (414) 766-2299
Phone: (414) 766-2288

SAFETY

Please read and comply with all of the safety precautions in this manual BEFORE operating this machine.

GENERAL

DO NOT use this machine for machine operations other than for which it was intended.

NORDCO is not responsible for any modifications made without authorization or written approval. Replace all NORDCO and OEM parts with genuine NORDCO or OEM parts. Use of non-OEM parts could compromise the safety of your machine.

FRA regulations require that a copy of this Operation Manual be kept on the machine at all times. Additional copies of the Operation Manual only can be ordered from Nordco Parts Sales at 1-800-647-1724.

FOLLOW SAFETY INSTRUCTIONS

Carefully read all safety messages in this manual. Learn how to operate the machine and how to use controls properly. Do not let anyone operate this machine without instruction. Failure to understand the contents of this manual could result in serious personal injury or death.

SAFETY ALERT SYMBOLS!

These are the safety-alert symbols. These symbols means pay attention! Your safety is at risk!

DANGER is used to indicate a definite hazardous situation which, if not avoided, **WILL** result in severe bodily harm or even death.

WARNING indicates a potentially hazardous situation which, if not avoided, **COULD** result in severe bodily harm or even death.

CAUTION indicates a potentially hazardous situation which, if not avoided, **MAY** result in minor or moderate injury.

CAUTION without the safety "!" means that failure to follow the alert may result in machine damage.

SAFETY means that the following points are instructions for safely operating the machine or the specific component of the machine.

GENERAL SAFETY TIPS

Only trained and authorized personnel should be allowed to operate this machine. In addition, all personnel at the worksite (gang) should be aware of the safety concerns and their individual responsibilities **prior to working this machine.**

SAFETY

1. Handle fuel safely. It is highly flammable and prolonged breathing of fumes may cause bodily harm.

2. Prepare for emergencies. Keep a first aid kit and fire extinguisher handy.

3. Protect against flying pieces of metal and debris by wearing safety glasses or goggles.

4. Wear good-fitting pants and shirt, no baggy or loose clothing.

5. Protect your head and eyes from flying debris by wearing a hard hat and safety goggles/glasses.

6. Wear leather gloves to protect your hands from vibration or flying metal particles.

7. Use safety-toed work boots.

SAFETY PRIOR TO WORKING

All personnel at the worksite (gang) should be aware of the safety concerns and their individual responsibilities **prior to working this machine**:

SAFETY

- Review the operating instructions if you are unsure of anything.
- Use the "pre-operational checklist" to check the machine for obvious faults. Repair or replace as necessary PRIOR to operating the machine.
- Before climbing onto the machine, make certain the area around and under the machine is clear of obstructions and personnel.
- Use care when climbing onto the machine. Always use the steps and handrails provided. (If an area does not have tread grips, walkways, or other methods to access the area, then DO NOT attempt to access that area.)
- Make seat and control adjustments PRIOR to starting the machine. ALWAYS wear a seatbelt.
- Know the weather forecast and plan your work speeds accordingly.
- There are guards on this machine. These are to be removed ONLY when service or maintenance is being performed on that area of the machine. Make certain they have been re-installed PRIOR to starting the machine.
- Check and service the fire extinguisher (if so provided) at regular intervals. Make certain all personnel are trained in its use. Note - Non-use of fire extinguisher still requires that it be recharged at the interval stated on its last inspection notice.
- Keep the stairs, cab entry platform and cab interior free and clear of ice, tools and personal items. Use the accessories provided on the machine (tool box, cup holder, coat hook, etc.) to properly store your gear.
- Never climb onto the machine while it is in motion.
- There are lockups on this machine that are used for both work and travel. These should be kept clear and free of debris, grease, etc. See **Lockup** section for instructions on their use.
- Inspect safety decals and replace when they become unreadable or are damaged. (See "Safety Decals" at the end of this Safety section).

SAFETY WHILE STARTING THE MACHINE

NORDCO recommends the use of a **Command** position. This means that the machine is **never** running unless someone is **at or near** the main control panel or remote control boxes. To prevent injury to personnel or damage to the machine, it is highly recommended to:

SAFETY

1. Only start and operate the machine from the operator's seat.

2. Use the "STARTUP Checklist" to check the machine controls and gauges to make certain all systems are operating correctly.

SAFETY WHILE OPERATING/TRAVELING

SAFETY

1. Never allow more riders than seats and seatbelts allow. This machine was designed to be operated by one person.

2. The machine is to be operated from the Operator's seat only. Do NOT stand and operate this machine.

3. Press the EMERGENCY STOP pushbutton on the center control console in emergencies and potentially dangerous situations.

4. If personnel or bystanders are near the machine during operation, give a warning signal using the air horn. If they fail to respond to this warning, stop operation immediately.

5. Slow down the work cycle and use slower travel speeds in congested or populated areas.

6. Halt work if visibility is poor. Strong rains, fog, and extremely dusty conditions can affect visibility in your work area. Wait for the weather to improve before continuining work.

SAFETY WHILE PARKED

When leaving a machine engine running, make certain that the parking brake is applied and the electrical interlock button has been activated.

NEVER stop and park this machine on an incline unless the machine wheels have been chocked.

SAFETY DURING MAINTENANCE

The following guidelines are suggested when performing maintenance:

SAFETY

1. Always chock the wheels
2. Alert others in the area that service or maintenance is being performed on this machine.
3. Become familiar with, and use, **your company's lockout/tagout** procedures when performing maintenance on this machine. See **LOCKOUT/TAGOUT REQUIREMENTS** later in this Safety Section for a chart on energy sources located on this machine.
4. Do not start the engine if repairs or work is being performed alone. You should always have at least two people working together if the engine must be run during service. One person needs to remain in the **command** position (at the controls), ready to stop the machine and shut off engine if the need arises.
5. Collect oils and fuels and dispose of them properly. There is a danger of scalding when working with engine oils.
6. Use only Nordco supplied repair parts for this machine. Use of non-OEM designed parts could comprise the integrity of this machine.
7. There are welding cautions on this machine. Pay attention to them PRIOR to welding.
8. Kits supplied by Nordco have welding instructions included. Welding of any components NOT of Nordco's manufacture or failure to follow these instructions may affect the stability of this machine.

MACHINE SAFETY ALERTS

DANGER ALERTS

Improper use of this machine for any type of operation can cause serious injury or death.
To avoid serious injury or death, make certain that the area around and under the machine is clear of all personnel and obstructions BEFORE travelling or working.
Serious injury or death can result from reaching into working components while machine is running. Make all observations from a distance and SHUT OFF machine while making adjustments.
Shut off engine when checking battery electrolyte level. Do not check or fill battery in presence of open flame, sparks, or when smoking. Battery fumes are flammable and/or explosive and if ignited will result in severe bodily injury or death.
Do not ride on tow bar between the machine and the towing vehicle. Falling from a moving vehicle may cause serious injury or death.

MACHINE SAFETY ALERTS

WARNING ALERTS

Failure to engage all lockup devices before propelling at travel speed can result in injury to personnel and/or extensive damage to the machine.
Remove hoses/fittings only when system is not pressurized. High pressure leaks can cause personal injury.
Always turn off machine when performing maintenance, making adjustments, or whenever unintended movement of machine could occur; unless directed otherwise. Failure to comply could result in personal injury and/or damage to the machine.
Exhaust emissions caused by the use of the engine on this machine may cause cancer, birth defects, or other reproductive harm if inhaled.
Disconnect the battery before servicing this machine. Failure to do so could result in personal injury from accidental engine startup.

LOCKOUT AND/OR TAGOUT REQUIREMENTS

The following list suggests lockout procedures to use on all components of the machine that require lockout due to the storage of various forms of energy. It is your company's responsibility to **Lockout/Tagout Procedures** based on this list, train you in their proper and safe use, and to periodically inspect your work area to verify that you are complying with the procedures. **Lockout/Tagout Procedures must be followed!**

NORDCO has provided the means to lockout this machine. NORDCO cannot be held responsible for injury caused by failure to comply with your company's **Lockout/Tagout Procedures**. See next page for suggested lockout/tagout procedure list.

LOCKOUT-TAGOUT PROCEDURES

The following procedures are designed to lead the operator through the steps required to shut the machine down and prepare it for performing mechanical maintenance work. These procedures are intended to release potentially dangerous stored energy forms and make the machine safe to begin repairs.

SAFETY PROCEDURES
LOCKOUT/TAGOUT

1. Apply parking brakes by pushing in **parking brake button** located on the center (front) control console. Note: This releases air pressure that normally releases the parking brakes. By relieving this pressure, a high energy spring applies all four brakes.
2. Chock wheels to prevent accidental rolling of machine on grade.
3. If you have not already done so, determine which components are to have maintenance. Place all machine mechanical systems or workheads in the full up and locked positions.
4. Refer to the list on the next page to determine what procedures are required when mechanical locking up of equipment is not feasible for maintenance. Then continue on with Steps 5-9.
5. Turn the **ignition switch** to the **OFF** position. This turns off the power to the control circuits on the machine. Place a **TAGOUT card** in close proximity to the ignition switch.
6. Turn the **battery disconnect switch (BDS)** to the **OFF** position.
    a. For machines with the BDS on the left side of the center (front) control console: Place a **TAGOUT card** on the switch after you have switched it to the OFF position.
    b. For machines with a remotely located BDS (usually next to the battery box itself): Close the cover to the disconnect switch and place a **LOCKOUT lock** on the box after you have switched it to the OFF position.
7. Completely bleed down air system by pulling on the **Air Drain Cords** located at the rear of the machine.
8. Bleed off hydraulic pressure.
9. Follow all of your company's lockout/tagout rules before proceeding. Note: When working on machine components, be aware that moving components during repairs may create energy (ie., moving a hydraulic cylinder). Proper precautions should be taken.

This list is for specific components in an assembly, where maintenance cannot be performed with the assembly in the full up and/or locked position. After completing the steps required, continue on with Steps 5-9 on the previous page.

When performing maintenance on:	Secure as follows:
RAIL CLAMP ASSEMBLY	
Rail Lift Up/Down Cylinder	Lower Rail Clamp Assembly to rail.
Rail Lift Spotting Cylinders	Lower Rail Clamp Assembly to rail.
Rail Clamp Lockup Cylinder (Air)	Lower Rail Clamp Assembly to rail.
Rail Clamp In/Out Cylinder	Lower Rail Clamp Assembly to rail and place a support under the rail clamp lever.
TIE GRIPPER ASSEMBLY	
Tie Gripper Open/Close Cylinder	Extend Tie Gripper/Exchanger Workhead all the way out on the side being worked on. Lower the Exchanger workhead. Tilt gripper head and place a support under the gripper jaws.
TIE EXCHANGER ASSEMBLY	
Lockup Cylinder (Air)	Lower the assembly to rail.

SAFETY DECALS ON THIS MACHINE

Safety decals and plaques that have been placed on this machine are to be kept clean and legible. Replace any decals or plaques that have become illegible or are missing.

When repairing or replacing components that had safety decals on them, it is your responsibility to replace the safety decals. These can be ordered from the Parts Sales Department.

Safety Decals on this Machine are:

PART NO.	DESCRIPTION	LOCATION
5642 0001	General Machine Cautions	Inside Logic Box Cover
5642 0002	Caution! Watch Your Step	Frame, by Step
5642 0004	Danger! Pinch Points	On Rail Clamps
5642 0005	Warning! Hand Hazard	On Rail Clamps
5642 0006	Danger! Before Servicing...	Logic Box Sides
5642 4501	Caution! Before Welding...	Logic Box Face Battery Box
5642 0010	Lockout Area	Logic Box Face
5642 0011	Lockout Area	Battery Box
5642 0012	Lockup Points	All areas requiring Lockups for travel.

GENERAL

This manual contains operation and maintenance information for the TRIPP Model "C" Machine with Tier 2 Engines, manufactured by NORDCO INC., Oak Creek, Wisconsin. Information regarding the operation and maintenance of this machine can be found behind the appropriate tabs. Information regarding operation and maintenance of OEM parts not of NORDCO manufacture can be found at the back of this manual, behind the tab marked **Component Data**.

Become familiar with all safety instructions, controls and instruments before operating this machine. Follow all instructions carefully.

ABOUT THIS MANUAL

This manual has been broken down into sections which have been separated by index tabs:

Mechanical has individual parts breakdown drawings and lists for each assembly

Hydraulic includes adjustment instructions and troubleshooting for the hydraulic system; and all piping and functional drawings for a standard machine and optional equipment

Pneumatic includes adjustment instructions and troubleshooting for the air (pneumatic) system; and all piping and function drawings for a standard machine and optional equipment

Electrical, includes all electrical schematics, logic box, control box, and cable drawings for the machine; and troubleshooting instructions

Component Data includes parts breakdowns and service instructions for components installed on the machine that are not of NORDCO's manufacture

SPECIFICATIONS❖

GENERAL

Model	Model C w/Tier 2 Engine
Gross Weight*	36,000 lbs (16,326 kg)
Length	36 feet (11 meters)
Width	11 feet (3.35 meters)
Working Clearance (from center of track with one Tie Exchanger Extended)	12.1 feet (3.68 meters)
Height	11 feet 6 inches (3.5 m)
Wheel Base	25 feet (7.6 m)
Travel Speed (Maximum)	23 mph (37 km/h)
Rated Draw Bar Pull (on rail)	1000 lbs (454 kg)

CAPACITIES

Fuel Tank (Painted Green)	120 gallons (454 liters)
Hydraulic Oil Tank (Painted Blue)	2 @ 85 Gallons (321 liters)
Oil Cooler	150 gpm (568 L/mn)

ENGINE

Make/Model	John Deere 6068T, Tier 2
Type	Turbocharged, 6-Cylinder
Continuous BHP	185 HP @ 2350 rpm
Oil Capacity	20 Quarts (19 liters)
Coolant Capacity	12 Quarts (11.3 liters)

HYDRAULIC SYSTEM (MANIFOLDED)

Pump Make/Model	Oil Gear PVG
Type	Piston Pump
Pressure Settings	
Relief Valve Setting (High System Pressure)	3000 psi (200 bar)
Compensator	2500 psi (172 bar)

PNEUMATIC SYSTEM

Engine Mounted Compressor	13 cfm @120 psi
Unloading Valve	100 psi
Relief Valve	150 psi
Tanks	2 @ 7 gallons each
Air Dryer	CR Brakemaster Turbo 2000, with Heater

ELECTRICAL SYSTEM

Battery	24 Vdc (Dual 12V DC batteries), 1150 Cold Cranking Amps
Ground	Negative
Alternator	70 Amp

AXLE DRIVE SYSTEM

Drive Type	Dual Axle Chain Drive
Propulsion Motor Type	Hydraulic

❖Items or capacities may vary according to options on your machine.
*** Approximate weight. Actual weight may vary according to options on your machine. Actual weight of your machine is as stenciled.**

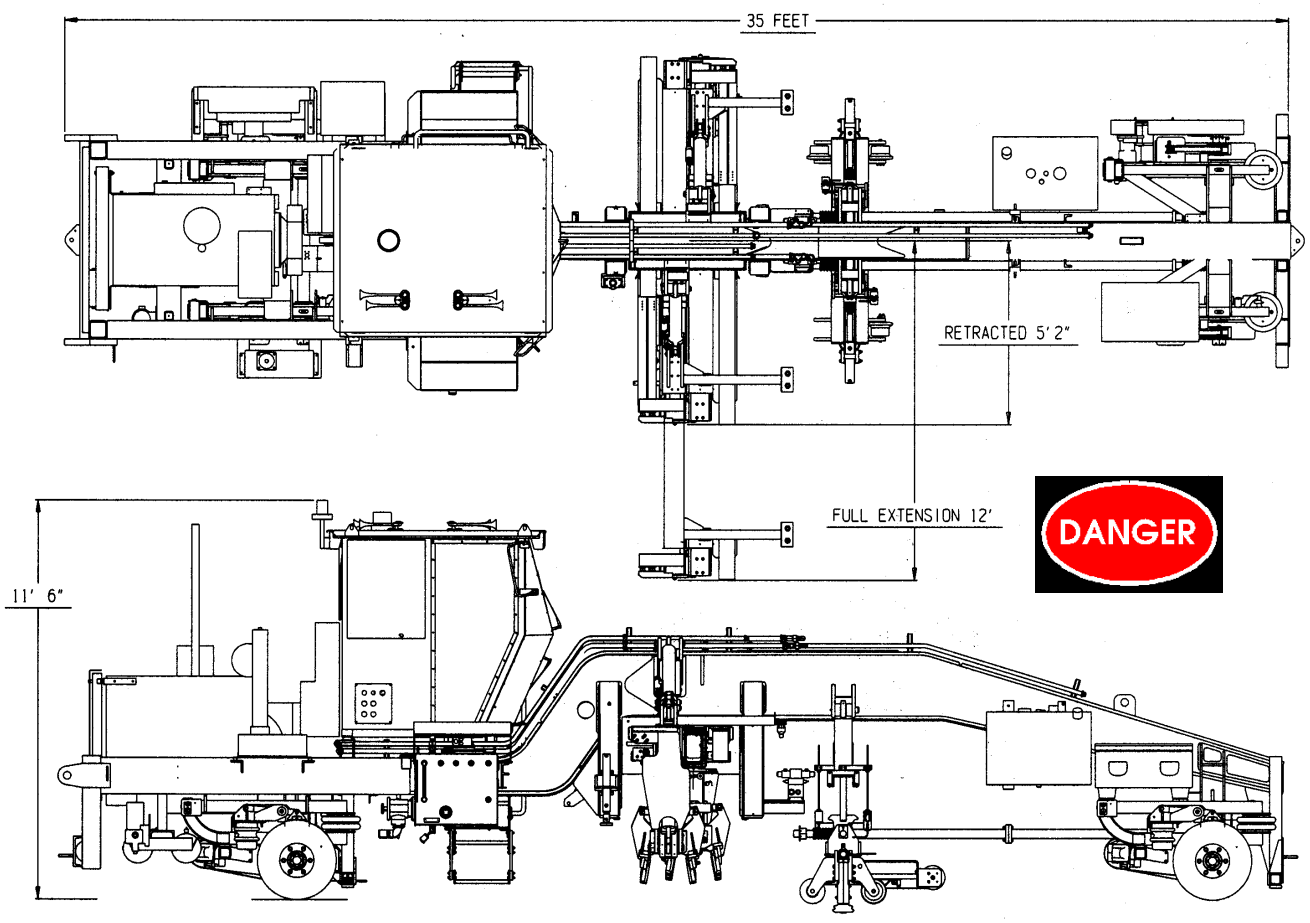
- continued on next page -

BRAKES

Type ..... Pneumatically Applied (Air)
Style ..... Four Wheel Cobra-Style

❖Items or capacities may vary according to options on your machine.
*** Approximate weight. Actual weight may vary according to options on your machine. Actual weight of your machine is as stenciled.**

Dimensional Information



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OPERATION

GENERAL

DO NOT use this machine for machine operations other than for which it was intended.

FRA regulations require that a copy of this Operation Manual be kept on the machine at all times. Additional copies of the Operation Manual only can be ordered from Nordco Parts Sales at 1-800-647-1724.

Carefully read all safety messages in this manual and on the decals located throughout the machine. Learn how to operate the machine and how to use controls properly.

Do not let anyone operate this machine without instruction. Failure to understand the contents of this manual could result in serious personal injury or death.

ABOUT THIS MACHINE

It is always good practice to become familiar with the components of the machine you are using.

The TRIPP machine is comprised of a drive unit for propulsion, rail lift workhead to raise rails, tie exchanger workhead to insert or remove ties on either side of the machine. Workheads and propulsion operation is done through a series of hydraulic valves located either remotely or on a manifold.

During operation of the tie exchanger, either the LH or RH tie grippers may be used, but cannot be used at the same time.

There are two or three control panels (depending on how your cab is equipped) and a joystick control located inside the cab. These are:

- Center Console. Contains all selectable travel controls including engine, pump, lights, travel direction; and cab condition controls such as wipers, defoggers, fans, etc. Also includes status indicators for filters, and all control gauges.
- Workhead Control Console (RH Panel). The left side of the panel contains all the controls associated with the working functions of the machine. The right side of the panel contains all the lockup controls for the workheads.
- Air Conditioning Console (Optional). This console can be located either to the left of the operator or behind and above the operator's head, depending on the type of A/C Unit provided.

An overview of the controls in this machine follows on the next pages.

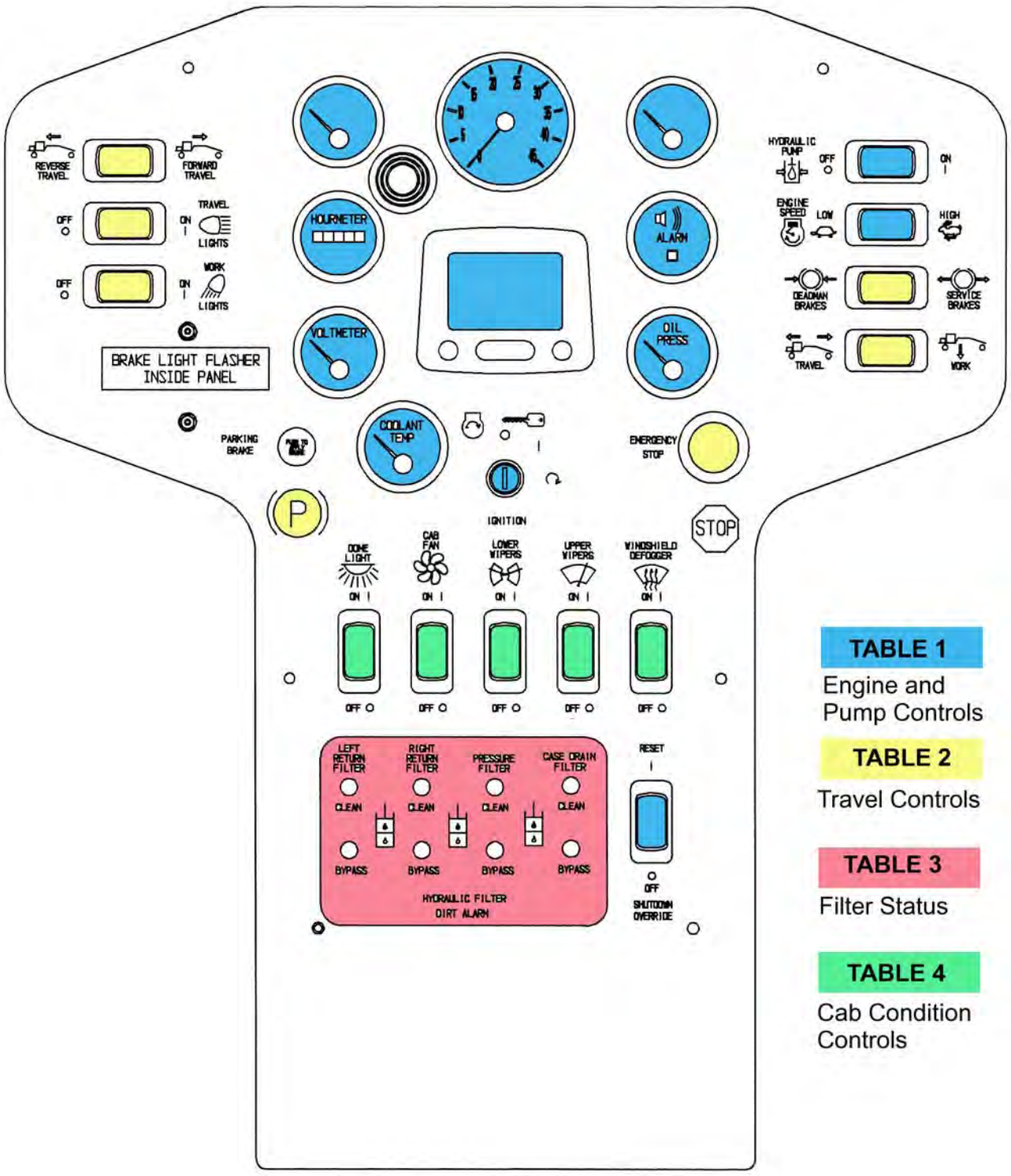


TABLE 1
Engine and Pump Controls

TABLE 2
Travel Controls

TABLE 3
Filter Status

TABLE 4
Cab Condition Controls

CENTER CONSOLE

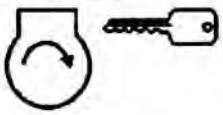
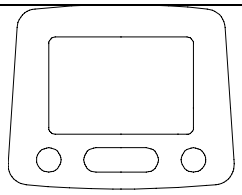
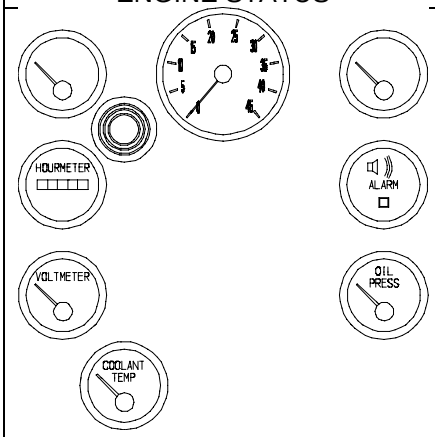
TABLE 1. ENGINE AND PUMP CONTROLS (Including Gauges)		
SYMBOL	CONTROL	DESCRIPTION
Hydraulic Pump 		Two Position Switch. ON/OFF. Controls the hydraulic pump.
	OFFPosition	This switch must be in the OFF position before the engine can be started.
	ON Position	This switch must be in the ON position during working or traveling operations.
ENGINE SPEED 		Two position switch. LOW/HIGH. Controls the engine speed.
	LOW	Low idle. Note: This switch must be in the LOW position before the engine can be started.
	HIGH	High Speed. This switch must be in the HIGH position during working/traveling operations.
IGNITION 		Three position switch. NOTE: This machine no longer requires the use of the "push to start" Murphy switch.
	O	OFF
	|	Turns the electrical system on.
		Turning full clockwise and then releasing starts the engine.
	Shutdown Override	
 ENGINE STATUS		This panel gives you the status of the engine at any given time. Refer to the engine manufacturer's operation manual for more detail on this panel. Programming information can be found in the Component Data section of this manual.
	Air Pressure Gauge	Displays the system air pressure. Operation range is **100 to 130 psi**, normal reading should be…
	Oil Pressure Gauge	Displays the engine oil pressure. Operation range is **35 to 65 psi**, normal reading should be…
	Coolant Temp. Gauge	Displays the temperature of the engine coolant. Operation range is **100˚to 200˚ F,** normal reading should be…
	Tachometer	Displays the engine rpm's. Low Idle is **1000 rpm,** High Idle is **2400 rpm.**
	Hourmeter	Counter. Displays the accumulated hours the engine has been in service. Provides information for service and work intervals.
	Fuel Level Gauge	Displays the total available fuel contained in the fuel tank.

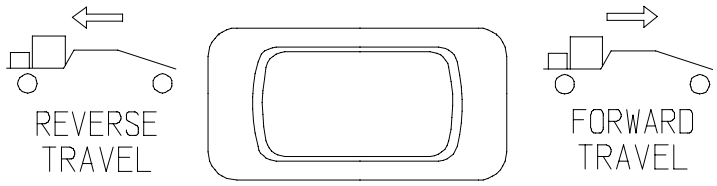
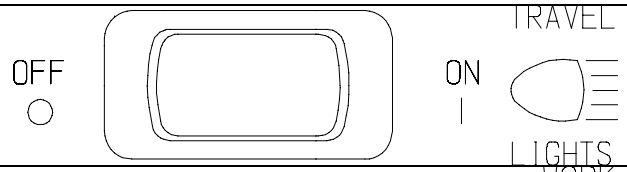
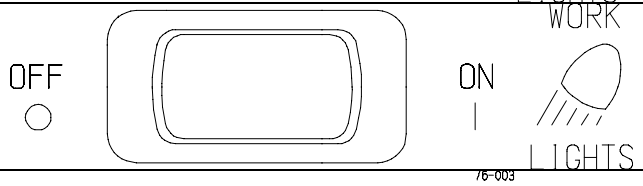
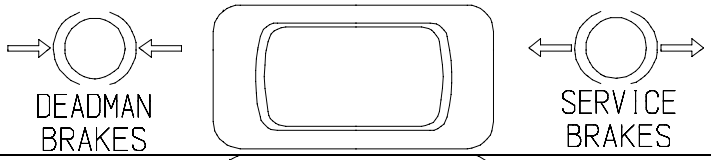
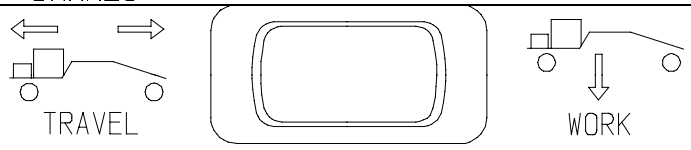
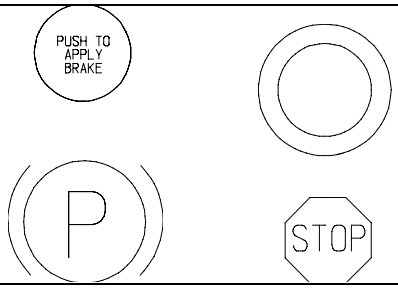
TABLE 2. TRAVEL & WORK CONTROLS	
CONTROL	DESCRIPTION
	Two position switch. FWD/REV. Operator selects direction of travel during work or other operations. Reverse Travel: When this is selected, the rear travel lights and front marker lights are energized. Backup alarm sounds during forward travel. Forward Travel: When this is selected, the front travel lights and rear marker lights are energized. Backup alarm sounds during reverse travel.
	Two position switch, ON/OFF. Used with the travel direction switch.
	Two position switch, ON/OFF. Energizes the worklights.
	Two position switch, DEADMAN/SERVICE. Deadman: Activates braking control any time the propulsion pedal is released. Service: Requires use of brake pedal in order to apply brakes.
	Two position switch, TRAVEL/WORK. TRAVEL: Raises retracts workheads to allow insertion of lockups; inflates air springs; disables hand controllers. WORK:
	

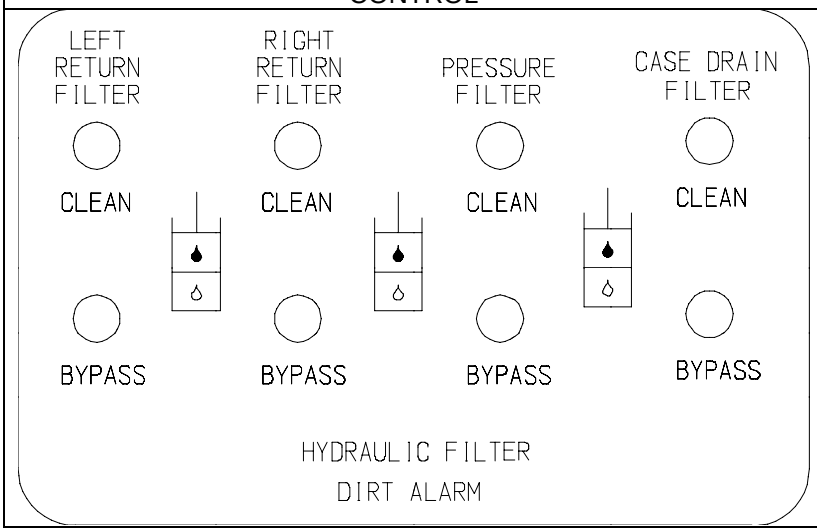
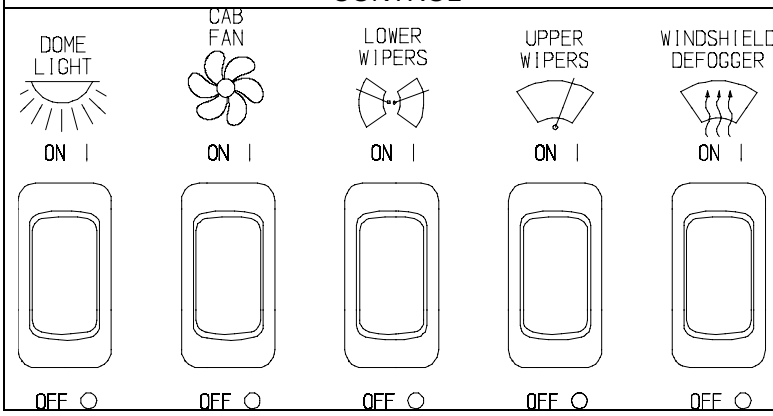
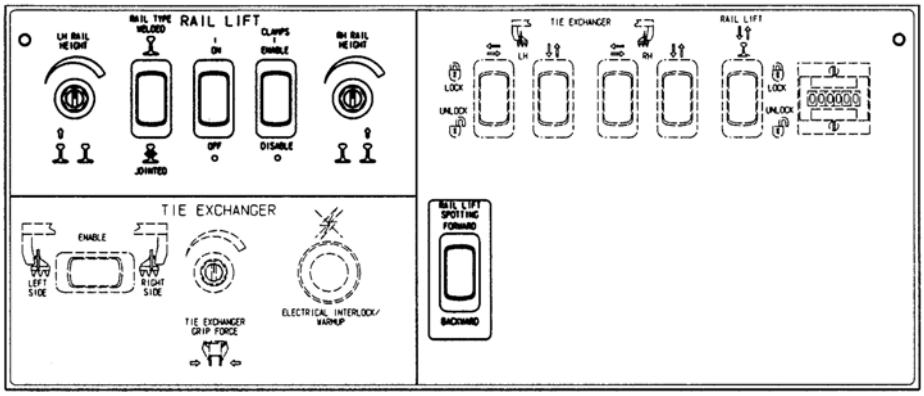
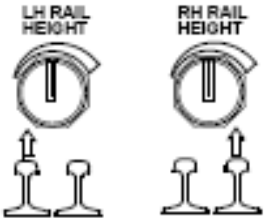
TABLE 3. FILTER STATUS	
CONTROL	DESCRIPTION
	Light shows the status of the filter.

TABLE 4. CAB CONDITION CONTROLS	
CONTROL	DESCRIPTION
	Two position switches. ON/OFF. Energizes or de-energizes the cab dome light, fan, wipers and defogger.

RH CONTROL CONSOLE

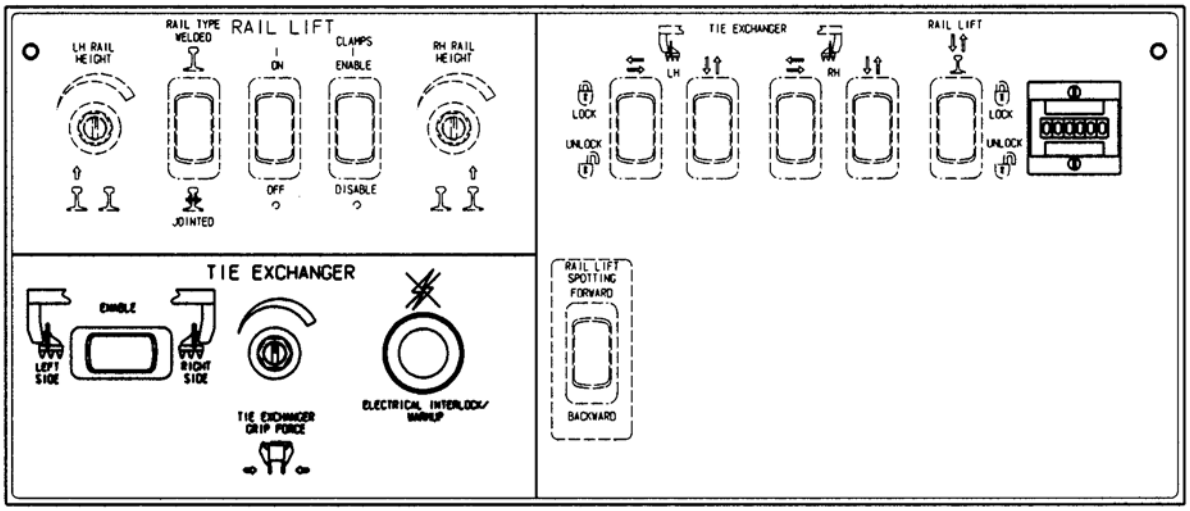
TABLE 5. RAIL LIFT CONTROLS

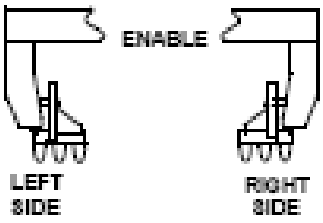
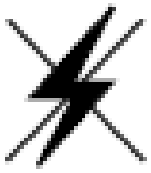


CONTROL	DESCRIPTION
	Located on the left and right sides of the rail lift console, these potentiometers work separately to control the height adjustment of the left and right rail lift. Increases the voltage required from the magnetic sensors on the rail lift workhead sensor rods to set the height of rail lift. Decreases the voltage required from the sensors.
	Located on the left side of the rail lift console, this switch selects the type of rail that is being worked on. Rail clamps close immediately when rail lift is activated. Rail clamps close after a time delay when rail lift is activated.
	Located on the center of the rail lift console, this switch controls the rail lift workhead. Energizes the rail lift workhead. Deenergizes the rail lift automatic function.
	Clamps Enable/Disable Use Enable for all work operations Use Disable for testing and adjustment of the rail lift LVDT
	Rail Spotting Forward/Back Used for manual positioning of the rail lift assembly. Note: Assembly returns to center automatically at end of each cycle.

RIGHT HAND CONTROL CONSOLE (CONTINUED)

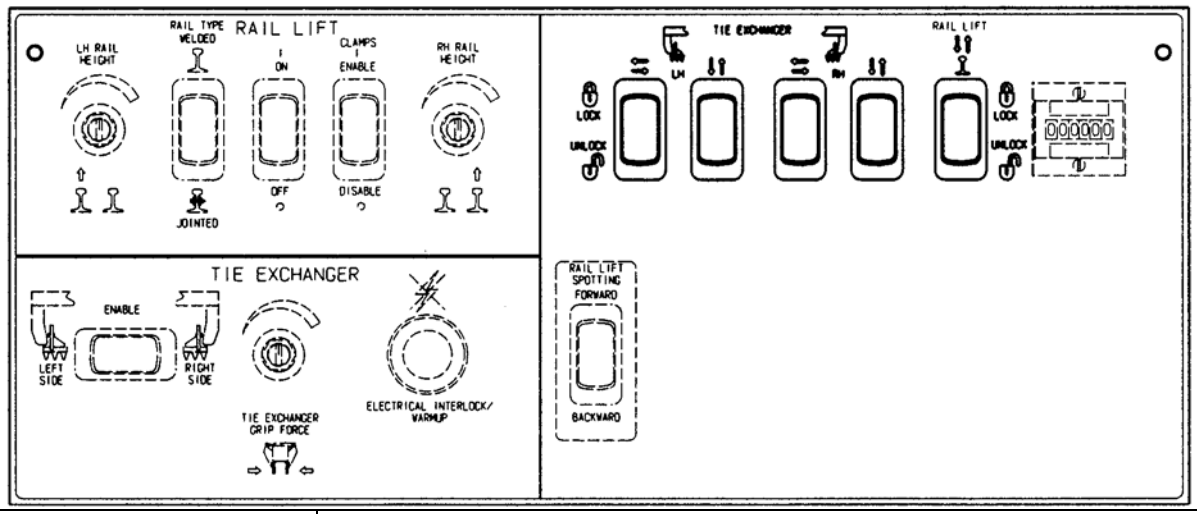
TABLE 6. TIE EXCHANGER CONTROLS



CONTROL	DESCRIPTION
	This switch is used to select either the left or right tie exchanger arm for operation. Position of this switch alters the functions of the hand controllers. Refer to the hand controller description later in this section.
	Located on the center of the tie exchanger console, this potentiometer controls the grip force of the tie exchanger. Clockwise: Increases the force gripping the tie. Counter-Clockwise: Decreases the force gripping the tie. Note: On some machines, as an option, an override button on the handcontroller allows the operator to momentarily increase the gripping force.
	Located on the right of the tie exchanger console, the electrical interlock/warmup controls. Normal machine operation Disables hand controller, propulsion, hydraulic joystick and outputs to manifolds. Locks brakes in both "service" and "deadman" modes.

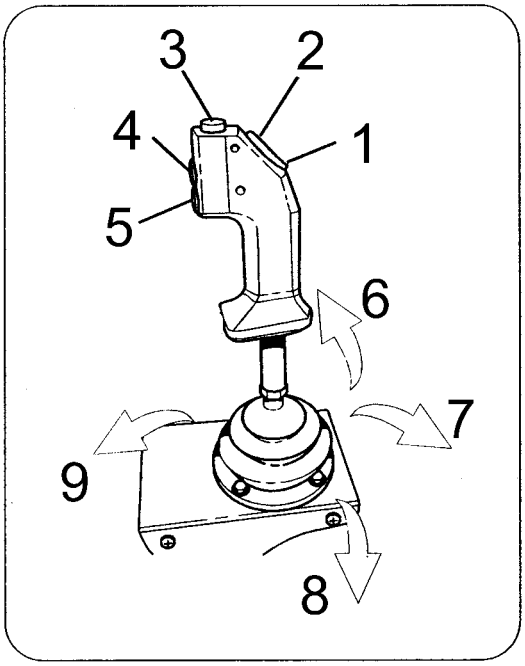
RIGHT HAND CONTROL CONSOLE (CONTINUED)

TABLE 7. WORKHEAD LOCKUPS



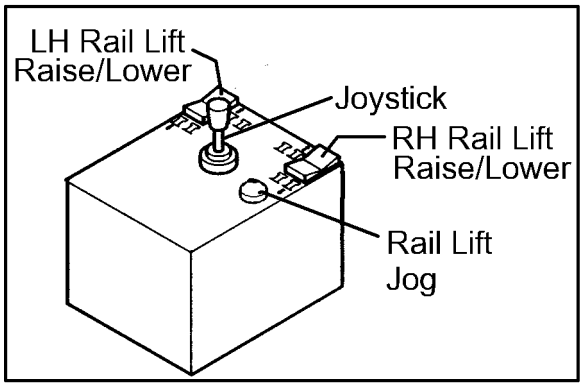
CONTROL	DESCRIPTION
Left Tie Exchanger Lock and Unlock Switches LH LOCK UNLOCK LOCK (Up Position) UNLOCK (Down Position)	Located on the left side of the lock/unlock console, this switches control the pneumatic locks on the left side tie exchanger. Controls the pneumatic cylinders to place mechanical locks on the hydraulic cylinders of the left side. Controls the pneumatic cylinders to release the mechanical locks on the hydraulic cylinders.
Right Tie Exchanger Lock and Unlock Switches RH LOCK UNLOCK LOCK (Up Position) UNLOCK (Down Position)	Located on the center of the lock/unlock console, this switches control the pneumatic locks on the right side tie exchanger. Controls the pneumatic cylinders to place mechanical locks on the hydraulic cylinders on the right side. Controls the pneumatic cylinders to release the mechanical locks on the hydraulic cylinders.
Rail Lift Workhead Lock and Unlock Switch RAIL LIFT LOCK UNLOCK LOCK (Up Position) UNLOCK (Down Position)	Located on the right side of the lock/unlock console, this switches control the pneumatic locks on the rail lift hydraulic cylinders. Controls the pneumatic cylinders to place mechanical locks on the hydraulic lift cylinders. Controls the pneumatic cylinders to release t

HAND CONTROLS
RIGHT HAND CONTROLLER



1	Tie Grip Close (Powerboost)(Opt.)	After the grippers have grabbed the tie, pushing this button gives a short (timed) boost of additional gripping power.
2	Tie Grip Close	Closes the tie grippers onto the tie with the preset force (set by the pots on the right hand control panel)
3	Rail Lift Cycle Set/Reset	Sets and resets the automatic rail lift cycle (same as button 5)
4	Rail Lift Jog	Allows operator to "jog" up the rail lift, overriding the LVDT controls. This is a timed jog and must be repeated until desired rail height is reached.
5	Rail Lift Cycle Set/Reset	Sets and resets the automatic rail lift cycle (same as button 5)
6	Right Movement With RH Exchanger Enabled With LH Exchanger Enabled	 Extends the RH Tie Exchanger workhead Retracts the LH Tie Exchanger workhead
7	Backward Movement	Raises Tie Exchanger
8	Left Movement With RH Exchanger Enabled With LH Exchanger Enabled	 Retracts the RH Tie Exchanger workhead Extends the LH Tie Exchanger workhead
9	Forward Movement	Lowers Tie Exchanger

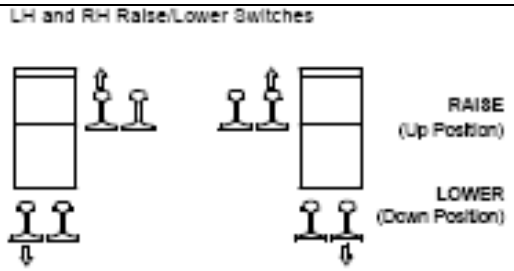
HAND CONTROLS
LEFT HAND CONTROLLER



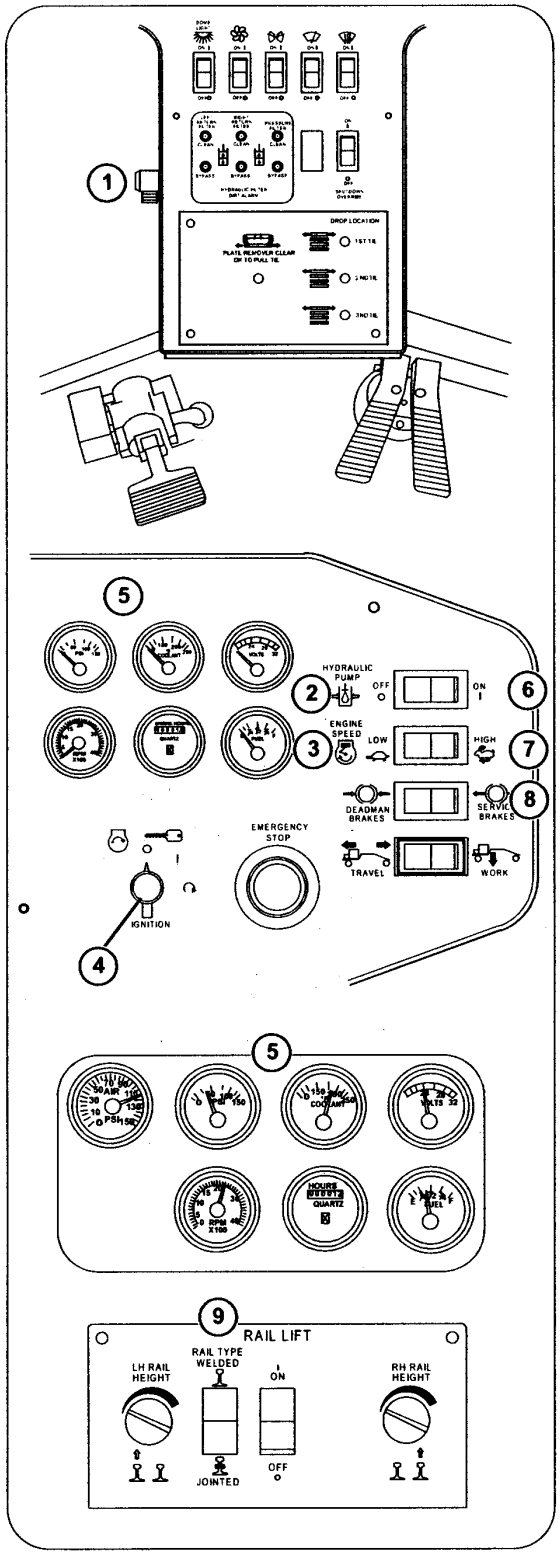
The joystick (located on the left hand arm of the cab seat) provides control of rail lift and tilt controls of the tie gripper workhead. The function of the joystick varies according to which side of the exchanger is enabled.

• Left Side Enabled: Left movement tilts gripper head up; right movement tilts gripper down

• Right Side Enabled: Left movement tilts gripper head down; right movement tilts gripper head up

	Located on the left and right side of the joystick on the Left Hand Control. Activates the manual lift of the rails. The height of lift is set by the proximity switches. Activates the manual lower of the rails.
Rail Lift Jog	Lifts the both rails simultaneously. The height of lift is set by the potentiometer on the PLC.

OPERATION



OPERATION

PRE START-UP CHECKS:

- Check engine oil level
- Check engine coolant level
- Check hydraulic oil level
- Inspect electrical connections for tightness

START-UP CHECKS:

Start the engine.

Place the Engine Speed Switch in the HIGH position.

Place the hydraulic Pump Switch in the ON position.

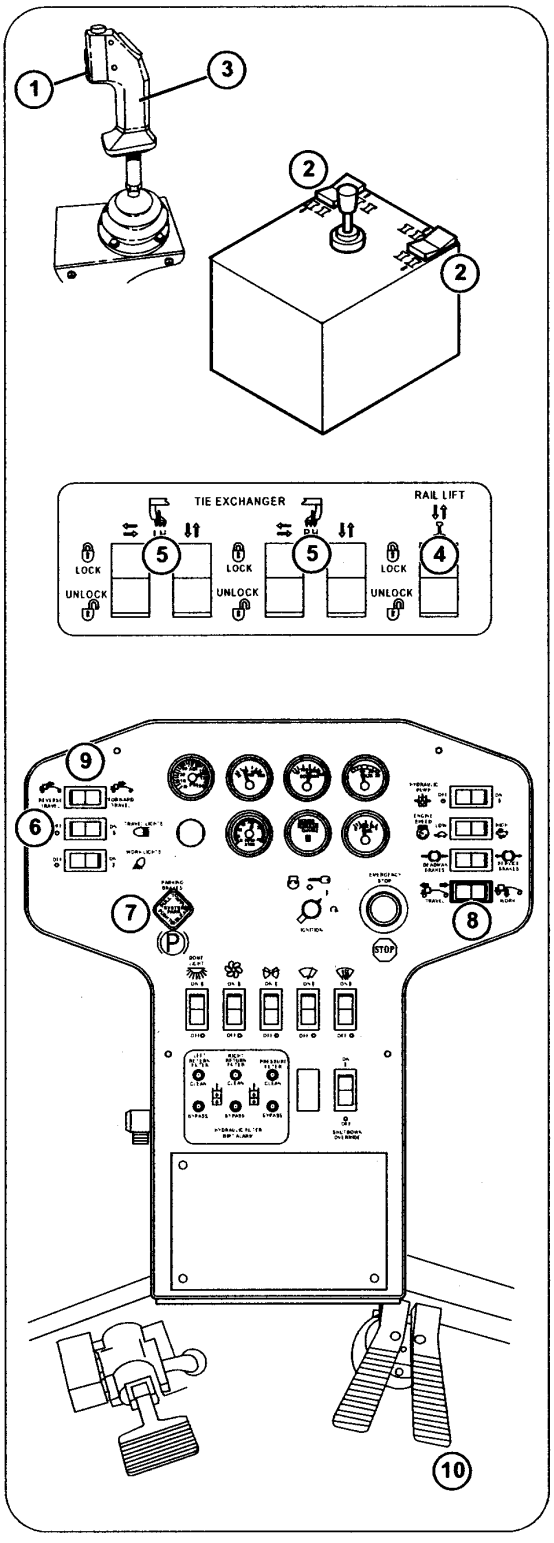
- Check the hydraulic oil filter indicators
- Check the air cleaner indicator
- Inspect hoses for and fittings for leaks
- Check the height setting of the proximity switches

STARTING THE ENGINE

1. Place Battery Disconnect Switch in the ON position.
2. Place the Hydraulic Pump Switch in the OFF position. (Note: the pump must be in the OFF position to start the engine.)
3. Place the Engine Speed Switch in the LOW position. (Note: The speed switch must be in the LOW position to start the engine.)
4. Turn the Ignition Switch to the START position.
5. Check that the gauges are in normal operating range.
    a. Air Pressure 100 to 130 psi
    b. Oil Pressure 35 to 65 psi
    c. Volts 23-26 VDC
    d. Engine RPM 1000 rpm

NORMAL OPERATION

6. Place the Hydraulic Pump Switch in the ON position.
7. Place the Engine Speed Switch in the HIGH position.
8. Select a placement of the Brake Switch in either the DEADMAN BRAKES or the SERVICE BRAKES position.
9. Select the type of rail you will be working on, WELDED or JOINTED, by pressing the switch on the RAIL LIFT CONSOLE.



FORWARD TRACK TRAVEL

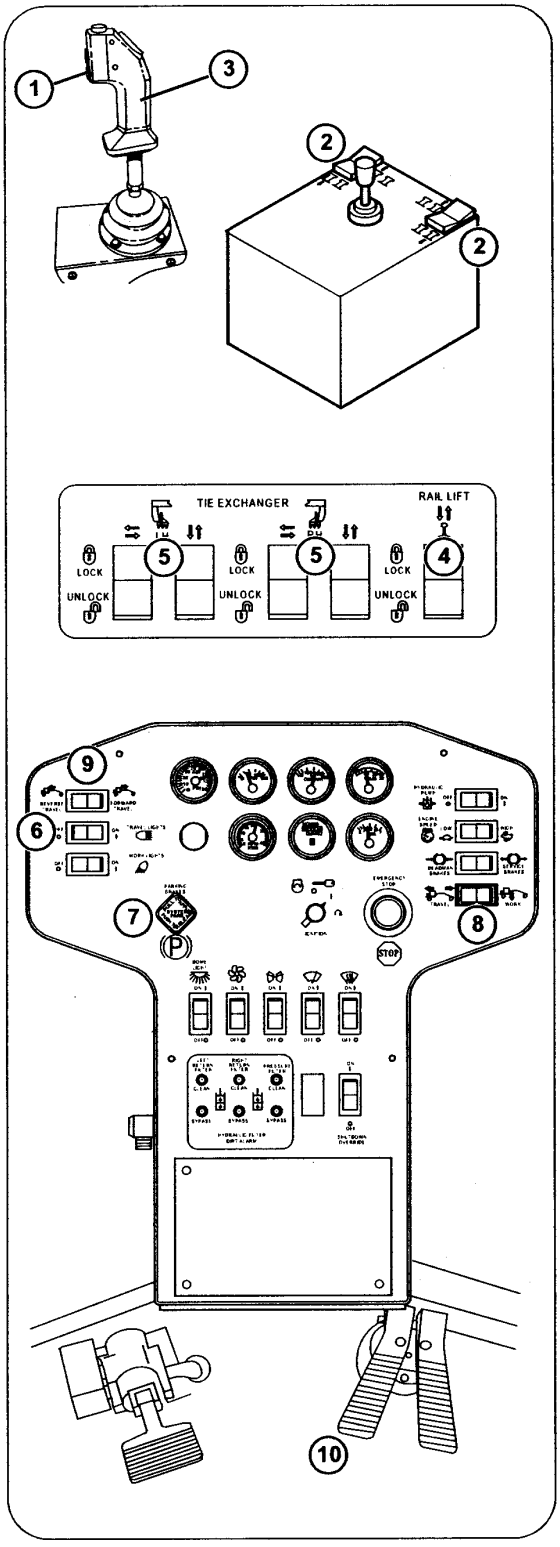
(For travel operation)

Start the engine. Set machine to NORMAL OPERATION.

NOTE: The operator must wear seatbelt in travel or work modes.

1. Raise the rail lift workhead by pressing (if needed) the Start/Reset Button on the joystick to release the rails.
2. Press both Rail Lift Raise Switches at the same time to evenly raise the rail lift workhead.
3. Use the joystick to fully raise and retract the tie exchanger workhead.
4. Place the Rail Lift Lock and Unlock Switch in the LOCK position.
5. Place the Left and Right Tie Exchanger Lock and Unlock Switches in the LOCK positions.
6. Place the Travel Lights Switch in the ON position. (The front travel lights and rear marker lights will automatically be selected with the Travel Switch in the FORWARD TRAVEL position.)
7. Release the Parking Brake if set.
8. Place the Travel/Work Switch in the TRAVEL position. (Retracts the hydraulic cylinders for the rail lift workhead, inflates the air springs, disables the hand controller.)
9. Place the Travel Switch in the FORWARD TRAVEL position.
10. Depress the forward travel foot pedal.

NOTE: The Travel Switch may be placed in either the Forward or Reverse position, and the machine will move forward when the forward travel pedal is depressed. The travel switch selects the operation of the travel and marker lights and the backup alarm.



REVERSE TRACK TRAVEL

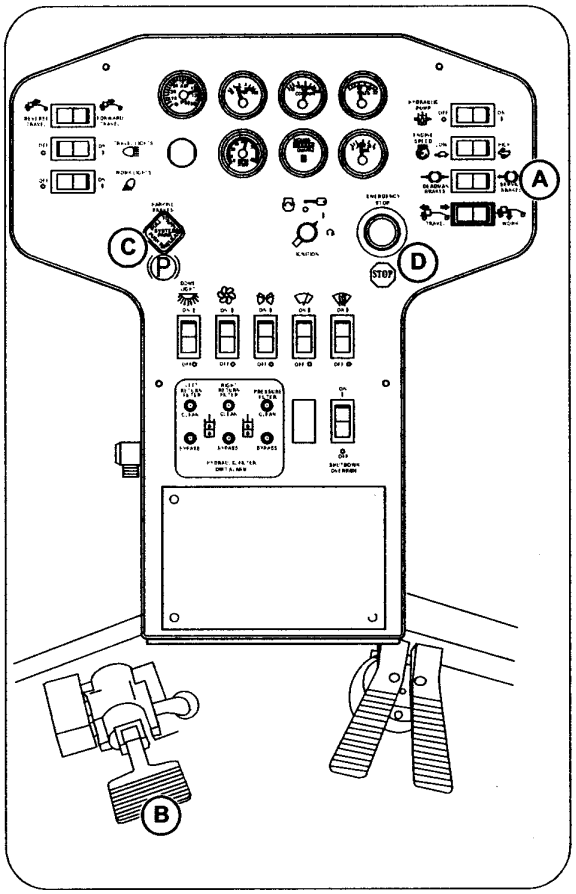
(For travel operation)

Start the engine.

Set machine to NORMAL OPERATION.

NOTE: The operator must wear seatbelt in travel or work modes.

1. Raise the rail lift workhead by pressing (if needed) the Start/Reset Button on the joystick to release the rails.
2. Press both Rail Lift Raise Switches at the same time to evenly raise the rail lift workhead.
3. Use the joystick to fully raise and retract the tie exchanger workhead.
4. Place the Rail Lift Lock and Unlock Switch in the LOCK position.
5. Place the Left and Right Tie Exchanger Lock and Unlock Switches in the LOCK positions.
6. Place the Travel Lights Switch in the ON position. (The front travel lights and rear marker lights will automatically be selected with the Travel Switch in the REVERSE TRAVEL position.)
7. Release the Parking Brake if set.
8. Place the Travel/Work Switch in the TRAVEL position. (Retracts the hydraulic cylinders for the rail lift workhead, inflates the air springs, disables the hand controller.
9. Place the Travel Switch in the REVERSE TRAVEL position.
10. Depress the reverse travel foot pedal.



BRAKING

Brake Operation

The Brake Mode Operation Switch (A) sets the brakes to either the DEADMAN BRAKES setting or the SERVICE BRAKES setting.

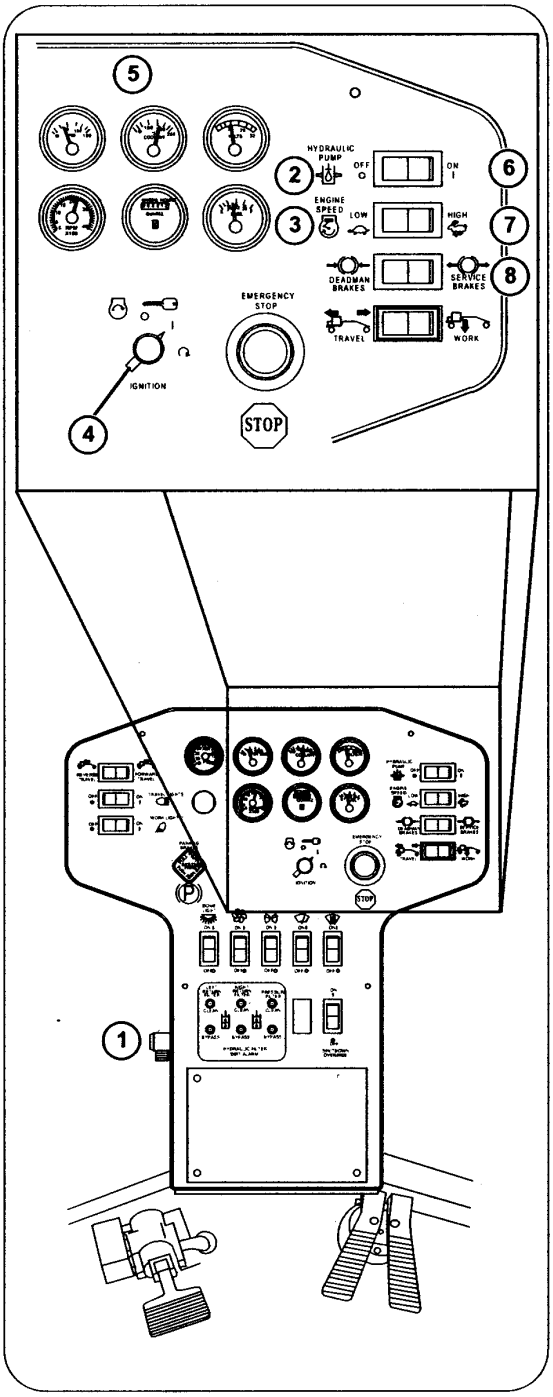
When the switch is placed in the DEADMAN BRAKES position, the brakes are automatically engaged any time the forward or reverse foot pedal is not pressed down.

If the Brake Mode Selection Switch is in the SERVICE BRAKES position, the use of the brake pedal (B) is necessary to stop the TRIPP.

Parking Brake Operation

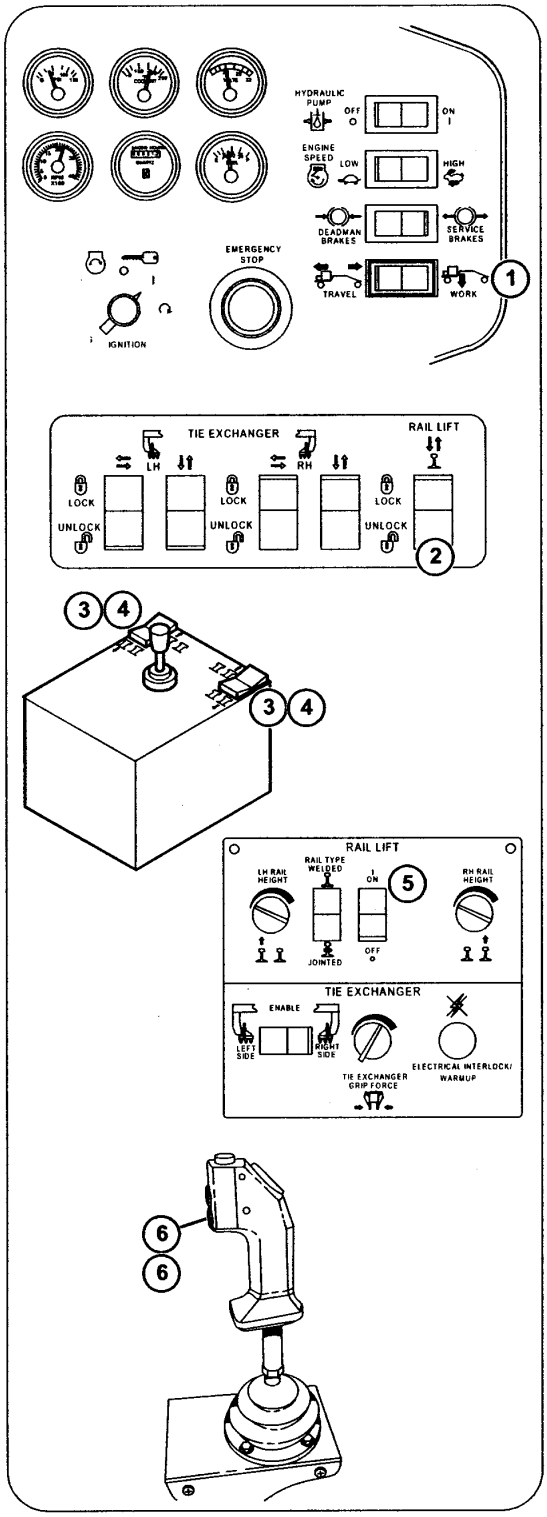
The Parking Brake Knob (C) controls the brakes by releasing emergency air pressure in the air brake chamber. Without air pressure, the brakes lock.

EMERGENCY STOP
The Emergency Stop (D) shuts off the engine and electrical power.



RAIL LIFT AND TIE EXCHANGE OPERATION

1. Place Battery Disconnect Switch in the ON position.
2. Place the Hydraulic Pump Switch in the OFF position. (Note: the pump must be in the OFF position to start the engine.)
3. Place the Engine Speed Switch in the LOW position. (Note: The speed switch must be in the LOW position to start the engine.)
4. Push and hold down the Engine Start Button and turn the Key Switch to the START position.
Note: Keep the engine start button down until the oil pressure comes up.
5. Check that the gauges are in normal operating range.
• Air Pressure 100 to 130 psi
• Oil Pressure 35 to 65 psi
• Engine RPM 1000 rpm
6. Place the Hydraulic Pump Switch in the ON position.
7. Place the Engine Speed Switch in the HIGH position (engine to 2400 rpm).
8. Place the Brake Switch in either the DEADMAN BRAKES or the SERVICE BRAKES position.



RAIL LIFT OPERATION

1. Place the Travel/Work Switch in the WORK position.
(Deflates the air springs and enables the hand controller.)
2. Place the Rail Lift Lock and Unlock Switch in the UNLOCK position.
3. Momentarily press the LH and RH Rail Lift Switches UP to assure rail lift is unlocked.
4. Press the LH or RH Rail Lift Switches DOWN to lower rail lift workhead to rails.

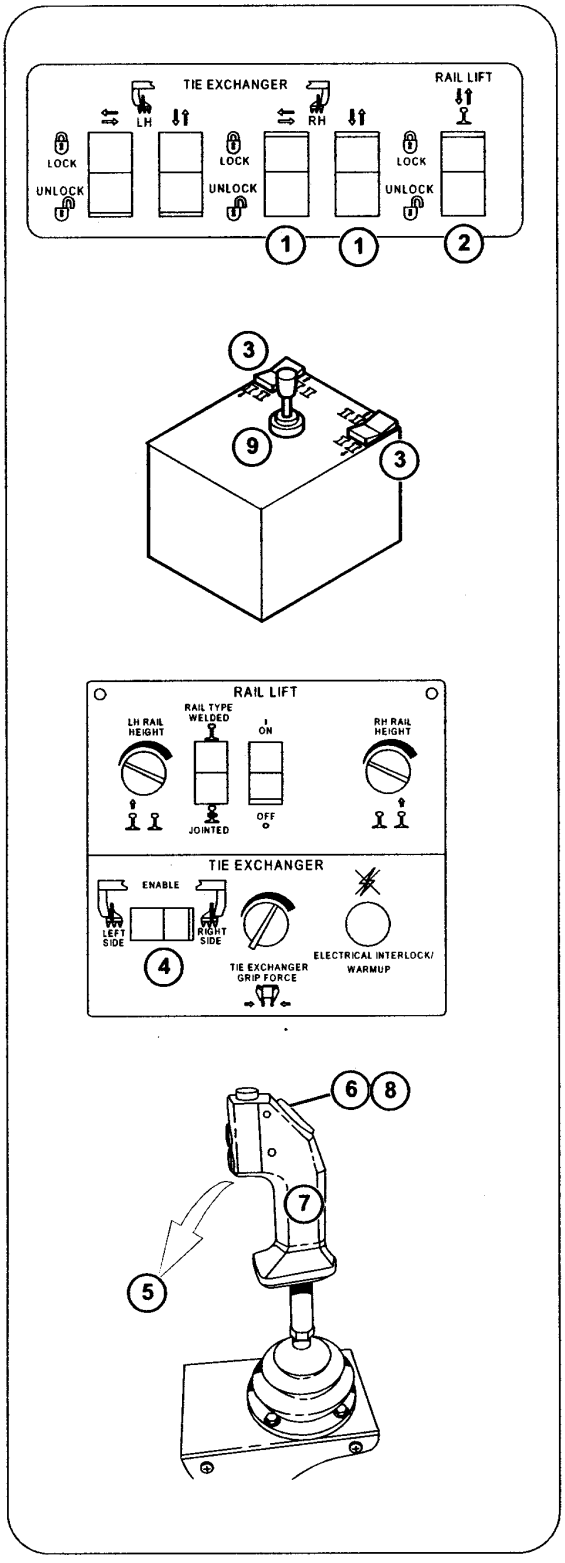
IMPORTANT: Look to see that the rail lift wheels are on rails. If not properly set on rails use the LH or RH Rail Lift Switches as needed to shift the rail lift workhead and set the wheels on the rails.

5. Place the Rail Lift ON/OFF Switch in the ON position.
6. Press the START/RESET Button (lower-front button) on the joystick to grab and raise the rails. Check the height that the rails are being raised.
7. Press the START/RESET Button on the joystick to lower the rails.

Rail Lift Height Adjustments:

• Continuous - Adjust the rail height potentiometers as needed. If adjusted, press the START/RESET Button to verify height adjustment.

• Temporary - Use the manual Rail Lift RAISE Switch(es) to lift the rail(s) if the tie exchanger needs to clear an object during tie removal or insertion.



TIE EXCHANGER OPERATION

Tie Removal:

1. Verify that the Tie Exchanger Lock and Unlock Switches (up/down and extend/retract) are in the UNLOCK position for the side that ties are being removed to and inserted from.
2. Verify that the Rail Lift Lock and Unlock Switch is in the UNLOCK position.
3. Momentarily press the Rail Lift Raise Switches on LH controller box to ensure locks are released.
4. Place the Tie Exchanger Enable Switch in the LEFT SIDE or RIGHT SIDE position (side that ties are being removed to and inserted from).

NOTE: During operation of the tie exchanger either the LH or the RH tie exchanger may be used. BOTH tie exchangers cannot be used at the same time.

5. Lower the tie exchanger workhead by moving the joystick forward. IMPORTANT: Ensure both sides of the tie exchanger workhead have lowered. Extend or retract the workhead as required by moving the joystick to the left or right to position the tie gripper over the tie.
6. Momentarily press the top of the Rocker Switch on the joystick to grip the tie.
7. Move the joystick to the side selected to remove the tie to.

NOTE: During tie removal or insertion, pressing the top of the Rocker Switch (6) will boost the hydraulics and provide extra force for removal or insertion of the tie.

8. Momentarily press the top of the Rocker Switch on the joystick to release the tie.

Tie Insertion: Follow steps 5 through 7 to grip and insert a new tie.

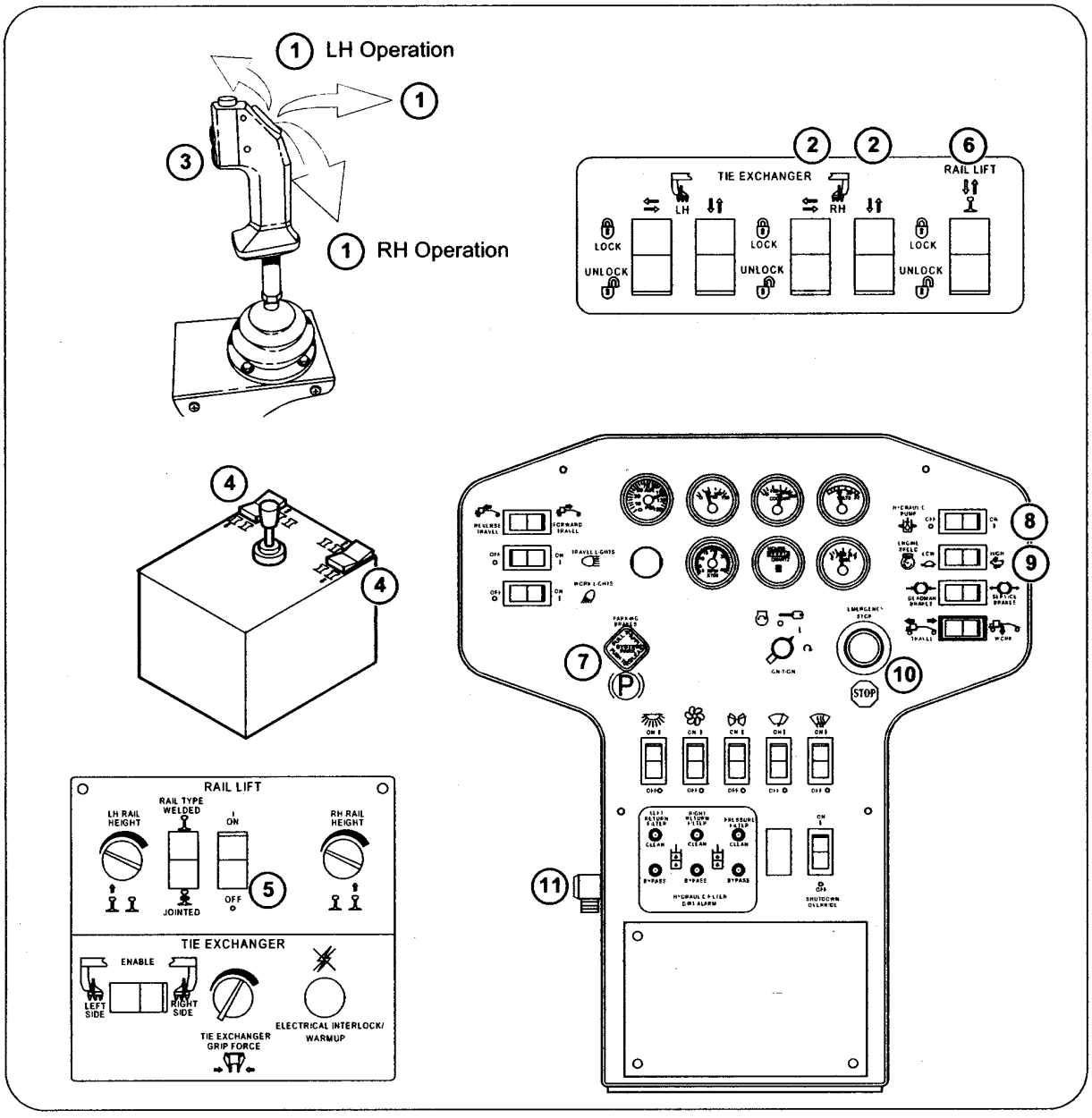
9. Use the smaller joystick on the LH side to tilt the tie (if needed) during insertion.

NOTE: After tie insertion, pressing the forward travel pedal will lower the rails and release the rail clamp.

MACHINE SHUT-DOWN

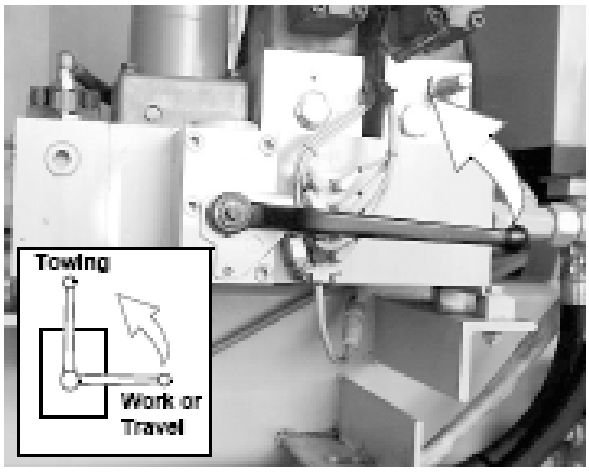
1. Use the joystick to raise and retract the tie exchanger workhead.
2. Place the Tie Exchanger Lock and Unlock Switches in the LOCK position. Use the joystick to ensure locks are fully engaged.
3. Press the Start/Reset Button on the joystick as needed to ensure the rail lift workhead has lowered and released the rails.
4. Simultaneously press **both** the LH and RH Rail Lift Switches UP to fully raise the rail lift Workhead.
5. Place the Rail Lift ON/OFF Switch in the OFF position.
6. Place the Rail Lift Lock/Unlock Switch in the LOCK position. Momentarily press **both** the LH and RH Rail Lift Switches UP to ensure locks are fully engaged.
7. Pull the Parking Brake Switch OUT to set the parking brake.
8. Place the Engine Speed Switch in the LOW position.
9. Place the Hydraulic Pump Switch in the OFF position.
10. Place the Ignition Switch in the OFF position.
11. Place the Battery Disconnect Switch in the OFF position.

TOWING



Maximum towing speed is 20 mph (32 km/h). Reduce speed accordingly as dictated by weather or track conditions. Remember that the machine weight may approach the weight of the towing vehicle. Maintain increased stopping distance accordingly.

The following steps must be taken before towing your machine:
1. Install Lock-Ups. See LOCKS-UPS section.
2. Drain air tanks.
3. Chock all wheels.
4. Remove T-bolt from back side of air canister and insert it into the bottom of the brake canister.
5. Tighten T-bolt until brakes release. (Spring inside of canister will compress, raising brake head from wheel.)



(Shown In Work or Travel Position)

6. Position propulsion bypass valve in the TOWING position.
7. Remove drive chain(s) if machine is to be towed a long distance.
8. Inspect the towing vehicle coupler for loose or damaged parts.
9. Back towing vehicle to the machine and engage the couplers. Keep hands and fingers clear of the coupling device and all other pinch points.
10. Ensure that the coupling device is fully engaged, closed, and locked.
11. Ensure that the coupling device and rear frame members of the towing vehicle will not interfere with or restrict motion of any part of the machine maneuvering. Remove chocks for towing.
12. When towing is complete, loosen T-bolt on bottom of the brake canister until brakes come into contact with wheel.
13. Remove T-bolt and return to its storage position at the back of the brake canister.
14. Return propulsion bypass valve to the work or travel position.

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MAINTENANCE AND SERVICE

GENERAL

Recommended service intervals are for normal operating conditions. Service more often if engine is operated under adverse conditions (See Maintenance for Extreme Conditions later in this section).

Neglecting maintenance can result in failures or permanent damage to equipment.

SAFETY DURING MAINTENANCE

Alert others in the area that service or maintenance is being performed on this machine. Become familiar with, and use, your company's **lockout-tagout** procedures when performing maintenance on this machine. See **LOCKOUT-TAGOUT REQUIREMENTS** in the **Safety Section** of this manual.

Do not start the engine if repairs or work is being performed alone. You should always have at least two people working together if the engine must be run during service. One person needs to remain in the **command** position (at the controls), ready to stop the machine and shut off engine if the need arises.

NORDCO'S SERVICE NETWORK

Need assistance? It's only a phone call away! If you experience problems, contact your original sales representative first, he is the one listed on the front page of this manual. If you cannot reach him, we suggest that you contact the representative closest to your work area BEFORE calling NORDCO's Service Manager. See map on the next page for the alternate representative closest to your work area.

REQUESTING ASSISTANCE

If you have any questions regarding maintenance and service on this machine, please call your local Nordco Representative or:

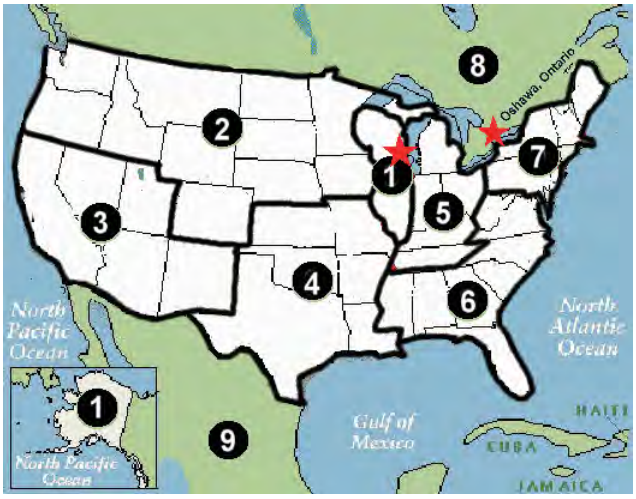
Nordco Service Manager
(414) 766-2342 (Wisconsin)
1-800-445-9258 (USA and Canada)

The process will be faster if you have the following information in hand **before calling**:

1. The Machine and Model Name
2. The Serial Number

SERVICE NETWORK

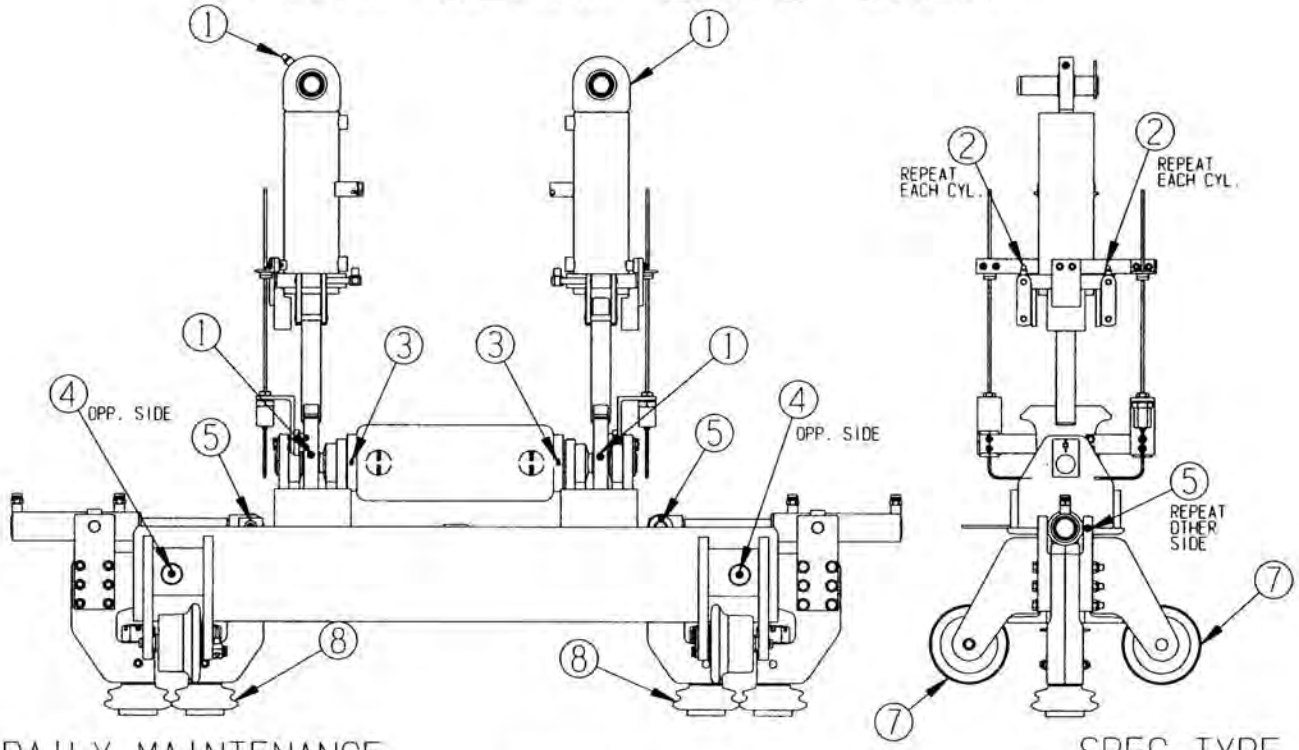
No.	Representative	Phone Number
1.	Nordco Service Manager	1-800-445-9258 or (414) 769-4603
2.	Russell Railway Supply	(952) 835-5125
3. & 4.	James H. Lynde	(913) 648-7379
5.	Stanley H. Smith Inc.	(606) 885-3353
6.	Dwayne Lambing	(770) 424-0401
7.	North American Equipment Company	(716) 675-2040 or (859) 885-3353
8.	North American Equipment Ltd. (Canada)	(905) 628-9997
International:	American Equipment	(561) 997-2080



LUBRICATION AND MAINTENANCE

Service points on this machine (adjustments, inspections, lubrication, etc.) are indicated on the following illustration. The items listed on the chart are preceded by a “D1, W1, M1, Q1 and A1" designation. These points are shown on the illustration and refer to the service interval (D=Daily, W=Weekly, M=Monthly, Q=Quarterly and A=Annually) for this point of the machine. Maintenance instructions are given for each and are separated by Service Interval.

RAIL CLAMP LUBE CHART



DAILY MAINTENANCE	SPEC TYPE
1. RAIL LIFT UP/DOWN CYLINDER (2 PER/4 TOTAL)	SPEC C
2. RAIL LIFT UP/DOWN CYLINDER LOCKUPS (2 PER/4 TOTAL)	SPEC C
3. RAIL CLAMP HOUSING PIVOT (2 TOTAL)	SPEC C
4. RAIL CLAMP PIVOT (2 TOTAL)	SPEC C
5. RAIL CLAMP IN/OUT CYLINDER (2 PER/4 TOTAL)	SPEC C
6. TIGHTEN RAIL CLAMP PIVOT MOUNTING BOLTS	

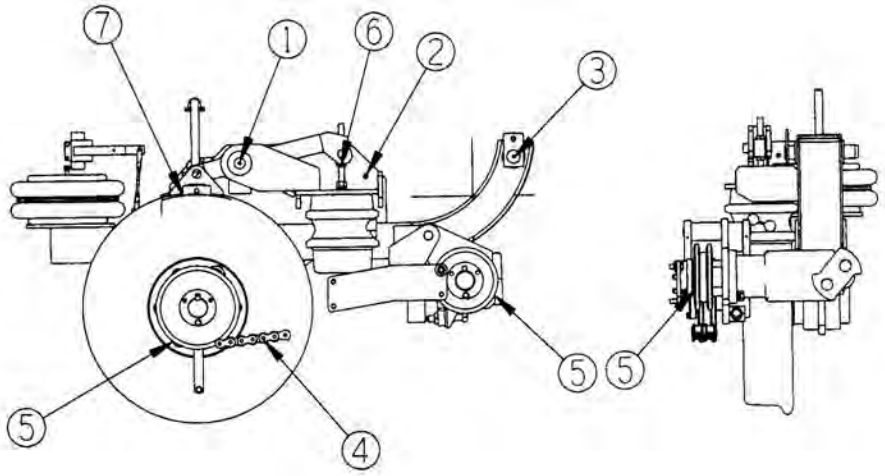
WEEKLY MAINTENANCE

7. INSPECT RAIL CLAMP FRAME WHEELS FOR WEAR (4 TOTAL)
8. INSPECT RAIL CLAMP ROLLERS FOR WEAR (4 TOTAL)

SERVICE SPECIFICATIONS

SPEC A.....ENGINE OIL
SPEC B.....HYDRAULIC OIL
SPEC C.....GREASE

SUSPENSION/BRAKES/PROPULSION LUBE CHART



SPEC TYPE

DAILY MAINTENANCE

1. BRAKE LEVER PIVOT (1 PER/4 TOTAL).....SPEC C
2. REMOTE WHEEL BEARING FITTING (1 PER/4 TOTAL).....SPEC C
3. SUSPENSION ARM PIVOT (1 PER/4 TOTAL).....SPEC C

WEEKLY MAINTENANCE

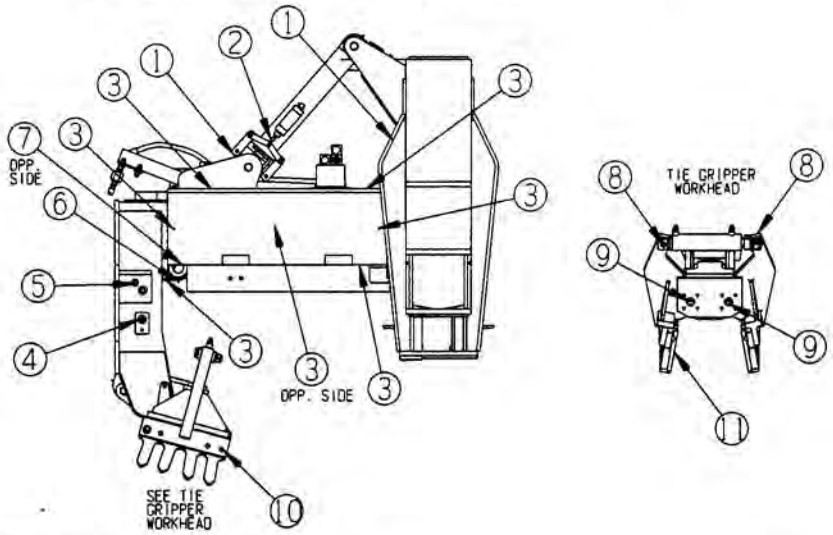
4. PROPULSION CHAIN (1 PER/4 TOTAL).....SPEC A
5. CHECK SPROCKETS FOR WEAR (2 PER/8 TOTAL)
6. BRAKE CANNISTER ARM (1 PER/4 TOTAL).....SPEC A
7. CHECK BRAKE PADS FOR WEAR
8. TIGHTEN ALL BOLTS

SERVICE SPECIFICATIONS

SPEC A.....ENGINE OIL
SPEC B.....HYDRAULIC OIL
SPEC C.....GREASE

TIE EXCHANGER LUBE CHART

(ONE SIDE SHOWN FOR CLARITY)



DAILY MAINTENANCE

		SPEC TYPE
1.	TIE EXCHANGER UP/DOWN CYLINDER PIVOTS(1 PER/2 TOTAL)..	SPEC C
2.	TIE EXCHANGER LOCKUPS (2 PER/ 4 TOTAL).....	SPEC C
3.	BOOM (6 PER/12 TOTAL).....	SPEC C
4.	GRIPPER JAW TILT CYLINDER (2 PER/4 TOTAL).....	SPEC C
5.	TIE EXCHANGER IN/OUT CYLINDER PIVOTS (1 PER/2 TOTAL)..	SPEC C
6.	GRIPPER ARM PIVOT (1 PER/2 TOTAL).....	SPEC C
7.	EXTENDER LATCH PIVOT (1 PER/2 TOTAL).....	SPEC C
8.	GRIPPER OPEN/CLOSE CYLINDER (2 PER/4 TOTAL).....	SPEC C
9.	GRIPPER JAW LEVER PIVOTS (2 PER/4 TOTAL).....	SPEC C

WEEKLY MAINTENANCE

10. CHECK ALL BOLTS FOR TIGHTNESS
11. CHECK GRIPPER JAWS FOR WEAR

SERVICE SPECIFICATIONS

SPEC A.....ENGINE OIL
SPEC B.....HYDRAULIC OIL
SPEC C.....GREASE

DAILY (OR 10 HOURS, WHICHEVER COMES FIRST)			
Key: =  = Refer to Mfr's Manual in Component Data  = More Detailed Instructions Follow			
LOC	ITEM	SYM	TASK
ENGINE	NOTE: All engine maintenance should follow the instructions given in the Engine Manufacturers Operation Manual. Items below are for general reference only. **All maintenance should be performed BEFORE engine startup (Daily – AM).**		
	D1.		Check engine oil level.
	D2.		Check coolant level.
	D3		Drain Fuel/Water Separator (if equipped).
	D4.		Clean Dust Unloader Valve (if equipped).
	D5.		Check Fuel Filter.
	D6.		Check Engine Air Cleaner Indicator (if equipped). Replace as necessary.
	D7.		
HYDRAULIC	**D8.**		Check Hydraulic Oil Level and Quality (Sight inspection at Gauge). Fill as req'd.
	D9.		Check Hydraulic Oil Filter Indicators at Front Control Panel (requires machine running and working)
	D10.		Inspect Hoses and Fittings for Leaks
	D11.		
	D12.		
RAIL LIFT & STABILIZER	**D13.**		Grease Rail Lift Cylinder Pivots
	D14.		Grease Rail Clamp Lever Pivot Pins
	D15.		Check Rail Clamp LVDT Cable and DIN Cable Connections
	D16.		Check Rail Clamp Rollers for Wear
	D17.		Grease Stabilizer Rod Ends
	D18.		
	D19.		
TIE EXCHANGER	**D20.**		Grease Tie Exchanger In/Out Cylinder Pivot Points
	D21.		Grease Tie Exchanger Up/Down Cylinder Pivot Points
	D22.		Grease Extender Latch Pivot Point
	D23.		Grease Gripper Jaw Lever Pivot Points
	D24.		Grease Gripper Jaw Tilt Cylinder Pivot Point
	D25.		
MISC.	**D26.**		Fill Fuel Tank – End of Day
	D27.		Inspect electrical connections/harnesses for tightness
	D28.		Drain Air Tanks
	D29.		
	D30.		

Detailed Daily Instructions

D1. ENGINE – Check Engine Oil Level	
Do the following **BEFORE STARTING THE ENGINE** for the first time each day: **IMPORTANT: DO NOT add makeup oil until the oil level is BELOW the crosshatch marks on the dipstick.** Check engine oil level on dipstick. Add as required, using seasonal viscosity grade oil. (See DIESEL ENGINE OIL in Fuels, Lubricants, and Coolant Section for oil specifications.) **IMPORTANT: DO NOT fill above the top mark on the dipstick. Oil levels anywhere within crosshatch (D) are considered in the acceptable operating range.** Engine Oil Capacity: 20 Quarts (18.93 liters) **See Page ____ of the John Deere Engine Manual for detailed instructions.**	

D2. ENGINE – Check Engine Coolant Level	
Check the coolant level daily. Add coolant as necessary, but do not overfill. Make a daily visual check for cooling system leaks. Look for an accumulation of coolant when the engine is running and when it is stopped. Fill the cooling system with coolant to the bottom of the fill neck in the radiator fill or expansion tank. **Do not add cold coolant to a hot engine. Engine may be damaged. Allow engine to cool before adding coolant.** **See Page ____ of the John Deere Engine Manual for detailed instructions.**	

D3. ENGINE – Check Fuel/Water Separator	
Check the fuel/water separator daily. **See Page ____ of the John Deere Engine Manual for detailed instructions.**	

D4. ENGINE – Clean Dust Unloader Valve (If so equipped)	
Check the fuel/water separator daily. **See Page ____ of the John Deere Engine Manual for detailed instructions.**	

D5. ENGINE – Check Fuel Filter	
Check the fuel/water separator daily. **See Page ____ of the John Deere Engine Manual for detailed instructions on replacement of filter if necessary.**	

D6. ENGINE – Check Engine Air Cleaner Indicator	
Check the fuel/water separator daily. **See Page ____ of the John Deere Engine Manual for detailed instructions.**	

D8. HYDRAULIC – Check Hydraulic Oil Level and Quality	
Inspect the oil level on a daily basis (or **every 10 hours** of operation) by reading the sight gauge located on the side of the reservoir. At full level, the oil should be to the top of the sight gauge. The hydraulic system uses SAE-20 (ISO 46) oil. Before filling the system with hydraulic oil, be sure that the fluid is as specified and that it is clean. Do not use cloth strainers or fluid that has been stored in contaminated containers. Care should be taken to keep the hydraulic oil free of dust, water, sealing compounds and other foreign matter. While using the sight gauge, verify oil quality. If oil becomes dark or milky colored, it should be changed immediately. NOTE: Always add hydraulic oil to reservoir through a filter. NEVER OVERFILL RESERVOIR. Never use hydraulic brake fluid in lieu of hydraulic oil.	

D9. HYDRAULIC – Check Hydraulic Filter Indicators (Main Control Panel)	
To keep the hydraulic system clean and free from moisture, there is a return line filter and a strainer in the hydraulic system. The hydraulic oil filters have indicator lights on the center console to provide a visual display of filter cleanliness. Units are equipped with an additional Main Pump (Pressure) Filter and a filter indicator box that gives the operator a visual status of the condition of the filters. The green light indicates no service required and the red light means service is required. The suction strainer has no indicating device and must be visually inspected.	

D10. HYDRAULIC – Inspect Hoses and Fittings for Leaks	
1. Look for loose or disconnected hoses. An oil spot below the machine is a good indication of a loose hose or hydraulic component. 2. Make certain shut-off valve on suction strainer is OPEN. Opening valve can often correct what appears to be a malfunction. 3. Inspect all vital hose connections, especially at main pump and the main pump hose connection at the manifold. 4. Look for cover damage and/or indications of twisted, worn, crimped, brittle, cracked, or leaking hoses. Hoses with their outer cover worn through or otherwise damages should be considered unfit for further service.	

D13. RAIL LIFT & STABILIZER – Grease Rail Lift Cylinder Pivots	

D14. RAIL LIFT & STABILIZER – Grease Rail Clamp Lever Pivot Pins	

D15. RAIL LIFT & STABILIZER – Check Rail Clamp LVDT Cable and DIN Cable Connections	

D16. RAIL LIFT & STABILIZER – Check Rail Clamp Rollers for Wear	

D17. RAIL LIFT & STABILIZER – Grease Stabilizer Rod Ends	

D20. TIE EXCHANGER – Grease Tie Exchanger In/Out Cylinder Pivot Pins	

D21. TIE EXCHANGER – Grease Tie Exchanger Up/Down Cylinder Pivot Pins	

D22. TIE EXCHANGER – Grease Extender Latch Pivot Point	

D23. TIE EXCHANGER – Grease Gripper Jaw Lever Pivot Points	

D24. TIE EXCHANGER – Grease Gripper Jaw Tilt Cylinder Pivot Point	

D26. MISCELLANEOUS – Fill Fuel Tank – End of Day	
Refill the tank at the end of each days' operation to prevent condensation from contaminating the fuel. Inspect the fuel level on a daily basis (or every 10 hours of operation) by reading the sight gauge on the side of the reservoir. **Use Diesel fuel only**.	

D27. MISCELLANEOUS – Inspect Electrical Connections/harnesses for tightness	
Daily inspection of the harnesses connected to the controllers, operator control boxes (both left and right control boxes), foot switches, and logic box are required. Harnesses that may not have proper connection could cause problems in starting and stopping the machine. In addition to harness connections, the foot switch should be inspected on a regular basis to guard against wear, deterioration, etc. If you notice excessive wear or breakdown, replace the switch.	

D28. MISCELLANEOUS – Drain Air Tanks	

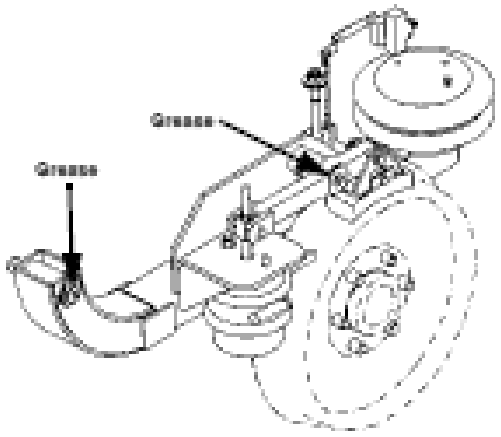
WEEKLY (OR 40 HOURS, WHICHEVER COMES FIRST)			
Key: =  = Refer to Mfr's Manual in Component Data  = More Detailed Instructions Follow			
LOC	ITEM	SYM	TASK
MISCELLANEOUS	**W1.**		Perform all Daily Lubrication and Maintenance Procedures
	W2.		Check Battery Condition.
	W3.		Oil Propulsion Chains
	W4.		Oil Propulsion Chain Adjusting Nuts
	W5.		Grease Brake Lever Pivot and Suspension Arm Pivot
	W6.		Grease Axle Bearings
	W7.		Check Suction Strainer Element[a]
	W8.		
	W9.		
	W10.		
	W13.		
	W14.		
	W15.		
	W16.		
	W17.		
	W18.		

a. Check Suction Strainer Element first 40 hours of operation and yearly after initial inspection.

*Optional Equipment

Detailed Weekly Instructions

W3. Oil Propulsion Chains	
When inspecting the drive chain, the chain should be nearly taut, with 1/4" (.635 Cm) play when depressed at the center. If not, adjustment is necessary see below. If the chain is too tight, the eccentricity of the sprockets may cause the chain to stretch and/or break. If the chain is too loose, the starting and stopping of the machine will shock load the chain, resulting in short chain life or failure. A worn or stretched chain will also cause short sprocket life as the load will not be carried by all of the teeth on the sprocket - resulting in excessive load on a few teeth. To adjust the drive chain: 1. Remove propulsion chain guard. 2. Unscrew the adjusting screw locknut, but do not remove it from the screw. 3. Turn adjusting screw clockwise (CW) to tighten the chain or counter-clockwise (CCW) to loosen the chain. 4. Once the desired tightness has been reached, tighten the adjusting screw locknut. 5. Reinstall the chain guard.	

W5. Grease Brake Lever Pivot and Suspension Arm Pivot	
Pivot grease fittings are located on the brake leverl pivot and the suspension arm pivot.	

W6. Grease Axle Bearings	
Periodic inspection of the axle bearings and spacers for wear and breakdown are required to keep this machine functioning properly. Inspect hardware for proper fit and secure all loose nuts and bolts. Check spacers (A) for wear. The wheel bearing grease fittings are located on the underside of the pillow blocks. Remote wheel bearing grease fittings for the wheels are located on the outside of the suspension arm. Weather conditions affect the time intervals of greasing. In general, a small amount of grease should be ok. Overgreasing may cause seal failure. Grease hardens with age. When this occurs, the bearing should be taken apart, cleaned, and relubricated following the manufacturer's instructions on the **component data** sheet. **If supplied, check automatic greasing assemblies for proper charge.**	

W7. Check Suction Strainer Element	
Located on the side of the reservoir, remove and inspect the filter after the **first 40 hours** of operation and **every year** thereafter. Clean as required. To access filter: 1. Turn off engine, Make certain suction valve is closed (off)(ccw). 2. Remove padlock (1) and pull out plug attached to cable. 3. Using Allen wrench, turn screw (2) inside of plug housing clockwise to open (counterclockwise to close). 4. Remove six capscrews and lift off front cover. Reverse process to reattach cover. NOTE:If for any reason removal of suction line filter is necessary, you must seal the hydraulic tank to prevent external contamination.	

MONTHLY (OR 150 HOURS, WHICHEVER COMES FIRST)			
Key: =  = Refer to Mfr's Manual in Component Data = More Detailed Instructions Follow			
LOC	ITEM	SYM	TASK
MISCELLANEOUS	NOTE: All engine maintenance should follow the instructions given in the Engine Manufacturers Operation Manual. Items below are for general reference only. **All maintenance should be performed BEFORE engine startup (Daily – AM).**		
	M1.		Perform all Daily and Weekly Lubrication and Maintenance Procedures
	M2.		Check Fan, Alternator and Generator Belts
	M3.		Change Engine Oil and Filters
	M4.		Check Brake Shoes for Wear
	M5.		Run Pressure Checks on Main Pump and Propulsion
	M6.		Check Oil Cooler, clean as necessary
	M7.		Check Air Intake System
	M8.		
	M9.		

Detailed Monthly Instructions

M2. Check Fan, Alternator and Generator Belts	
Check the belts and tighten the fan drive, battery-charging alternator and other accessory drive belts. Belts should be neither too tight nor too loose. Belts that are too tight impose excess loads on the crankshaft, fan, and/or alternator bearings, shortening both belt and bearing life. Excessively overtightened belts can result in crankshaft breakage. A loose belt will slip and may cause damage to accessory components. Replace all belts in a set when one is worn. Single belts of similar size should not be used as a substitute for a matched belt set. Premature belt wear can result because of belt length variation.	

M4. Check Brake Shoes for Wear	
Replace brake shoes when the pad is less than 1/4 (.64 cm) thick. To replace brake shoes: 1. Override the brake valve cylinder on the main manifold until the cylinder collapses. 2. Once the cylinder has been collapsed, close the brake shut-off valve located behind the left main manifold. This will trap oil in the cylinder and keep the cylinder collapsed. 3. Insert the Brake lockup pins. 4. Turn off machine, following **Lockup/Tagout** procedures. 5. Remove the lower cotter pin and pin holding brake shoe bracket to brake lever. (See Item #1 in Figure). 6. Lift up the brake bracket to gain access to the brake shoe. 7. Remove brake shoe mounting hardware and replace brake shoe. Make certain you have reinstalled the mounting hardware! 8. Lower the brake bracket and reinstall the pin and cotter pin. Repeat Steps 5 through 8 for all brake shoes that need replacing. After that is done, continue on with the following steps: 9. Remove the brake lockup pins. 10. Return machine to service following the **Lockout/Tagout** procedures. Turn on machine. 11. Open shut-off valve.	

M5. Run Pressure Checks on Main Pump and Propulsion	
Pressure checks should be performed **every 250 hours or monthly** after the engine and hydraulics have thoroughly warmed up (oil temperature has reached 100°F [37.8°C] minimum). Before performing these checks, **read and understand all OPERATION instructions, warnings and cautions.**	

QUARTERLY (OR 500 HOURS, WHICHEVER COMES FIRST)			
Key: =  = Refer to Mfr's Manual in Component Data = More Detailed Instructions Follow			
LOC	ITEM	SYM	TASK
MISCELLANEOUS	**Q1.**		Perform all Daily, Weekly and Monthly Lubrication and Maintenance Procedures
	Q2.		Drain Fuel Tank. Replace Fuel Filters.
	Q3.		Check Cooling System Hoses
	Q4.		Test Hydraulic Oil Cleanliness, replace filters as necessary
	Q5.		Replace Hydraulic Tank Breathers
	Q6.		
	Q7.		
	Q8		

Detailed Quarterly Instructions

Q4. Test Hydraulic Oil Cleanliness	
Proper fluid condition is essential for long and productive life of hydraulic components and systems. Thorough precautions should always be observed to insure the hydraulic system is clean: 1. Filter each change of oil to prevent introduction of contaminants into the system. 2. Maintain the proper oil level and regularly service filters, breathers, and reservoirs. 3. Take precautions to prevent moisture contamination. Change fluid whenever contamination occurs because even small amounts of water can affect system performance as well as induce corrosion and oil breakdown.	

YEARLY (OR 2000 HOURS, WHICHEVER COMES FIRST)			
Key: =  = Refer to Mfr's Manual in Component Data  = More Detailed Instructions Follow			
LOC	ITEM	SYM	TASK
MISCELLANEOUS	**Y1.**		Perform all Daily, Weekly, Monthly and Quarterly Lubrication and Maintenance Procedures
	Y2.		Steam Clean Engine Radiator and Oil Cooler
	Y3.		Inspect Wheels for Excessive Wear
	Y4.		Inspect Suction Strainer Element.
	Y5.		Drain and Replace Hydraulic Oil in Tank. Replace all Filter Elements.
	Y6.		- Reserved for Future Use -
	Y7.		- Reserved for Future Use -
	Y8		- Reserved for Future Use -

Note: For Recommended Engine Service Intervals over One (1) year, refer to the Engine Manual or contact the Engine Manufacturer.