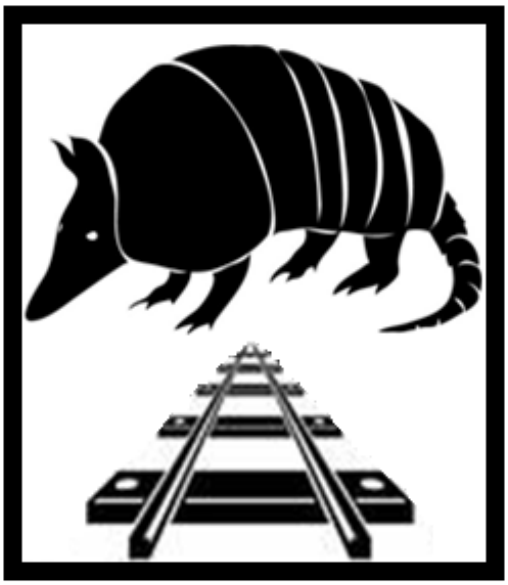
Nordco Equipment Services

Stonedilla Cribber



Operation and Maintenance Manual

Reorder Part: 49452300
Last Revision: -
DECEMBER 2011

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

NOTICE

This machine has an engine that contains an Electronic Control Unit (ECU). Precautions MUST be taken to correctly isolate it during welding on this machine. Failure to do so will result in damage not covered under warranty. See last page of Maintenance Section for proper procedure.

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.

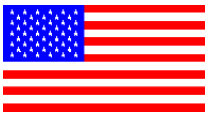
Personnel responsible for the operation and maintenance of this equipment should thoroughly study the manual before commencing operation or maintenance procedures.

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

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) 766-2249

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.

Formerly 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

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

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.

NOTICE

NOTICES
(Machine damage only)

Before starting a new or overhauled engine that has been in storage, consult the engine manufacurer's manual for initial start instructions. Failure to follow those instructions can result in serious engine damage.
Never shut off the battery disconnect switch with the engine running. This could cause damage to the voltage regulator, alternator, and/or electrical system.
This machine has an electronic control unit (ECU). Failure to correctly isolate it during welding on this equipment will result in damage not covered under warranty.
See decals on engine for more engine specific notices that may cause damage to the engine.

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.

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 **Stonedilla Cribber** Machine, 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. This section has been expanded upon and is also broken down into tabbed sections.

SPECIFICATIONS❖

GENERAL

Model ..... A
Gross Weight* with Options ..... 46,000 lbs (20,865 kg)
Length ..... 37 Feet 8 Inches (11.5 meters)
Width (without workheads extended) ..... 10 Feet 6 Inches (3.2 meters)
Working Clearance (from center of track with Plow Extended) ..... 8 Feet 6 Inches (2.6 meters)
Working Clearance (from center of track with one Cribber Extended ..... 6 Feet 10 Inches (2 meters)
Height ..... 11 feet 6 inches (3.5 meters)
Wheel Base ..... 25 feet (7.6 meters)
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 ..... Cummins QSB6.7, Tier 3
Type ..... Turbocharged, 6-Cylinder
Continuous BHP ..... 190 HP @ 2350 rpm
Dry Weight (with Pump Drive) .....
Oil Capacity with Standard Oil Pan (total system) ..... 17.6 Quarts (16.7 liters)
Oil Capacity with Suspended Oil Pan (total system) ..... 20.8 Quarts (19.7 liters)
Oil Capacity with High Capacity Oil Pan (total system) ..... 27.9 Quarts (26.4 liters)
Maximum Oil Temp ..... 280° F (138° C)
Coolant Capacity ..... 2.6 gallons (10 liters)
Recommended Minimum Operating Temperature ..... 160° F (71° C)

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

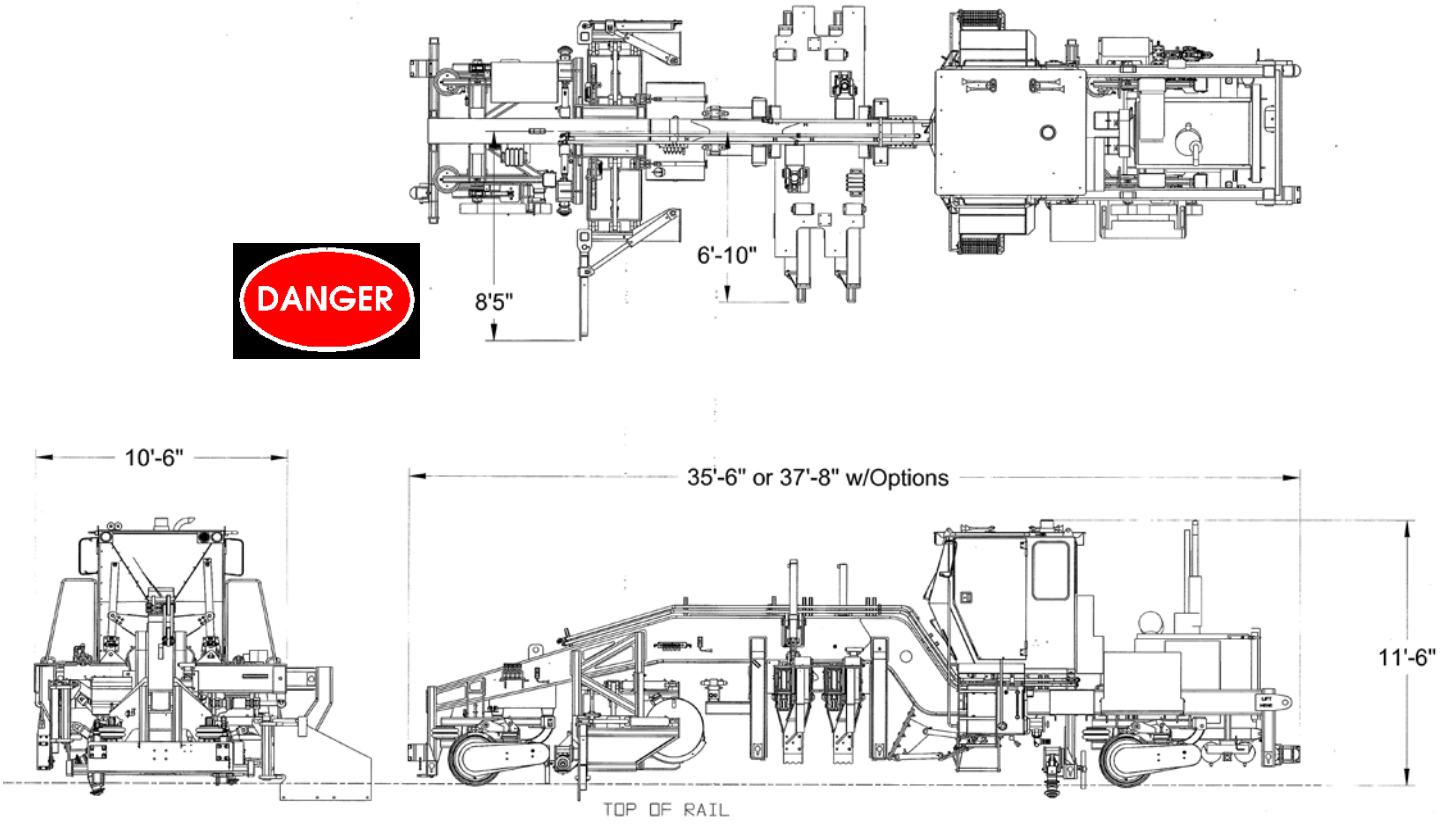
❖Items or capacities may vary according to options on your machine.
*** Approximate weight. Actual weight may vary according to options on your machine. Actual weight of your machine is as stenciled.**

- continued on next page -

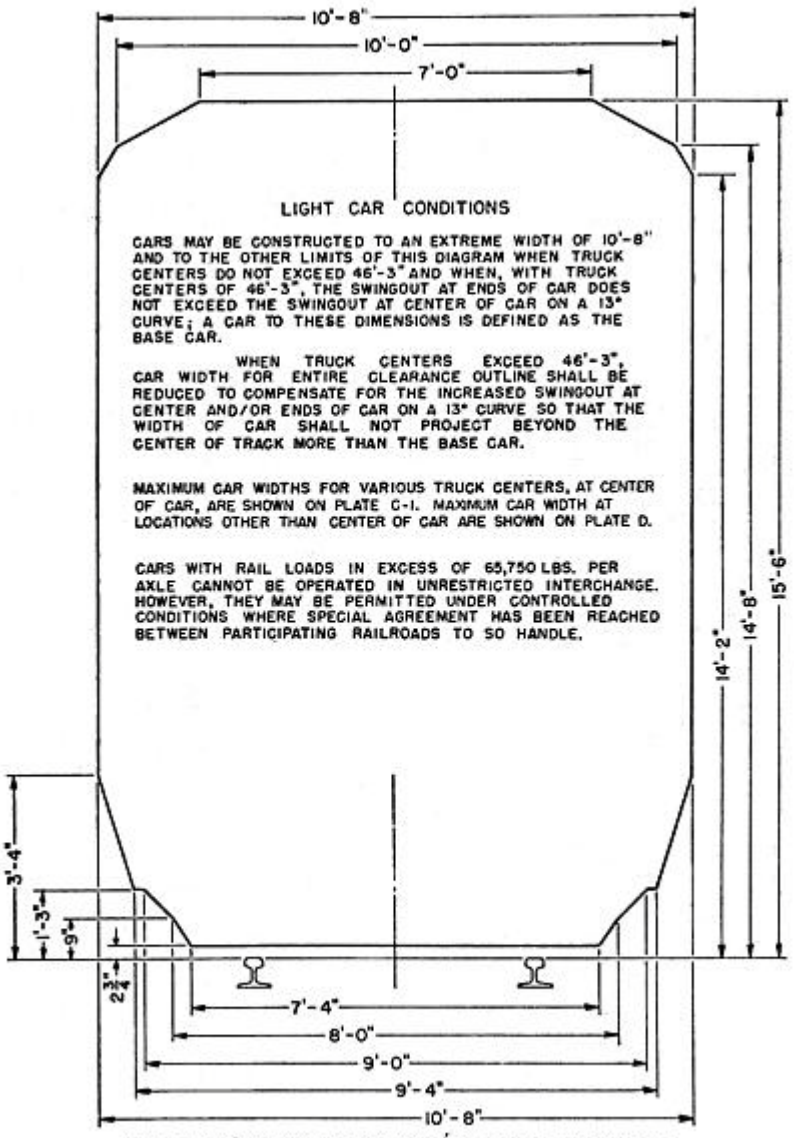
BRAKES
Type ..... Pneumatically Applied (Air)
Style ..... Four Wheel Cobra-Style

❖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



UNRESTRICTED ON ALL ROADS EXCEPT ON CERTAIN ROUTES OF THOSE ROADS SHOWN BELOW.
FOR SPECIFIC RESTRICTED AREAS ON SUCH ROADS SEE "RAILWAY LINE CLEARANCES"



THE 2-3/4" ABOVE TOP OF RAIL IS ABSOLUTE MINIMUM UNDER ANY AND ALL CONDITIONS OF LADING, OPERATION, AND MAINTENANCE.

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 Stonedilla Cribber machine is comprised four distinct workhead components: Rail Clamps, Ballast Plows, Cribbers, and Tie Pusher. Workhead and propulsion operation is done through a series of hydraulic valves located either remotely or on a manifold.

There are multiple control consoles 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.
- Left Arm Console with Joystick which controls the left ballast plow
- Right Arm Console with Joystick and Hand Controller. Joystick controls the right ballast plow and the hand controller controls the cribber workhead and tie pusher.
- 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.

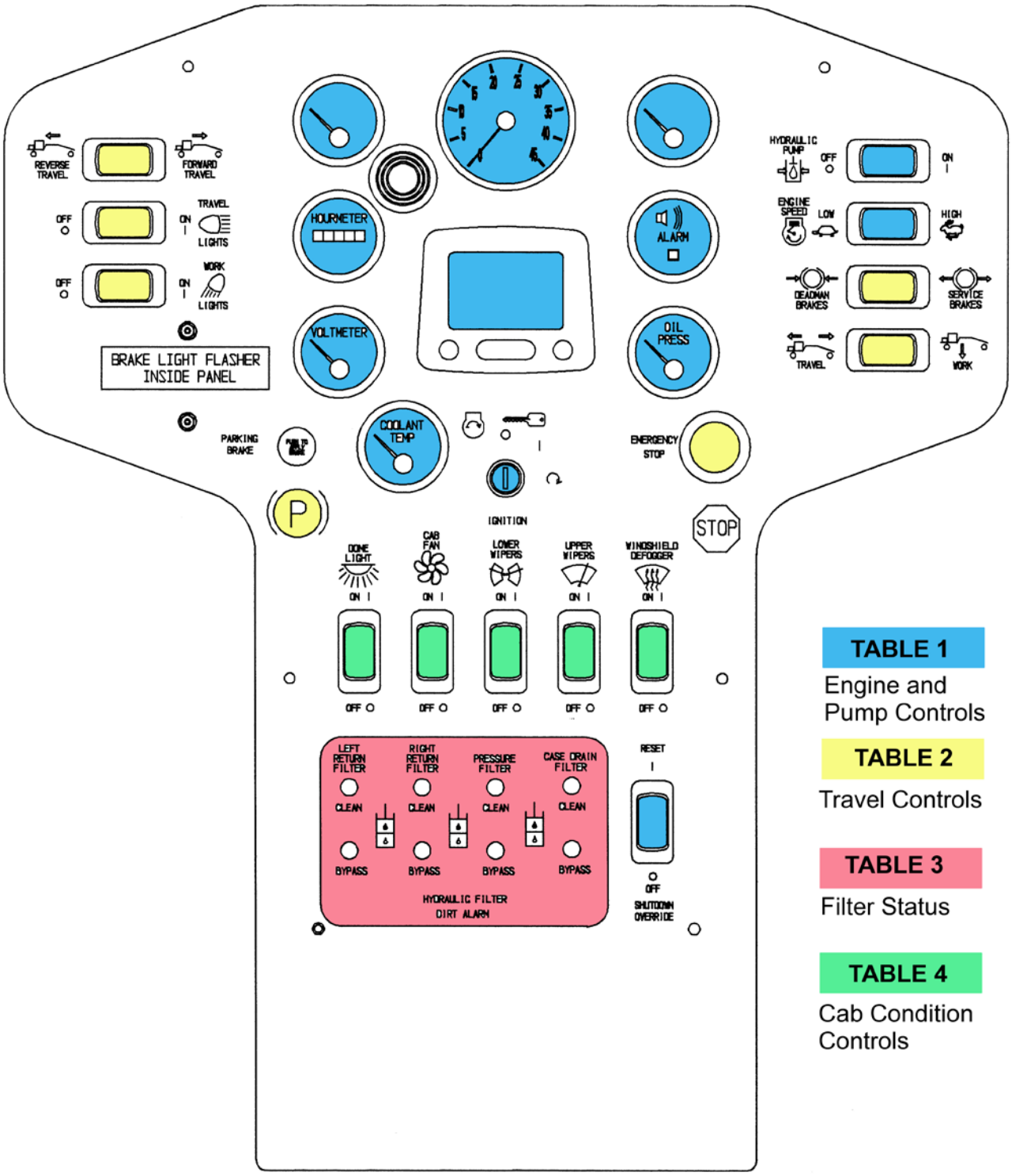


TABLE 1
Engine and Pump Controls

TABLE 2
Travel Controls

TABLE 3
Filter Status

TABLE 4
Cab Condition Controls

CENTER CONSOLE

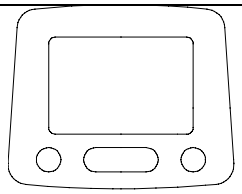
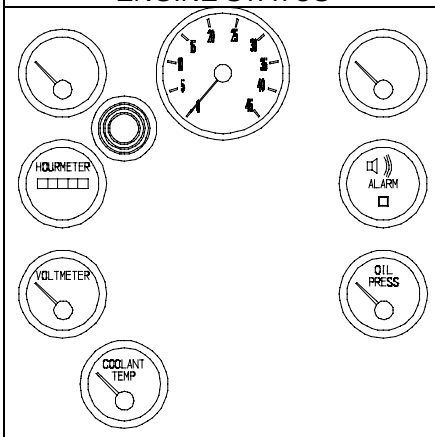
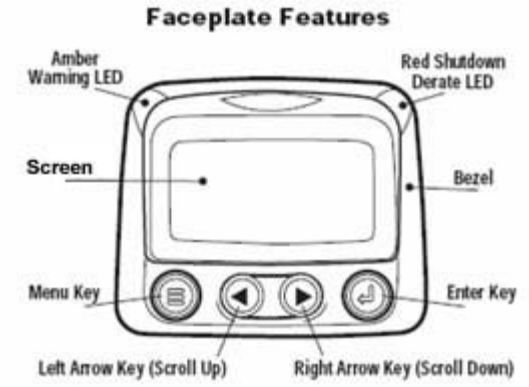
TABLE 1. ENGINE AND PUMP CONTROLS (Including Gauges)		
SYMBOL	CONTROL	DESCRIPTION
Hydraulic Pump 		Two Position Switch. ON/OFF. Controls the hydraulic pump.
	OFFPosition	This switch must be in the OFF position before the engine can be started.
	ON Position	This switch must be in the ON position during 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.
		OFF
		Turns the electrical system on.
		Turning full clockwise and then releasing starts the engine.
	Shutdown Override	
 ENGINE STATUS		See Table 1A for more detailed information.
	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 1A. POWERVIEW GAGE	
CONTROL	DESCRIPTION



LEFT AND RIGHT ARROW KEYS

Use the **left and right arrows** to move around from one status screen to another.

In the 1-up example, pushing the right arrow will take you to the COOLANT TEMPERATURE screen.

In the 4-up example, pushing the right arrow will take you in a clockwise direction around the screen. (Default position is lower left corner). Once you have gone through the intial screen, pushing the right arrow will take you to the next set of 4 statuses.

You can use the left arrow at any time to return to a prior screen.

ENTER KEY

The **enter key** is used when a fault occurs. Generally, any fault that occurs will come up on the screen at the time it happens. In order to go back to the original status screen you have to push the enter key once. NOTE: This will hide the fault screen until you 1) correct the fault, or 2) you press enter again.

MENU KEY

The **Menu** key is only used during factory setup procedures. (See Component Data Section for additional operation and setup instructions.)

LED LIGHTS (OUTER BEZEL OF POWERVIEW)

LED status lights are located on the upper left and upper right sides of the powerview. When they are lit, the screen will tell you the fault, the code number for the fault, and the method to correct the fault.

The **Amber Warning LED** signals an ACTIVE FAULT code. When the light comes on, an abnormal condition exists. It is not necessary to shut down the engine immediately, but problem should be corrected as soon as possible. This light will remain on until all faults are corrected. Note: There may be more than one fault if <NEXT or MORE> appears at the bottom of the screen. You can also hide the faults by hitting the ENTER key. (Hitting the enter key again will take you back to the fault).

The **Red Shutdown Derate LED** signals a fault has occurred that requires immediate action. Shutdown the engine, but do not turn the switch to the off position. You must go through the codes on the screen and correct the problems prior to restarting the engine. (The Powerview remembers the errors).

NOTE: Ignoring active fault codes (warnings or shutdown) could result in severe engine damage.

More detailed information regarding programming and setup can be found behind the component data tab – in the engine manual or in the Murphy Powerview Installation and Operation Manual.

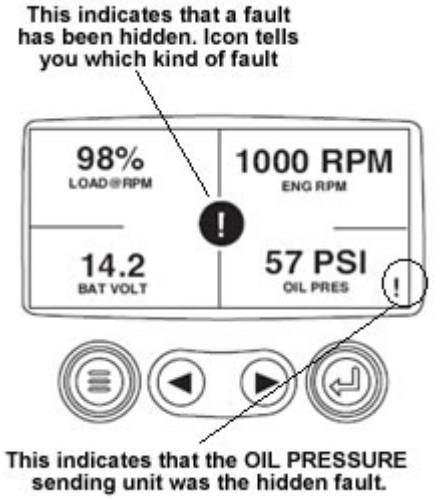
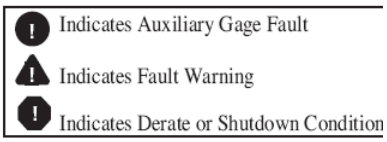
TABLE 1A. POWERVIEW GAGE	
CONTROL	DESCRIPTION
	**HIDING FAULTS AND WARNINGS** If you have hidden (hit the ENTER key at any fault condition), and have returned to the original 4-Up (or 1-Up) screen, the screen will now show icons in the upper right hand corner of a 1-UP screen or in the middle of the 4-UP screen (see figure below) to show you where the faults occurred. (In the 4-up shown below, the exclamation point appears in the middle and at the status that is showing a fault – the oil pressure.) Remember, the screen will show a <NEXT or MORE> if more than one error has occurred. Scroll through the screen until you find the individual component that has a fault. Highlight the Acomponent and press the ENTER key to read the fault. Each fault icon has a different meaning and different methods to correct. These are:  NOTE: Faults can only be cleared when the fault has been corrected. SHUTDOWN MACHINE as soon as possible when you have encountered a Shutdown Fault. A complete list of faults, by engine, can be found in the Mechanical Preface.

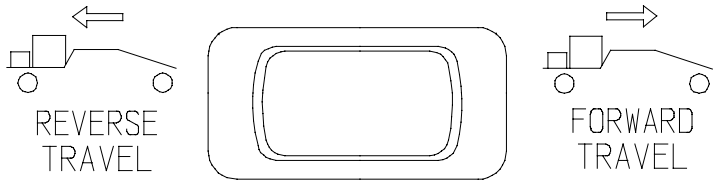
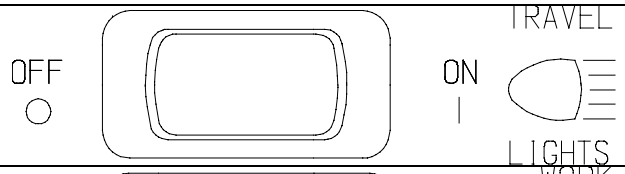
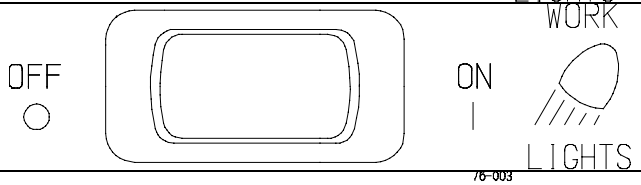
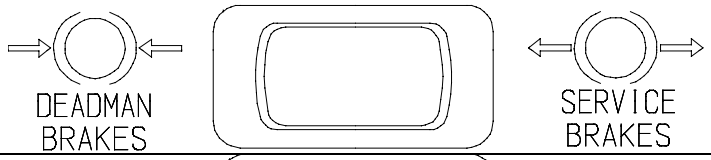
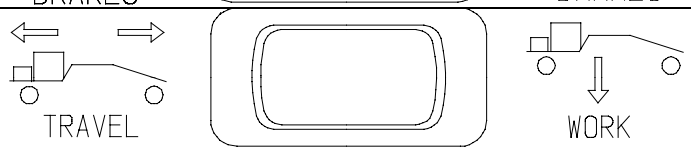
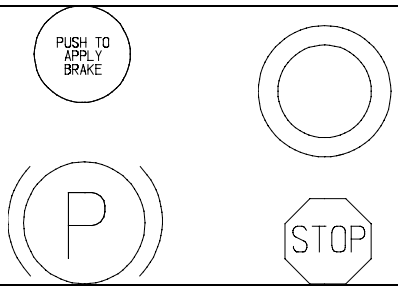
TABLE 2. TRAVEL & WORK CONTROLS	
CONTROL	DESCRIPTION
	Two position switch. FWD/REV. Operator selects direction of travel during work or other operations. Reverse Travel: When this is selected, the rear travel lights and front marker lights are energized. Backup alarm sounds during forward travel. Forward 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: Enables all workheads (ballast plows, tie pusher, and cribber)
	

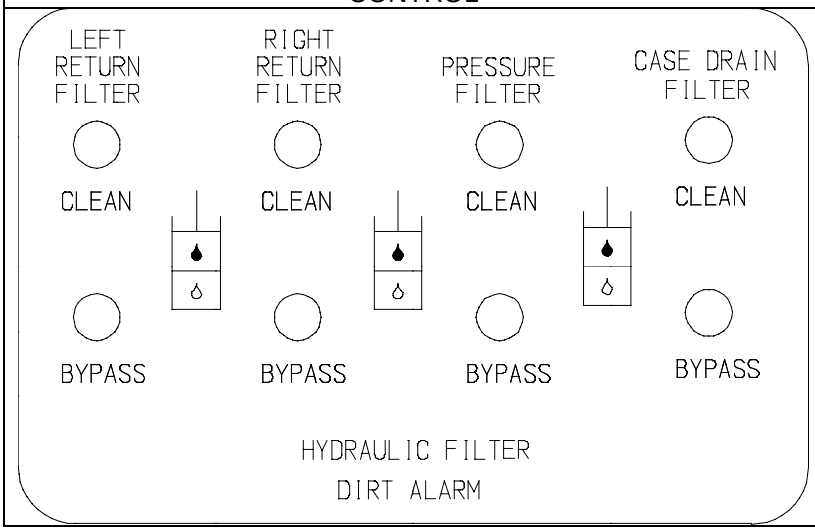
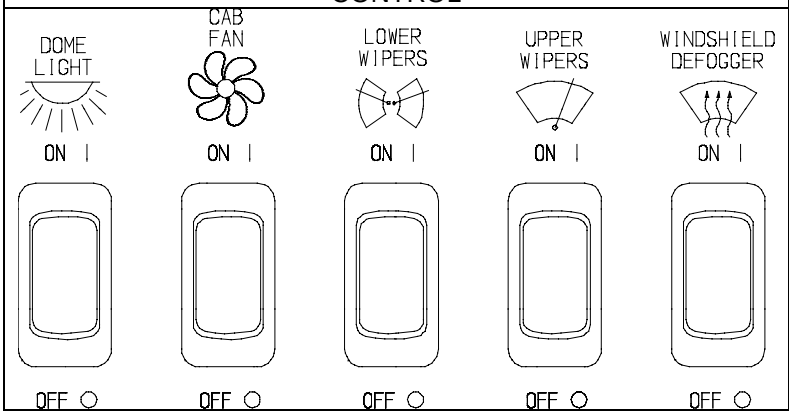
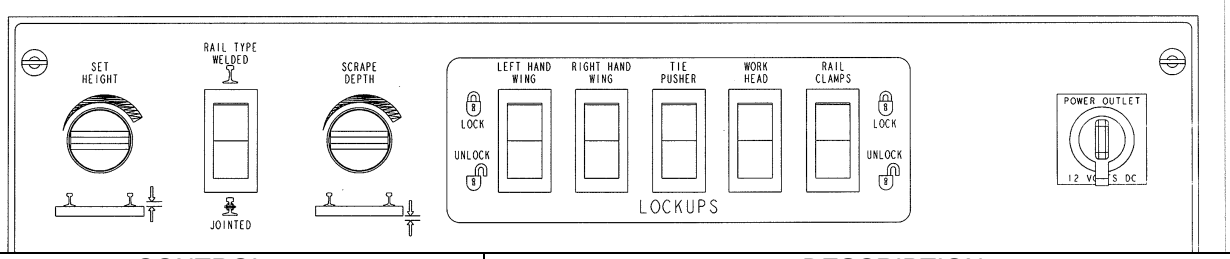
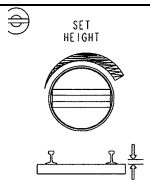
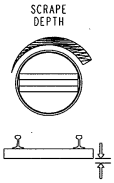
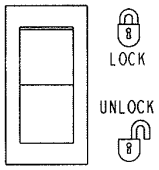
TABLE 3. FILTER STATUS	
CONTROL	DESCRIPTION
	Light shows the status of the filter.

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

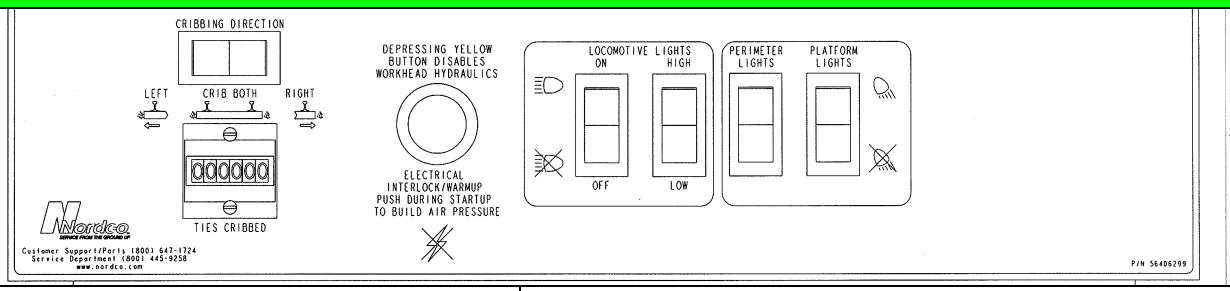
TABLE 5. CONSOLE - TOP CONTROLS

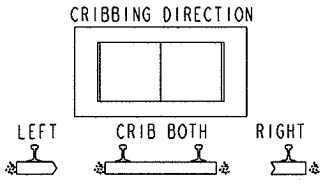
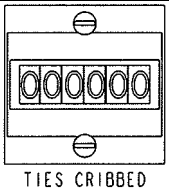
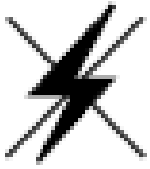
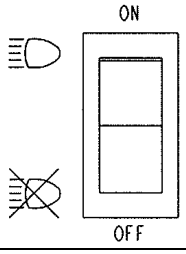


CONTROL	DESCRIPTION
	This potentiometer controls the "READY" height of the Cribber workhead.
	Used to set the type of rail being worked on. In WELDED mode, clamps stay in contact with web of rail during travel. In JOINTED mode, clamps pulse up during travel to clear rail joint bars.
	This potentiometer controls the maximum scrape depth of the Cribber workhead. The programming will then calculate the second scrape depth of the cycle based on the position of this potentiometer.
	These switches control the lockups on the various components. These components should be kept in the locked position at all times when not being used. Lock position engages lockups. Unlock position disengages lockups.
	Power Outlet: Used for providing power. 12V DC.

RIGHT HAND CONTROL CONSOLE (CONTINUED)

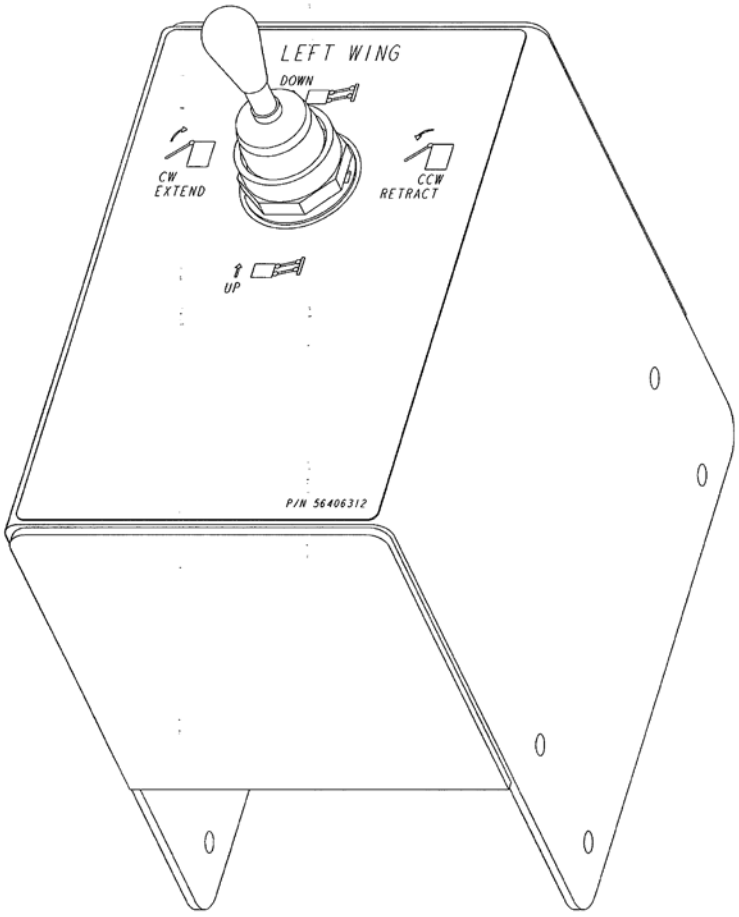
TABLE 6. CONSOLE - LOWER



CONTROL	DESCRIPTION
	Cribbing Direction: When in the LEFT position, the cribber workhead will extend out the RH side of the machine and push ballast to the LEFT side of the machine. When in the CRIB BOTH position, each side of the cribber workhead will push out from the centerline of the machine out to each side of the machine. When in the RIGHT position, the cribber workhead will extend out the LH side of the machine and push ballast to the RIGHT side of the machine.
	Crib counter. Counts the amount of ties that have been cribbed. This is not resettable.
	Electrical Interlock This button should be pulled out during all normal working operations. When pressed in (activated) it disables the electric functions of the hand controller (all cribber functions), the solenoids on the plow valves, and locks the brakes.
	Optional Lighting Controls. On and off switches.

HAND CONTROLS
LEFT HAND JOYSTICK

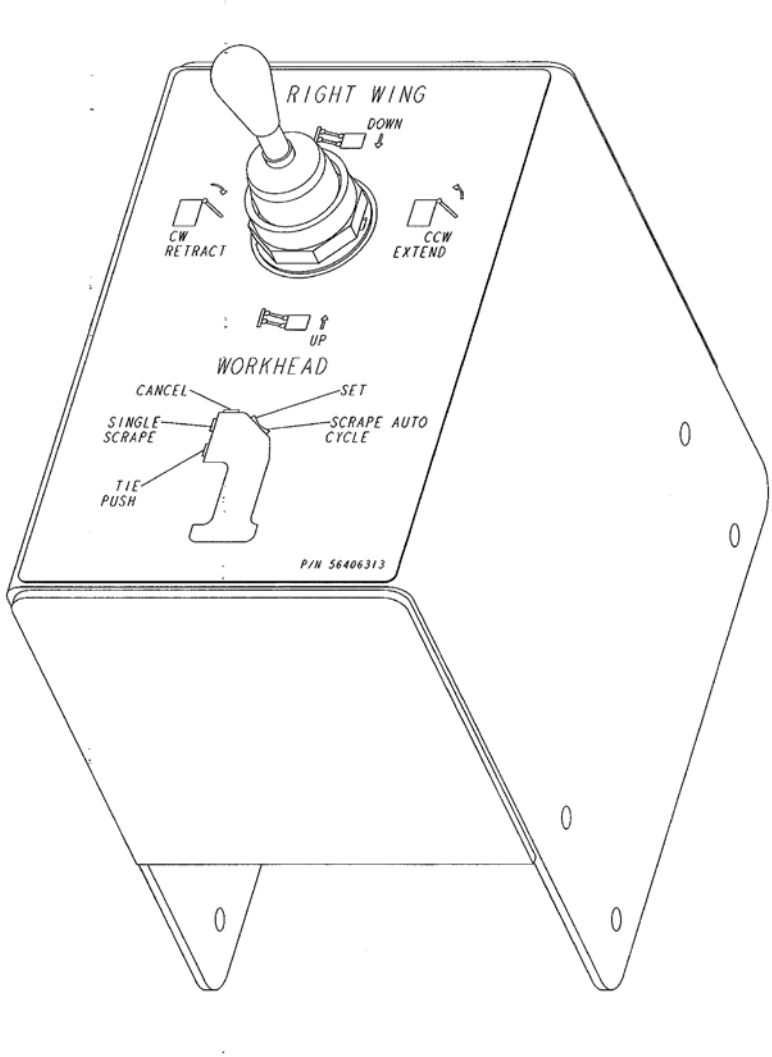
The joystick (located on the left hand arm of the cab seat) provides control of left ballast plow.



Joystick Movement:

Forward: Lowers the LEFT ballast plow
Back: Raises the LEFT ballast plow
Left: Extends the LEFT plow blade out from machine
Right: Retracts the LEFT plow blade into machine

HAND CONTROLS
RIGHT JOYSTICK
CRIBBER WORKHEAD HAND CONTROLLER



The joystick (located on the right hand arm of the cab seat) provides control of right ballast plow.

Joystick Movement:

Forward: Lowers the RIGHT ballast plow
Back: Raises the RIGHT ballast plow
Left: Retracts the RIGHT plow blade into machine
Right: Extends the RIGHT plow blade out from the machine

OPERATION

DANGER

IMPROPER USE OF THIS MACHINE FOR ANY TYPE OF OPERATION CAN CAUSE SERIOUS INJURY OR DEATH.

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 first detent (power will come on, but engine is not started) and wait. The Powerview will come on, and a “WAIT TO START – PREHEAT” message will appear on the screen.

5. When the message disappears and the light goes out, it is safe to start the engine.

6. Once the engine has started, you will see the first of many status screens on the Powerview. Use the left and right arrow keys to get from one screen to another.

NOTE: More detailed information regarding programming and setup, and fault codes can be found behind the component data tabs ENGINE and OTHER (Murphy Powerview)

7. Check that the following 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

TRACK TRAVEL

8. Place the Hydraulic Pump Switch in the ON position.

9. Place the Engine Speed Switch in the HIGH position.

10. Select a placement of the Brake Switch in either the DEADMAN BRAKES or the SERVICE BRAKES position.

11. Select the type of rail you will be working on, WELDED or JOINTED, by pressing the switch on the RIGHT CONTROL CONSOLE.
12. Make certain all Workhead Lockups are in the LOCKED position (Right Hand Console)
13. 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.)
14. Release the Parking Brake if set.
15. 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.)
16. Place the Travel Switch in the FORWARD or REVERSE TRAVEL position.
17. Depress the travel foot pedal.

BRAKING

Brake Operation

The Brake Mode Operation Switch 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 is necessary to stop the machine.

Parking Brake Operation

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

EMERGENCY STOP

The Emergency Stop shuts off the engine and electrical power.

Stonedilla Cribber Operation Procedure Outline

Cribbing

- Start Engine
    - Pump must be off and engine speed set to low
    - Travel mode should also be selected
- Allow air pressure to build for proper air brake performance
- Select either Service or Deadman brakes
    - If in Service Mode, you must push the brake pedal to stop
- Release the parking brake
- Turn on the pump
- Disengage the power locks for the rail clamps - RH Panel
- Disengage the power locks for the work head - RH Panel
- Select Work on the Work/Travel switch
- Select the desired cribbing direction (Left - Both - Right)
- Press Cancel on the hand controller to lower the workhead from the locked position.
    - Once clear of the locks it will automatically move to the home position for the mode selected.
    - At this height you can select a different cribbing mode and it will automatically move to the appropriate home position
    - Once the sequence for reaching a home position is complete it is ready for work and the set button is enabled
- Position the machine over the tie that is to be removed
- Press the set button
    - This lowers the workhead closer to the tie to assure machine is positioned properly. The height it lowers to is adjustable on a dial on the right hand panel.
    - The rail clamps are applied
- If needed, propel the machine to position the workhead properly over the tie
    - If you propel for more than a minimal distance (measured by the PLC with timing) the workhead will automatically raise to protect against potential obstructions. If this happens, simply complete positioning the machine and then press set again.
- Select the desired scrape depth using the dial on the right hand panel
- When satisfied that the workhead is positioned properly over the tie press the Scrape Auto Cycle button.
    - An automatic cycle will occur as follows:
        - 1st Scrape
            - Lower into the ballast to a predetermined depth
            - Ballast is pushed up to a position just short of the rail (direction depends on cribbing direction mode.)
            - Raise above tie and return tools to home position
        - 2nd Scrape
            - Lower to a midway point, based on final depth set point
            - Ballast is pushed and tools will reach under the rail

- Tools retract enough to clear rail
- Raise to above tie and return tools to home position

▪ 3rd Scrape
- Lower to the depth set point
  - o If it cannot reach this depth in a certain amount of time, the cycle will continue and a 4th Scrape will automatically occur later
- Ballast is pushed and tools will reach under the rail
- Raise to just short of the bottom of the rail
- Tools retract enough to clear rail
- If full depth was reached it will raise to above the rail and return to the home position

▪ 4th Scrape
- If the full depth was not reached in the 3rd scrape sequence a 4th scrape will automatically occur
- Ballast is pushed and tools will reach under the rail
- Raise to just short of the bottom of the rail
- Tools retract enough to clear rail
- Raise to above the rail and return to the home position

o Single Scrape
- ▪ If more material than desired remains in the crib, you may initiate an extra scrape sequence. It is intended to be faster than the full sequence and it goes straight to the full depth.
- ▪ This is only enabled after a normal auto scrape sequence has occurred. Once the machine has moved or any modes have been changed it is disabled
- ▪ At the end of the auto scrape sequence, the home position will automatically reset.
- ▪ Once the sequence for reaching a home position is complete it is ready for work and the set button is enabled
- ▪ Press Set
  - This lowers the workhead to the set height (this height is adjustable by a dial on the right hand panel.)
  - The rail clamps are applied
- ▪ Press the single scrape button
  - Lower to the depth set point(this height is adjustable by a dial on the right hand panel.)
    - o If it cannot reach this depth in a certain amount of time, the cycle will continue
  - Ballast is pushed and tools will reach under the rail
  - Raise to just short of the bottom of the rail
  - Tools retract enough to clear rail
  - Raise to above the rail and return to the home position
- ▪ This sequence can be repeated as long as the machine has not moved.

- At certain sequences in the cycle if a position in not reached in time the cycle will automatically end and raise to the home position.

- At any time you can end the cycle by pressing the Cancel button. This stops any sequence and the workhead returns the home position. This also works when you are at the set position and want to return to the home position
- From the home position the workhead can be returned to the lock by pressing and holding the Cancel button for 2 seconds. Once the sequence starts release the button.
- The workhead can also be returned to the lock from any position by switching to Travel Mode.

Tie Pusher

- After a crib has been cleared the tie pusher can be used to push the tie forward into the crib
- The machine must be in work mode
    - When the cribber workhead is below the locks the tie pusher camera is automatically displayed on the monitor #1. When in the locks, the forward camera is displayed (see Plow Wings section.)
- Disengage the power locks for the tie pusher - RH Panel
- The machine must be repositioned for this function
    - On normal 24" concrete tie spacing, you must move forward approximately 2 ties
    - A camera is used to aide in this operation
    - Propel so that the cribbed tie is between the alignment guides visible on monitor #1
    - If you are too far forward it will hit the top of the tie or miss
    - If you are too far back it will hit the top of the tie behind it or not push the desired tie far enough.
- Once positioned, the machine must be stopped for this operation to be enabled. If in service brake mode apply the brake pedal.
- Press the Tie Push Cycle button
    - The tie pusher will automatically extend and then retract in a timed sequence.
    - Movement of the workhead and tie is visible on monitor #1
- The tie pusher automatically retracts when the machine is in Travel mode.

Plow Wings

- The machine must be in work mode for this operation.
- If the cribber workhead is in the locked position Monitor #1 will display the forward camera (except when backing up, see Camera and Monitors section.)
- Monitor #2 is configured as a split screen, with the left plow on the left side of the screen, and the right plow on the right side of the screen.
- Disengage the power locks for the wings on the RH Panel
    - The locks for the left and right wing are controlled separately
- Use joysticks to move the wings
- Hard stops are stored near the wing lock. This is to set the maximum depth.
- In preparing for travel, you must manually retract the wings with the joysticks while still in work mode, using caution that all personal and obstructions are clear.
- Wings will automatically raise when the machine is put into Travel mode.

Cameras and Monitors

- Monitor #1
  - Travel Mode
    - The Forward camera is displayed by default
    - When the reverse propel pedal is pressed the Rear camera is displayed
      - This stays on until the forward propel pedal is pushed or the machine has come to a stop for a time amount. For example, if the brake is not applied and the machine is coasting or rolling backwards, the reverse camera stays on.
  - Work Mode
    - If the workhead is in the locked position (fully raised) the Forward camera is the default
    - If the workhead is below the locked position, the tie pusher camera is the default.
    - When the reverse propel pedal is pressed for a timed amount, the Rear camera is displayed. The time delay is so the tie pusher camera stays displayed when spotting the machine for the Tie Pusher operation.
      - Once the reverse camera is on, it will stay on until the forward propel pedal is pushed or the machine has come to a stop for a time amount.
- Monitor #2
  - This display is the same in all modes. It is configured as a split screen, with the left plow on the left side of the screen, and the right plow on the right side of the screen.

MACHINE SHUT-DOWN

1. Use the joystick to raise and retract the tie exchanger workhead.
2. At the Right Control Console, place the Lock and Unlock Switches in the LOCK position. (Rail Clamps, Cribber, Plows, Tie Pusher. Make certain they 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. Pull the Parking Brake Switch OUT to set the parking brake.
5. Place the Engine Speed Switch in the LOW position.
6. Place the Hydraulic Pump Switch in the OFF
7. position.
8. Place the Ignition Switch in the OFF position.
9. 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.)
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
15. travel position.

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.

REQUESTING ASSISTANCE

If you have any questions regarding maintenance and service on this machine, please call:

Nordco Service Department
1-800-445-9258

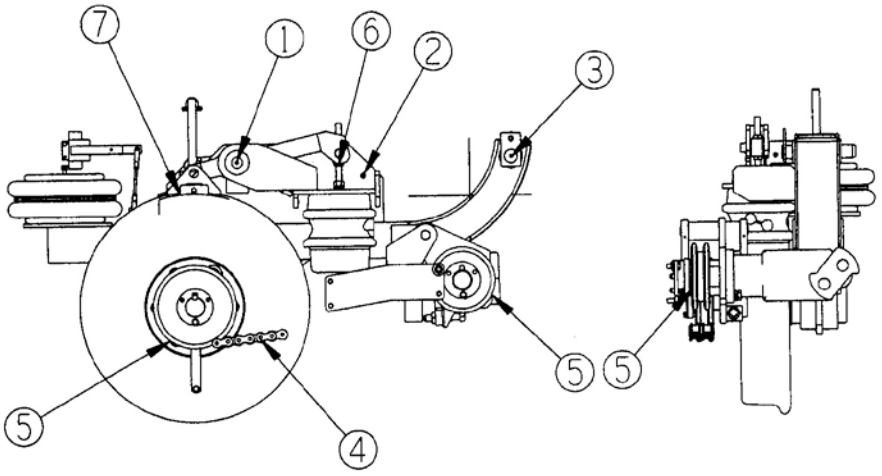
The process will be faster if you have the following information in hand **before calling**:

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

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.

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

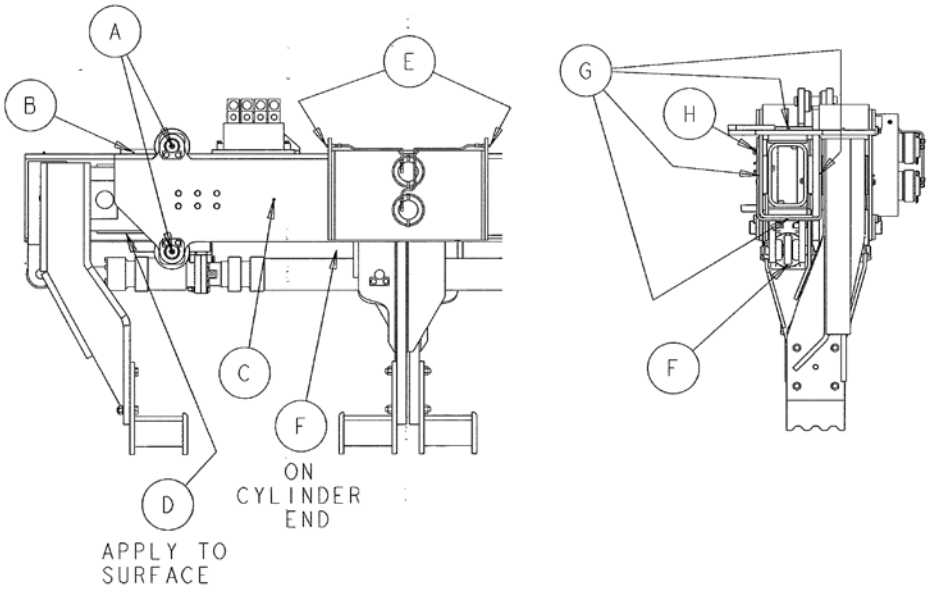
WEEKLY MAINTENANCE

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

WORKHEAD LUBRICATION



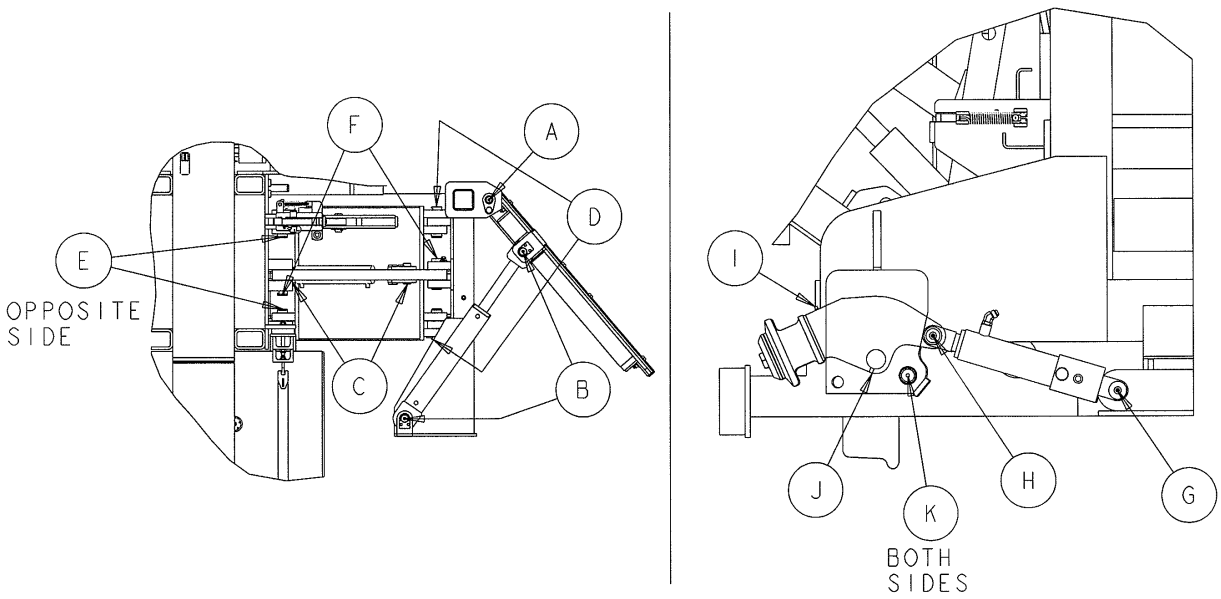
DAILY MAINTENANCE:

A.	BOOM ROLLER PIN (16)	GREASE
B.	BOOM ROLLER UPPER SURFACE (4)	GREASE
C.	BOOM OUTER PAD (2)	GREASE
D.	BOOM ROLLER LOWER SURFACE (4)	GREASE
E.	WORKHEAD FRAME ROLLER (4)	GREASE
F.	CYLINDER ATTACHMENT PIN (8)	GREASE
G.	BOOM END WEAR PADS (14)	GREASE
H.	INSIDE WEAR PADS (2)	GREASE

P/N 5640231 0

P/N 5640231I

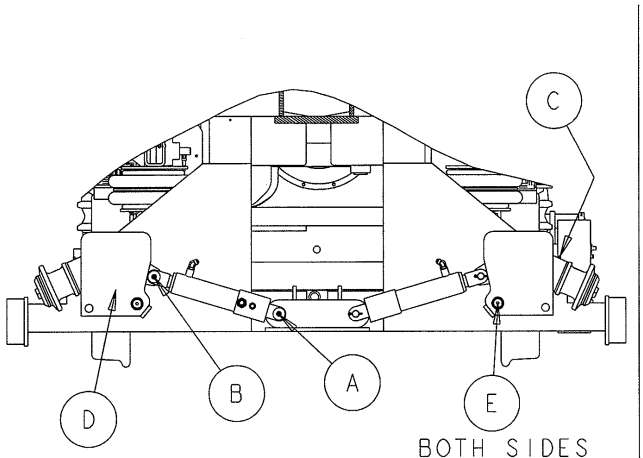
PLOW/WING LUBRICATION
FRONT RAIL CLAMP LUBRICAITON

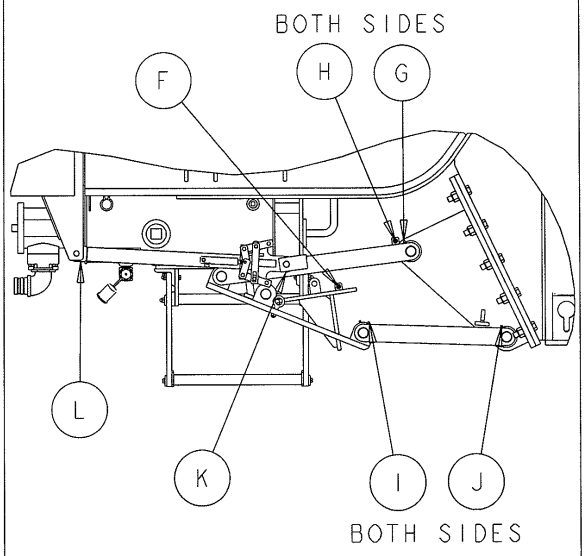


DAILY GREASE APPLICATION

A. PLOW PIVOT PIN (2). . . . . .GREASE
B. PLOW CYLINDER ATTACHMENT PINS (4). . . . . GREASE
C. WING CYLINDER ATTATCHMENT PINS (4). . . . . .GREASE
D. WING LOWER OUTER LINK PINS (4). . . . . .GREASE
E. WING LOWER INNER LINK PINS (4). . . . . .GREASE
F. WING UPPER LINK PINS (4). . . . . .GREASE
G. INNER RAIL CLAMP CYLINDER PIN (2). . . . . GREASE
H. OUTER RAIL CLAMP CYLINDER PIN (2). . . . . GREASE
I. RAIL CLAMP ROLLER PIN (2). . . . . GREASE
J. RAIL CLAMP PIVOT PIN (2). . . . . GREASE
K. RAIL CLAMP BRACKET PIN (4). . . . . .GREASE

REAR RAIL CLAMP/TIE PUSHER LUBRICATION





DAILY MAINTENANCE

A.	INNER RAIL CLAMP CYLINDER PIN (2).	GREASE
B.	OUTER RAIL CLAMP CYLINDER PIN (2).	GREASE
C.	RAIL CLAMP ROLLER PIN (2).	GREASE
D.	RAIL CLAMP PIVOT PIN (2).	GREASE
E.	RAIL CLAMP BRACKET PIN (4).	GREASE
F.	TIE PUSHER PLATE PIN (1).	GREASE
G.	UPPER LINK TOP ATTACHMENT PIN (2).	GREASE
H.	UPPER LINK BOTTOM ATTACHMENT PIN (2). . . .	GREASE
I.	LOWER LINK TOP ATTACHMENT PIN (2).	GREASE
J.	LOWER LINK BOTTOM ATTACHMENT PIN (2). . . .	GREASE
K.	TIE PUSHER CYLINDER ROD END (2).	GREASE
L.	TIE PUSHER CYLINDER CAP END (2).	GREASE

P/N 56402312

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.		
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 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 Engine Manual for detailed instructions.**	

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

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

D5. ENGINE – Check Fuel Filter	
Check the fuel/water separator daily. **See 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 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.	

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	

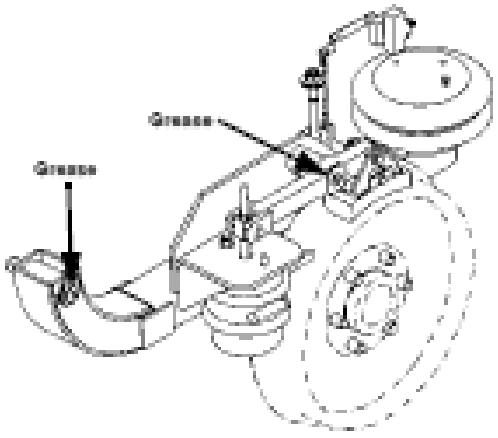
WEEKLY (OR 40 HOURS, WHICHEVER COMES FIRST)			
Key: =  = Refer to Mfr's Manual in Component Data  = More Detailed Instructions Follow			
LOC	ITEM	SYM	TASK
MISCELLANEOUS	**W1.**		Perform all Daily Lubrication and Maintenance Procedures
	W2.		Check Battery Condition.
	W3.		Oil Propulsion Chains
	W4.		Oil 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.

ENGINE PRECAUTIONS

When welding:

NOTICE

This machine is equipped with an engine that has an electronic control unit (ECU or ECM). Failure to correctly isolate it during welding on this machine **WILL** result in damage not covered under warranty.

Please take the following steps to avoid damage to the ECU or ECM:

1. Remove ground connection between the engine and the machine frame.
2. Remove the connectors from the electronic control unit (ECU or ECM) of the engine and the engine harness from the control box or panel.
3. Turn battery disconnect switch to the OFF position.
4. Connect welder ground close to weld point so ECU or ECM and other electronic components are not in ground path.

When installing components to engine:

NOTICE

Do not apply a thrust load or end force either end of crankshaft during engine installation or during operation. Do not force or use bolts to pull up transmission or other drives to the engine. Be sure clutch shaft or drive shafts do not restrict proper engine crankshaft end play.

Failure to follow these instructions may result in SEVERE engine damage.