# M415XT MAINTAINER

# OWNER / OPERATOR / PARTS MANUAL

M415XT Maintainer Serial Number: _____

M415XT Maintainer Specification Number: _____

_____

**Sold & Serviced by:**

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## DANGER

"Danger" indicates an imminently hazardous situation which, if not avoided, **will** result in death or serious injury.

## WARNING

"Warning" indicates a potentially hazardous situation which, if not avoided, **could** result in death or serious injury.

## CAUTION

"Caution" indicates a potentially hazardous situation which, if not avoided, **may** result in minor or moderate injury. May also alert against unsafe practices.

The above Safety Alert Symbol means ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED! It stresses an attitude of "Heads Up for Safety" and can be found throughout this Operator's Manual and on the machine itself.

BEFORE YOU OPERATE THIS EQUIPMENT, READ AND STUDY THE FOLLOWING SAFETY INFORMATION. IN ADDITION, MAKE SURE THAT EVERY INDIVIDUAL WHO OPERATES OR WORKS WITH THIS EQUIPMENT, WHETHER FAMILY MEMBER OR EMPLOYEE, IS FAMILIAR WITH THESE SAFETY PRECAUTIONS.

Our Company ALWAYS takes the operator and his/her safety into consideration when designing our machinery and we guard exposed moving parts for the operator's protection. However, some areas can NOT be guarded or shielded in order to assure proper operation. Therefore, this Operator's Manual, and Decals on the machine, warn of further danger and should be read and observed closely.

ALWAYS keep this manual in a convenient place for instant reference and NEVER make repairs or adjustments that you do not fully understand. If you require additional information or service, contact you authorized MAULDIN Dealer.

REMEMBER! It is the owner's responsibility to communicate information on the safe use and proper maintenance of this machine! This includes providing understandable interpretation of these instructions for operators who are not fluent in reading English.

### MANDATORY SAFETY SHUTDOWN PROCEDURE

BEFORE cleaning, adjusting, lubricating, or servicing the unit:

1. Bring machine to full parking stop on level surface. Never park on a slope or hillside.
2. Fully retract and lower the Moldboard and the Attachment(s) to the ground.
3. Place controls in Neutral and set Park Brake.
4. Idle engine for gradual cooling.
5. Turn the Starter Key Switch to OFF position and remove key. Take the key with you for security reasons.

**NOTE**
**. Loss of Battery power will result if the switch is left in the ON positi**on.

ONLY when you have taken these precautions can you be sure it is safe to proceed. Failure to follow the above procedure, could lead to death or serious bodily injury.

## ADDITIONAL SAFETY REMINDERS

USER/OPERATOR SAFETY PRACTICES as established by applicable industry standards are included in this Operator's Manual and are intended to promote SAFE OPERATION of the machine.

These guidelines do not preclude the use of good judgment, care and common sense as may be indicated by the particular job site work conditions.

It is essential that operators be physically and mentally free of mind altering drugs and chemicals, and thoroughly trained in the safe operation of the machine. Such training should be presented completely to all new operators and should not be condensed for those claiming previous experience. Information on operator training is available from several sources including the manufacturer.

Some photographs in this manual may show Doors, Guards and Shields open or removed for illustration purposes ONLY. BE SURE that all Doors, Guards, and Shields are in their proper operating positions BEFORE starting the Engine to operate the unit.

The operator MUST know the capabilities and work applications for the machine, and operate it at speeds slow enough to insure complete control at all times. When working on slopes or near drop offs, use good judgment. ONLY operators with sufficient experience should attempt such work.

Be alert and avoid loose or soft surface conditions that could cause sudden tipping or loss of control. Avoid side hill travel wherever possible by driving up or down the slope. In case of slippage on grade, turn the machine IMMEDIATELY downhill. Keep the blade crossways and lowered for extra stability when scarifying across slopes.

Operating in virgin terrain (called pioneering) is especially dangerous. Be sure you know how this is done. Avoid falling branches, trees, and up-turning roots, and do not drive onto brush piles, logs, or large rocks.

IF YOU ARE NOT CAREFUL WHILE OPERATING THIS MACHINE, ANY OF THE ABOVE FACTORS COULD CAUSE THE MACHINE TO TIP AND THROW YOU OUT OF THE OPERATOR'S STATION, WHICH MAY CAUSE SERIOUS BODILY INJURY OR DEATH!

ALWAYS wear your seat belt!

ALWAYS keep hands, feet, and arms inside of the Operator's Station when operating the machine!

ALWAYS wear appropriate personal safety gear as called for by the job or working conditions!

ALWAYS be aware of pinch point areas on the machine such as Wheels to Frame, Cylinders to Frame, Moldboard and Attachment to Frame!

ALWAYS maintain a safe distance from electric power lines or buried cables, and avoid any electrically charged conductor! Contact can result in electrocution. Call your proper local authorities for utility line locations BEFORE starting a job!

ALWAYS check the job site for terrain hazards, obstructions and bystanders!

NEVER by-pass the Starter Key Switch when starting the Engine. ALWAYS use the jump-starting procedure detailed in the Service chapter!

NEVER use your hands to search for hydraulic fluid leaks. Hydraulic fluid is pressurized. Escaping fluid can be invisible and can penetrate the skin, causing a serious injury! If any fluid is injected into your skin, see a doctor familiar with this type of injury at once! Injected fluid MUST BE surgically removed by a doctor or gangrene may result!

Do NOT operate the machine where the weight, with all attachments installed, exceeds approved load limits!

Do NOT allow minors or any unqualified personnel to operate or be near the machine unless properly supervised. This is strictly a single Seat, NO passenger machine!

Do NOT start the Engine or operate any Controls unless properly seated in the Operator's Seat and ALWAYS wear your seat belt!

Do NOT operate the machine in an enclosed area without adequate ventilation! Internal combustion engines deplete the oxygen supply in enclosed spaces and may create a serious hazard unless the oxygen is replaced. This includes the atmosphere inside the cab when the unit is equipped with an enclosed cab!

Do NOT leave the Operator's Station with the Moldboard or Attachment raised! ALWAYS lower the Attachment(s) to the ground, shut off the Engine and engage the Park Brake BEFORE leaving the Operator's Station!

Do NOT refill the Fuel Tank when the Engine is hot. Allow Engine to cool down BEFORE refilling. A hot Engine can ignite the fuel if it should spill or splash!

Do NOT smoke while filling the Fuel Tank or working on the fuel or hydraulic systems! Sparks can ignite fumes and/or fuel!

Do NOT drive too close to a ditch or excavation site. BE SURE that the surrounding ground has adequate strength to support the combined weight of the machine and Attachments!

ALWAYS be alert for immovable objects such as rocks, tree stumps or roots when blading!

Do NOT remove the Radiator Cap when the Engine reaches operating temperature or becomes overheated. The Engine Coolant is extremely HOT and is under pressure. Exploding Engine Coolant will cause serious injury. ALWAYS wait for the Engine to cool down BEFORE removing the Radiator Cap to relieve pressure!

Do NOT loosen or disconnect ANY Hydraulic Lines, Hoses or Fittings without first relieving hydraulic circuit pressure. Also, be careful NOT to touch any hydraulic components that have been in recent operation. They can be extremely HOT and can burn you!

Do NOT wear loose or baggy clothing while operating or servicing the machine!

NEVER allow any riders on this machine. NEVER use the machine as a lift for personnel!

## MODIFICATIONS, NAMEPLATES, MARKINGS, AND CAPACITIES

Modifications and additions which affect the capacity or safe operation shall NOT be performed without the manufacturer's prior written approval. Where such authorization is granted, tags or decals shall be changed accordingly.

All attachments MUST be marked to identify the Attachment(s) and show the approximate weight of the machine and Attachment combination.

ALWAYS make sure all nameplates, danger, warning, caution and instruction markings are in place and legible. Local government regulations may require additional decals. It is the responsibility of the Owner to provide these!

**SAFETY GUARDS AND WARNING DEVICES**

The machine is fitted with a Roll Over Protective Structure (ROPS) in accordance with industry standards. It is intended to offer protection to the operator from roll over and falling objects, but cannot protect against every possible impact. Therefore, it should not be considered a substitute for good judgment and care in operating the machine.

The machine is equipped with a Horn, Backup Alarm, and Side Mirrors (with Cab Option). The operator/user shall determine if conditions require the machine to be equipped with additional sound-producing or visual devices (alarms, extra mirrors, blinking lights, etc.). The operator/user is responsible for providing and maintaining such devices.


Part #100A3706-A - Located on either side of platform


Part #165924 - Located either side of the radiator.


Part #065927 - Located at various places on the machine.


Part #A1002504 - Located on fuel tank.


Part #108787 - Located beside operator's seat on seat deck.


Part #108785-Located at each wheel.

## SPECIFICATIONS

All Dimensions are in Inches Unless Otherwise Noted

Drive System:

| | |
|---|---|
| Engine | 4-cylinder, Turbocharged and after-cooled liquid cooled diesel<br>Tier 4 Final Compliant |
| Final Drive | All Wheel Limited Slip<br>Hydrostatic Drive<br>Electronic Traction Control<br>Front & Rear Drive & Steering Axles<br>30º Front Axle Oscillation |

Safety Equipment:

Neutral Start Safety Switch
Backup Alarm (noise level 84 dba w/cab) Seat Belt
SAE ROPS Certified Neutral Safety Start Switch Loader Boom Safety Prop.

Moldboard Dimensions:

| | |
|---|---|
| Width (G) | 120” (3.66m) |
| Height (H) | 19” (.56m) |
| Ground Clearance (I) | 11” (.36m) |
| Side Shift | 36” (.91m) left or right |
| Angle | 39º right and left |
| Tilt Positions | Infinitely variable through 45º |
| Blade Down Pressure | 12,109 lbs (5,493 kg) |

Scarifier:

| | |
|---|---|
| Tool Bar/Scarifier Width | 72” (1.83m) |
| Maximum Tool Bar Height | 24” (.61m) |
| Down Pressure | 6,000 lbs (2,722 kg) |
| Number of Shanks | 7 |
| Shank Penetration | 8” (.20m) |

Loader Assembly:

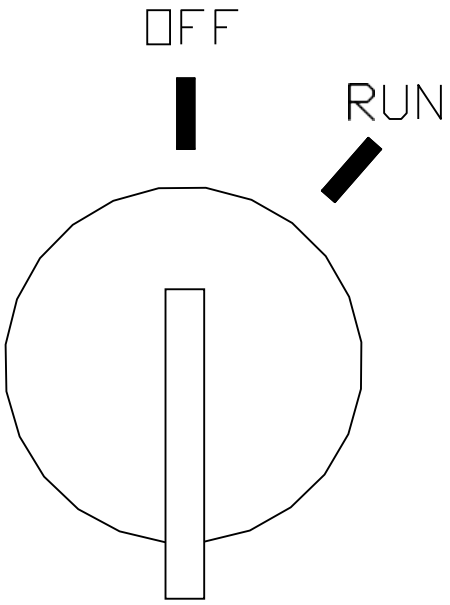
| | |
|---|---|
| Bucket Capacity | 1/2 cubic yd/2,000 lbs (.38$m^3$/.91 kg) |
| Dump Height (E) | 120” (3.05m) |

Minimum Turning Radius:

| | |
|---|---|
| Inside Wheel | 96” (2.44m) |
| Inside Moldboard | 60” (1.525m) |

**CAUTION**
The operator must be familiar with all controls and instruments before operating the machine. All controls are within easy reach of the operator.

## OPERATOR'S STATION INDICATORS AND SWITCHES




**Ignition Key Switch and Start Button**
When the key is straight up and down in the Key Switch, it is in the OFF position and all electrical functions are disconnected from the electrical circuit. Also, this is the only position in which the Key Switch can be inserted or removed.

Turn the key clockwise to the RUN position and electrical power is supplied to all functions.

**NOTE**
The Dash Gauges and Indicators should come ON when the key is turned to the RUN position. Use this Key Switch position as a "Bulb Check."

**NOTE**
The Engine will not start unless the Speed Control Pedal is in neutral.

**NOTE**
If equipped, in cold weather conditions (40°F and below), push grid heater button and hold for 20 to 40 seconds, then start while holding button in.

**Battery Charge Lamp**
This Lamp indicates output performance of the Alternator. During normal operation, with the Engine running above idle speed, this Lamp should be OFF. During starting and when the Engine is NOT running, this Lamp should be ON.

**NOTE**
If this lamp comes ON during normal operation, a problem may exist in the charging system. Refer to Section G - Troubleshooting, of this manual.

**Engine Oil Pressure Gauge**
This Gauge indicates if sufficient Engine lubricating oil pressure is present. During normal operation, with the Engine running, this Gauge should read between 30 to 60 PSIG.

**NOTE**
If this reads toward the far left during normal operation with the Engine running, STOP the Engine immediately. After allowing the oil to drain down for a few minutes, check the Engine oil level. Maintain oil level at the FULL mark on the dipstick.

**Water Temperature Gauge**
This Gauge indicates whether the Engine coolant is at the proper temperature or NOT. During normal operation, a reading of 180°F to 200°F (82°C to 93°C) indicates that the Engine coolant is at the proper temperature.

**NOTE**
If the Gauge indicator moves toward the HIGH number range during normal operation, it indicates a problem in the cooling system. STOP the Engine immediately and investigate and correct the cause of the problem! Refer to Section H - Service, of this manual. Common causes are: (1) low coolant level, (2) dirty radiator fins, (3) improper fan belt tension, or (4) plugged radiator core.

**WARNING**
Do NOT remove the Radiator Cap when the Engine is HOT or overheated. Coolant is extremely HOT and under pressure and will severely burn the skin. Wait for the engine to cool BEFORE relieving the pressure and removing the Radiator Cap.

**Hourmeter**
The Hourmeter indicates the operating time of the machine and should be used to keep an accurate Maintenance Log. Refer to Section H - Service, of this manual.

**Horn Pushbutton**
Push this Button switch in to activate the Horn. The Keyswitch MUST be at the RUN position for this switch to be effective.

**Fuel Level Gauge**
The Fuel Gauge has a color bar to represent the amount of fuel remaining in the Fuel Reservoir, as shown by the position of the needle. The red zone indicates low fuel level.

**High/Low Drive Switch**
With the switch in High position, two-wheel drive mode is engaged. This mode is used for travel speed on road ways. With the switch in Low position, four-wheel drive mode is engaged. This mode is used for working applications.

**Optional Cab Environment Switches**
When provided, these are used to operate the Windshield Wiper, Heater and Air Conditioning.

**Other Optional Dash Switches**
When provided, these are used to operate lights and turn signals.

## INSTRUMENT PANEL INDICATORS

1. Water Temperature
2. Fuel
3. Hour Meter
4. Engine Oil Pressure
5. Horn Button
6. Starter Key switch
7. Tachometer
8. Voltmeter
9. Engine Oil Pressure
10. Park Brake ON/OFF
11. Air Filter Indicator
12. High/Low Drive Switch
13. Lights
14. Strobe Light
15. Park Brake Engaged Light
16. Engine High Temperature
17. Windshield Defroster Fan (Option)

## FRAME/BODY INDICATORS

**Hydraulic Reservoir Fluid Level –** The Sight Gauge is located on the side of the Reservoir.

**Engine Oil Level -** Refer to the Engine Manual for location. Pull out the Dipstick and wipe off. Re-insert and pull out to read engine oil level.

**Radiator Level -** The Fill Cap is located on the top rear of the Engine Hood. CAUTION this Cap is pressurized.

**Battery Fluid Level -** The Battery is located inside of the Engine compartment.

## DRIVE FUNCTION CONTROLS

Dual Direction/Speed Control Pedal
Press the Foot Pedal forward for forward travel. Reverse depression enables backward travel. Speed is determined by the distance the pedal is depressed.

**Steering**
The Power Steering Motor is designed to give effortless steering with no shock reaction from the front wheels to the Steering Wheel. This machine uses hydraulic pressure from the hydraulic pump without the use of a special power steering pump.

**Park Brake**
The machine cannot be started unless the Park Brake is set. To operate the machine, you must have Park Brake off.

## MOLDBOARD AND ATTACHMENTS CONTROLS

On the operator's display, select "Grader Mode" to activate the moldboard.

**WARNING**
Unattended machine hazard. Set Brake, lower Moldboard and Attachments to ground BEFORE leaving the machine. An unattended machine could move or roll and cause death or serious injury to operator or bystanders.

**Tool Bar Lift**
Tool Bar is used with the Scarifier and/or the compactor attachment. In Loader Mode slide the Index finger slider completely left or right, then move the left thumb slider up or down for raise and lower.

**Bucket Tilt**
In Loader Mode, move the joy stick left or right.

**Boom Lift**
In Loader Mode, move the joy stick forward or backward.

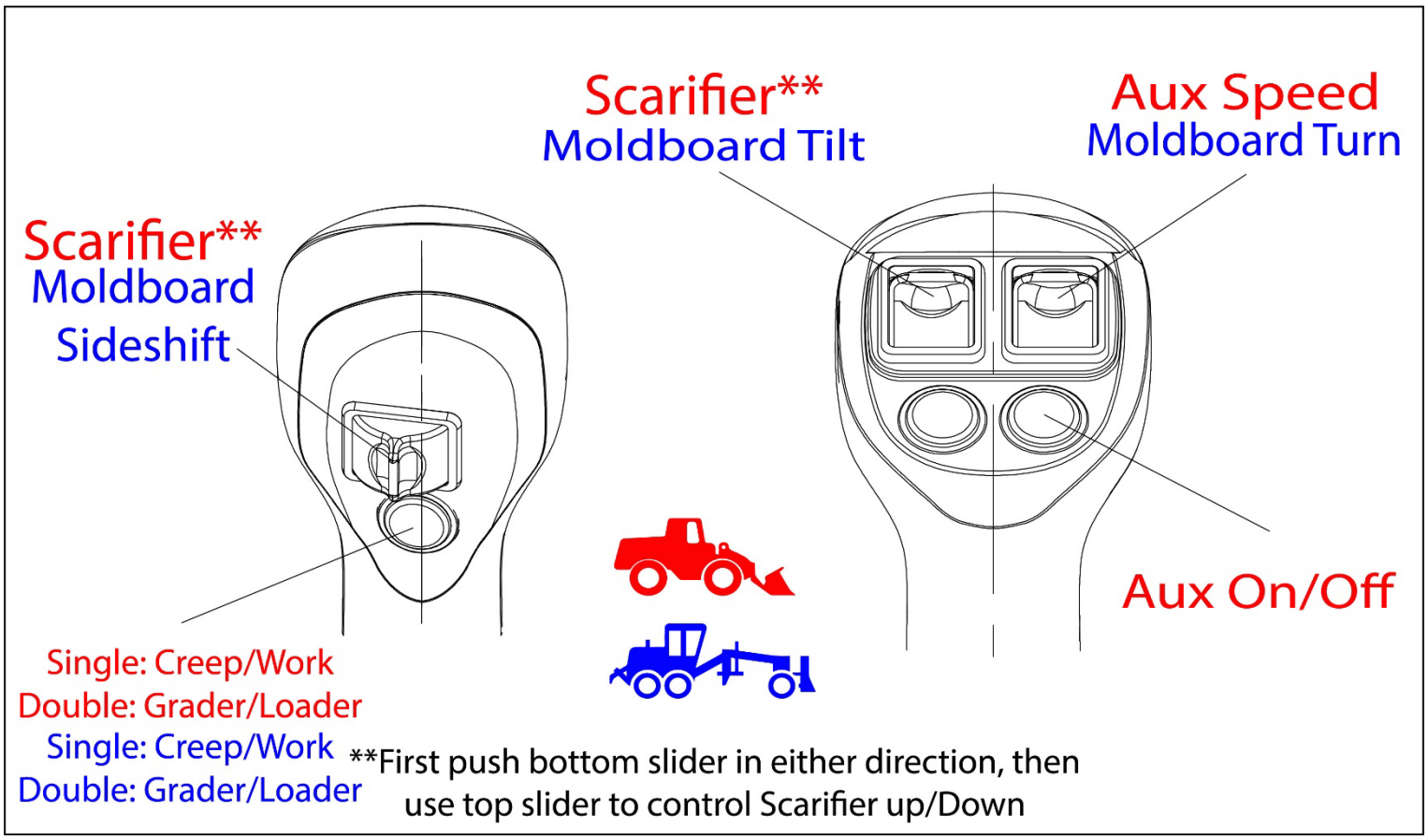
**Right/Left Blade Lift**
In Grader Mode, pull the joy stick straight back to raise both left and right sides of the blade. Move the joy stick straight forward to lower both left and right sides of the blade.

To raise just the right side of the blade move the joy stick straight tot the left, this will raise the right cylinder and lower the left. To raise just the right side of the blade move the joy stick straight right, this will lower the right side and raise the left side. You can also move the joy stick diagonally to any direction to vary the rate at with the left and right sides go up or down.

**Blade Tilt**
In grader mode, push the left thumb slider up or down to tilt the moldboard.

**Blade Side Shift**
In Grader Mode, use the index finger slider to shift the moldboard from side to side.

**Blade Angle**
In Grader Mode, use the left thumb slider up or down to turn the moldboard. This will rotate the blade on its Z axis.


Scarifier**
Moldboard Tilt
Aux Speed
Moldboard Turn
Scarifier**
Moldboard
Sideshift
Aux On/Off
Single: Creep/Work
Double: Grader/Loader
Single: Creep/Work
Double: Grader/Loader
**First push bottom slider in either direction, then
use top slider to control Scarifier up/Down

## PRE-START

Check the machine daily to make sure all systems are in good operating condition. Perform the following before starting the machine the first time each day.

Perform at least two "walk-around" inspections each working day - - once before starting the day and once at day's end when parked for refueling and fluid checks. ***Interim "walk-arounds" when you dismount for a time, or leave the machine unattended, will help eliminate unnecessary down time.***

**NOTE**
Make sure the machine is parked on a level surface in order to check Engine Oil and Hydraulic Fluid levels accurately.

1. Check the engine oil and coolant, fuel and hydraulic oil levels. Drain water and sediment from the Fuel Filter.
2. Make sure daily lubrication has been done.
3. Check the Park Brake.
4. Turn the Key Switch to RUN position but do not start the engine.
5. Visually inspect for leaks, worn, loose, broken, or malfunctioning parts. Make sure all caps, covers and safety shields are in place.
6. Check tires for cuts, bulges, nails, correct pressure, and loose wheel nuts, etc.
7. Inspect the work area. Make sure you know where you will be grading and making turns. Look over the terrain of the job site for holes, obstacles, slopes, slippery surfaces and soft or deep mud.

If the machine is found to be in need of repair, or is unsafe or contributing to unsafe conditions, the matter shall be reported IMMEDIATELY to the user's designated authority. The machine shall not be operated until it has been restored to a safe operating condition.

**CAUTION**
Follow manufacturer recommendations regarding use of proper lubricants, oil or coolant.

To prevent a fire or explosion, allow engine to cool down BEFORE refilling the Fuel Tank. A hot engine could ignite the fuel and burn you.

Do NOT smoke while refilling the Fuel Tank.

Over-inflated tires can explode and cause injury or death. Tire repairs must be made only by authorized personnel using proper tools and equipment.

NEVER operate the machine with safety guards or covers removed.

**DANGER**
Always maintain a safe distance from electric power lines and cables. Avoid contact with any electrically charged conductor or gas line! Electrocution or an explosion can occur. Call the "DIGGER'S HOTLINE" or proper local authorities for utility line locations BEFORE starting to grade.
Before operating the machine on roads or highways, check local laws regarding the use of lights, flags, licensing, slow moving vehicle emblems (SMV), etc.

## ENGINE BREAK-IN

Your new Engine does not require extensive break-in. However, for the first 100 hours of operation, keep the following in mind:

1. Allow the Engine to idle for a few minutes after every cold start.
2. Do NOT idle Engine for long periods of time.
3. Do NOT operate the Engine at maximum power for long periods of time.
4. Check the oil level frequently and replenish as necessary.

A special "break-in" oil is not used. The oil in the Engine crankcase is the same as is specified for regular oil changes. Change the oil and replace the oil filter at the intervals specified in Engine Oil and Filter in Section H - Service, of this manual. Do NOT add special additives or special "break-in" components to the crankcase.

## STARTUP

Before mounting the operator's station, walk completely around the machine to make sure no one is under, on or near the machine. Let others near the area know you are going to start up and wait until everyone is clear of the machine. Then proceed as follows:

**CAUTION**
Before starting the Engine and operating the machine, review and comply with ALL recommendations set forth in the Section A - Safety, of this manual. Know how to STOP the machine before starting it!

1. Make sure the floor of the operator's station and the foot controls are free of debris and mud. Adjust the seat and ***fasten the seat belt securely***.

**CAUTION**
Exhaust fumes can kill. Insure proper ventilation when starting indoors or in enclosed areas. Use proper grab handles, not the Steering Wheel or Levers, as a hand hold when mounting or dismounting. Start and operate the machine only from the Operator's Seat, and ONLY with the Seat Belt securely fastened.

**NOTE**
Do not crank the starter for more than 30 seconds at a time or Starter Motor damage could result. If prevailing temperature is 40°F (4°C) or below, it may be necessary to use a cold weather starting aid to start the diesel Engine. For proper use of starting aids, check instructions in the OEM engine manual.

1. Depress the Glow Plug Button (if provided) for 30 seconds. Continue to depress button while turning Key Switch to RUN position. Then depress the Starter Button until the Engine starts.

**NOTE**
If the engine fails to start on the first try or it dies out after only running a short time, turn the Key Switch to OFF, wait at least two minutes and repeat above steps.

**NOTE**
If the Battery becomes discharged and fails to have sufficient power to start the Engine, jumper cables can be used to assist startup. Refer to As Required Service in Section H - Service, of this manual, for safe jump-start procedure.

**After Start Checks**
After the machine starts and BEFORE beginning operation, perform the following:

1. Run the Engine at idle speed for about five minutes to allow it to warm up.

**NOTE**
Avoid unnecessary idling. Prolonged idle can cause crankcase oil dilution and incomplete fuel combustion. This can lead to premature Engine failure from gum deposits on internal Engine parts.

2. Check that the Indicator Gauges are registering proper readings.
3. Check that the color of the exhaust gas is normal. It should be light gray.
4. Check that there are NO fuel, oil, or Engine coolant leaks.
5. Check that there are NO abnormal noises or vibrations.
6. Raise and Lower all tools.
7. Test all tool positions for both Travel & Work positions.
8. Release the Park Brake.
9. Move the machine FORWARD by depressing either Direction/Speed Control Pedal to the forward position. REVERSE the machine by depressing either Pedal to the reverse position. Speed is determined by the distance the Pedals are depressed. Refer to Drive Function Controls in Section C - Controls and Accessories, of this manual.

**CAUTION**
Be certain you can control both speed and direction before moving. If any function, operation, or control of the machine does not respond correctly, shut down the machine and DO NOT use the machine until it has been made operational.

**Cold Start (Grid Heaters) - If Equipped**

1. Depress the Switch Button for 20 to 30 seconds.
2. While cranking the Engine Starter, continue to depress the switch.
3. As the Engine starts, release the button.

**Stopping Engine**

When ready to stop operating the machine, use the following procedure:

1. Bring the machine to full parking stop on a level surface. NEVER park on a slope or hill side.
2. With all personnel clear of the machine, slowly lower hydraulic equipment flat to the ground in a positive support position.
3. Place controls in neutral and set the Park Brake.
4. Turn the Key Switch to OFF and remove the key. Take the key with you for security reasons.

**NOTE**
When the engine is stopped, be sure the Key Switch is in the OFF position. Loss of battery power will result if left in the ON position.

**NOTE**
If working on any public road or shoulder, be sure the machine is the prescribed distance from the highway as designated by laws in your area. NEVER lower attachments from any position except when seated in the operator's seat.

## WORKING APPLICATION TIPS

The type of terrain, grading or backfilling application should determine the best choice for using hydraulic equipment and attachments on the machine.

When finish-grading or leveling under good conditions, work the material from side to side.

Select the desired working speed by clicking the index finger button, or the button on the display, as needed. Engine Throttle should be set at 1600 to 1800 RPMs for normal operation. Use 1800 to 2000 RPMs for high work loads.

**NOTE**
Grading, loading, and ripping should be done in creep or work travel speed. Travel speed should be used for moving the machine from place to place.

1. When ditching or sloping, you may find it necessary to raise and/or lower one or both ends of the Moldboard, whichever prevails in your situation.

To set or maintain the desired cutting depth of the Moldboard, use the joy stick to lower or raise the Moldboard while SLOWLY driving the machine forward.

A sloping grade may be made by lowering the left or right end of the Moldboard from the horizontal plane as desired.

1. TILT the Moldboard forward for better use in grading imbedded gravel, soft soils, clay or sandy terrain. The center position is for general use. Tilting it all the way back is recommended for efficient cutting of hard surfaces.

For maximum cut, TILT the Moldboard to the extreme backward position. For leveling, begin with the top of the Moldboard slightly ahead of the bottom.

1. To assist in rolling material to the desired area, on the right or left side, adjust the ANGLE of the Moldboard accordingly.
2. Side shift the Moldboard to cast material outside of the tires' path by using the BLADE SHIFT Control. Side shifting the Moldboard also allows continued grading in a straight path while avoiding obstructions or obstacles at the end of the Moldboard.

**LOADER MODE – Using the Front-End Loader**

On the operator's display, select "Loader Mode" to activate the front-end loader.

The Bucket of the Maintainer can be used for loading loose material or back-blading (pulling out) loose material from tight areas.

**CAUTION**
The Front-End Loader Boom is equipped with a safety prop bar. Failure to use it while working on the machine and the boom is in the air will result in injury/death.

**WORKING APPLICATION TIPS**

The type of terrain, grading or backfilling application should determine the best choice for using hydraulic equipment and attachments on the machine.

**Back Blading with the Bucket**

1. To back-blade loose material in front of a wall, tip the Bucket down past the level position and position the Cutting Edge as close to the wall as possible.
2. Lower the Boom to the "float" position and reverse the Maintainer, pulling the loose material with the Bucket as you go.
3. Level the material by gradually raising the Bucket.

**Loading the Bucket**

1. Lower the Boom to ground level and level the Bucket according to the Bucket Level Sight Gauge.
2. Approach loose material from a head-on angle so that the Bucket will be evenly filled.
3. As the Bucket penetrates the loose material, tilt the Bucket completely back using the BUCKET TILT Control Lever and begin to raise the Boom using the BOOM Control Lever.
4. Reverse the Maintainer away from the pile and carry the loaded material to the desired dumping spot.
5. If dumping material into a truck, raise the Boom completely and approach the side of the truck slowly.
6. When the Bucket clears the sideboard of the truck, tilt the Bucket completely forward.
7. When the Bucket is empty, tilt it back completely and back the Maintainer away from the truck.

**Using the Scarifier**

The Scarifier attachment may be used for loosening surfaces such as hard dirt, compact gravel, etc.

1. Lower the Scarifier using the Scarifier Control Level. Enter the material gradually while traveling forward in a straight line at slow speed.
2. Use all seven Shanks in most conditions. Use fewer Shanks in more severe conditions.
3. Keep the Scarifier deep enough to fully utilize Engine power without slipping the tires.
4. On grades, rip downhill to use the weight of the machine.
5. Cross rip only when required for a special purpose.
6. To break up paved surfaces, dig under the surface and then raise the Scarifier.

NOTE
To avoid damage, raise the Scarifier out of the ground BEFORE turning.

**End of Work Session**

1. Always check the hydraulic fluid level at operating temperature, preferably at the end of the work day. Park on a level surface and stop the Engine according to the Mandatory Safety Shutdown Procedures in Section A - Safety, of this manual. Lower the Loader Boom and Tool Bar completely.

**NOTE**
The Hydraulic Reservoir is full if fluid is visible in the sight gauge window.

2. Check the Air Cleaner Pre-Cleaner.
3. Check all Cylinders for signs of leaks.
4. Secure the machine.

**NOTE**
Always fill the Fuel Reservoir completely at the end of the working day to prevent moisture condensation from occurring overnight.

## FUELS

**NOTE**
Due to chemical differences in petroleum products, see the Engine Manual for recommended fuels and lubricants. The following lubricants and fluids are factory recommendations. Any lubricants, fuels or fluids which are NOT recommended here are used at your own risk. The manufacturer assumes NO responsibility for the results due to the use of any lubricants, fuels or fluids which are NOT recommended.

**NOTE**
NEVER put additives in the fuel used in the machine unless specifically recommended by your Engine dealer.

Keep dirt, scale, water, etc. out of stored fuel. Do NOT store fuels for any extended periods of time. Fill the Fuel Tank after completing work at the end of each day. This will reduce the problem of condensation forming in the tank overnight, which adds water to the fuel.

**WARNING**
ALWAYS shut off the Engine when filling the Fuel Tank. ALWAYS ground the fuel nozzle against the filler neck to avoid sparks. NEVER fuel the machine when smoking or near a fire or open flame. Avoid spilling fuel. If a spill occurs, wipe it up immediately. NEVER add fuel when Engine is HOT!

## LUBRICATION

Keep parts properly lubricated to prevent excessive parts wear and early failures.

**WARNING**
NEVER lubricate or service the machine while the Engine is running. ALWAYS BE SURE to exercise the Mandatory Safety Shutdown Procedure in Section A - Safety, of this manual, BEFORE proceeding to lubricate or service the machine. When venting or filling the hydraulic system, loosen the Filler Cap SLOWLY and remove gradually.

**Lubricants**
Recommended Lubrications can be found on decals on the side of hydraulic tank.

**Axle Oil:**
SAE 85W90

**Engine Fuel and Oil**
Refer to OEM Engine Manual.

**Hydraulic System Filter Elements and Fluid**

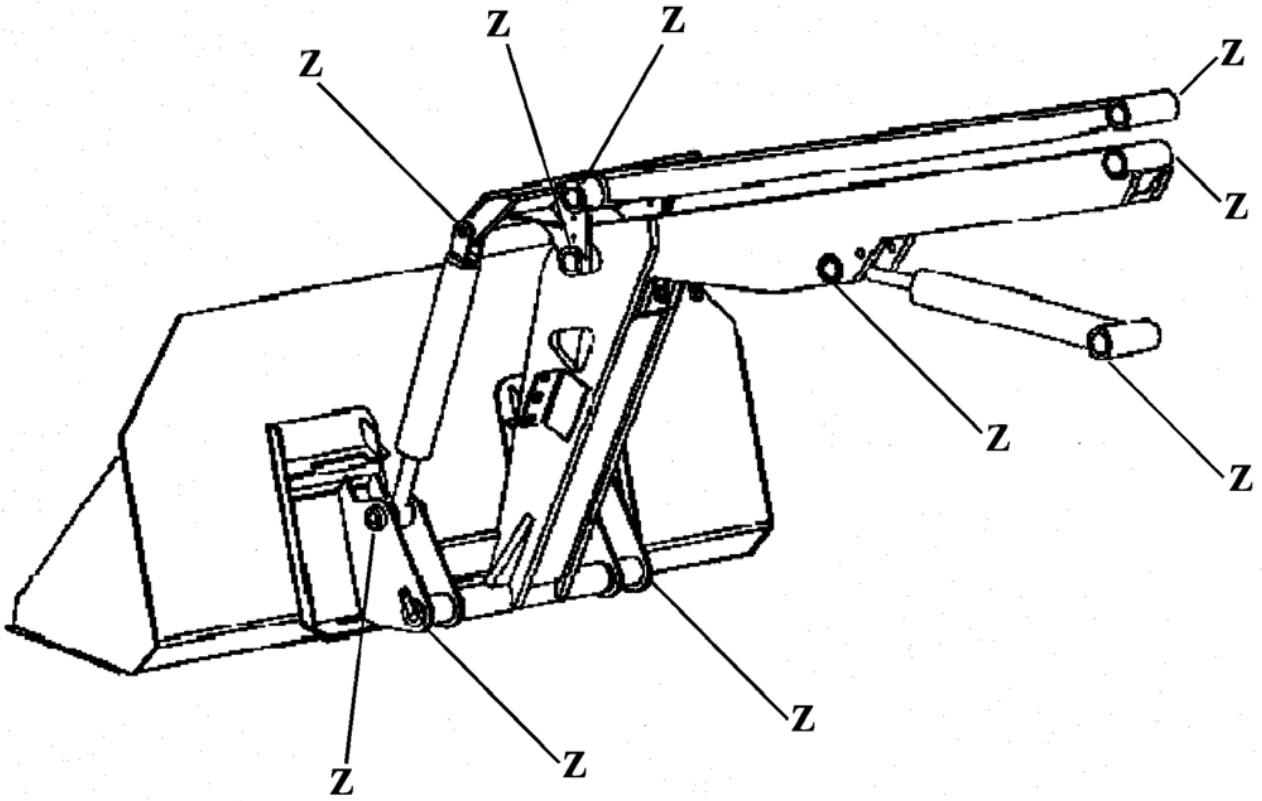
1. 10 Micron - Auxiliary Hydraulic Controls Circuit
2. 7 Micron High Pressure Hydraulic Filter
3. Hydraulic Suction Strainer
4. Fluid - Mobile 424 or equivalent

**NOTE**
Refer to Operator Services in Section H - Service, of this manual, for detailed information regarding periodic checking and replenishing of lubricants.

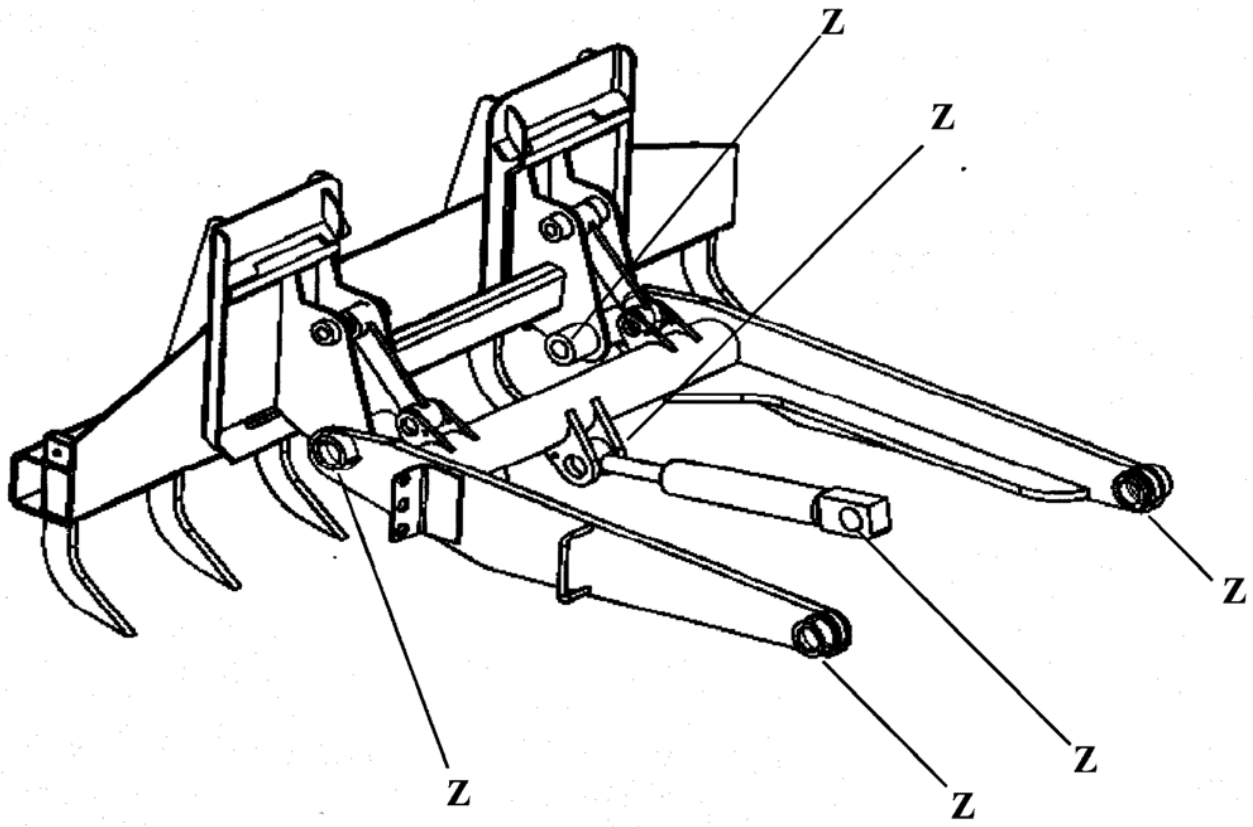
**Greases**
Multi-Lube Lithium Grease NLGI #2 or equivalent.

**Greasing**
Wipe dirt from the Fittings before greasing them to prevent the dirt from being forced into the Bearings of the pivot joints. Replace any missing or damaged fittings when necessary. To minimize dirt build-up, avoid excessive greasing.

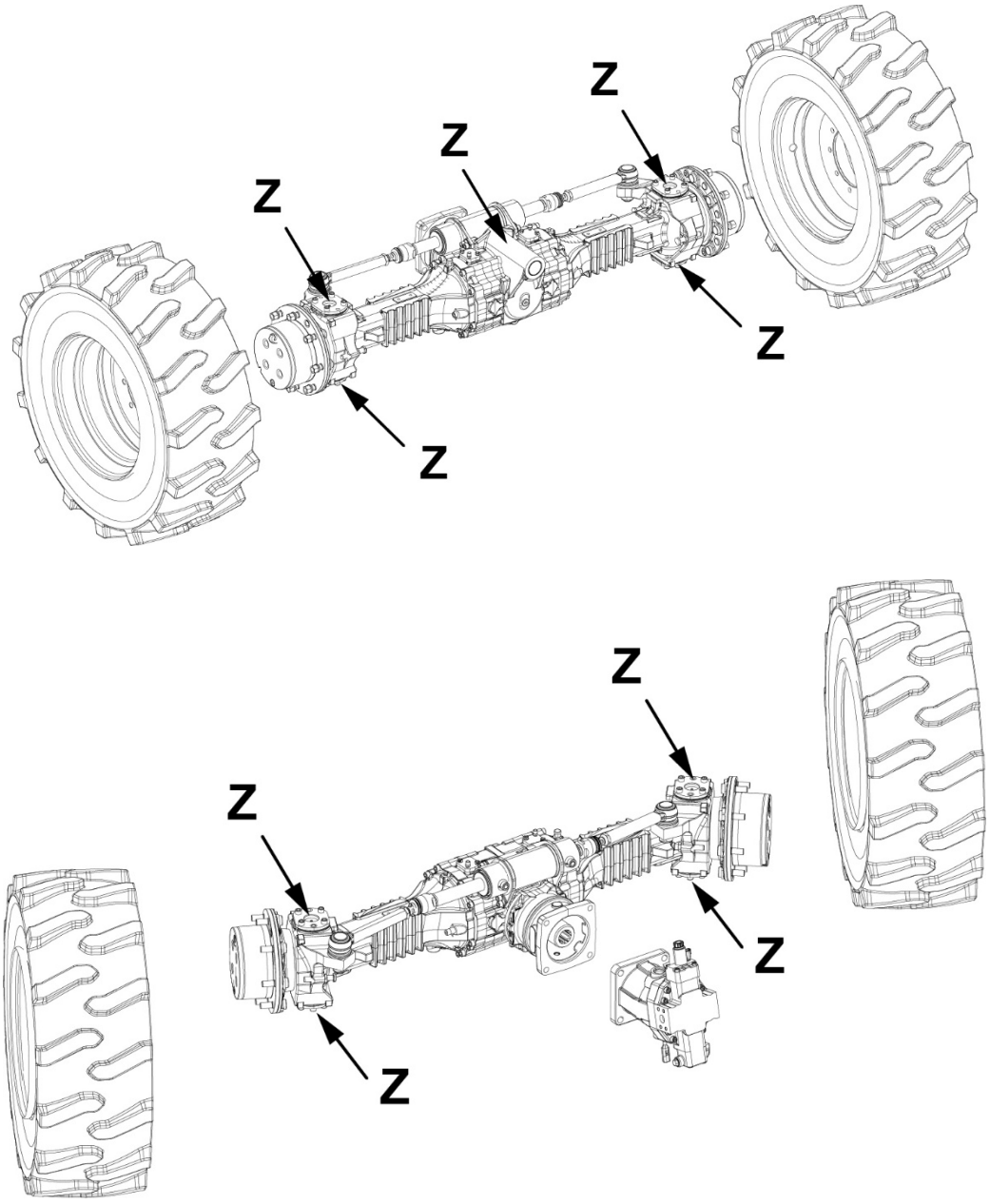
The following illustrations show the location of all grease fittings.



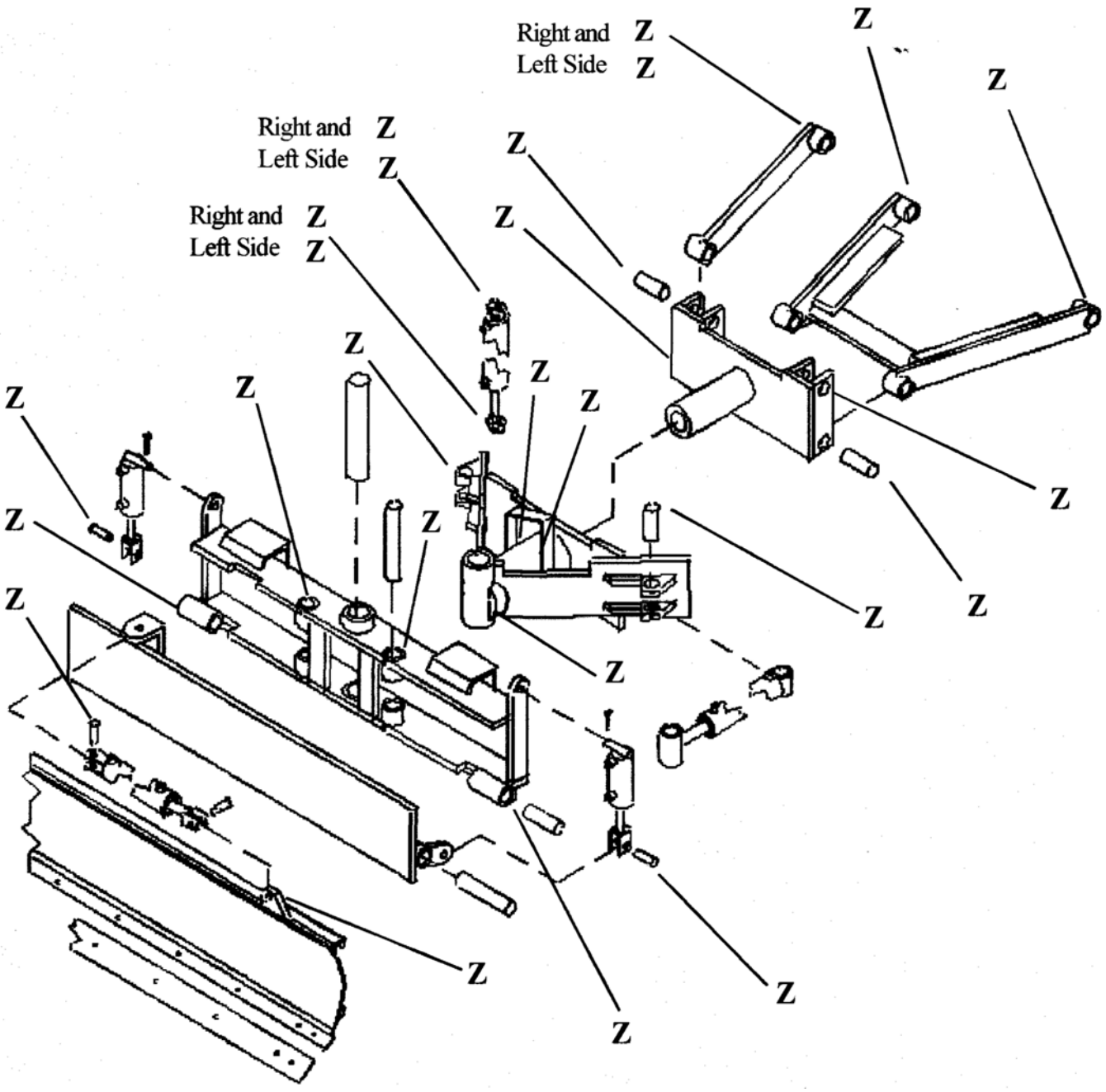

**Boom & Bucket Assembly**
**10 Grease Zerks (Z)**




Tool Bar Assembly 6 Grease Zerks (Z)




Front & Rear Axle Assembly 9 Grease Zerks (Z)




Moldboard Assembly 25 Grease Zerks (Z)

## TRANSPORTING

When loading or unloading in a congested area, be sure flagmen are used to insure the utmost SAFETY to the operator and other motorists and/or pedestrians in the area.

**CAUTION**
ALWAYS follow ALL state and local regulations regarding the operation of equipment on or across public highways! Whenever any appreciable distance exists between job sites, or if transporting on a public highway is prohibited, BE SURE to transport the machine using a vehicle of appropriate size and weight.

## LOADING USING RAMPS

**NOTE**
A matched pair of ramps is required.

**WARNING**
ALWAYS abide by the following recommended procedures and guidelines when using ramps to load the machine onto (or unload it from) a truck or trailer. Failure to heed these guidelines can result in damage to equipment and serious personal injury or death!

1. The ramps MUST be of sufficient strength to support the machine. Whenever possible, use strong steel ramps as well as some type of center supporting block.
2. The ramps MUST be firmly attached to the truck or trailer bed with NO step between the bed and the ramps.
3. Incline of ramps MUST be less than 15° (ramp length MUST be at least 16 feet long.
4. Ramp width MUST be at least 1-1/2 times the tire width.
   Refer to Figure F-1
5. Block the front and rear of the tires on the truck or trailer. If so equipped, engage the parking brake also.
6. Slowly drive the machine up to the ramps. Position the Bucket in a level position according to the Bucket Level Sight Gauge.
7. Position the Scarifier and Blade in a position where they will not come into contact with the ramps, ground or trailer during the loading process.
8. Slowly (at the lowest Engine speed possible), carefully drive the machine up the ramps to the forward bulkhead of the trailer.

**CAUTION**
NEVER adjust travel direction (even slightly) while travelling on the ramps. Instead, back down off the ramps and then re-align the machine with the ramps.

9. Engage the Park Brake on the machine.
10. Position the Moldboard using the BLADE SHIFT Control Valve Levers so that the Moldboard is centered on the trailer when it is in the full down position.
11. Lower the Scarifier and Blade to full down position.
12. Stop the Engine according to Mandatory Safety Shutdown Procedures in Section A - Safety, of this manual.

13. The forward tie down point is a Tie Down Loop on the bottom of the Main Frame at the back of the front axle.
14. The rear tie downs are located on the rear of the Push Block Assembly where the Attachment Draw Bar Arms pivot.
15. The Bucket tie down is over the Bucket/Boom Attachment Pin, NEVER over the Cylinder Rod Pin.

**NOTE**
ALWAYS use chains and chain binders. Do NOT lower tools to float position when loaded on transport vehicle. Tools in float position offer no stabilization when vehicle bounces.

## IN TRANSIT

If in transit for a few days, follow these guidelines:

1. Raise air pressure in tires several pounds above normal operating pressure to prevent excessive bouncing.
2. Check cooling system for proper anti-freeze.
3. Disconnect the Battery.
4. Clean all bright surfaces and coat with heavy grease to prevent rusting.
5. Cover Exhaust Pipe to prevent entrance of water.

When transporting the machine, know the overall height to allow clearance of obstructions. Remove or tape over the slow moving vehicle emblem (SMV) if it will be visible to traffic.

**WARNING**
If tire pressure has been increased for transport, it MUST be lowered to operating pressure before the machine is placed back into service.

## UNLOADING WITH RAMPS

**NOTE**
A matched pair of ramps is required.

Use ramps as described in Steps 1 thru 4 in LOADING USING RAMPS. Then proceed as follows to unload the machine:

1. – 4. (see previous section LOADING USING RAMPS)
5. Remove the chains and chain binders.
6. Start the Engine according to Startup in Section D - Operations, of this manual.
7. Raise the Scarifier, Boom and Moldboard.
8. Clear all personnel from the ramp area.
9. Disengage the Parking Brake.
10. If necessary, adjust the machine so that the wheels are in line and centered with the ramps. Slowly (at the lowest Engine speed possible) and carefully drive the machine down the ramps.

**NOTE**
All loading and unloading should be done in Low (4-wheel) drive.

## THEFT DETERRENTS

THE CERTAINTY OF APPREHENSION IS A STRONG DETERRENT TO THEFT OF CONSTRUCTION EQUIPMENT! Users should take as many of the following actions as possible to discourage theft, to aid in the recovery in the event that the machine is stolen, or to reduce vandalism:

1. Remove keys from unattended machines.
2. Attach, secure, and lock all anti-vandalism and anti-theft devices on the machine.
3. Lock doors of cabs when NOT in use.
4. Inspect the gates and fences of the vehicle storage yard. If possible, keep machines in well lighted areas. Ask the law enforcement agency having jurisdiction to make frequent check around the storage or work sites, especially at night, during weekends, or on holidays.
5. Report the theft to the dealer and insurance company. Provide all the model and serial numbers.
6. Request that your dealer forward this same information to Calder Brothers Corporation.

| PROBLEM | CAUSE | REMEDY |
|---|---|---|
| | **NOTE:**<br>This Troubleshooting guide presents problems, causes, and remedies beyond the extent of loose, worn, or missing parts and is developed in consideration of the machine being in otherwise good operating condition. Repairs to hydraulic components, electronic systems, engine or transmission should ONLY be done by your MAULDIN Dealer or authorized Service Dealer. | |
| Engine Will Not Start (Refer to Engine Manual for complete list) | 1. Air cleaners dirty or plugged.<br>2. Battery weak or loose cable connections.<br>3. Fuel tank empty.<br>4. Tank valve closed.<br>5. Cap clogged.<br>6. Fuel contaminated, wrong fuel.<br>7. Fuel Filters dirty or plugged.<br>8. Engine too cold.<br>9. Electric fuel shut-off. | Clean or replace.<br>Tighten connections, charge or replace battery.<br>Add fuel.<br>Open valve.<br>Clean cap.<br>Replace.<br>Replace.<br>Refer to Engine Manual.<br>Refer to Engine Manual. |
| Hard Starting (Refer to Engine Manual for complete list) | See Causes 1-6.<br>8. Lube oil too high. Wrong Lube oil. | See Remedies for Causes 1-6.<br>Replace. |
| Engine Stops (Refer to Engine Manual for complete list) | See Causes 2-4, 7.<br>9. Exhaust system restricted. | See Remedies for Causes 2-4, 7.<br>Refer to Engine Manual. |
| Engine Runs Erratic (Refer to Engine Manual for complete list) | See Causes 1, 4-6, 9.<br>10. Tank Filler Cap plugged.<br>11. Throttle linkage out of adjustment or sticking. | See Remedies for Causes 1, 4-6, 9.<br>Clean cap.<br>Consult an authorized Service Dealer. |
| Black Exhaust Smoke (Refer To Engine Manual for complete list) | See Causes 1, 4, 9.<br>12. Inoperative or missing thermostat.<br>13. Engine overloaded, over speed. | See Remedies for Causes 1, 4, 9.<br>Refer to Engine Manual.<br>Refer to Engine Manual. |
| Blue Exhaust Smoke (Refer to Engine Manual for complete list) | See Causes 1, 4, 8. | See Remedies for Causes 1, 4, 8. |

| PROBLEM | CAUSE | REMEDY |
|---|---|---|
| White Exhaust Smoke (Refer to Engine Manual for complete list) | See Causes 6, 12. | See Remedies for Causes 6, 12. |
| Low Power (Refer to Engine Manual for complete list) | See Causes 1, 4-6, 8, 9, 11-13.14.<br>Fan belt loose orslipping.<br>Radiator fins or tubes dirty or restricted. | See Remedies for Causes 1, 4-6, 8,9, 11-13.<br>Adjust belt.<br>Clean fins, repair radiator. |
| Engine Overheating (Refer to Engine Manual for Complete list) | See Causes 9, 12, 14. | See Remedies for Causes 9, 12,14. |
| Engine Overcooling (Refer to Engine Manual for complete list) | Inoperative or missing thermostat. | Refer to Engine Manual. |
| Engine Knocks (Refer to Engine Manual for complete list) | Loss of Lube oil or internal damage. | Shut down. Refer to Engine Manual. |
| Low Oil Pressure (Refer to Engine Manual for complete list) | Lube oil level too low. Wrong Lube oil. | Fill to proper level. Replace. |
| Hydraulic Oil Temperature Too High (Hydraulic oil temp. NEVER to be more than 100°F over ambient temp. **Hydraulic oil temp. + ambient temp. NEVER to exceed 225°F.)** | Low on fluid or leaking.<br>Cooler fins clogged.<br>Cooler covered.<br>Hydraulic filters clogged.<br>Bad gauge. | Repair & add fluid.<br>Clean.<br>Remove covering.<br>Replace if clogged.<br>Replace. |
| Hydraulic Oil Temperature Low Or Not Indicating | Bad gauge.<br>Extreme low ambient temperature. | Replace.<br>Consult an authorized Service Dealer. |

| PROBLEM | CAUSE | REMEDY |
|---|---|---|
| Blade Side Shift Sticks Or Stops | Dirt compacted in Blade<br>Slide. Cylinder damage.<br>Hydraulic leak. Check other accessories for operation before continuing work. | Clean slide.<br>Repair or replace.<br>Repair if minor. Consult an authorized Service Dealer if major. |
| Jerky Operation Of Any Accessory | Damage or excessive wear on Cylinder attachment parts. | Repair or replace. |
| Unit Will Not Start<br>(Engine Starter not operating) | Key switch inoperative.<br>Push Button inoperative.<br>Neutral Safety Switch inoperative.<br>Engine Starter/Solenoid inoperative.<br>Low battery voltage | Check for proper voltage (12 VDC).<br>Check for proper voltage (12 VDC).<br>Adjust or replace.<br>Refer to Engine Manual.<br>Charge battery. |
| Unit Will Not Start (Engine Starter Operating) | No fuel in Tank.<br>Electric Fuel Shut-Off inoperative.<br>Internal fuel pump malfunction.<br>Internal engine problems. | Fill to proper level.<br>Refer to Engine Manual.<br>Refer to Engine Manual.<br>Refer to Engine Manual. |
| Excessive Engine Coolant Temperature | Low coolant level.<br>Coolant/water ratio wrong.<br>Radiator air flow obstructed.<br>Engine fan v-belt loose.<br>Engine thermostat inoperative.<br>Water pump not working properly.<br>Internal engine malfunctions. | Fill to proper level.<br>Use engine coolant (anti-freeze).<br>Clean cooling fins.<br>Adjust.<br>Refer to Engine Manual.<br>Refer to Engine Manual.<br>Refer to Engine Manual. |

| PROBLEM | CAUSE | REMEDY |
|---|---|---|
| Excessive Hydraulic Fluid Temperature | Low hydraulic fluid level. | Fill to proper level |
| | Hydraulic cooler air flow obstructed. | Clean cooling fins. |
| | Contaminated hydraulic fluid. | Replace fluid - Refer to Shop Repair guide. |
| | Hydraulic P.T.O valve engaged without accessories attached. | Check position of handle. |
| Accessory Pump Noisy | Low hydraulic fluid level. | Fill to proper level. |
| | Suction hose/fittings leaking (pump cavitations). | Tighten connections, replace damaged hose. |
| Hydraulic Cylinders Operating Slow or Will Not Move | Low hydraulic fluid level. | Fill to proper level |
| | Internal hydraulic cylinder leakage. Load check casting plugs loose. | Repair or replace. |
| | Accessory hydraulic pump worn excessively. | Repair or replace. |
| | Hydraulic control valves not fully engaged. | Adjust. |
| Hydraulic Cylinders Leaking Down or Will Not Hold Their Position | Cylinder leaking internally | Repair or replace. |
| | Control valve leaking internally. | Repair or replace. |
| Hydraulic Cylinders/Control Valves Leaking Externally | Seals/O-Rings worn. | Replace. |

| PROBLEM | CAUSE | REMEDY |
|---|---|---|
| Unit Runs But Will Not Move | Low hydraulic fluid. | Fill to proper level. |
| | Drive system filters restricted. | Change filter. |
| | Transmission pump filter restricted. | Change filter. Re-tighten. |
| | Transmission external linkage loose. | Release brake valve. |
| | Parking brake engaged. Gear reducer locked. | Consult an authorized Service Dealer. |
| | Connecting transmission pump drive components broken. | Consult an authorized Service Dealer. |
| | Internal transmission problems. | Consult an authorized Service Dealer. |
| Transmission Pump Noisy | Low hydraulic fluid level. Transmission pump filter restricted. | Fill to proper level. Change filter. |
| | Drive plate/Drive link assembly loose. | Re-tighten. |
| | Internal pump problems. | Consult an authorized Service Dealer. |
| Hydraulic Fluid Coming From Filler Neck | Hydraulic system too full. | Drain off excess. |
| | Hydraulic system drawing air (aerated fluid). | Consult an authorized Service Dealer. |
| | Hydraulic fluid contaminated with water. | Replace fluid. |
| Hydraulic Steering Problems | Consult an authorized Service Dealer. | Consult an authorized Service Dealer. |
| Drive System Not Responsive When Changing Directions | Plugged pump orifice. | Consult an authorized Service Dealer. |
| | Transmission pump problems. | Consult an authorized Service Dealer. |

| PROBLEM | CAUSE | REMEDY |
|---|---|---|
| Two-Speed Not Working Properly | Electric switch inoperative.<br>Electric solenoid inoperative.<br>Low or no voltage to switch (wiring short).<br>Electrically activated control valve inoperative. | Consult an authorized Service Dealer.<br>Consult an authorized Service Dealer.<br>Consult an authorized Service Dealer.<br>Consult an authorized Service Dealer. |
| Drive System Sluggish With Low Power | Low hydraulic fluid.<br>Restricted transmission pump suction screen.<br>Pump controller or linkage needs adjustment.<br>Plugged pump orifice.<br>Low transmission pump charge pressure.<br>Hydraulic motor failure. | Fill to proper level.<br>Clean or replace.<br>Adjust.<br>Consult an authorized Service Dealer.<br>Consult an authorized Service Dealer.<br>Consult an authorized Service Dealer. |
| Brakes Engaging Prematurely or When Slowing Machine Down | Excessive worn drive motor causing loss of charge pressure.<br>Excessive worn drive pump.<br>Brake malfunction. | Consult an authorized Service Dealer.<br>Consult an authorized Service Dealer.<br>Consult an authorized Service Dealer. |

## GENERAL PRECAUTIONS

**NOTE**
Do NOT perform any maintenance or repair without prior authorization. Allow only trained personnel to service the machine. In addition, WARRANTY repairs can **only** be done by a MAULDIN Dealer. They will know what portions of the machine are covered under the terms of the MAULDIN warranty and what portions are covered by other vendor OEM warranties.

**NOTE**
Always dispose of waste lubricating oils, anti-freeze and hydraulic fluids according to local regulations, or take them to a recycling center for disposal. Do NOT pour them onto the ground or into a drain.

**WARNING**
Do NOT smoke or allow any open flames in the area while checking and/or servicing hydraulic, battery or fuel systems. All contain highly flammable liquids or explosive gases which can cause an explosion or fire if ignited.

Keep feet, clothing, hands, and hair away from moving parts. Wear appropriate protective clothing, gloves, and shoes.

Wear a face shield when you disassemble spring loaded components or work with battery acid. Wear a helmet or goggles with special lenses when you weld or cut with a torch.

When working beneath a raised machine, always use blocks, jack-stands, or other rigid and stable supports.

Always wear safety glasses or goggles to protect eyes from electric arcs from shorts, fluids under pressure, and flying debris or loose material when the Engine is running or when tools are used for grinding or pounding.

### WORK AREA PRECAUTIONS

BEFORE starting inspection and repair, move the machine onto a clean, level surface. Make sure you have sufficient room, clearances, and adequate ventilation. Shut down Engine, and release all hydraulic pressure.

Clean walking and working surfaces. Remove oil, grease, and water to eliminate slippery areas. Use sand or oil-absorbing compound, as necessary, while servicing the machine.

ALWAYS lower the Moldboard and Tool Bar to full ground contact. Place all controls in neutral. Block the Wheels.

Disconnect the Battery and remove the ignition key. Remove only those guards or covers that provide needed access. Wipe away excess grease & oil.

**CAUTION**
If repair welding is ever required, remove the Battery (+) positive terminal connection before proceeding to weld. In addition, BE SURE to attach the ground (-) cable from the welder as close as possible to the area to be repaired.

NEVER weld on support frame or overhead guards without the consent of the manufacturer. Special metals may have been used which require special welding techniques, or their design should NOT have welded repairs. NEVER cut or weld on fuel lines or tanks.

Rotating parts MUST be inspected during repair, and replaced if they are cracked or damaged. Excessively worn or damaged parts can fail and cause injury or death. BE SURE that all replacement parts are interchangeable with original parts and of equal quality.

Use care NOT to damage machined and polished surfaces. Clean or replace all damaged or painted over plates and decals that can NOT be read.

After servicing, check the work performed. BE SURE there are NO parts left over. Install all guards and covers, and reconnect the Battery. Replace all tools and clean any spills.

**NOTE**
NEVER leave guards off or access doors open when the machine is unattended. Keep bystanders away if access doors are open.

## OPERATORS' SERVICING DUTIES

**NOTE**
Some of the operator related services will require access to components located inside various superstructure hoods and covers.

**Pump Pressures**
ACCESSORY DRIVE PUMP PRESSURE:
Set at 2350 PSIG +/- 100 PSIG.

TRANSMISSION PUMP PRESSURE:
Set at 5000 PSIG.

**Fuse**
The fuse provides ignition protection to the Engine's electrical system. If it is "blown", the gauges and indicators will NOT work and the Engine will shut off.

**Hydraulic Fluid Level** (10 Hours or Daily)

**CAUTION**
Remove the pressure cap SLOWLY to relieve any pressure.

Always check the hydraulic fluid at operating temperature, preferably at the end of the working day. BE SURE the machine is parked on a level surface for fluid checks.

Stop the Engine according to the Mandatory Safety Shutdown Procedures in Section A - Safety, of this manual. Lower the Boom, Tool Bar and Moldboard completely.

**NOTE**
Hydraulic System Schematics are included in the Parts Manual.

**Radiator Coolant Level** (10 Hours or Daily)

**NOTE**
Be careful when removing the Reservoir Filler Cap so that NO dirt or other foreign matter enters the hydraulic system while the Cap is removed. DO NOT OVERFILL.

With the machine on level ground, remove the Radiator Cap. Add clean, soft water (summer) or 50/50 water and anti-freeze mixture (winter) if the coolant level is below the filler neck. Replace the Radiator Cap securely.

**WARNING**
Do NOT remove the Radiator Cap when the Engine is HOT or overheated. Coolant is extremely HOT and under pressure and it can burn your skin. Wait for the Engine to cool down BEFORE relieving the pressure and removing the Radiator Cap.

**Battery** (40 Hours or Weekly**)**

**WARNING**
Explosive gas is produced while a Battery is in use or being charged. Keep flames or sparks away from the Battery area. Make sure Battery is charged in a well ventilated area.

NEVER lay a metal object on top of a Battery. A short circuit can result.

Battery acid is harmful to skin and fabrics. If acid spills, follow these first aid tips:

1. Immediately remove any clothing on which acid spills.

2. If acid contacts the skin, rinse the affected area with running water for 10 to 15 minutes.

3. If acid comes in contact with the eyes, flood the eyes with running water for 10 to 15 minutes. See a doctor at once. NEVER use any medication or eye drops unless prescribed by the doctor.

Neutralize acid spilled on the floor, using one of the following mixtures:

a) 1 Pound (0.5 kg) of baking soda in 1 U.S. Gallon (4 Liters) of water.
b) 1 Pint (0.4 Liters) of household ammonia in 1 U.S. Gallon (4 Liters) of water.

Acid from the Battery can damage the paint and metal surfaces of the machine. Avoid overfilling the Battery cells.

Whenever Battery is removed from the unit, BE SURE to disconnect the negative (-) Battery terminal connection cable first.

**NOTE**
The Battery in the machine is warranted by the supplier.

The top of the Battery MUST always be kept clean. Clean the Battery with a brush dipped in an alkaline solution (ammonia or baking soda and water). After the foaming has stopped, flush the top of the Battery with clean water. If the terminals and cable connection clamps are corroded or have a build-up, disconnect the cables and clean the terminals and clamps with the same alkaline solution.

After cleaning the top of the Battery, check the fluid level by removing the filler-vent caps. If the level is low, add clean, soft water or distilled water. Fluid level is correct when the liquid covers the rings in the filler wells, or is a minimum of 1/4" above the plates.

**NOTE**
Since water and electrolyte will NOT mix immediately, do NOT add water in freezing weather unless the Battery is warm. If water is added, run the Engine for a minimum of two hours.

**Cylinder Attachment Bolts and Pin Setscrews** (250 Hours) Check and re-tighten if loose.

**Air Cleaner** (250 Hours)
Completely wipe the outside of the Air Cleaner body with a rag or cloth. Blow off excess dirt and dust with compressed air. Disassemble as follows.

1. Remove, empty, and wipe out the Air Intake Bowl Pre-cleaner.

2. Loosen the Clamp ring and remove the End Cap. Remove the Dust Cup. Wipe the End Cap and Cup completely clean. Reassemble the End Cap.

3. Remove the Element Wing Bolt, rotate the Element 180°, and remove it. Wipe the entire inside of the main Body.

**WARNING**
NEVER use gasoline or solvent to clean the Air Cleaner or its subassemblies. These are flammable and could explode or ignite, causing death or serious injury.

**Air Cleaner Element** (250 Hours)
This Element, although re-cleanable periodically, should be replaced every season:

The Air Cleaner Element may be cleaned with LOW pressure compressed air or washed with water if extremely dirty.

**NOTE**
Do NOT blow air or water from the "outside to the inside" when cleaning the Element. This can clog the element and restrict proper air mixture to the fuel system.

If contaminants in the Element contain soot or oily deposits, it may be necessary to wash the Element. Two ounces of detergent soap mixed with a gallon of water makes a good soak/wash solution. Soak for 15 minutes or more and rinse with clear water. Remove excess water with low air pressure. The Element must dry at 70°F (21°C) for a minimum of 48 hours before reusing.

**CAUTION**
NEVER use an Element that is damaged. Severe Engine wear and eventual failure can result if dirt gets through a hole in the Element.

**NOTE**
Keep spare Elements on hand to eliminate down time.

Make sure the clean Element has no holes or ruptures. Placing a bright light inside the Element and inspecting the outside will show any holes or tears. Discard the Element if holes or tears are evident.

Reassemble the Air Cleaner. Make sure the large O-Ring is in place between the End Cap and the Body.

**Engine Oil and Filter** (250 Hours)

**NOTE**
The Engine oil and Filter should be changed after the first 50 hours of Engine break-in, and every 250 hours thereafter. Use the following procedure:

1. With the Engine warm, remove the crankcase Drain Plug. Some plugs are equipped with a magnet to gather metal particles. Completely clean and flush away all metallic filings from the Plug, and re-install it.
2. The Engine Oil Filter should be changed at every oil change interval. Remove and discard the throw away Filter canister. Wipe the Gasket sealing area of the block with a clean cloth.

**NOTE**
Your Engine Oil Filters have special by-pass valves built-in. Use ONLY quality Engine replacement filters.

3. Apply a thin coat of clean oil to the new oil filter gasket. Spin tighten. Refill the crankcase with new oil. Follow specifications for type and viscosity of the replacement oil. See Section E - Fuels and Lubrication, in this manual.

4. After new oil has been added, run the Engine at idle speed until the oil pressure gauge indicates oil pressure. Check for leaks at the Filter and Drain Plug. Re-tighten only as much as necessary to eliminate leakage.

If the Engine still will NOT start, consult your nearest authorized Engine dealer.

**NOTE**
**Only** an authorized Engine dealer can perform WARRANTY Service on the Engine.

**Fuel Filter** (250 Hours)
The Fuel Filters (primary and secondary) will require occasional replacement to maintain a clean and adequate fuel flow for maximum Engine horsepower. The frequency of Filter replacement will depend on the cleanliness of available fuel, the care used in storing fuel supplies, and the conditions in which the machine is operated. Refer to the Engine manual.

**WARNING**
Do NOT service the fuel system while you are smoking, near a flame or fire, with the Engine running or while the engine is still hot.

**Fuel Bleeding Procedures** (250 Hours)
Whenever the Fuel Filter is removed and replaced, or the Engine runs out of fuel, air MUST be bled from the system. Refer to the Engine manual for instructions in proper bleeding procedures.

**Hydraulic Fluid Filters** (500 Hours or Every Season)
These Filter Elements should be replaced at or before the first 25 hours on a new machine. Thereafter, replacement should be done whenever the Dash Indicator Lamp comes on, OR 500 hours AND every season.

**CAUTION**
Escaping diesel fuel under pressure can have sufficient force to penetrate the skin. Before applying pressure to the fuel system, BE SURE all connections are tight and lines and hoses are NOT damaged. Use a piece of wood or cardboard to search for suspected leaks. If injured by escaping fuel, see a doctor familiar with this type of injury at once.

**WARNING**
NEVER service the fuel system while you are smoking, near an open flame, with the Engine running or while the engine is hot. Sparks can ignite fumes and/or spilled fuel.

**Hydraulic Fluid Replacement** (500 Hours or Every Season)
The hydraulic fluid should be replaced every 500 hours, every season or sooner if fluid becomes contaminated.

Stop the Engine and lower all attachments.

Drain the Reservoir through a line or suction through the top. Fill the Reservoir with approved hydraulic fluid ONLY to level of Lower Sight Gauge.

Start the Engine and operate all Cylinders. Raise the Boom and Tool Bar. Run the Wheels and stop Wheels.

Stop the Engine and lower the Boom and Tool Bar to the ground. Fill the reservoir, if needed, only to level of Lower Sight Gauge.

**NOTE**
Hydraulic System Schematics are included in the Parts Manual.

**Cutting Edges and Ripper Points** (As Required)
Check periodically for damage and wear. End tips are replaceable as needed.

**Exterior Cleaning** (As Required)
The machine should be washed (or steam cleaned) whenever excess dirt buildup occurs. Be sure to lubricate all grease fittings after steam cleaning.

**Fuel Injectors** (As Required)
Whenever faulty or plugged injectors are indicated, see your nearest authorized Engine dealer.

**Injection Pump Timing** (As Required)
Whenever Injection Pump timing or other pump service is indicated by abnormal Engine operation, contact your nearest Engine dealer.

## Jump Starting

**CAUTION**
The ONLY safe method for jump starting a discharged Battery is for TWO PEOPLE to carry out the following process. The second person is needed for removing the jumper cables so that the operator does NOT have to leave the Operator's Seat while the Engine is running.

**WARNING**
Do NOT jump start the Battery if it is frozen. This can cause the battery to rupture or explode.

**WARNING**
BATTERIES PRODUCE EXPLOSIVE GASES! ALWAYS keep sparks, flames, and cigarettes away from Batteries. Also, wear safety glasses to protect your eyes and avoid leaning over batteries while jump starting.

**NOTE**
BE SURE that the jumper battery is also a 12 volt D.C. Battery.

ALWAYS use the following procedure to jump start the machine. Follow these procedures in the order listed to avoid personal injury.

1. Turn the Key switches on both vehicles to OFF. Make sure that both vehicles are in Neutral and NOT touching.

2. Remove the Battery Filler Caps and make sure that electrolyte solution is up to the proper level. In addition, place a clean cloth over the uncapped filler holes to prevent the electrolyte solution from boiling over.

**CAUTION**
If acid comes in contact with your skin, eyes, or clothing, flush the area IMMEDIATELY with running water for 10 to 15 minutes.

**WARNING**
NEVER make the jumper cable connections directly to the Starter Solenoid of the Engine. Make sure all controls are in Neutral.

3. Connect one end of the positive (+) Jumper Cable to the positive (+) Battery Terminal on the disabled vehicle first. Do NOT allow the jumper's positive (+) cable clamps to touch any metal other than the positive (+) Battery terminals. Connect the other end of the positive Jumper Cable to the jumper Battery positive (+) terminal.

**WARNING**
When jump starting, NEVER connect the negative (-) Jumper Cable to the frame or Loader Boom. Doing so could present a high resistance current path resulting in poor jumper performance.

4. Connect one end of the negative (-) Jumper Cable to the jumper Battery negative (-) terminal.
5. Make final connection of the other end of the negative (-) jumper cable to the disabled vehicle's Engine Block, NOT to the Battery Negative Post. When making the connection to the Engine, keep the clamp away from the Battery, Fuel Lines, Tubing, or Moving Parts.

**NOTE**
Twist the Jumper Cable clamps a couple of times on the Battery terminals to insure a good electrical path for conducting current.

6. Start the machine. If it does NOT start immediately, start the jumper vehicle Engine to avoid excessive drain on the jumper Battery.

7. After the machine is started and running smoothly, have the second person shut the jumper vehicle OFF. Next, that person should remove the Jumper Cables from the jumper vehicle Battery, and then from the machine while making sure NOT to short the two cables together.

Allow sufficient time for the Alternator to build up a charge in the Battery before operating the machine or shutting the Engine off. BE SURE to discard the cloths and re-install the Vent Caps.

**NOTE**
If the Battery frequently becomes discharged, have the Battery checked for possible dead cell(s) or troubleshoot the entire electrical system for possible short circuits or damaged wire insulation.

**CAUTION**
SERIOUS DEATH OR INJURY COULD RESULT FROM AN EXPLOSION OF THE TIRE/RIM ASSEMLBY DUE TO THE FOLLOWING:
Improper mounting/misapplication/overloading/excessive speed/ incorrect inflation. Only specifically trained personnel should mount tires. Mount only on approved rims.

**Tire Air Pressure** (40 hours or weekly)

| | |
|---|---|
| Sandy Soil | 23 psi |
| Clay | 23 Psi |
| Gravel | |
| Rock | |
| | |
| | |

**Wheel Lug Nuts** (40 hours or weekly)
Lug nuts should be torqued to 287 foot pounds.

# MAINTENANCE LOG

**SERVICE EVERY 10 HOURS or DAILY**

| COMPONENT & SERVICE REQUIRED | PROCEDURE, SECTION, TOPIC REFERENCE |
|---|---|
| 1. Check Fuel Tank Level | Refer to Section E - Fuels & Lubrication or Engine Manual for fuel types |
| 2. Check Engine Oil Level | Refer to Section H – Service |
| 3. Check Radiator Cooling System | Refer to Section H – Service |
| 4. Check Hydraulic Oil Tank Level | Refer to Section H – Service |
| 5. Check Hydraulic System for leaks | Refer to Section H – Service |
| 6. Check Fuel Filter, Drain Water Accumulation | Refer to Section H – Service |
| 7. Lube Grease Fittings | Refer to Section E - Fuels & Lubrication for Grease Zerk Locations |
| 8. Check Backup Alarm | Refer to Section H – Service |
| 9. Check/Clean Air Pre-Cleaner | Refer to Section H – Service |
| 10. Check All Decals | Refer to Section A - Safety for Decal Locations |

**DATE SERVICE IS COMPLETED**

| | | | | | |
|---|---|---|---|---|---|
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# MAINTENANCE LOG

| SERVICE EVERY 40 HOURS or WEEKLY | |
|---|---|
| **COMPONENT & SERVICE REQUIRED** | **PROCEDURE, SECTION, TOPIC REFERENCE** |
| 1. Check Battery Fluid Level and Connections | Refer to Section H – Service |
| 2. Check Fan Belt Tension & Wear | Refer to Section H – Service |
| 3. Check Tire pressure | Refer to Section H – Service |
| 4. Check Wheel Nuts | Refer to Section H - Service |

| DATE SERVICE IS COMPLETED | | | | | |
|---|---|---|---|---|---|
| | | | | | |

# MAINTENANCE LOG

**SERVICE EVERY 250 HOURS**

| COMPONENT & SERVICE REQUIRED | PROCEDURE, SECTION, TOPIC REFERENCE |
|---|---|
| 1. Change Engine Oil and Filter | Refer to Section H – Service |
| 2. Inspect & Clean Air Cleaner Element | Refer to Section H – Service |
| 3. Replace Fuel Filters | Refer to Section H – Service |
| 4. Check Fluid in Power Wheel Hubs | Refer to Section H – Service |
| 5. Check Cylinder Attach Bolts/Pin Setscrews | Refer to Section H - Service |

**DATE SERVICE IS COMPLETED**

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |

# MAINTENANCE LOG

**SERVICE EVERY 500 HOURS or EVERY SEASON**

| COMPONENT & SERVICE REQUIRED | PROCEDURE, SECTION, TOPIC REFERENCE |
|---|---|
| 1. Change Hydraulic System Filters & Fluid | Refer to Section H – Service |
| 2. Change Air Cleaner Element | Refer to Section H – Service |

**DATE SERVICE IS COMPLETED**

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |

# MAINTENANCE LOG

**SERVICE AS REQUIRED**

| COMPONENT & SERVICE REQUIRED | PROCEDURE, SECTION, TOPIC REFERENCE |
|---|---|
| 1. Change Hydraulic Fluid | Refer to Section H – Service |
| 2. Adjust Fuel Injectors & Injection Pump Timing | Refer to Section H – Service & OEM Engine Man. |
| 3. Check/Replace Cutting Edges or Ripper Points | Refer to Section H – Service |
| 4. Clean (Wash or Steam) Exterior Surfaces | Refer to Section H - Service |

**DATE SERVICE IS COMPLETED**

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |

If the machine will NOT be operated for a long period of time, prepare and store it using the procedures as follows.

## BEFORE STORAGE

Perform the following prior to placing the machine in storage:

1. Wash off the entire machine.
2. Lubricate ALL grease fittings as described in Section C - Fuels and Lubrication, in this manual.
3. Change Engine oil as outlined in Section H - Service, in this manual.
4. Apply grease to all exposed hydraulic Cylinder Rod areas.
5. Disconnect the Battery Cable Clamps and cover the Battery or remove the Battery from the machine and store it separately.
6. If the ambient temperature (at ANY time during the storage period) is expected to drop below freezing, make sure the Engine coolant is either completely drained from the Radiator and Engine block or that the amount of anti-freeze in it is adequate to keep the coolant from freezing. Refer to the separate Engine manual provided for anti-freeze recommendations and quantities.
7. Preferably, store the machine inside where it will remain dry. If it MUST be stored outside, park it on lumber laid on flat, level ground or on a concrete slab and cover the machine with a tarp.

## DURING STORAGE

1. About once each month, connect the Battery and check ALL fluid levels to make sure they are at the proper level BEFORE starting the Engine.

**NOTE**
If the Hydraulic Cylinders are operated at this time, BE SURE to wipe the protective grease (and any adhering dirt) from the Cylinder Rods BEFORE starting the Engine. After operating, BE SURE to recoat the Cylinder Rods with grease if the machine is going to be returned to storage.

2. Start the Engine and allow it to run until it warms up, and then move the machine a short distance to help re-lubricate the internal parts. Run the Engine until the Battery has a chance to recharge and then shut it off.

## AFTER STORAGE

After removing the machine from storage and BEFORE operating it, perform the following:

1. Change Engine oil and Filter to remove condensation or other residuals.
2. Wipe off grease from Cylinder rods.
3. Lubricate ALL grease fittings.
4. Review and re-familiarize yourself with all safety precautions as outlined in Section A - Safety, in this manual.
5. Follow the starting and warm-up procedures as outlined in Section D - Operation, in this manual.


# CALDER BROTHERS CORPORATION

## (LIMITED) PRODUCT WARRANTY

Calder Brothers Corporation warrants that the Paver, Roller, Tank or Grader under this program will be free from defects in material and workmanship for a period of(12) twelve months from the date of installation. Written notice of any claimed defect must be given to Calder Brothers Corporation within the warranty period and within (30) thirty days after such defect is discovered. Liability under this warranty is limited to replacing or repairing at Calder Brothers Corporation election, any part or parts deemed defective after examination by Calder Brothers Corporation or an Authorized Service Representative via prepaid transportation for which is found to be defective, will be repaired or replaced and returned to the customer via prepaid surface transportation within the United States. Should any part be found not defective, inspection and handling may be charged to the customer by Mauldin or an Authorized Service Representative.

**EXCLUSIONS:**

This warranty does not apply to routine wearable parts of the Mauldin machine such as seals, points, plugs, hoses or similar items. This warranty does not extend to any machine or part replaced or repaired under this warranty. This warranty does not cover any repair or replacement labor or any part of parts found defective after examination by Mauldin or an Authorized Service Representative. This warranty does not apply to defects caused by casualty or unreasonable use, including faulty repairs by others and failure to provide reasonable and necessary maintenance.

THIS WARRANTY SET FORTH HEREIN IS IN LIEU OF AND EXCLUDES ANY AND ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, ARISING BY OPERATION OF LAW OR OTHERWISE, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, AND CUSTOMER WAIVES ANY OBLIGATION OF LIABILTY OF MAULDIN ARISING IN TORT OR STRICT LIABILITY IN TORT, OR FOR LOSS OR USE, REVENUE OR PROFIT WITH RESPECT TO MAULDIN MACHINE AND/OR PARTS FOR ANY LIABILTY OF CUSTOMER TO ANY THIRD PARTY, OR FOR OTHER DIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES.

**I have read and fully understand the warranty policy above.**

Customer _____ Witness _____

*CALDER BROTHERS CORPORATION*