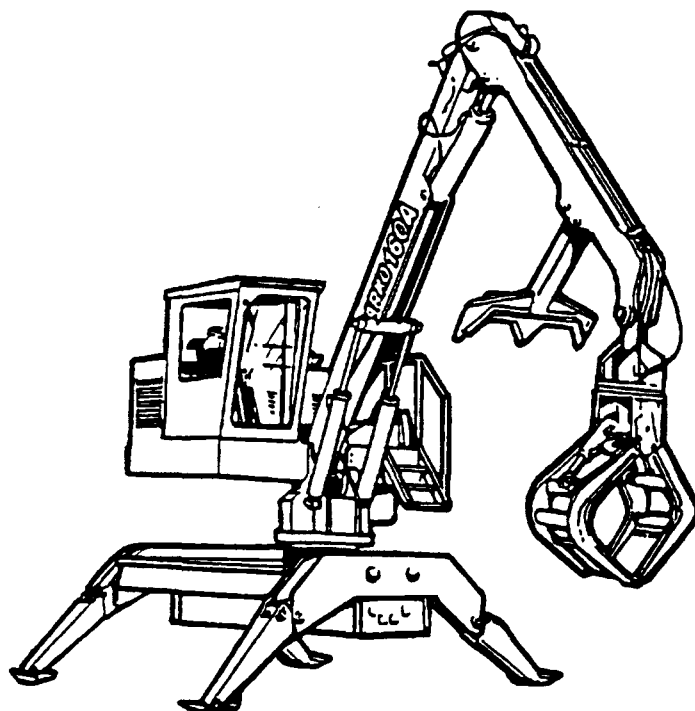




OPERATOR'S MANUAL

MODEL 160A

TRUCK MOUNT



INTRODUCTION

The Barko Loader has been designed and manufactured with high quality materials and care in workmanship. The instructions in this manual have been prepared to ensure that, when followed, the Loader will provide long and efficient service.

Read the entire manual before the initial start-up of the Loader. It is important to know the correct operating procedures of the Loader and all safety precautions to prevent the possibility of property damage and/or personal injury.

NOTE

Information in this manual is current at the time of printing. Barko Hydraulics reserves the right to make changes and improvements to its products at any time without notice or obligation.

INFORMATION

All requests for information, service or spare parts should include Loader serial number. For more information contact:

Barko Hydraulics
P.O. Box 16227
Duluth, MN 55816

Phone Number: 715-392-5641
Telex: 510-601-8066
Facsimile: 715-392-3931

REFERENCE INFORMATION

The Loader serial and model number plate is located on the platform near the head and steps.

Loader	
Model No.	_____
Serial No.	_____
Engine	
Model No.	_____
Serial No.	_____

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MODEL 160 A



WARNING

MAXIMUM HYDRAULIC PRESSURE FOR THIS MACHINE IS 2,000 psi. SETTINGS HIGHER THAN THIS MAY RESULT IN HARM TO PERSONS AND PROPERTY.

BARKO HYDRAULICS

In many instances, we have learned that the hydraulic relief valves of this equipment have been reset, increasing the maximum system pressure, and with it, the load the unit will lift before the relief valve opens. In some instances, the consequences of increasing this setting have been serious. The function of the relief valve is to provide a fuse action to protect the machine and the operator from overloading. When overloaded, different portions of the machine can become stressed to a level where parts fracture and serious physical damage to the equipment and personnel can result. **This is an extremely dangerous practice.**

Accordingly, you are advised that the setting of this valve is limited to a maximum of **2,000 psi**. Pressure settings in excess of this level render each and all Barko warranties null and void and constitute an obvious misuse and abuse of our product.

NOTE: 2000 psi IS THE SYSTEM PRESSURE. GRAPPLE PRESSURE SETTINGS MAY BE LOWER, AND MUST BE NOTED.

1. INTRODUCTION

SAFETY SUMMARY

Failure to follow the safety precautions in this manual can result in personal injury or property damage. Observe the same precautions as with any other similar machinery where carelessness in operation or maintenance is hazardous to personnel. Carefully read the safety precautions below and within this manual.

 **DANGERS** - Indicate Immediate hazards which WILL result in severe personal injury or death.

 **WARNINGS** - Indicate hazards or unsafe practices which could result in severe personal injury or death.

 **CAUTIONS** - Indicate hazards or unsafe practices which could result in damage to the machine or minor personal injury.

DANGER

Never approach power lines with any part of the machine. Current in a high voltage line may arc some distance to jump from the wire to a nearby "ground." **KEEP WELL CLEAR!**

WARNING

Lifting heavy components incorrectly can cause severe injury or machine damage.

WARNING

Always lower the boom to the ground before leaving the cab. If necessary to work on a machine with lifted boom, securely support the machine or attachment.

WARNING

Do not support the machine on cinder blocks, hollow tiles, or props that may crumble under continuous load. Do not work under a machine that is supported solely by a jack. Follow recommended procedures in this manual.

WARNING

Do not operate machine without lowering stabilizers.

WARNING

Allow only the operator on the machine. Keep riders off. Riders on machine are subject to injury such as being struck by foreign objects and being thrown off the machine. Riders also obstruct the operator's view, resulting in the machine being operated in an unsafe manner.

WARNING

Clear all persons from area of operation and machine movement.

WARNING

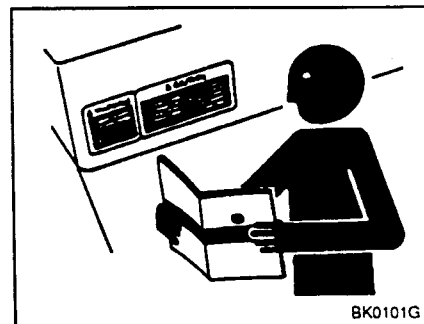
Never use a boom attachment for a work platform or personnel carrier.

WARNING

Never move loads over the heads of other persons.

WARNING

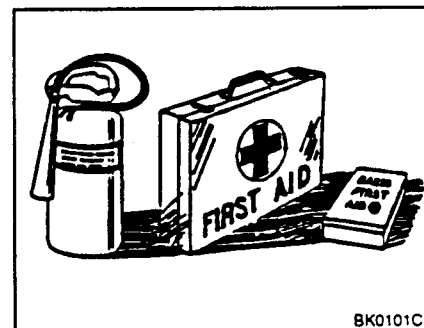
Do not jump off from the machine.



OBSERVE SAFETY



NO RIDERS



HAVE SAFETY EQUIPMENT



VG
ON

WARNING

Under no circumstances should any modifications be made to Barko machinery without factory authorization. Any modifications may void the warranty. This machine was designed to do a specific job and alterations could result in injury to operator or machine.

WARNING

Handle fuel carefully. If the engine is hot or running, do not fill the fuel tank. Do not smoke while filling fuel tank or working on fuel system.

CAUTION

Stop the machine if voltmeter exceeds normal operating limit to prevent damage to the electrical components.

CAUTION

Stop the machine immediately if the engine oil pressure is too low. Low engine oil pressure could result in damage to the machine.

CAUTION

Stop the engine immediately if water temperature exceeds normal operating limit to prevent damage to the engine from overheating.

CAUTION

Wear close-fitting clothing and safety equipment appropriate to the job.



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ING

CAUTION

Prolonged exposure to loud noise can cause impairment or loss of hearing. Wear a suitable hearing protective device such as earmuffs or earplugs to protect against objectionable or uncomfortable loud noises.

WARNING

Before servicing or shutting down the machine:

- Lower the boom to the ground.
- Stop the engine.

WARNING

Escaping fluid under pressure can penetrate the skin, causing serious injury. Relieve pressure before unhooking hydraulic or other lines. Tighten all connections before applying pressure. Keep hands and body away from pinholes and nozzles which eject fluids under high pressure. Use a piece of cardboard to search for leaks.

WARNING

If ANY fluid is injected into the skin, it must be surgically removed within a few hours by a doctor familiar with this type injury or gangrene may result.

CAUTION

If loader is not functioning properly, shut machine down and follow proper repair procedures.

 CAUTION

Make sure that all walking and climbing surfaces of the machine are free of dirt, debris, water, grease, oil, ice and snow. Don't leave loose tools and rags on the machine.

 CAUTION

Wear shoes with some kind of nonslip soles and hard toe protection.

 CAUTION

Always use both hands when climbing on or off the machine.

 WARNING

Do not tamper with any hydraulic line or component while it is pressurized.

 WARNING

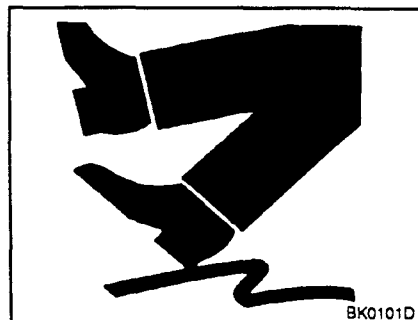
Mechanically connected controls will cause movement of components at all times - even if the pump or engine is not operating. Always be certain that the boom and grapple are properly supported or resting on firm ground before stopping the engine, to minimize the chance of accidental movements of components and injury.

 WARNING

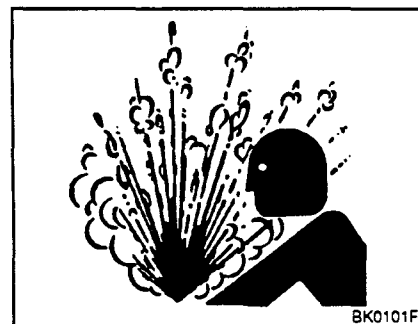
Do not weld on any structural member unless specifically authorized by Barko Hydraulics. Any unauthorized welding or welding procedures will void the warranty, and may cause structural failure.

 CAUTION

Remove or secure all personal or maintenance items such as lunch buckets, chains, shovels, etc. before moving or operating the machine.

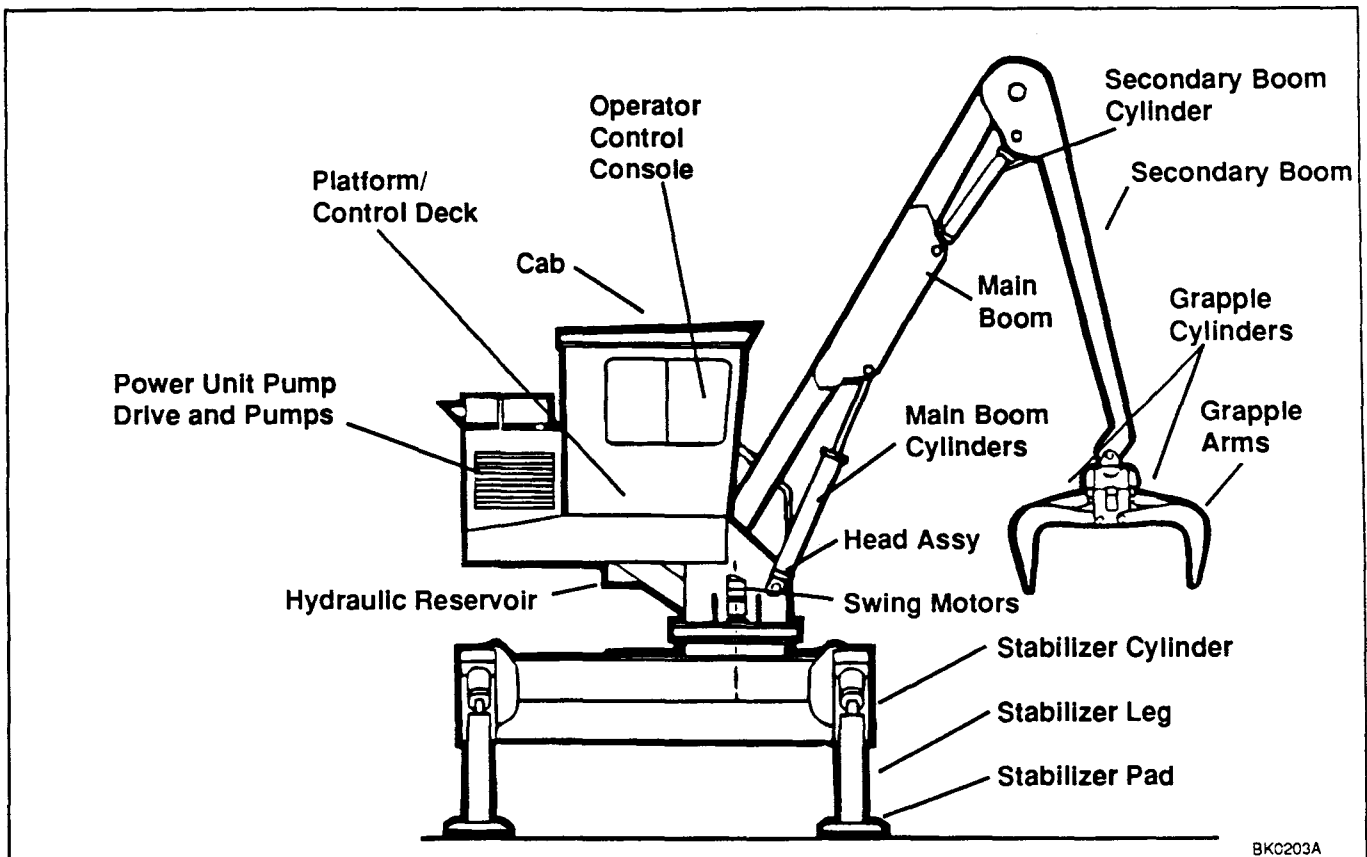


WEAR NON-SLIP SOLES



UNDER PRESSURE

MODEL DESCRIPTION



STANDARD AND OPTIONAL FEATURES

The Barko Model 160A Loader equipped with one of the optional grapples, is designed to handle logs, timber and pulpwood. This truck mounted machine can be easily relocated between operating sites.

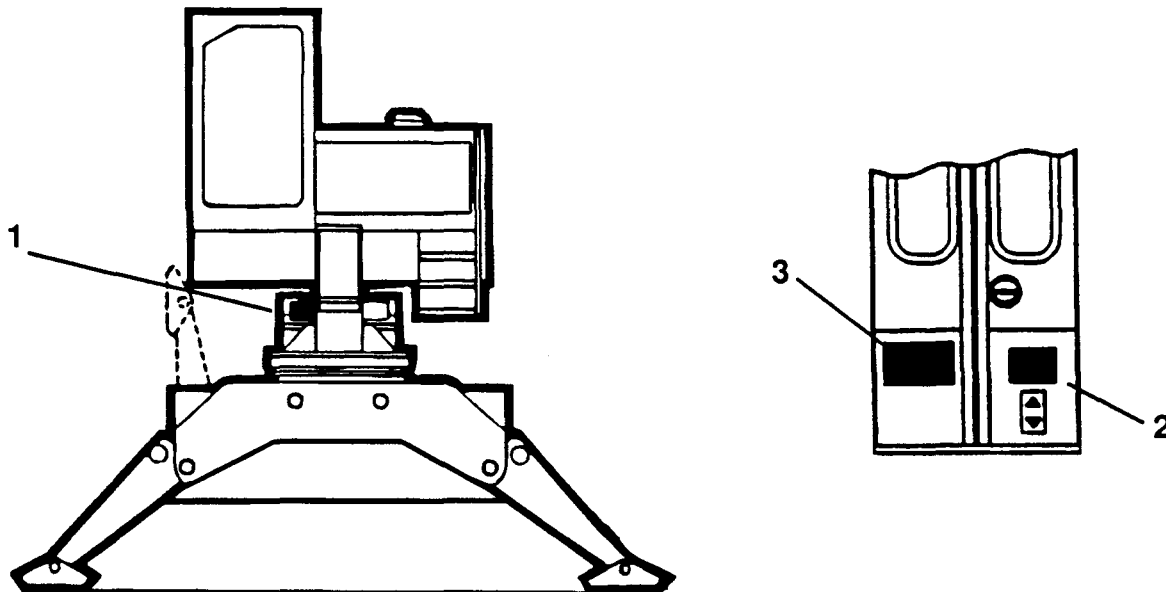
The Loader is a fully hydraulic machine. All working functions are performed by fluid power. Hydraulic cylinders raise and lower the booms; hydraulic cylinders also open and close the grapple; a hydraulic motor rotates the grapple; hydraulic motors swing the control deck and upper structure.

The diesel engine serves as the power supply. It drives the hydraulic pumps which supply pressure for the system.

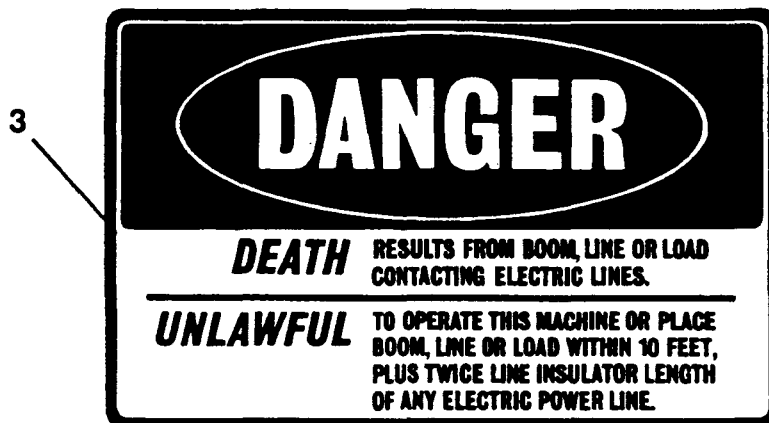
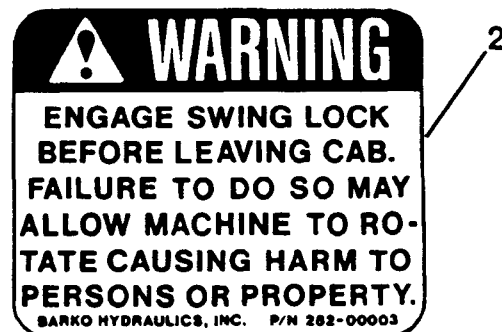
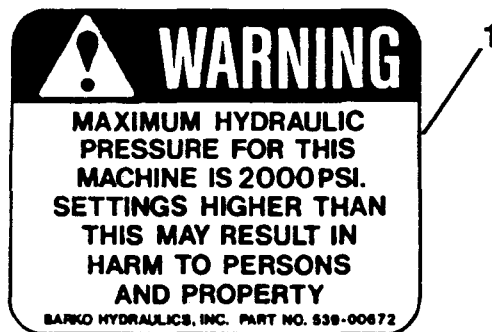
The basic features of the Loader include a knuckle boom consisting of the main and secondary booms, an optional rotating grapple, and a continuous rotating control deck including cab and boom. This Loader can be truck mounted for transit between operating sites.

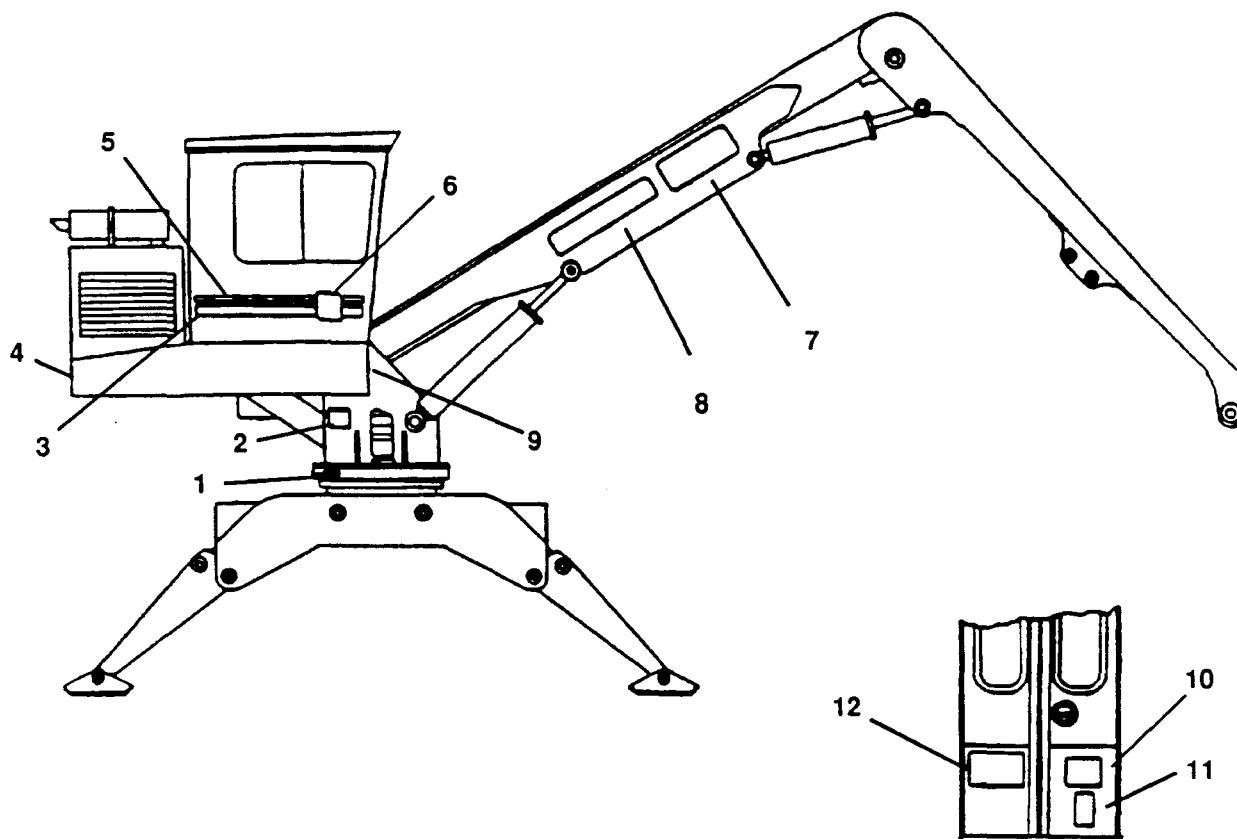
Optional Live Heel Boom, Dead Heel Boom, or Detachable Heel Bar are available also as described in the Optional Equipment Section of this manual. However, the manual deals primarily with the standard equipment.

DECAL LOCATIONS



SAFETY PRECAUTION DECALS





BK0204B

ITEM	QTY	DESCRIPTION
	1	ASSEMBLY, complete
1	1	DECAL, Bearing Torque 310 ft. lbs.
2	1	DECAL, Warning Hydraulic Pressure 2000 P.S.I.
3	40"	DECAL, striping (brown) - mounted toward front of cab on side opposite the cab door.
4	1	DECAL, "Barko" - mounted on rear of platform.
5	40"	DECAL, striping (orange) - mounted toward front of cab on side opposite the cab door.
6	1	DECAL, Barko Strong Arm - mounted toward front of cab on side opposite the cab door.
7	2	DECAL, "160A" 8" X 26-1/2" - mounted on both sides of boom.
8	2	DECAL, "Barko" - mounted on both sides of boom.
9	1	TAG, serial number - mounted between head and ladder on platform.
10	1	DECAL, Warning Swing Lock - mounted inside cab door.
11	1	DECAL, Swing Lock - mounted inside cab door.
12	1	DECAL, Danger (small) - mounted inside cab door.
	1	DECAL, Controls - mounted inside cab on top of control knobs.
	1	DECAL, Negative Ground Electrical System - mounted on battery box cover in upper left corner. Not used on electric machines.

SAFE OPERATION

SAFETY

Read and follow the instructions in this manual carefully before operation. Observe safety precautions as with any similar machinery. Be familiar with the controls, safety and instructional decals/plates located on the machine (refer to **Decal Location**).

The operator must handle the load so that maximum stability is maintained. Be familiar with the size and weight of handled materials. Know the prohibited uses or work areas for the machine. Know the hand signals used on this job and who gives them. Some general and specific safety instructions for operation are included below.

FIRE PREVENTION

This machine has several components which are at high temperatures under normal operating conditions. The engine and exhaust systems are a primary source of high temperatures. The electrical system, if damaged or incorrectly maintained, can be a source of arcs or sparks. Avoid conditions where explosive dust or gases can be ignited by arcs, sparks, or heat.

Flammable debris must be removed regularly. Excessive debris will increase the condition for a fire hazard. Clean the machine as often as necessary.

FIRE PREVENTION CHECK LIST

The following list provides data which will help to prevent fires.

- Do not use the machine in areas with explosive dust or gases. These elements can be ignited by arcs, sparks, hot components, or exhaust gases.
- Inspect the cab, engine compartment and engine cooling system every day. Clean if necessary to prevent overheating. Remove all flammable material.

- Inspect electrical wiring and connections for damage. Keep the battery terminals clean and tight. Replace or repair any damaged part.
- Inspect fuel, oil, and hydraulic tubes, hoses, and fittings for damage and leakage. Tighten or replace as necessary. Always clean fluid spills.
- Do not use ether or starting fluids on diesel engine with glow plugs. These starting aids can explode and injure bystanders.
- Clean the machine and disconnect battery cables before doing any welding. Cover rubber hoses, battery, and other flammable parts. Never ground arc welder or electrical accessories through turntable or boom bearings as arcing may occur, causing premature bearing failure. Keep a fire extinguisher nearby when welding.
- Stop the engine and allow it to cool before adding fuel. Never smoke while handling fuel or working on the fuel system.

SAFETY PRECAUTIONS



These safety instructions are unique to this machine. Read and observe the safety precautions as follows:

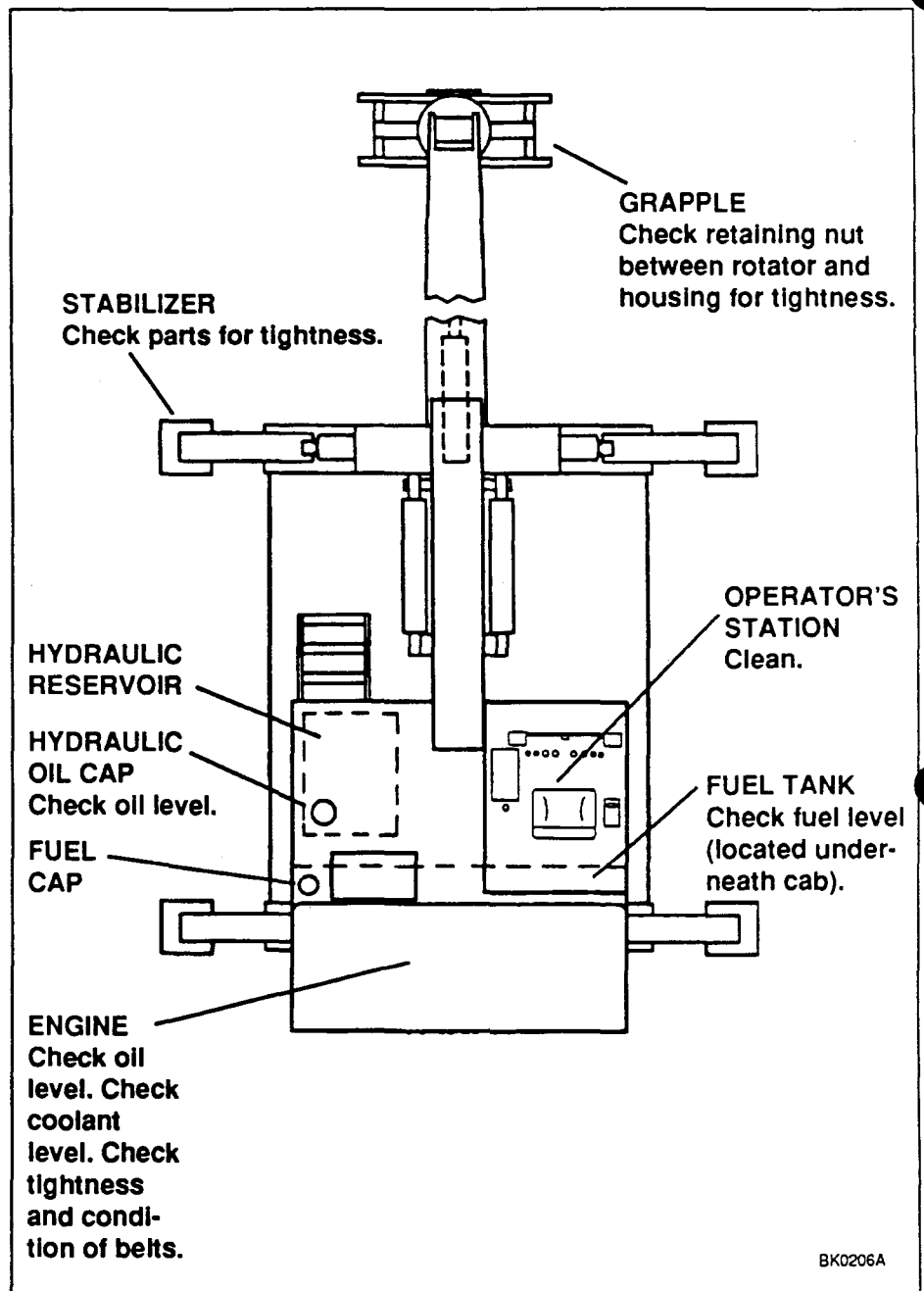
- Be extra careful when traveling on a slope. The danger of tipping is always present.
- Position the grapple as low as possible for better stability and visibility.
- Drive carefully in congested areas, over rough ground, near ditches, and on slopes.
- Be constantly aware of people and obstacles in your job area while operating. Never allow anyone to be under the boom or load.
- Never approach power lines with any part of the machine. Current in a high voltage line may arc some distance to jump from a wire to a nearby "ground." **KEEP WELL CLEAR!**
- Use care when securing, manipulating and positioning the load.
- Read your Engine Manual for complete operating instructions.

2. OPERATION

BEFORE STARTING

INSPECTION BEFORE STARTING

- Inspect machine daily.
- Understand the correct starting and stopping procedures.
- Clear all people away from the machine. Sound the horn to alert personnel in the area.
- Keep steps, floor, handrails, windows and controls free of water, dirt and grease. Clean cab glass daily.
- Ensure that all guards and screens are secure and in the proper place.
- Adjust the seat so you can work comfortably. **DO NOT** do it while the controls are energized.
- Always wear seat belt.
- **Electrical System**
Check for worn or frayed wires and loose connections.
- **Hydraulic System**
Check hoses for leaks, damage or looseness. If necessary, fill reservoir with correct grade oil and viscosity (refer to **Fuel and Lubricants**).
- Always leave the reservoir shut-off valves open except during times of repair or service. If the pump is operated while the valves are closed, it will damage the pump.
- **Fuel Tank**
If necessary, fill with correct grade fuel (refer to **Fuel and Lubricants**).
- **Boom, Grapple, Sheet Metal**
Check for loose or missing parts.

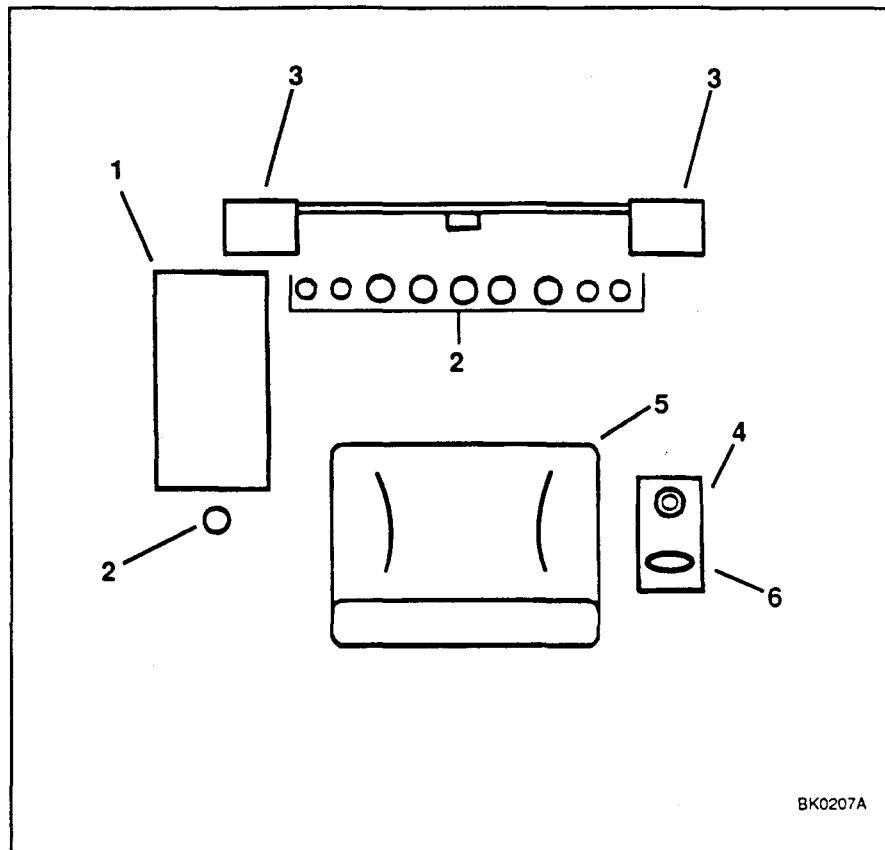


OPERATOR'S STATION

The cab contains all the necessary controls for operation. The controls are shown at the right. Know the location and function of all controls before operating the machine. The controls are identified below. Refer to **Control Functions** for more information.

CAB LAYOUT

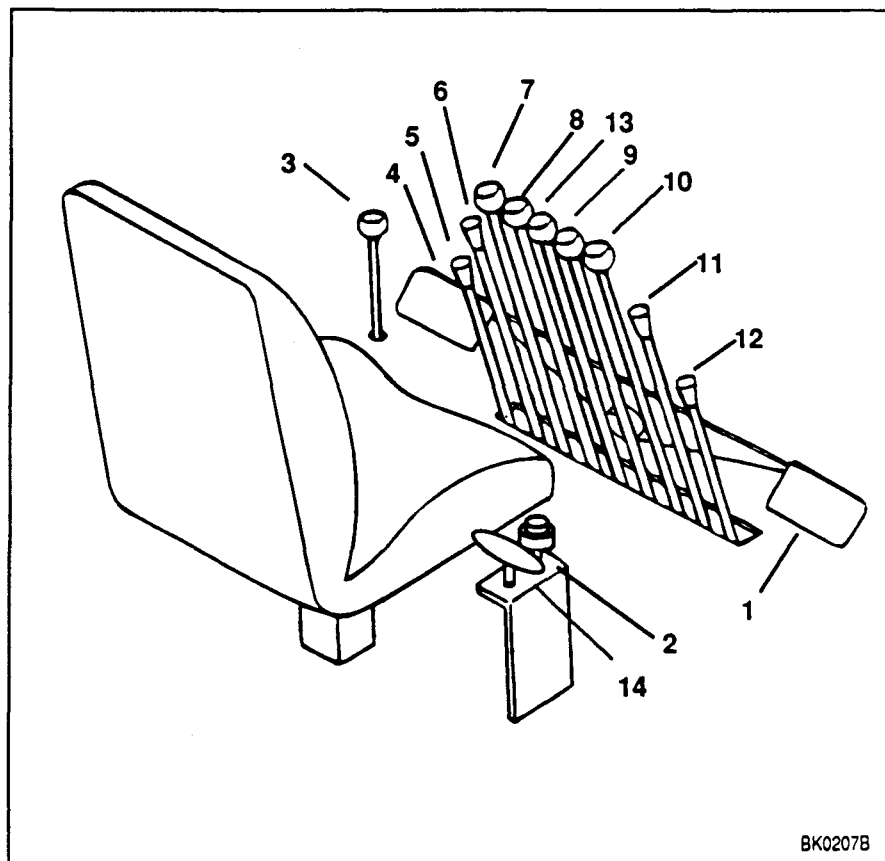
- 1 **Instrument Panel** - Contains the engine and optional controls/gauges. Refer to **Instrument Panel** for more information on these controls and gauges.
- 2 **Hand Lever Controls** - Functions which pertain to the booms, grapple, stabilizers, and swing lock.
- 3 **Foot Pedal Controls** - Operate the movement of the platform swing system.
- 4 **Throttle** - Controls engine speed.
- 5 **Operator's Seat** - Adjustable seat with seat belt.
- 6 **Engine Shut-down Handle** On Machines with GM Engines



BK0207A

STANDARD HAND AND FOOT CONTROLS

- 1 Swing - Right Foot Pedal
- 2 Throttle Handle
- 3 Swing Lock Lever
- 4 Swing - Left Foot Pedal
- 5 Left Rear Stabilizer Lever
- 6 Left Front Stabilizer Lever
- 7 Grapple Open/Close Lever
- 8 Main Boom Lift Lever
- 9 Secondary Boom Lift Lever
- 10 Grapple Rotate Lever
- 11 Right Front Stabilizer Lever
- 12 Right Rear Stabilizer Lever
- 13 Optional Live Heel Boom Lift Lever
- 14 Engine Shut-down Handle On Machines with GM Engines

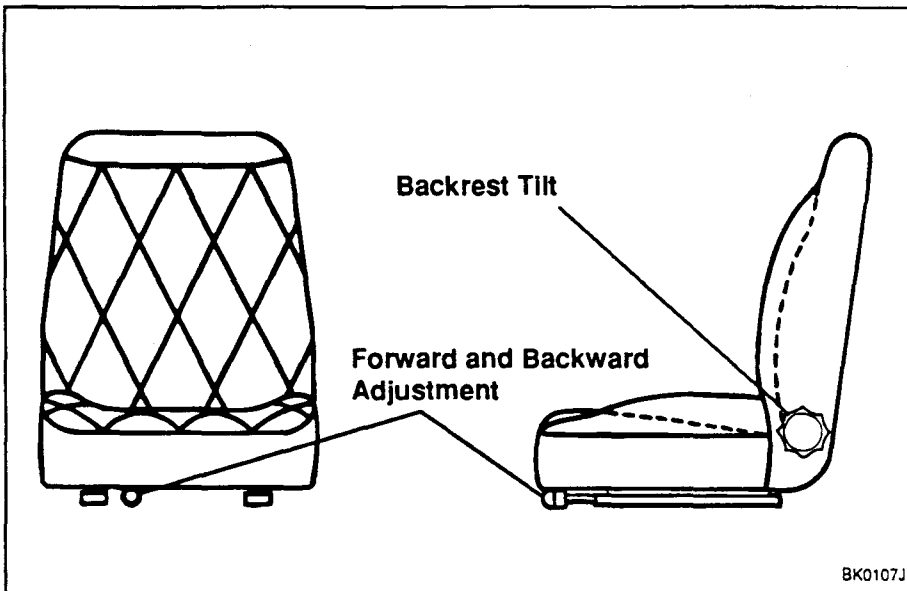


BK0207B

OPERATOR'S SEAT

Standard Controls Seat

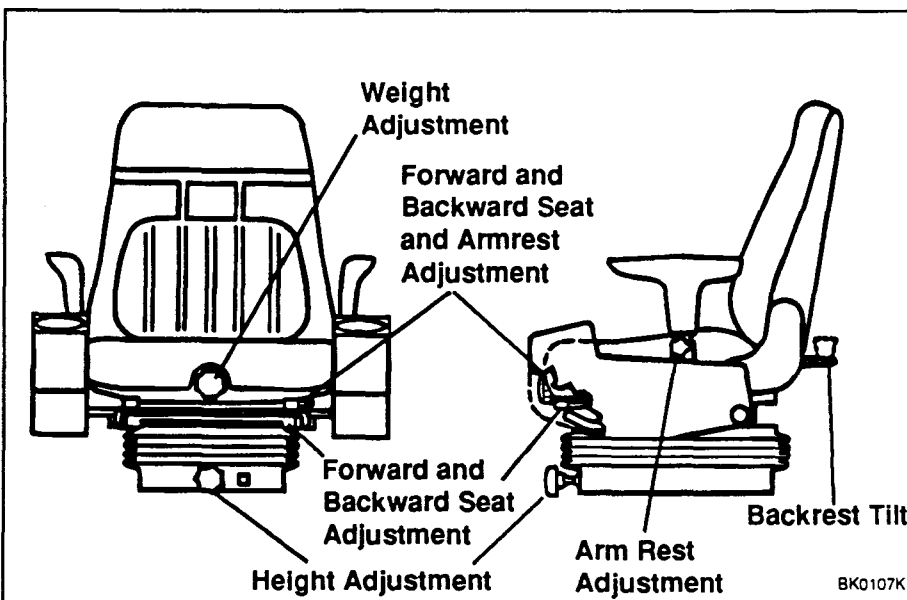
The standard Operator's Seat has two adjustments for the operator's convenience and comfort. This seat is used on machine with manual controls.

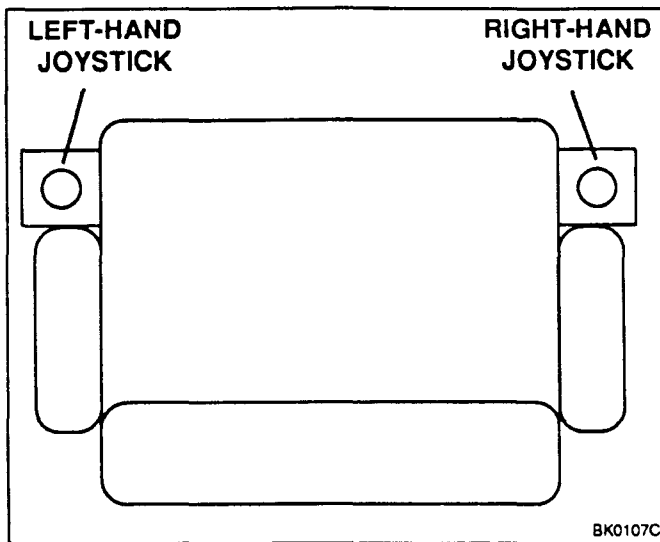


Dual Joystick Controls Seat

The Dual Joystick Controls seat has joysticks mounted ahead of each arm rest. This seat has adjustments for operator's weight, seat height, backrest tilt, seat only forward and backward, and seat with arm rests forward and back. There are also arm rest height adjustments.

This seat is standard on machines with joystick controls.

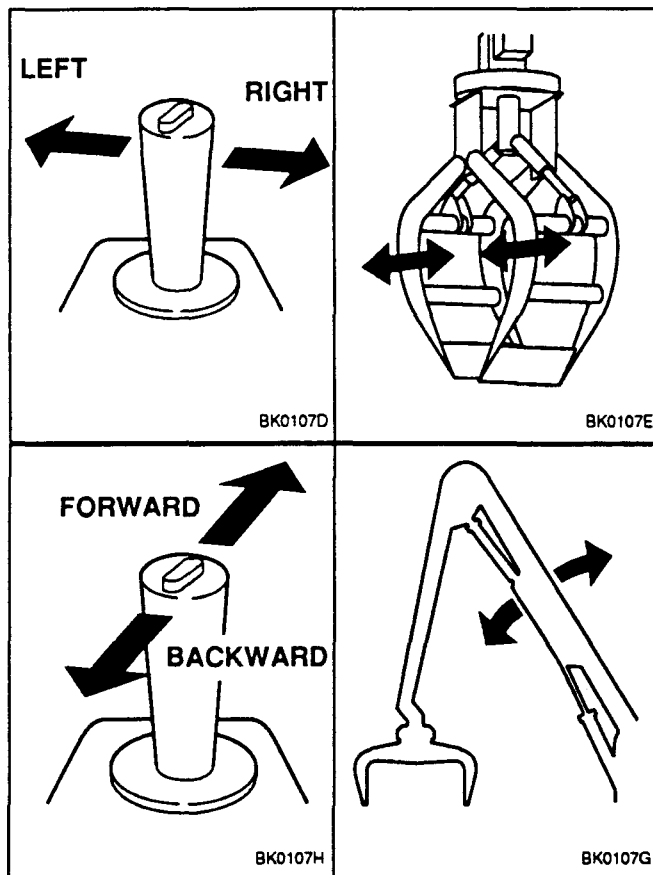




OPTIONAL JOYSTICK CONTROLS

Four functions are combined into each joystick control on a standard machine. One is located on each side of the operator's seat. The adjustable seat is a different style than on standard machines. The movement and function of the controls are described below.

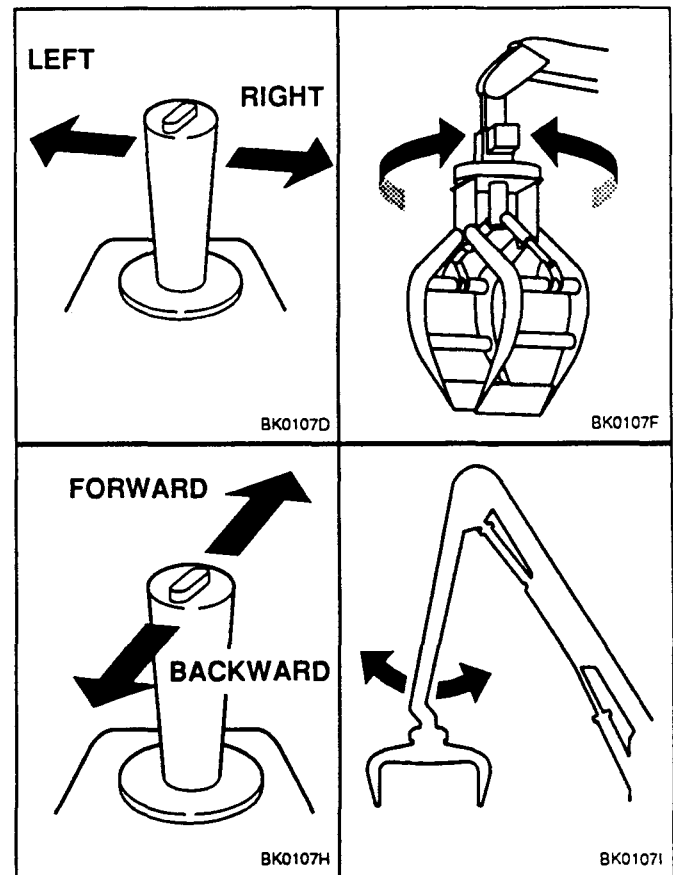
LEFT-HAND JOYSTICK



Left-Hand Joystick

Left Movement - Opens grapple.
Right Movement - Closes grapple.
Forward Movement - Main boom down.
Backward Movement - Main boom lift.

RIGHT-HAND JOYSTICK



Right-Hand Joystick

Left Movement - Rotates grapple left.
Right Movement - Rotates grapple right.
Forward Movement - Secondary boom down.
Backward Movement - Secondary boom lift.

Optional Live Heel Boom Joystick Controls

On a machine with a live heel boom, the right hand joystick is used differently than on a standard machine. The rocker switch on the joystick controls the grapple rotation, while the left to right joystick movement controls the live heel boom lift, as shown below.

NOTE

The left hand joystick remains the same as on standard machines.

Switch - Rotate grapple either clockwise or counter-clockwise.

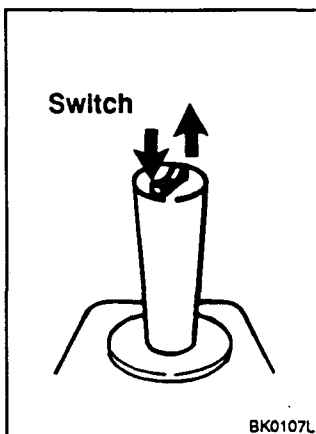
Left Movement - Live Heel Boom down.

Right Movement - Live Heel Boom lift.

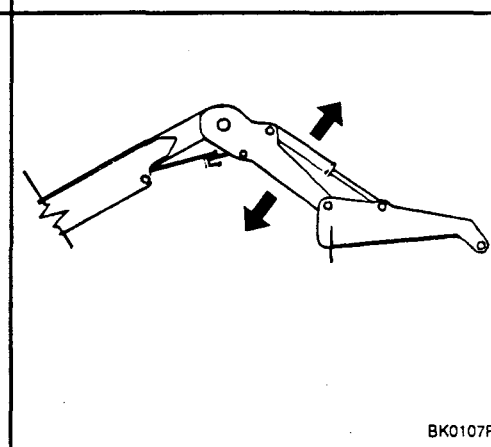
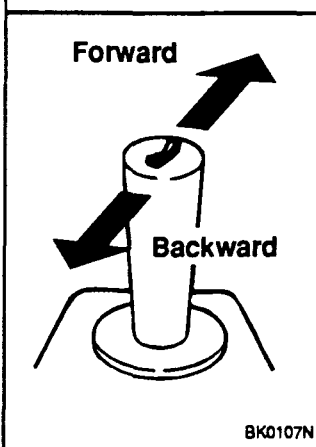
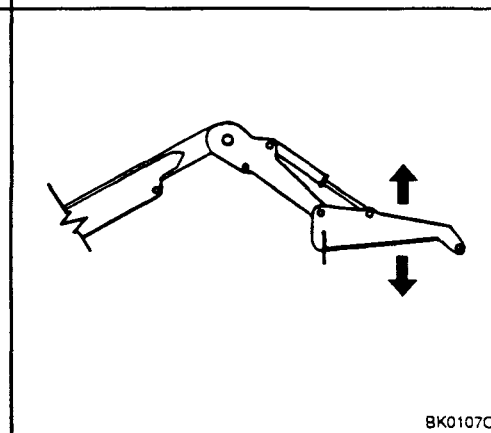
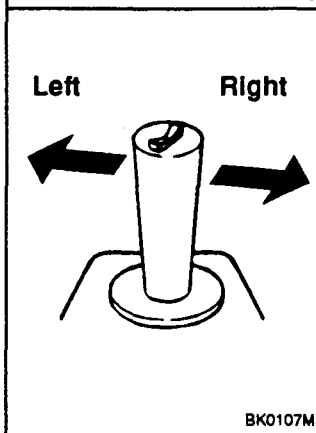
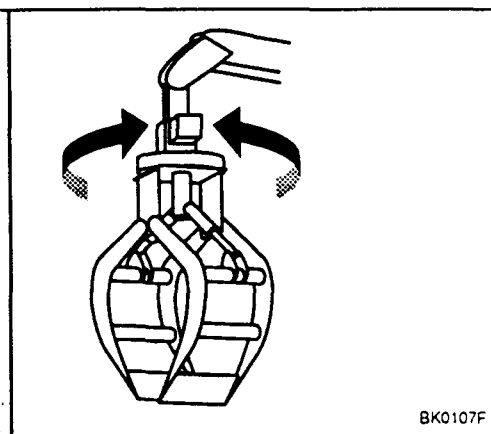
Forward Movement - Secondary Boom down.

Backward Movement - Secondary Boom lift.

RIGHT HAND JOYSTICK



LIVE HEEL APPLICATION



INSTRUMENT PANEL

This section identifies the operator controls on the Instrument Panel. Refer to **Control Functions** for more information.

NOTE

Know the location and function of all controls before operating this machine.

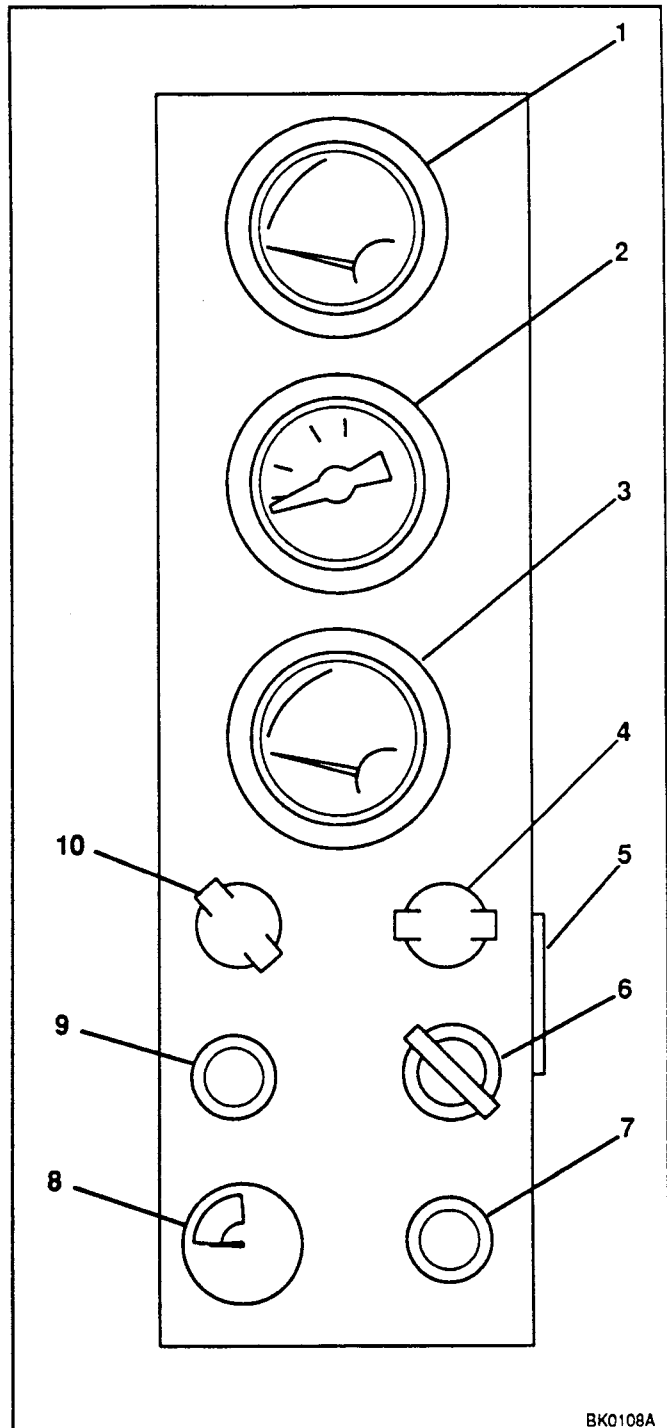
- 1 Voltage Gauge**
Indicates voltage of the electrical system. Units of measure: volts.
- 2 Oil Pressure Gauge**
Indicates oil pressure of the engine. Units of measure: psi Normal operating pressure is 40 - 60 psi at 1800 - 2200 RPM's.
- 3 Water Temperature Gauge**
Indicates water temperature of the engine cooling system. Units of measure: degrees Farenheit. Normal operating temperature is between 160° F - 195° F.
- 4 Defroster Switch**
Operates the windshield defroster. Includes an indicator light which is illuminated when defroster is operating. Turn the switch to one of the four positions. From left to right: Off, High, Medium, and Low.
- 5 Hourmeter**
Indicates the hours of operating time. Functions after the engine starts.
- 6 Ignition Key Switch**
Energizes and deenergizes the electrical system. Turn the switch to one of three positions. From left to right: Accessories Only, Ignition Off, and Ignition On. The windshield wipers and washer, cab heater, defroster, and lights are operable in Accessories Only and Ignition On positions.
- 7 Horn Switch**
Sounds the horn. Depress the pushbutton to sound the horn.
- 8 Windshield Wiper and Washer Switch**
Dual switch operates the windshield wipers and washer. Push the knob to activate the washer. Normally positioned to allow operation of the windshield wipers. Turn the switch to one of three positions. Left to right: Stop, Low Speed, and High Speed.

9 Engine Start Switch

Cranks the engine. After ignition key switch is energized, depress pushbutton momentarily to start engine.

10 Heater Switch

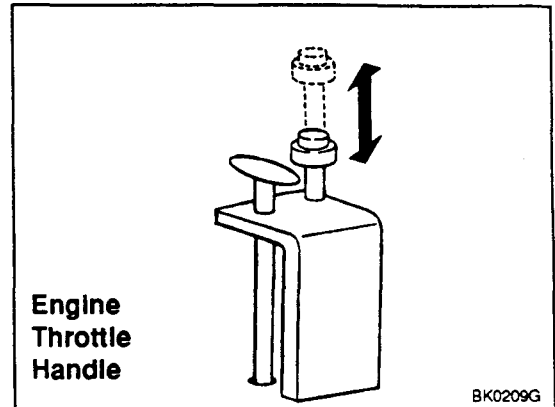
Starts and stops the heater inside the cab. Turn switch to one of four positions. Left to right: Off, High, Medium, and Low.



CONTROL FUNCTIONS

Throttle Handle

Pull handle up to increase engine speed. Push handle down to decrease engine speed.

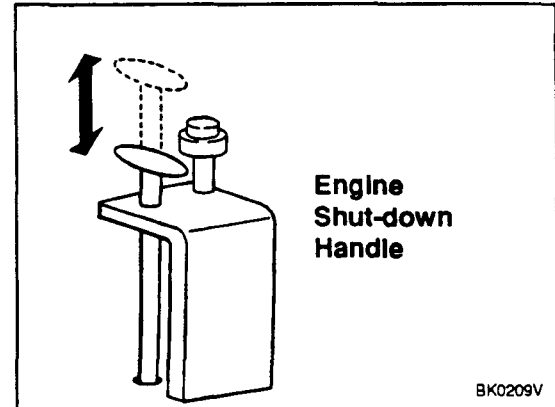


Engine Shut-down Handle

Used on machines with GM engine. Pull handle up to shut-down the engine. The handle must be down to start the engine.

NOTE

Machines with Cummins engine use the ignition key to shut-down the engine.



NOTE

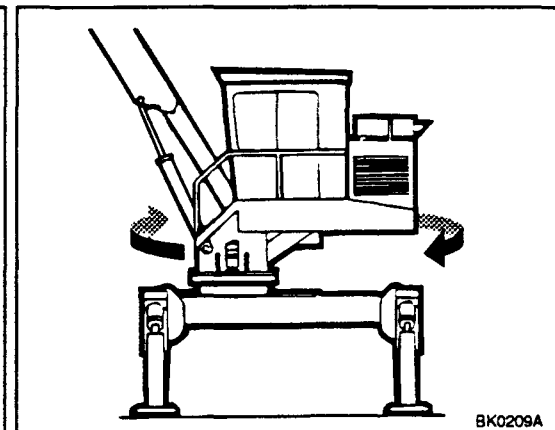
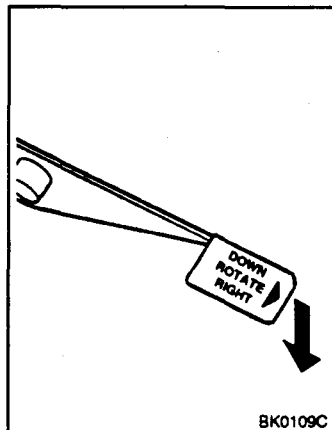
Operator must keep both feet on the swing pedals at all times while swinging.

Swing - Right Foot Pedal

Depress the pedal to swing the platform assembly to the right.

NOTE

Depressing the swing - left foot pedal to the center position will decrease or stop the swing speed.

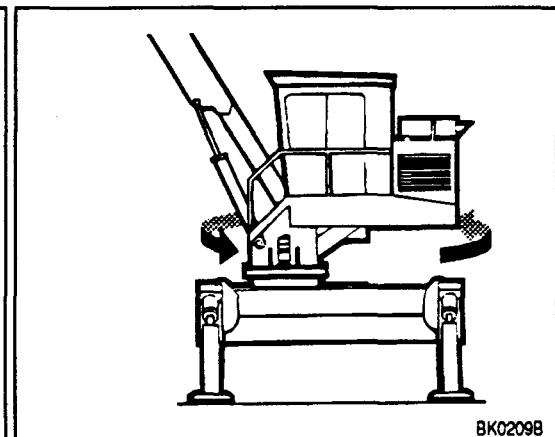
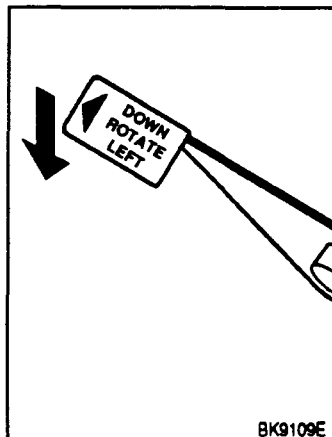


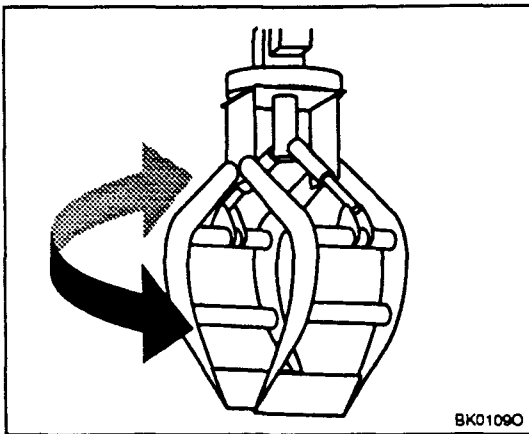
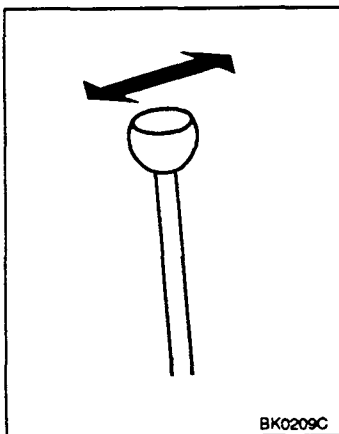
Swing - Left Foot Pedal

Depress the pedal to swing the platform assembly to the left.

NOTE

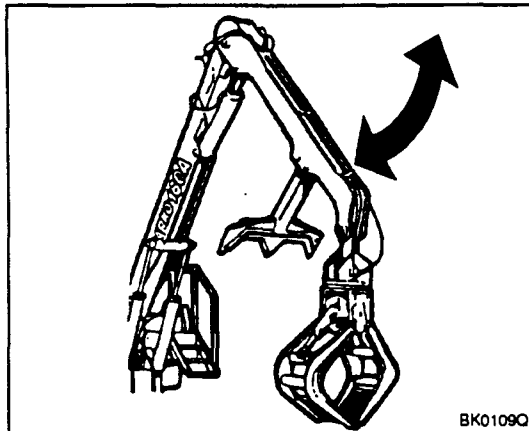
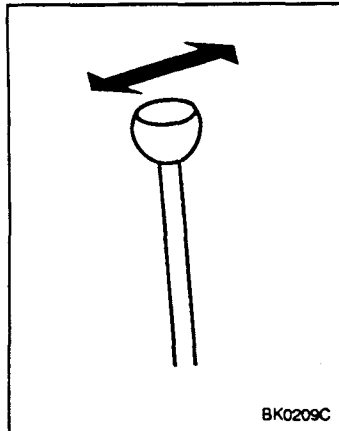
Depressing the swing - right foot pedal to the center position will decrease or stop the swing speed.





Grapple Rotate Lever

Move the lever forward to rotate the grapple counterclockwise. Move the lever backward to rotate the grapple clockwise.



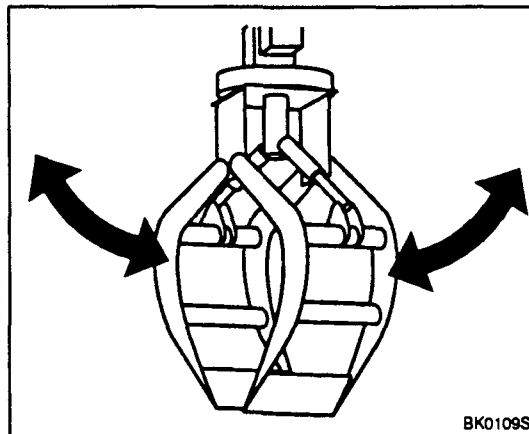
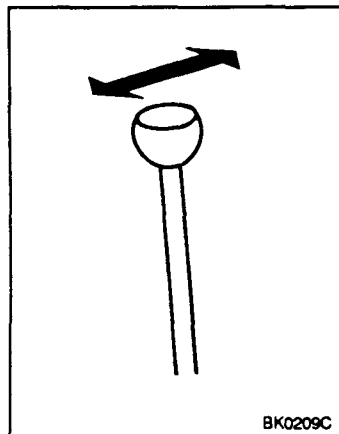
Secondary Boom Lift Lever

Push the lever to move the secondary boom in. Pull the lever to move the secondary boom out.



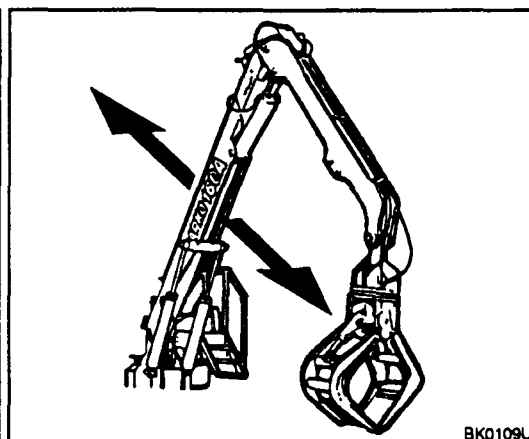
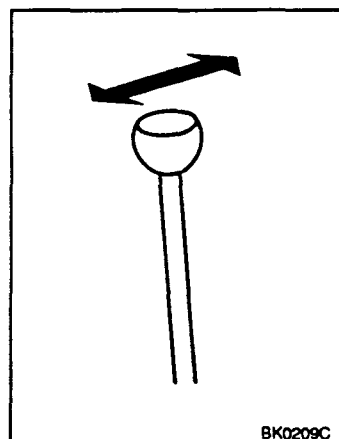
WARNING

Mechanically connected controls will cause movement of components at all times - even if the pump or engine is not operating. Always be certain that the boom and grapple are properly supported or resting on firm ground before stopping the engine, to minimize the chance of accidental movements of components and injury.



Grapple Open/Close Lever

Move the lever forward to open the grapple. Move the lever backward to close the grapple.

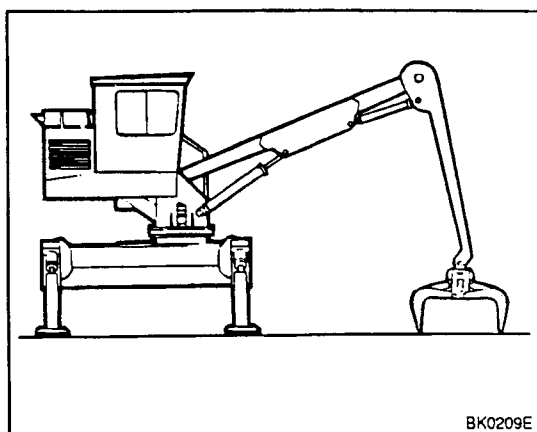
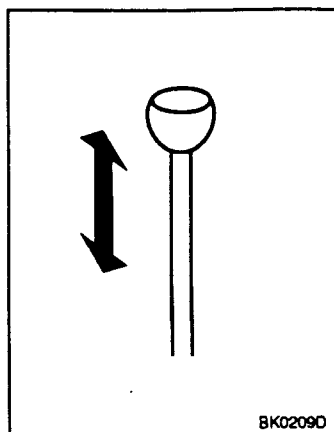


Main Boom Lift Lever

Move the lever forward to lower the main boom. Move the lever backward to raise the main boom.

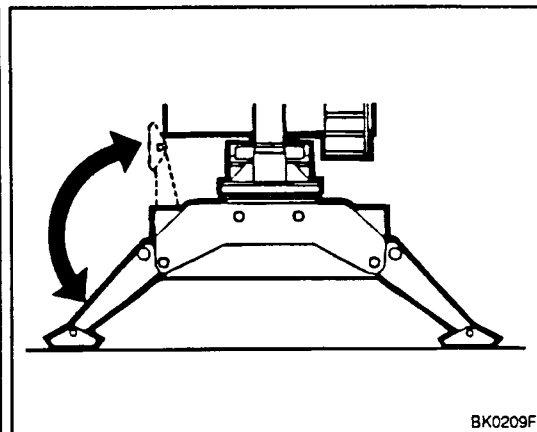
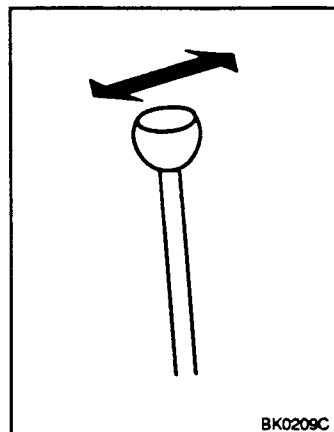
Swing Lock Lever

Pull the lever to prevent movement of the platform assembly after machine shut-down. Push the lever to allow movement of the platform assembly before operating any of the swing controls.



Stabilizer Levers

Each stabilizer lever controls movement of one stabilizer. Push the appropriate lever to lower the stabilizer. Pull the lever to raise the stabilizer. The four levers are identified in **Operator's Station**.



START-UP PROCEDURE

STARTING THE ENGINE

After performing the **Inspection Before Starting**, ensure that the throttle lever is in the "down" position.

NOTE

On machines with GM engine, be sure Engine Shut-down handle is in down position.

Turn the ignition key switch to the ON position. Then push the engine start switch to start the engine.



CAUTION

Do not crank engine more than 20 seconds. Wait ten seconds before trying again. If engine fails to start after two or three tries, return key switch to OFF.

After engine starts, idle for 20 seconds. Do not accelerate rapidly during warm-up.

Before operating the hydraulic control levers, and before applying a load, run the engine at part throttle and no load for about 5 minutes, allowing it to warm up. Check the water temperature and oil pressure gauges to make sure engine is warming up and that there is oil pressure.



CAUTION

If, after starting the engine, no oil pressure is indicated, stop the engine and check the engine's lubricating oil system.

Now pull the throttle handle until engine is at top running RPM. Check water temperature and oil pressure gauges again for the proper readings.

Operate all systems to extreme limits of travel in order to raise hydraulic pressure in each line to maximum. Check for leaks in connections. The Barko Hydraulic Loader is now ready for operation.



CAUTION

Help prevent an accident: If you leave the cab for any reason **PUT THE START KEY IN YOUR POCKET!**

COLD WEATHER START-UP

In cold weather, special precautions must be taken to ensure that the hydraulic oil supply is warmed up enough for proper circulation before the loader is put to work.

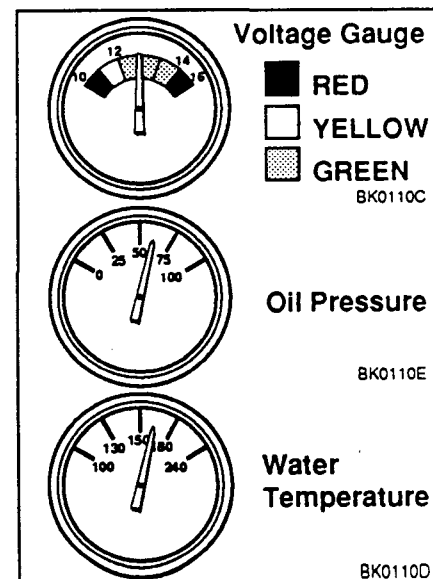
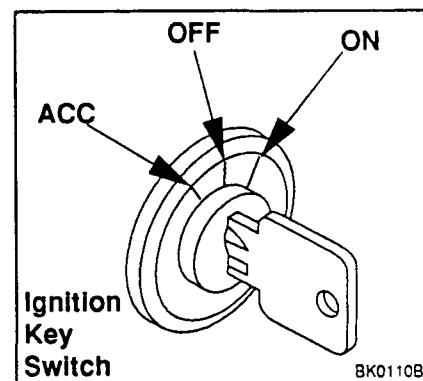
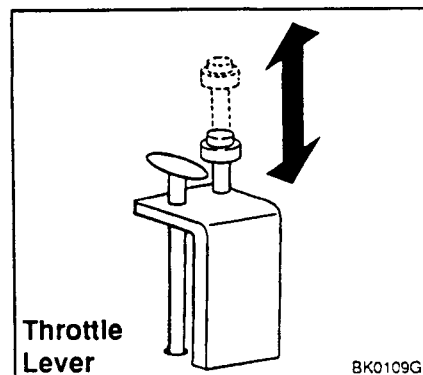
When the oil viscosity is above 4,000 SSU (SAE 10W @ 20°F, SAE 20 @ 35°F, SAE 30 @ 50°F), use extreme care in starting the machine for operation to allow warming of the hydraulic oil to a temperature suitable for proper circulation. The following method may be used to warm the oil.

When the oil viscosity is above 20,000 SSU (SAE 10 @ -5°F, SAE 20 @ 7°F), warm tank (up about 40 degrees) before starting pump, then follow the steps above.

Run pump at 1/2 speed (about 800 to 1000 engine RPM) and fully extend cylinder, thus blowing oil

through the pressure relief valve. Relieve pressure 10 seconds of each minute.

Oil passing thru the relief valve does no useful work and picks up 8-1/2 degrees of warmth per 1000 pounds of pressure drop. Follow this procedure approximately ten times. For prolonged service in sub zero temperatures, consult Barko.

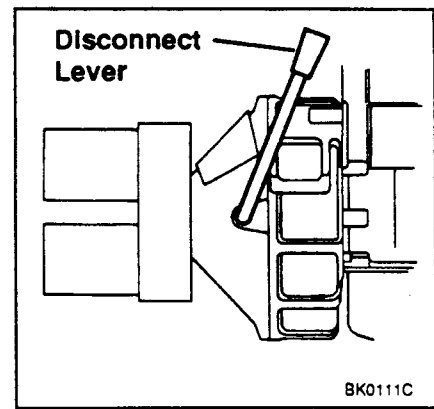


COLD WEATHER STARTUP WITH OPTIONAL DISCONNECT CLUTCH

On machines equipped with this Disconnect Clutch on the Pump Drive, disengage the clutch before starting the engine to ease the load on the starting system in cold weather.

After the engine is running and warm, re-engage the clutch to then warm the hydraulic oil also.

Move the disconnect lever toward the engine to engage the clutch. To disengage the clutch, move the lever toward the pumps.



SHUT-DOWN PROCEDURE

STOPPING AND PARKING THE MACHINE

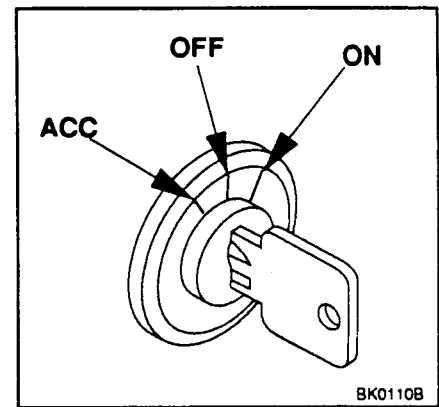
Lower the boom and the grapple down to a secure position.

Pull the swing lock lever to prevent movement of the platform assembly.

Depress pushbutton on throttle handle and push handle down to decrease engine speed.

For machines equipped with a Cummins engine:

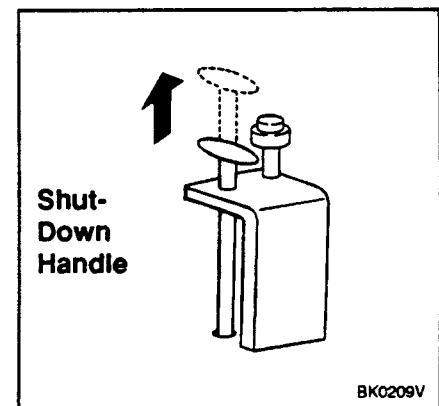
Turn ignition key switch to OFF. This will shut off electrical system and engine.



For machines equipped with a GM engine:

Pull up engine shut-down handle to stop engine. Turn ignition key switch OFF after engine stops completely. This will prevent possible charging circuit damage.

Move control levers to neutral which relieves hydraulic pressure.

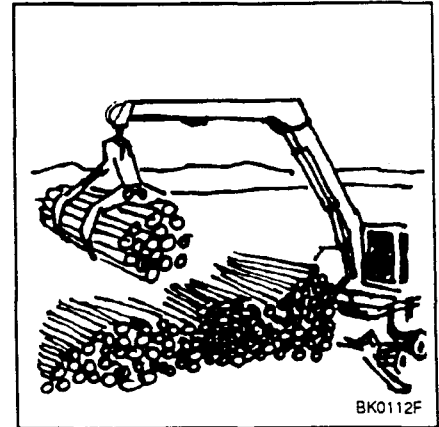


LOADING TECHNIQUES AND OPERATIONS



WORKING AND TRAVELING SAFELY

- Do not operate while there are people in the working area.
- Always remain in the operator's seat.
- Move controls slowly to get the feel of the machine.
- Unlike the directly connected mechanical levers that can cause movement of components - hydraulically operated controls (joysticks) become inert when hydraulic power is lost and the engine is shut down.
- Operate carefully:
 - where room is limited
 - where ground is rough
 - where there are fallen trees
- Stay clear of loose rocks and dangerous rock formations.



Stock Piling Logs

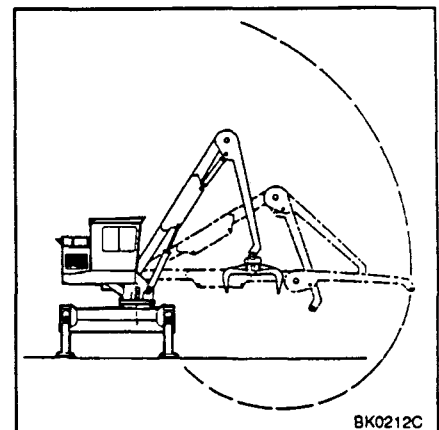
OPERATING PROCEDURES

Always allow the engine and hydraulic system to warm up before operating. Run the engine at idle for about five minutes. Then operate the hydraulic controls several times: lift and lower the booms, open and close the grapple, and swing the machine in both directions. During colder temperatures increase the warm-up time.

Run the engine at full throttle for all operations of the machine to ensure constant hydraulic pressure.

Take advantage of the easy operation of the machine. Keep the operating distance as short as possible. Keep the work area small to shorten the cycle time.

Plan ahead to place the machine, the stock pile, and loading area in position for as short a cycle as possible to increase production.



GETTING THE FEEL OF THE LOADER

Before starting the first job with a new machine, it is suggested that the operator find a good open spot on firm, level ground that's free of obstructions such as trees, buildings and other equipment - and must be free of people, too. Move the machine to this area - and spend some time just getting to know the "operating feel" of the machine.

Every operating part of any machine, has a slightly different "operating feel" - an individual machine response to the movement of the controls.

This "get acquainted" time will allow the operator to become familiar with the instrument panel, control levers, and pedals before beginning work.

The machine is built to lift multi-ton loads. The machine is exceedingly powerful. Do not operate carelessly; there is potential for personal injury and equipment damage. Be concerned about safety when preparing to operate the new Barko machine.

Ensure safe operation by inspecting the machine as stated in **Before Starting**. This inspection amounts to a common sense visual check of the machine at the beginning of every operation. Follow a preventive maintenance program; such a procedure will reduce the possibility of costly downtime. Read the **Before Starting** section of this manual and understand it.

The "fluid" nature of hydraulic power requires a special operating approach to the hydraulic loader that can be described as a smooth, even technique. The control levers should be moved in a gradual, deliberate way rather than with jerky, abrupt movements. Jerky operation: can cause damage and early wear to various parts on the loader, will overheat the hydraulic system.

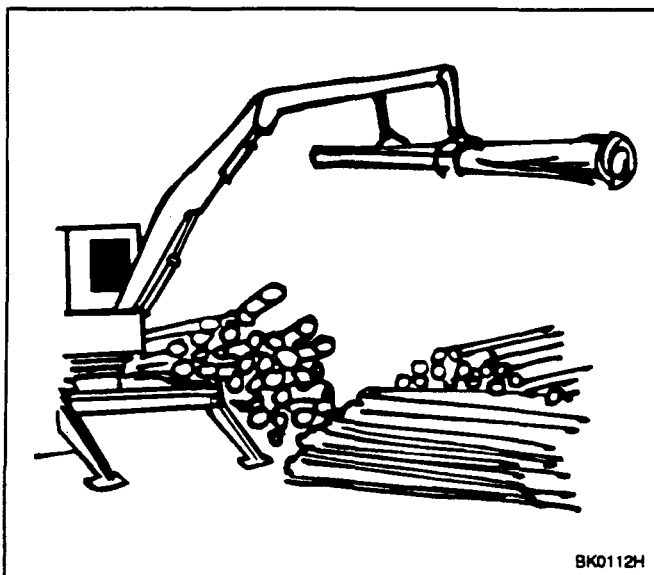
As each control lever is moved forward or backward from the center, or neutral position, the oil flows to the cylinder or motor controlling a function. The component (boom, grapple, etc.) starts to move. The component moves faster as the control lever is moved further forward or backward. Holding the lever in the forward or backward position will hold that function at a given rate of speed. To slow the movement down, gradually move the lever toward the neutral position. Movement is stopped at the neutral position. The position is maintained until the control lever is moved again.

Feathering the controls is a technique that will increase loading output and make operating the machine easier. When starting any motion of the machine, move the control slightly from neutral until it starts to move, then smoothly move the control to increase motion to desired speed. Do the same when stopping a motion.

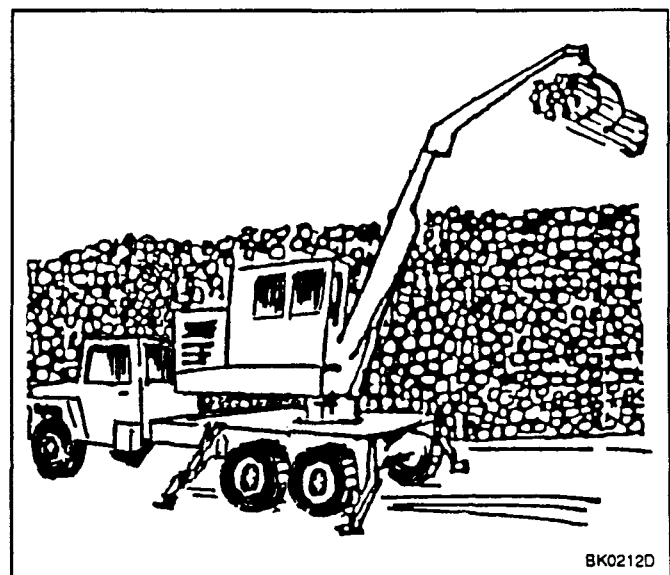
There is no fixed feathering position for any control, but the operator will discover how far to move each control for maximum effect.

After the operator is used to the responses from movement of the control levers, two or more components (such as booms and grapple) can be functional at the same time. Even slight movement of two or more controls at the same time allows oil flow to each function.

Another operating technique involves the "end of travel" of the cylinders. As a cylinder moves to the end of its travel, in the extended or retracted position, movement stops and a relief valve system diverts the oil flow back to the reservoir.



Handling Logs



Stock Piling Pulpwood

Gradually return the control lever to the neutral, or center position, whenever a cylinder approaches the end of travel. This will prevent overheating of the system's components and save fuel. Additional holding, lifting, or grabbing power will not occur by holding a control lever in the far forward or backward position.

It is better to allow the component (boom, grapple, etc.) to stop by returning the lever to neutral before the cylinder has reached the end of travel. Get to know the "end of travel" of all cylinders and use the lever to stop the function rather than waiting for the "end of cylinder travel."

Practicing these techniques will result in smooth working cycles with minimum effort. Each machine has a definite rhythm of operation. Feathering controls and overlapping machine motions are techniques to help find this rhythm and take advantage of it.

TRAVELING TO WORK SITE

When truck mounted, this machine is designed for traveling between local work sites. Whenever the machine is to be driven, secure the boom and grapple on the truck bed and set the swing lock.

Shut down the engine. Always shut down the engine even when traveling short distances.

When driving the machine on the highway, know what warnings must be placed on the machine and whether an escort is needed. Flag the grapple or furthest projection of the boom for safety.

SELECTING A WORK SITE AND PREPARING THE MACHINE FOR OPERATION



Select an operating site for the loading and unloading positions within the machine's reach. Keep in mind that short boom travel and swing are most efficient.

Do not set the stabilizers near holes, on rocky ground, or on extremely soft ground. This may cause the machine to tip, resulting in injury to personnel. If soil conditions warrant, lay down timbers for the stabilizer pads to bear against.

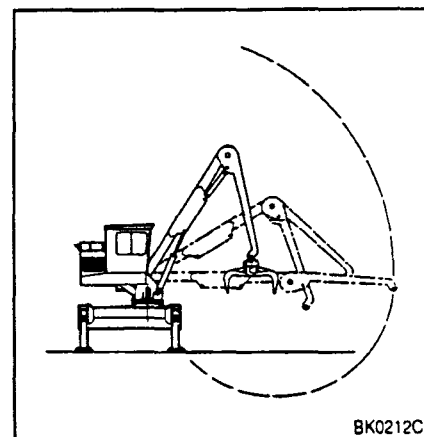
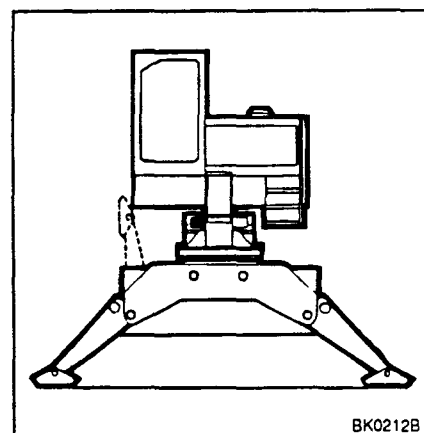
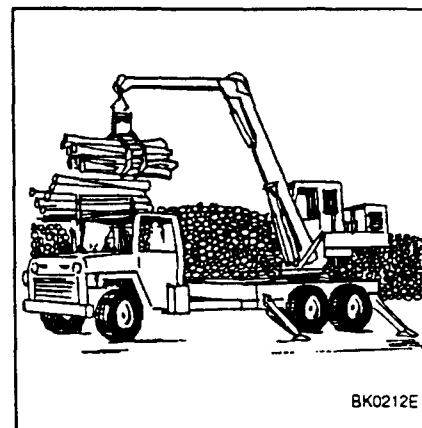
The operating site must be level with solid ground areas for the stabilizer pads.

Make a test lift before starting to operate, to check soil firmness and the loader's response.

RETRACTING THE STABILIZERS

Swing the boom over the front of the machine and engage the grapple at its transit position on the truck.

Retract stabilizers to stored position.



TRANSPORTING

DRIVING ON PUBLIC ROADS

Become familiar with public laws and ordinances affecting driving on public roads. Use "slow moving vehicle" emblems.

Secure the boom and grapple in the boom rest position on the truck bed and set the swing lock.

Shut down the engine. Always shut down the engine when transporting - even over short distances.



CAUTION

Do not allow riders on the machine during transit.

Check that the truck tires are correctly inflated.

Observe all safe driving rules including slowing down for curves and avoiding rapid steering or braking.

Obtain the necessary permits for transporting the machine. Check the route for overhead clearances, and bridges for weight limits.

Be sure the machine is within legal limits.

It is good practice when parking to set the brakes and chock the wheels.

Always tape or cap the exhaust pipe on the loader engine to prevent air from spinning the turbocharger while the vehicle is transported at highway speeds. The turbochargers depend upon engine oil pressure to lubricate the shaft bearings and may be damaged if spun dry. Be sure to remove tape after transporting or before starting engine.

3. MAINTENANCE

FUEL AND LUBRICANTS

FUEL SPECIFICATIONS

Use Grade No. 2-D fuel above 40° F.

Use Grade No. 1-D fuel below 40° F.

Use Grade No. 1-D fuel for all air temperatures at altitudes above 5,000 ft.

NOTE

Change the engine oil at one-half the normal interval if fuel sulfur content exceeds 0.5%.

Use fuel with less than 1.0% sulfur. Use fuel with less than 0.5% sulfur if possible.

Sediment and water should not exceed 0.10% for maximum filter life.

The cetane number should be 40 minimum. A fuel with a higher cetane number may be required if operating the machine where air temperatures are normally low or where altitudes are high.

In cold weather operation, the cloud point should be 10° F below lowest normal air temperatures.

FUEL STORAGE

NOTE

Diesel fuels stored for a long time may form gum or bacteria and plug filters.

Keep fuel in a clean container and store in a protected area. Water and sediment must be removed before fuel gets to the engine. Do not use deicers to remove water from fuel. Do not depend on fuel filters to remove water.

NOTE

Keep all dirt, scale, water or other foreign material out of fuel.

Store fuel drums on sides with plug up.

ENGINE OIL

Refer to the Cummins or GM service book supplied with the machine.

HYDRAULIC OIL

The following lists some features to look for in an oil. The hydraulic oil for the machine should feature:

- Rust resistant additives to prevent rust formation from moisture condensation.
- Anti-foam agents to break up air bubbles and prevent "foaming" that causes sluggish and erratic operation.
- High stability to resist oxidation and prevent varnish formation and deposits that foul systems.
- Anti-wear properties to prevent scuffing and excessive wear at high speeds and high pressure operation.
- Good viscosity index for easy flow at low temperatures without thinning out at high temperatures after hours of use.

For operation in different temperatures, refer to the following chart for selection of hydraulic oil.

ISO Viscosity Grade	Average Ambient Temp.	System Operating Temp.
46	32° F TO 45° F	150° F MAX.
68	ABOVE 45° F	190° F MAX.

Below 32° F ambient, consult factory.

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GREASE

Use grease shown on chart on the following page, depending on the expected air temperature range.

Greases Recommended Are:

SAE Multipurpose Grease with Extreme Pressure (EP) performance and containing 3 to 5% molybdenum disulfide.

SAE multipurpose EP grease.

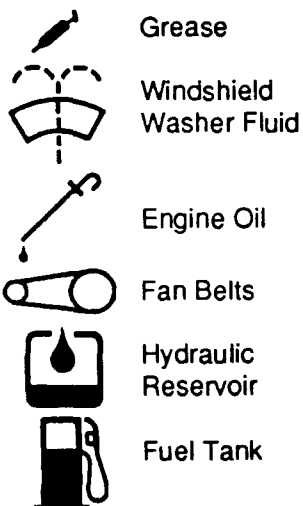
ALTERNATIVE LUBRICANTS

Conditions in certain geographical areas may require special lubricants and lubrication practices which do not appear in this manual.

LUBRICANT STORAGE

The machine can operate at top efficiency only if clean lubricants are used. Use a clean container to handle all lubricants. Store them in an area protected from dust, moisture, and other contamination. Store drums on sides.

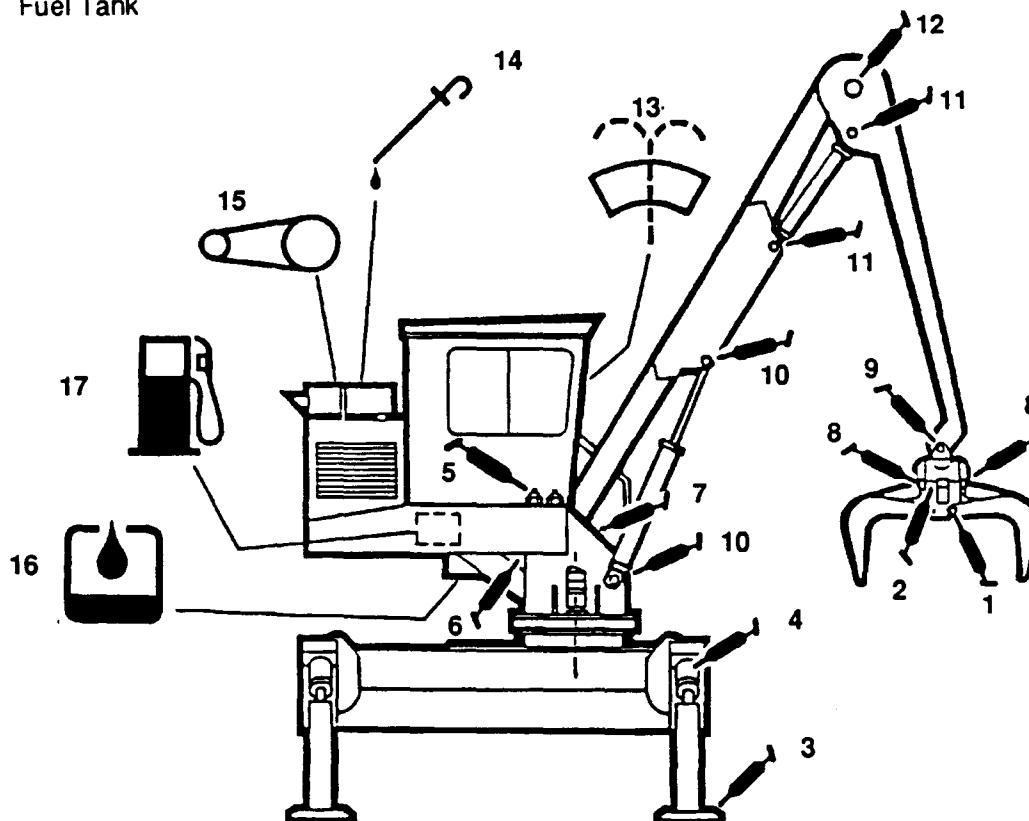
SERVICING AND LUBRICATION



- 1 Grapple Arms
- 2 Grapple Head
- 3 Stabilizer Legs
- 4 Stabilizer Cylinder
- *5 Swing Bearings & Pinion
- 6 Control Levers
- 7 Main Boom Pivot
- 8 Grapple Cylinders
- 9 Grapple Hanger(2 fittings)
- 10 Main Boom Cylinder
- 11 Secondary Boom Cylinder
- **12 Secondary Boom Pivot
- 13 Windshield Washer Reservoir
- 14 Engine Oil Dipstick
- 15 Fan Belts
- 16 Hydraulic Oil Reservoir
- 17 Fuel Tank

* See Turntable Bearing Lubrication (next page)

** See Optional Live Heel Boom Lubrication (next page)



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GREASE

	AIR TEMPERATURE RANGE										
Fahrenheit (F)	-67	-40	-22	-4	14	32	50	68	86	104	122
Celsius (C)	-55	-40	-30	-20	-10	0	10	20	30	40	50
						NLGI NO.2					
						HIGH TEMP./EP					
					NLGI 0 OR 1						
ARCTIC GREASE											

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TURNTABLE BEARING LUBRICATION

Perform the periodic service on the machine's turntable bearings to ensure long bearing life. This servicing includes regular lubrication and torque checks of the bearing bolts. Turntable bearings must be greased daily. Use a grease with lithium base, E.P. additives, and rust inhibitors.

- Above 32° F - Use #2 grease.
- Below 32° F - Use #1 grease.

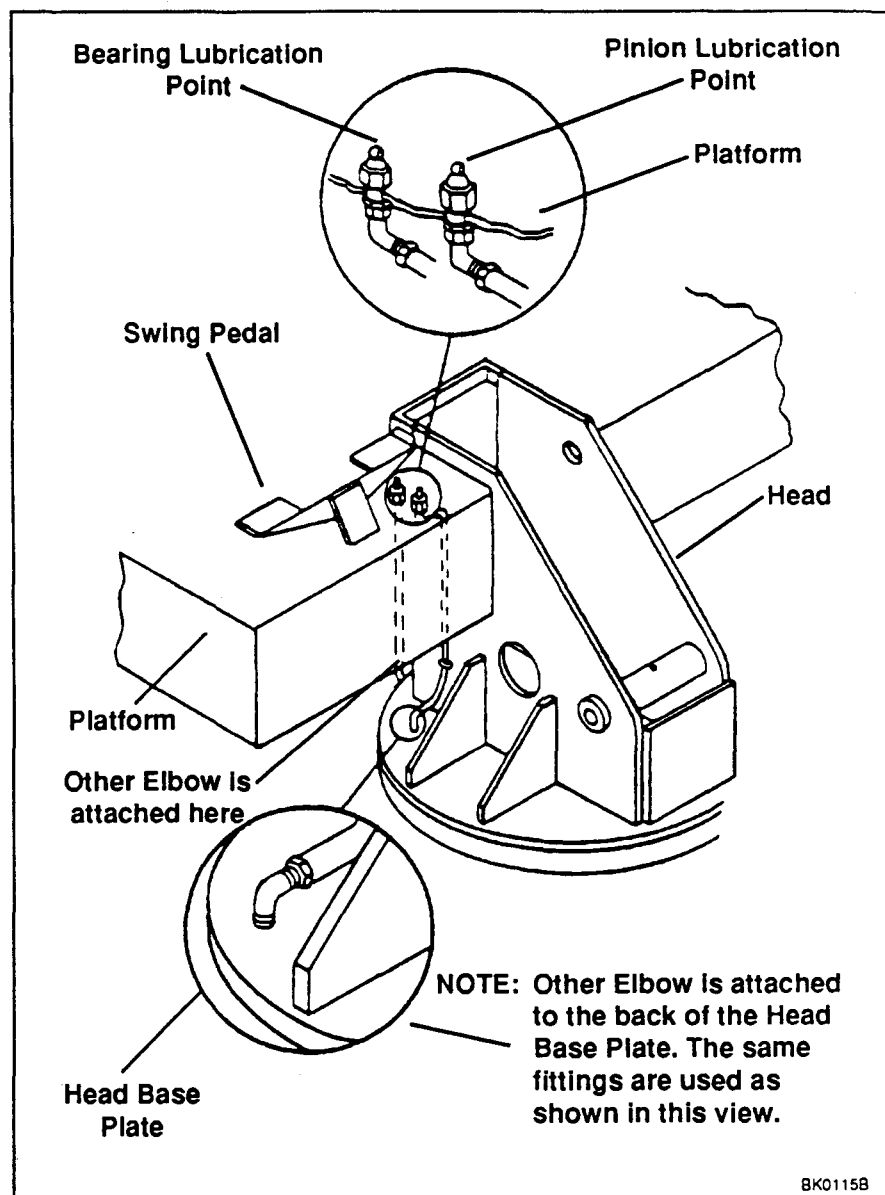
These lube points, (pinion and bearings) can be greased from the platform. High pressure grease guns are not recommended for the turntable bearing, as they may damage the seal. Use of hand grease gun is suggested.

Rotate the machine as the grease is being applied for complete distribution of the grease throughout the bearings. Rotate the machine at least two complete revolutions for each fitting. Three shots of grease per fitting will be sufficient, on a daily basis.



CAUTION

Have an operator at the controls to rotate the machine during greasing operations.



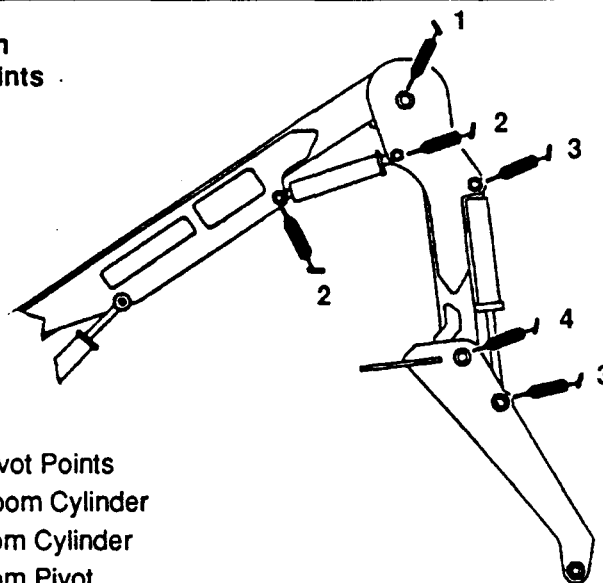
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GRAPPLE LUBRICATION

Use a multi-purpose grease for all grapple lubricating. Lubricate grapple cylinders at grease fittings on each end. Lubricate grapple hanger at grease fittings also. The grapple head must be lubricated at the grease fitting, which is in varying locations on the head depending on the grapple model. (See Parts Manual.) The grapple arms also have grease fittings for lubrication.

Live Heel Boom Lubrication Points



- 1 Secondary Pivot Points
- 2 Secondary Boom Cylinder
- 3 Live Heel Boom Cylinder
- 4 Live Heel Boom Pivot

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PREVENTATIVE MAINTENANCE



SAFETY WHILE SERVICING

- Always lower the boom to the ground before working on the machine. If necessary to work on a machine with lifted boom, securely support the boom or attachment.
- Do not support the machine on cinder blocks, hollow tiles, or props that may crumble under a load. Do not work under the machine that is supported solely by a jack.
- Handle fuel carefully. Do not smoke while filling the fuel tank or working on the fuel system.
- Ensure that all walking and climbing surfaces of the machine are free of dirt, debris, water, grease, oil ice, and snow. Don't leave loose tools and rags on the machine.
- Do not exceed 15 psi nozzle pressure when drying parts with compressed air. Do not direct compressed air against human skin. Serious injury could result.

PERIODIC MAINTENANCE

Lubricate and make service checks at intervals shown on Service Schedule.

Check the hour meter regularly to determine when the machine needs periodic maintenance. Use the intervals on the Service Schedule when operating in normal conditions. Service the machine at shorter intervals when operating in very hot, cold, dusty, or humid environments.

Refer to **Fuel and Lubricants** whenever replacing oils, filling fuel tank, or applying grease.

GENERAL SERVICE SCHEDULE

Service Required	8 Hrs. Daily	50 Hrs. Weekly	100 Hrs. Monthly	400 Hrs. 2 Months	1000 Hrs. 6 Months
Hydraulic oil reservoir. Check level and quality of oil.					
Fuel tank. Check level and fill if necessary.					
Engine crankcase oil. Check level.					
Engine radiator. Check coolant level and fill if necessary. Inspect exterior for dirt and debris and clean if necessary.					
Hoses, connections, cylinders. Inspect for leaks and damage. Tighten, repair, or replace parts if necessary.					
Fan and drive belts. Check for looseness and wear. Tighten or replace if necessary.					
Operator's platform. Clean area of debris, tools, rags, water, ice, and snow.					
Boom, stabilizer, cylinder and grapple fittings. Lubricate all fittings with multi-purpose grease.					
Turntable bearings. Lubricate.					

GENERAL SERVICE SCHEDULE - continued

Service Required	8 Hrs. Daily	50 Hrs. Weekly	100 Hrs. Monthly	400 Hrs. 2 Months	1000 Hrs. 6 Months
Hydraulic oil reservoir breather. Clean with fuel oil or nonflammable solvent.					
Nuts and bolts. Inspect for tightness and/or damage on boom, grapple, and head assembly.					
Engine air filter. Clean or replace.					
Hand lever linkage. Lubricate grease fittings.					
Battery. Clean and coat posts with grease. Check electrolyte level and fill if necessary.					
Engine shrouding. Clean.					
Head assembly bolts. Check looseness and torque if necessary.					
Hydraulic oil cooler. Inspect and clean fins.					
Engine oil filter. Replace.					
Hydraulic oil collector. Check tightness of attaching mounts.					
*Hydraulic oil filter. Replace.		*			
Pump drive. Check fluid level. Replace fluid with 80-90 gear lube.					
Hydraulic reservoir. Replace oil and clean suction screens.					
Entire loader. Steam clean. Inspect for stress, wear, cracks, damage, and loose parts.					

* On new machines the initial change must be done at 50 hours; and at 400 hours thereafter.

TORQUE SPECIFICATIONS

	DIA.	DRY		*LUBRICATED	
		COARSE	FINE	COARSE	FINE
 GRADE 5 SAE GRADE 5 RECOMMENDED TORQUE FOOT POUNDS	1/4	9	10	5	6
	5/16	17	20	10	12
	3/8	31	35	19	21
	7/16	50	55	30	33
	1/2	75	85	45	51
	9/16	110	120	66	72
	5/8	150	170	90	100
	3/4	265	300	160	180
	7/8	400	435	240	260
	1	600	650	360	390
	1-1/8	800	900	480	540
	1-1/4	1120	1240	670	745
	1-3/8	1470	1670	880	1000
	1-1/2	1950	2200	1170	1320

NOTE

- * This is lubed torque, lubricate with anti-seize compound (part no. 514-00700).

	DIA.	DRY		*LUBRICATED	
		COARSE	FINE	COARSE	FINE
 GRADE 8 SAE GRADE 8 RECOMMENDED TORQUE FOOT POUNDS	1/4	12	14	7	9
	5/16	25	27	15	17
	3/8	44	49	26	30
	7/16	70	78	42	47
	1/2	107	120	64	72
	9/16	154	171	92	102
	5/8	212	240	127	144
	3/4	376	420	226	252
	7/8	606	668	364	400
	1	909	995	545	597
	1-1/8	1288	1444	773	866
	1-1/4	1817	2012	1090	1207
	1-3/8	2382	2712	1430	1627
	1-1/2	3161	3557	1897	2134

NOTE

GRADE 9 BOLTS MUST BE USED WITH GRADE 9 WASHERS.

	DIA.	DRY		*LUBRICATED	
		COARSE	FINE	COARSE	FINE
 GRADE 9 (MIN. 8 RADIAL MARKS ON HEAD) GRADE 9 (BOW- MALLOY) RECOMMENDED TORQUE FOOT POUNDS	1/4	17	19	10	12
	5/16	34	37	20	22
	3/8	60	68	36	41
	7/16	96	108	58	65
	1/2	145	165	87	100
	9/16	210	235	125	140
	5/8	290	330	175	200
	3/4	515	575	310	345
	7/8	830	980	500	590
	1	1250	1350	750	810
	1-1/8	1750	1950	1050	1170
	1-1/4	2500	2750	1500	1650
	1-3/8	3250	3700	1950	2220
	1-1/2	4350	4850	2600	2900

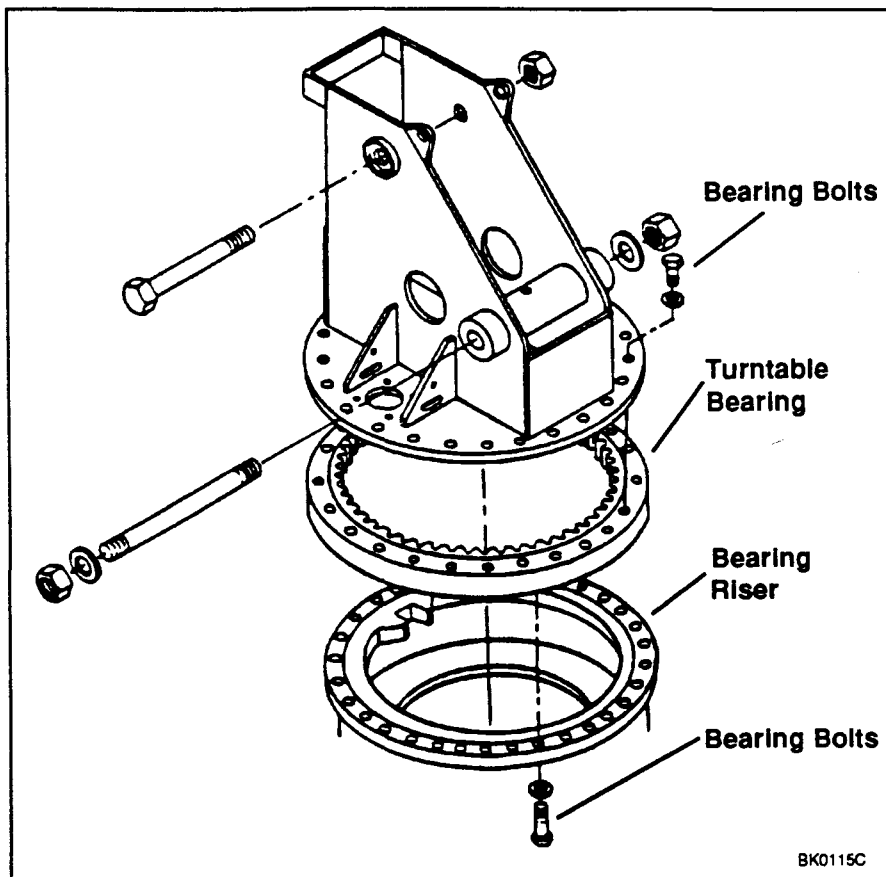
TORQUE SPECIFICATIONS OF TURNTABLE BEARING BOLTS

The turntable bearing bolts should be checked and retorqued, if necessary, every 100 hours, or every two weeks. Torque to 310 foot pounds of lubed torque (use anti-seize compound, part no. 514-00700).

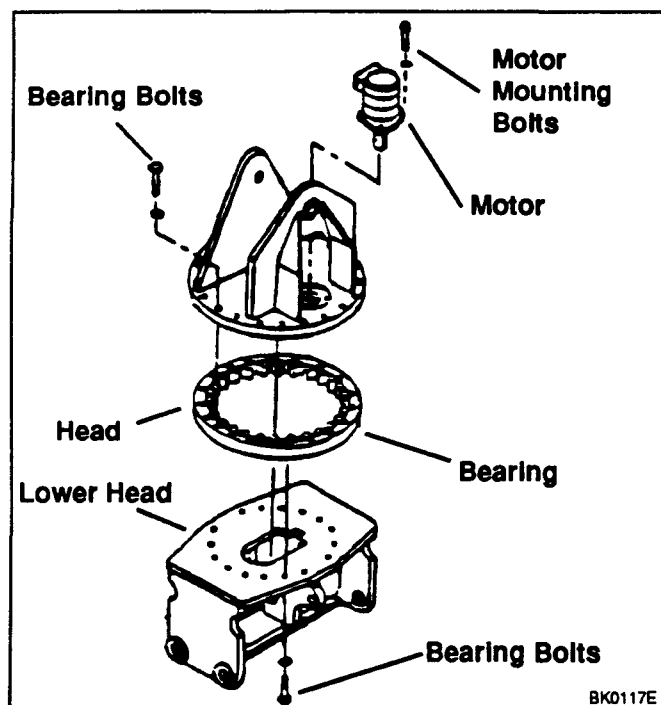


WARNING

Failure to keep bolts tight can lead to failure of the bolts and thus machine damage or personal injury.



BK0115C



BK0117E

360° Continuous Rotation Grapple

GRAPPLE BOLT TORQUE

On the continuous rotation grapple be sure that the bearing bolts are torqued to 127 foot pounds and the motor mounting bolts to 64 foot pounds. This is a lubricated torque, using anti-seize compound, part no. 514-00700.

SPECIAL TORQUE SPECIFICATIONS

LUBRICATE WITH ANTI-SEIZE COMPOUND (PART NO. 514-00700)

Turntable Bearing Bolts	310 ft. lbs.
Swing Motor Bolts (secure motor to head)	175 ft. lbs.
Grapple Bearing Bolts	127 ft. lbs.
Grapple Motor Mounting Bolts	64 ft. lbs.

TROUBLE SHOOTING

If the machine should malfunction, find the problem in the headings listed, then refer to the possible causes and remedy listed with the problem. The list of problems, causes, and remedies will only give an indication of where a possible problem can be and what repairs are needed. More or other possible repair work may be needed beyond the recommendations in the list.

NOTE

For more detailed trouble shooting information refer to the Service Manual.

ENGINE

Problem	Cause	Remedy
Engine cranks but will not start or starts hard.	Fuel tank empty. Water in fuel or water frozen in fuel lines. Water frozen in fuel filter. Debris or dirt in fuel. Air filter elements restricted with dirt, snow, or water. Air intake pipe screen plugged.	Check fuel level. Fill as necessary. Thaw and/or drain water from fuel tank. Thaw ice in fuel lines and drain. Install new fuel filter. Drain small amount of fuel from tank into empty container. Inspect for debris. Drain and flush fuel system. Change fuel filter. Clean or replace filter elements. Clean air inlet pipe screen.
Low engine oil pressure.	Low oil level. Low viscosity - using winter oil in summer.	Check oil level. Fill to correct level. Check for leaks. Repair leaks. Drain and fill with summer weight oil.
Engine overheats.	Low coolant level. Loose, worn or broken fan belt. Engine overloaded. Air filter elements plugged.	Fill to correct level and check for leaks. Tighten or replace belt. Reduce load. Clean or replace elements.
Engine will not start.	Low or discharged battery.	Charge battery.

HYDRAULIC SYSTEM

Problem	Cause	Remedy
Pump or motor too noisy.	Low oil supply or wrong viscosity. Air in oil.	Fill reservoir with proper oil. Check for foamy oil. Tighten connections, replace o-rings or lines.
Oil overheats.	Fluid dirty or low supply. Incorrect fluid viscosity. Excessive load.	Replace filters and fluid. Fill reservoir to proper level. Replace oil with proper viscosity. Reduce load.
No flow or pressure.	Pump not receiving fluid. Damaged line.	Any or all of the following: • Replace dirty filters • Clogged inlet line • Clean reservoir breather vent • Fill reservoir to proper level Replace line.
Hydraulic system pressure too low.	External leak in system.	Tighten connections and bleed air from system.
Hydraulic pressure erratic.	Air in fluid. Contamination in fluid.	Tighten connections, fill reservoir to proper level, and bleed air from system. Replace dirty filter and system fluid.
Slow hydraulic functions.	Fluid viscosity too high. Machine linkage not lubricated. Low oil supply. Obstruction in line or line damaged.	Fluid may be too cold or should be replaced with proper viscosity. Lubricate. Fill reservoir with proper oil. Inspect lines. Replace parts if necessary.
Parts move too erratically.	Machine linkage not lubricated.	Lubricate.

ELECTRICAL SYSTEM

Problem	Cause	Remedy
Battery will not charge.	Loose or corroded connection.	Clean and tighten battery connections.
	Loose alternator belts.	Tighten or replace belts.
Starter will not work or cranks slowly.	Loose or corroded connections.	Clean and tighten connections.
	Wrong engine oil.	Replace oil. Refer to Fuel and Lubricants .
Gauges do not work.	Failed gauge sender.	Replace sender.
	Loose gauge ground connection.	Check ground connection. Tighten if necessary.
Windshield wiper/washer does not work.	Wiper/washer switch failure.	Replace switch.
	Wiper or washer motor failure.	Repair or replace motor.
	Disconnected or damaged wiring.	Inspect wiring. Connect or replace wiring as necessary.
Defroster does not work.	Defroster switch needs service.	Replace switch.
	Defroster fan motor failure.	Repair or replace motor.
	Disconnected or damaged wiring.	Inspect wiring. Connect or replace wiring as necessary.
Horn will not sound.	Horn needs service.	Replace horn.
	Horn switch needs service.	Replace switch.
	Disconnected or damaged wiring.	Inspect wiring. Connect or replace wiring as necessary.

MACHINE OPERATIONS

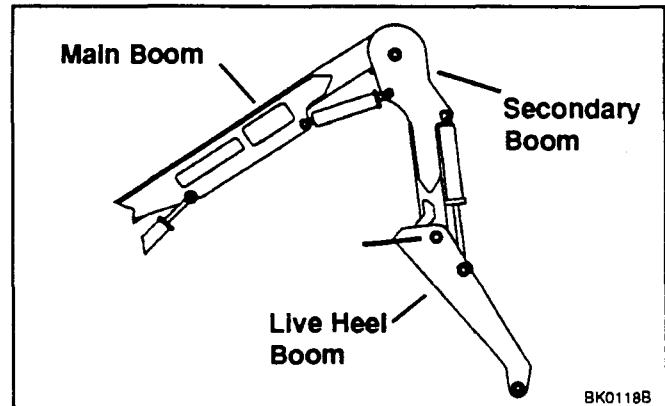
Problem	Cause	Remedy
Stabilizers will not remain up, will not extend or will not retract.	Damaged lines. Loose lines and connections. Stabilizer valve not functional. Stabilizer valve damaged. Stabilizer cylinder needs service.	Replace lines. Tighten connections. Check control lever linkage for tightness. Replace valve if necessary. Replace valve. Repair or replace cylinder.
Boom will not remain raised.	Loose control lever linkage. Main or secondary boom valve not operational. No oil flow or pressure. Damaged lines. Loose lines. Worn cylinder seals.	Tighten and secure linkage. Replace valve. Any or all of the following. • Replace dirty filters • Fill reservoir to proper level Replace lines. Tighten connections. Replace seals.
Platform assembly does not swing.	Swing motor needs service. Leakage or blockage in hydraulic system. Swing pump needs service.	Repair or replace motor. Repair or replace sources of leaks and blocks. Repair or replace pump.

4. OPTIONAL EQUIPMENT

BOOMS

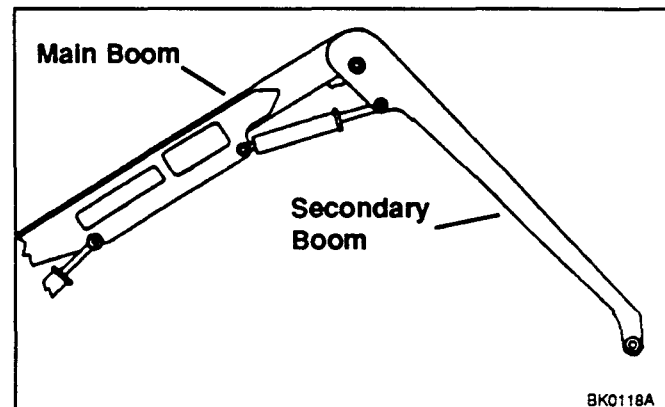
LIVE HEEL BOOM

A cylinder mounted on the secondary boom provides an additional pivot for maneuvering. The heel is used for stabilizing logs while loading and unloading.



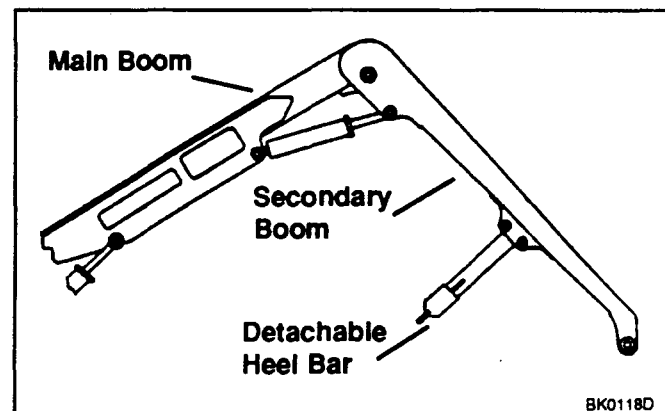
STRAIGHT KNUCKLE BOOM

This boom is a single, straight, welded assembly of steel plates, and is attached to the standard machines. It has mounting plates for the heel bar described below.



DETACHABLE HEEL BAR

The heel bar is secured by bolts to the secondary boom and may be removed easily from the mounting plate on the secondary boom.



DEAD HEEL BOOM

Handles and stabilizes logs during operation. This angular secondary boom and heel are constructed as a single weldment.

