



Bobcat
Service Manual
M-970
Skid Steer

Service Manual

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BC-S-970

SERVICE MANUAL

M-970 LOADER

**DIESEL
and
GASOLINE**



**CLARK
EQUIPMENT**

CLARK EQUIPMENT COMPANY
MELROE DIVISION, Gwinner, North Dakota 58040
Printed in U.S.A.



⚠ Always wear a hard hat.



⚠ Always fasten your seat belt.



⚠ When learning to operate, be careful
⚠ Go slow.



⚠ Always lower the bucket and shut off engine before leaving the seat.



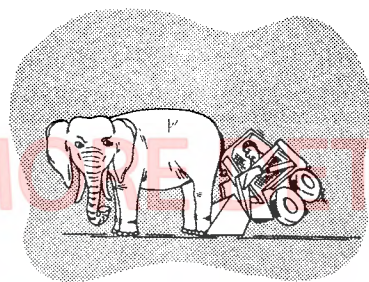
⚠ Do not offer rides to others.



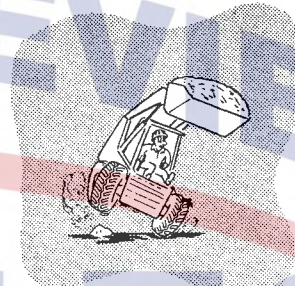
SAFETY RULES

We Care About YOUR Safety!
Don't get hurt. Follow these safety rules.

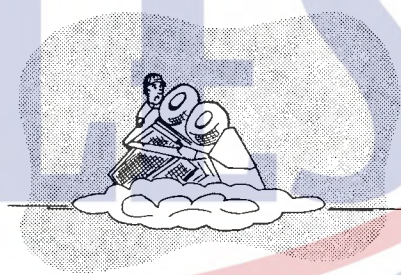
Although we make every effort to insure maximum safety when operating the Bobcat, inexperienced persons should not operate this loader. They must first receive proper instruction and become familiar with the safe handling of the machine.



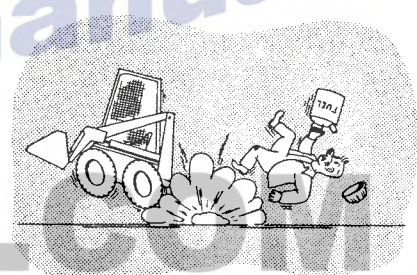
⚠ Do not exceed rated load capacity.



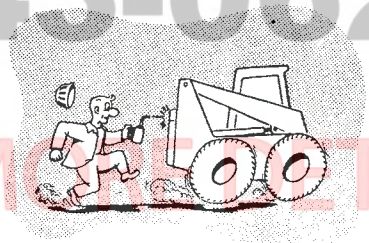
⚠ Always carry the bucket low.



⚠ Leave protective guards on machine.



⚠ Never fuel a hot engine.



⚠ Do not lubricate, adjust or repair the machine while it is running.

SAFETY EQUIPMENT

Your Bobcat Loader is equipped with several safety items for your protection. They are:

1. Seat belt.
2. Roll-Over Protective Structure (ROPS) with screen (glass is optional).
3. Lights, flasher, etc. (optional).
4. Back-up warning device (optional).
5. Safety treads for steps.

These items are provided for your safety. Take care of them, and inspect their condition often.

1. Check seat belts for frayed or cut webbing, damaged buckles or loose mounting brackets.
2. Check ROPS for damage. Never remove the heavy screens. The glass (optional) is mounted over the screens.
3. Inspect working condition of all lighting and the back-up warning device.
4. Keep safety treads clean. Replace them if they become worn or come off.

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INSTRUMENTATION (Figure 1)

1. FUEL GAUGE indicates the level of fuel remaining in fuel tank.
2. TACHOMETER/HOUR METER GAUGE indicates engine RPM and registers engine running hours.
3. AMMETER GAUGE indicates charging rate of alternator.
4. KEY/START SWITCH (ignition/start switch on gasoline models).
5. REAR LIGHTS SWITCH
6. FRONT LIGHTS SWITCH
7. FLASHER LIGHTS SWITCH
8. HYDROSTATIC/HYDRAULIC FLUID INDICATOR: When illuminated, oil temperature is excessive, or pressure is low. Immediately shut engine down and troubleshoot.
9. ENGINE OIL PRESSURE INDICATOR: When illuminated, the oil pressure is low. Shut the engine down immediately and troubleshoot.
10. ENGINE TEMPERATURE INDICATOR: When illuminated, engine temperature exceeds safe operating limits. Shut down engine immediately and troubleshoot.

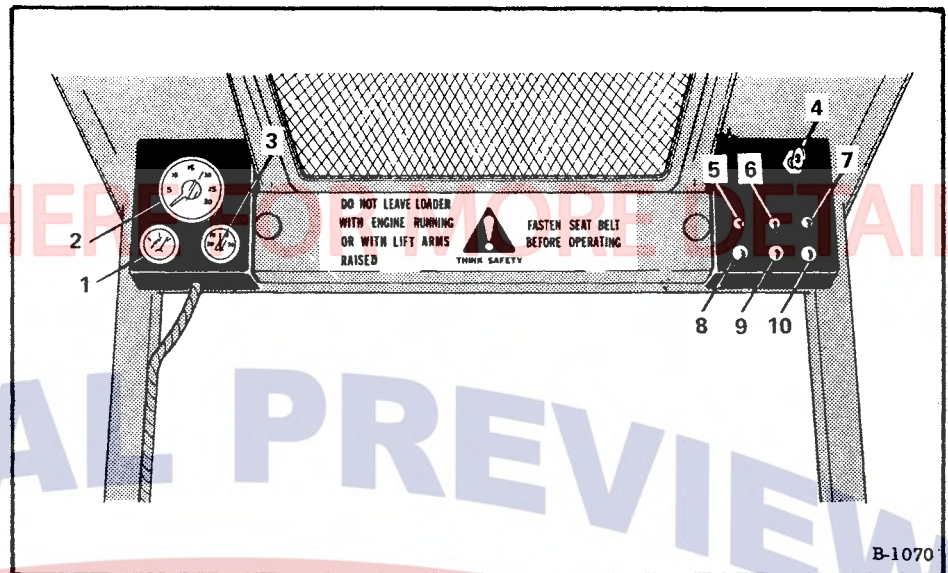


Fig. 1 Instrumentation

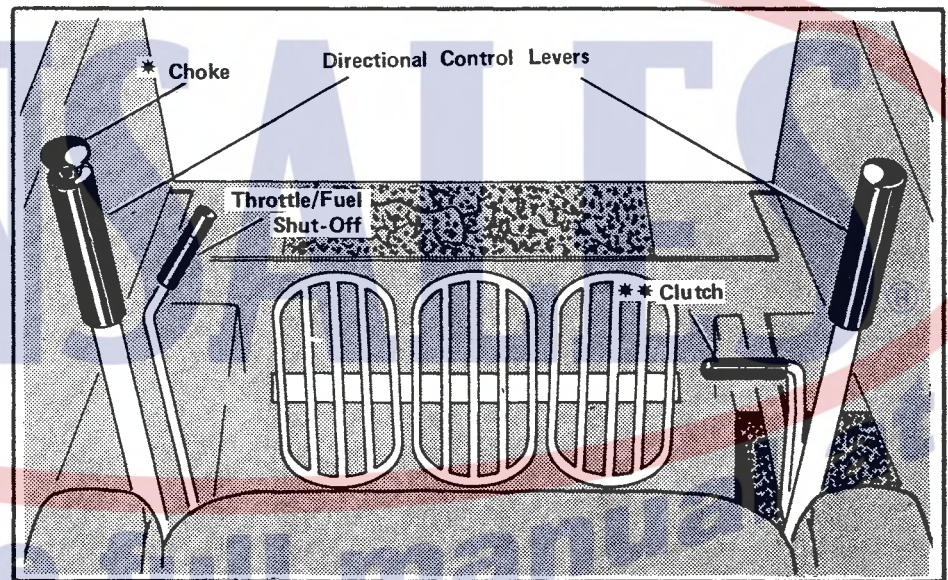


Fig. 2 Engine & Drive Controls * Gasoline Only ** Diesel Only

ENGINE CONTROLS (Figure 2)

The throttle/fuel shut-off control is located immediately to the left of the operator seat. Move the lever forward to increase the engine RPM. Move the lever backward to decrease the engine RPM. On diesel models moving the lever all the way back will actuate the fuel shut-off and stop the engine.

The choke control, on gasoline equipped models, is located on the top of the left direction control lever. Pull button up to close choke valve. Push button down to open choke valve.

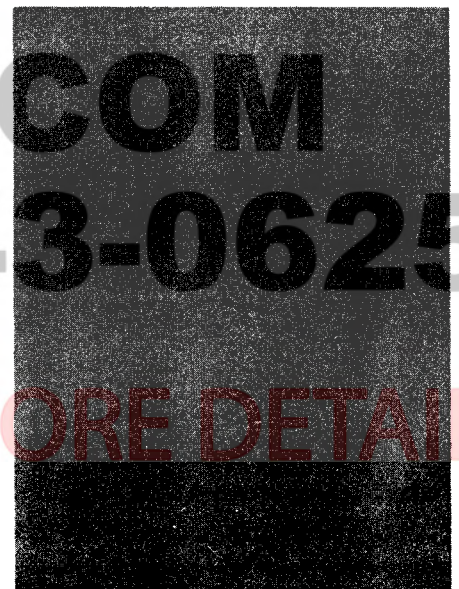
The start/power switch (ignition/start switch on gasoline equipped models) is located in the upper right instrument panel. Turn key fully to right to engage starter. Release to disengage starter (Figure 1). Be certain to turn power switch to "OFF" position on diesel models after engine shut-down.

DRIVE CONTROLS (Figure 2)

TO ENGAGE CLUTCH (Diesel Only), slowly push clutch control lever, located to lower right of operator, completely forward. To disengage, pull lever backward. The clutch should be disengaged during cold weather for easier starting and longer starter life.

The clutch engages or disengages the engine from the hydrostatic drive and implement hydraulic system.

NOTE: Control levers and hydraulic control pedals must be in neutral position before engaging clutch.



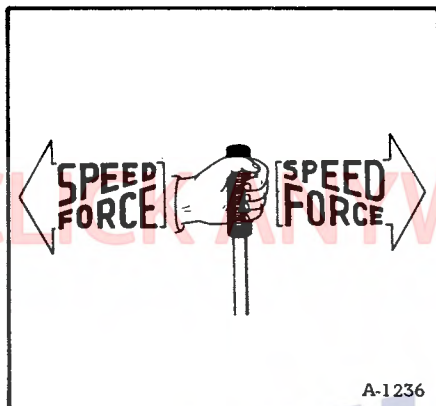


Fig. 3 Speed-Force

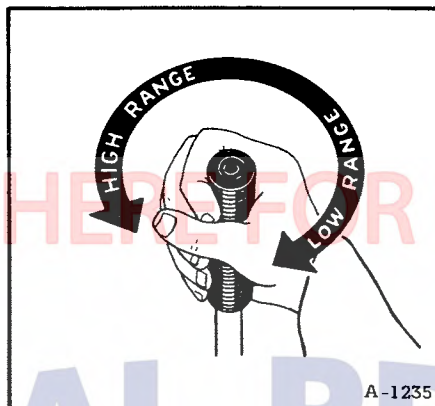
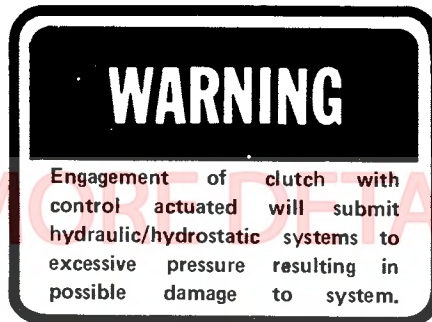


Fig. 4 Speed Range



The forward, reverse, ground speed, and turning functions are all controlled by two hand levers located on either side of the operator.

By increasing lever travel, the machine speed is increased proportionally (Figure 3). Releasing levers will automatically put drive in neutral. With levers in the neutral position, the hydrostatic systems provides the M-970 with automatic braking.

OPERATING RANGES, (Figure 4) may be selected "on the go" by twisting the grip of the right control lever.

TO TRAVEL FORWARD: (Figure 5) push both levers forward an equal amount.

TO TRAVEL BACKWARD: (Figure 6) pull both levers backward an equal amount.

TO TURN: (Figures 7 and 8) move one lever further from neutral than the other to make a wide smooth turn. To pivot, move the levers in opposite directions. The loader will turn "in its tracks."

LOADER CONTROLS (Figure 9)

TO RAISE LIFT ARMS, press heel of left control pedal. To lower lift arms, press toe of control pedal.

NOTE: Pressing toe of the left pedal to maximum down position will lock lift valve in float position. This permits the lift arms to follow the contour of the ground.

TO TILT bucket or attachment down, press toe of right control pedal. To roll back bucket or attachment, press heel of right control pedal.

NOTE: Pressing toe of the right pedal to maximum down position will increase tilt (or dumping) speed.

AUXILIARY CONTROL: Press the heel of the center pedal to actuate auxiliary attachments. Press with heel to maximum down position to lock pedal in detent.

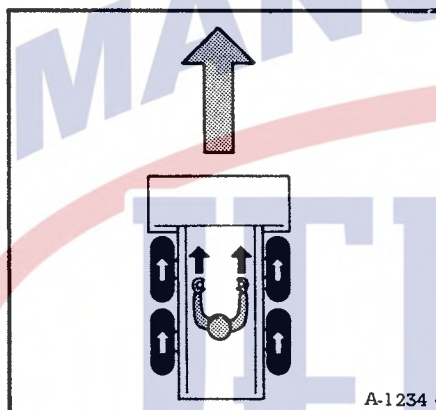


Fig. 5 Forward Travel

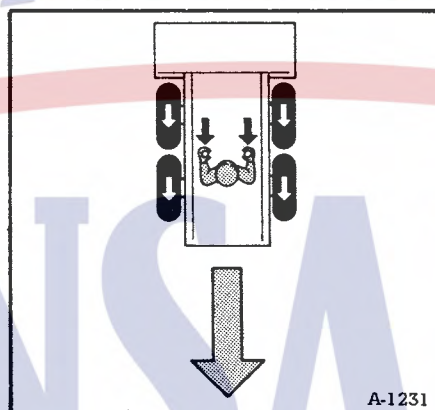


Fig. 6 Backward Travel

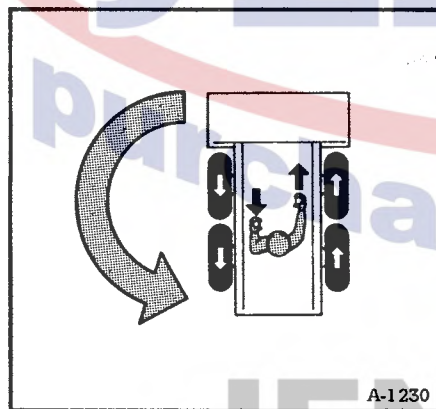


Fig. 7 Pivot Left

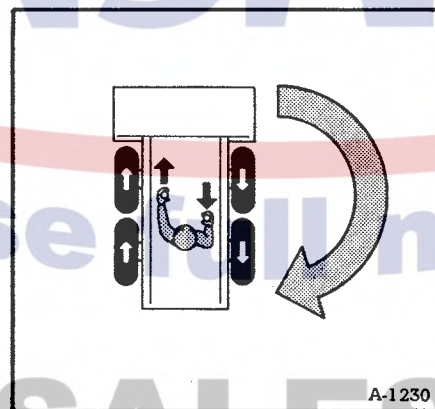


Fig. 8 Pivot Right

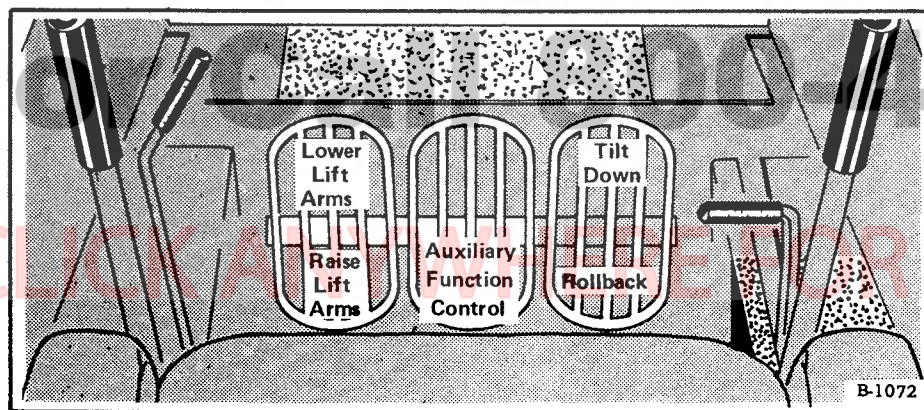


Fig. 9 Loader Controls

AUXILIARY FLOW SELECTOR (Figure 10) The M-970 is equipped with a hydraulic flow control. The operator may select, at his option, fast or slow auxiliary hydraulic functioning. Moving selector lever up will provide for 14 GPM delivery. Moving selector down will provide for 40 GPM. The Auxiliary Flow Selector Control lever is located immediately below the operator seat.

WARNING

To actuate this lever, engine must be shut down and toe of tilt control pedal must be in **FULL** down position.

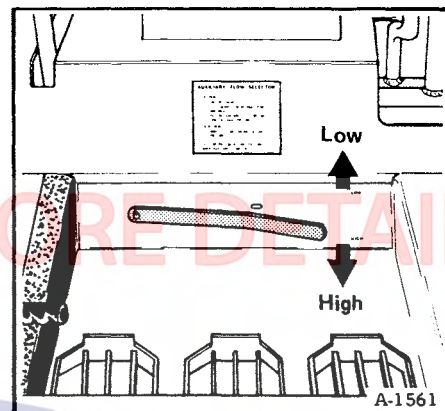


Fig. 10 Auxiliary Flow Selector

PRESTART CHECK

It is good practice to make this check at the beginning of each shift and when servicing loader (See also Engine Service Section).

1. Make a visual inspection for signs of damage or leaks. Make repairs or adjustments promptly.
2. Check the Condition Indicator on the engine air cleaner (Figure 11). If the red ring appears in a viewing window, replace filter element (See Air Cleaner Service, page 12). Check filter can for any damage which could provide access for unfiltered air. Check inlet hoses for breaks and clamps for tightness. Make repairs or adjustments immediately to eliminate the resultant possibility of more costly repairs.
3. Check engine oil level. Oil level must be between add and full mark on dipstick. Add if necessary (See Engine Oil Specifications, page 14).
4. Check coolant level in the radiator. Check only when engine is cool and add if necessary (See page 18 for coolant information). Clean debris from radiators.

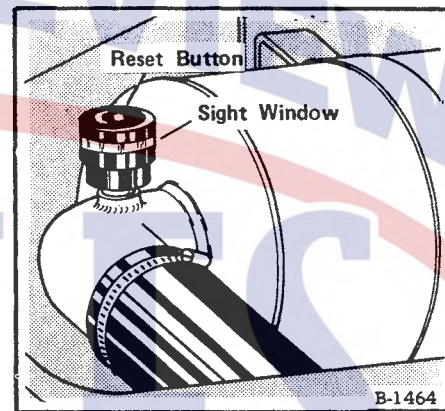


Fig. 11 Condition Indicator

STARTING PROCEDURE

When preparing to operate, observe the following procedure:

1. Adjust the seat so that all controls are within convenient reach. This will help prevent operator fatigue.
2. Adjust and fasten seat belt.
3. Disengage clutch and place directional control levers and hydraulic control pedals in neutral position.
4. Advance throttle 1/3 to 1/2 and turn start switch to "start" position. (On gasoline models, choke as necessary.)
5. If engine does not start within 15 seconds, release start switch and wait 60 seconds before trying again. If engine will not start after several attempts, refer to Troubleshooting Section (Diesel - page 111; Gasoline - page 139).
6. After engine starts, allow a short warm-up period.

NOTE: IDLING ENGINE FOR LONG PERIODS OF TIME CAN RESULT IN ENGINE OIL DILUTION AND EXCESSIVE WEAR.

7. Engage clutch slowly and allow hydrostatics a short warm-up period.

WARNING

Do not engage clutch unless hydraulic control pedals and Directional Control Levers are in neutral position.



COLD WEATHER STARTING

If start up temperatures are below 32°F, the following starting procedure is recommended:

1. Equip engine with a block heater and/or a Cold Weather Starting Aid approved by engine manufacturer.
2. Replace engine crankcase oil with recommended type and viscosity for the anticipated starting temperature (See Oil Specifications, page 14).
3. Use winter grade fuel (See Fuel Specifications, page 15).
4. Maintain battery(ies) at full charge.
5. Disengage engine clutch (Diesel Model Only - See Page 1) to remove pump load. Engage clutch slowly immediately after engine starts. Clutch should be engaged only when engine is idling at a low RPM.
6. Where starting temperatures below -20°F are anticipated, a means of warming the hydraulic/hydrostatic oil must be used. House machine in a building where temperatures remain above 0°F if possible. If such housing is not available, install an immersion type heater in the hydraulic oil reservoir.

WARNING

Starting the engine at a low enough temperature to cause hydrostatic oil starvation (cavitation) will seriously damage the hydrostatic drive system.

OPERATING THE M-970 BOBCAT

With engine running at 3/4 throttle and speed range control in low range (right directional control lever grip) proceed slowly to actuate the various functions. Move controls slowly avoiding jerky operation. Resting arms on seat rests and use of finger or wrist action will help eliminate jerky operation.



Remember, if you become confused, release the Directional Control Levers, the controls will immediately return to neutral position, and machine will stop moving.

BREAK-IN

Follow this procedure for loader and engine break-in:

1. Do not run engine at continuous maximum load or RPM for the first 15 hours.
2. Avoid overloading the engine or loader.
3. Allow the engine to warm up before applying a load.
4. Avoid rough or jerky operation.
5. Check the engine oil frequently. A new engine may use oil at a higher rate until piston rings seat.

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BOB-TACH SYSTEM (Figure 12)

The Bob-Tach system provides for rapid changes of buckets or attachments.

Procedure for mounting attachment:

1. Tilt Bob-Tach forward slightly with lift arms in down position. Locking levers must be in unlocked up position.
2. Maneuver machine until upper lip of Bob-Tach is aligned directly beneath mounting flange on bucket or attachment (Figure 13).
3. Raise lift arms until Bob-Tach contacts mounting flange and lift attachment slightly.
4. Roll back Bob-Tach allowing attachment to swing into position on lower portion of Bob-Tach frame (Figure 14).
5. Engage locking mechanism by rotating levers downward into locked position (Figure 12).

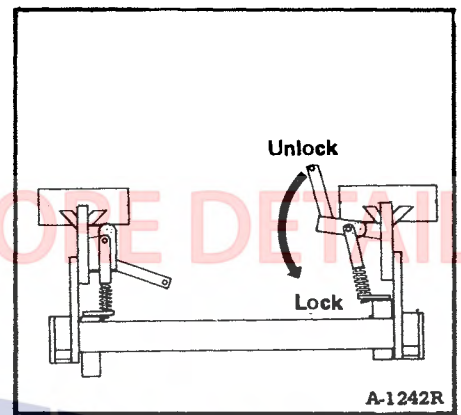


Fig. 12 Bob-Tach System

WARNING

Be certain both locking wedges are fully engaged before placing unit into operation.

Procedure for dismounting attachment:

1. Lower lift arms fully with attachment in rollback position.
2. Release locking mechanism by rotating levers up.
3. Tilt Bob-Tach forward and slowly back Bobcat away.

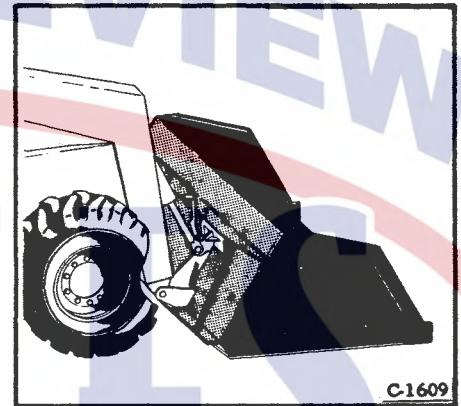


Fig. 13 Alignment Position

TRANSPORTING THE M-970

Emergency Towing:

The "Neutral Brake" feature of the hydrostatic drive system prevents the loader from being towed if the engine is not running. In order to allow the M-970 to be towed short distances, a set of bypass valves are designed into the drive system. Opening these valves will provide a hydraulic fluid "bypass" allowing the loader to be towed slowly, for a short distance, to a convenient repair or loading area.

The towing valves are located at the rear of the hydraulic control pedal mounting plate. It is necessary to tilt the operator enclosure to gain access to them (Figure 15).

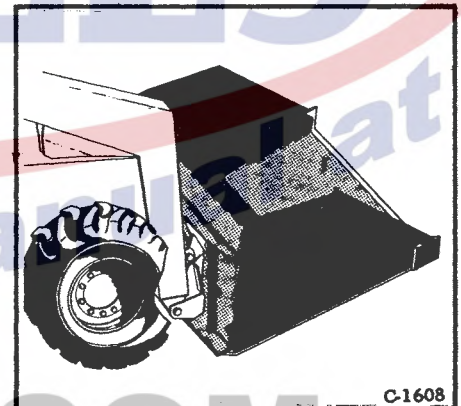


Fig. 14 Locking Position

WARNING

Do not tow the loader at more than 2 MPH or for a distance of greater than 50 yards or serious transmission damage may result.

TRANSPORTING BY TRUCK OR TRAILER

Use steel ramps of a suitable length to load the Bobcat onto the transporting vehicle. Planks should not be used as a substitute.

With bucket empty, back up ramps. When loaded, drop bucket to floor and chain Bobcat in place.

HOISTING THE M-970

When using the single point lift for hoisting the M-970, the lift arms must first be locked to the frame.

On machines equipped with lift bails, be certain chains or cables are fastened securely. Be careful not to damage any hydraulic lines when hoisting. Do not attach hoisting cables or chains to any place other than lift bails.

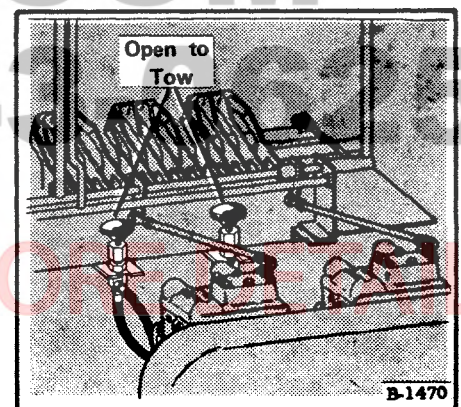


Fig. 15 Towing Valves

M-970 BOBCAT PREVENTATIVE MAINTENANCE SCHEDULE

			HOURS					
ENGINE		MACHINE	8-10	50	100	250	500	As Req'd
Diesel	Gasoline	Drive and Loader						
Check coolant level. Check oil level. Check air cleaner condition indicator. Check for oil, fuel or coolant leaks. * Retorque Cylinder head.	Check coolant level. Check oil level. Check air cleaner condition indicator. Check for oil, fuel, or coolant leaks.	Check tires for damage and air pressure. Check wheel nuts. Check for loose assemblies and fluid leaks. Grease all pivot points. Check hydraulic fluid level.						
Drain and replace oil and filter. Retorque head bolts, if not done during pre-delivery inspection. Reset valve tappet clearance. Check oil flow to rocker arms. Adjust fan belt tension. Check condition of battery cases, tighten cable clamps and check electrolyte level.	Drain and replace oil and filter. Adjust fan belt tension. Check battery electrolyte level. Check battery case for condition. Check battery clamps for tightness.	Check final drive chain and adjust if necessary. Check fluid level in final drive chaincase.						
Clean fuel water trap.		Check fluid level in reduction gearcases. Initial 100 hours replace 10 micron filter element.						
	Regap, clean and/or replace spark plugs. Regap, clean and/or replace breaker points. Clean distributor cap.	Remove drain plug on hydraulic fluid reservoir and drain off condensation.						
Replace fuel filters. Clean lift pump sediment chamber. Check hoses and clamps.	Adjust valve tappet clearance. Adjust fuel mixture and idle speed on carburetor. Replace fuel filter.	Replace 10 micron filter element every 500 hours.						
Drain, flush and refill cooling system. Have authorized personnel check and adjust engine timing and fuel system.	Drain flush and refill cooling system.	Drain and refill reduction gearcase fluid. Drain, flush and replace final drive chaincase fluid.						
* Upon delivery or prior to 25 hours elapsed running time.								