Bobcat®

Service Manual

B780 Backhoe Loader

S/N B4U311001 & Above

7363907enUS (07-19) (0)

Printed in Belgium

MAINTENANCE SAFETY

WARNING

Instructions are necessary before operating or servicing machine. Read and understand the Operation & Maintenance Manual, Operator's Handbook and signs (decals) on machine. Follow warnings and instructions in the manuals when making repairs, adjustments or servicing. Check for correct function after adjustments, repairs or service. Untrained operators and failure to follow instructions can cause injury or death.

W-2003-0807

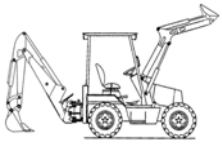
Safety Alert Symbol: This symbol with a warning statement, means: "Warning, be alert! Your safety is involved!" Carefully read the message that follows.

CORRECT

B-10731a

Never service the Bobcat Backhoe Loader without instructions.

CORRECT

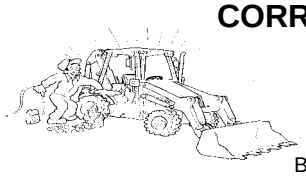


B-16768

Always use an approved lift arm support device when servicing the backhoe loader with the lift arms raised. Replace the lift arm support device if damaged or missing.

Disconnecting or loosening any hydraulic tubeline, hose, fitting component, or part failure can cause lift arms or backhoe boom to drop.

CORRECT

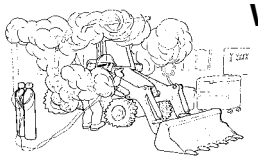


B-16738

Cleaning and maintenance are required daily.

NEVER modify equipment or add attachments not approved by Bobcat.

WRONG

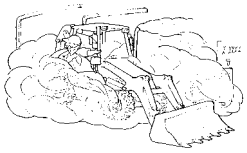


B-16730

Have good ventilation when welding or grinding painted parts.

Wear dust mask when grinding painted parts. Toxic dust and gas can be produced.

WRONG



B-16746

Vent exhaust to outside when engine must be run for service.

Exhaust system must be tightly sealed. Exhaust Fumes can kill without warning.

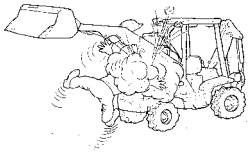
WRONG

B-16719

Never work on backhoe loader with lift arms raised unless supported by an approved lift arm support device.

Always lower the backhoe bucket to the ground before doing any maintenance.

WRONG



B-16571

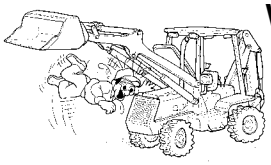
Stop, cool and clean engine of flammable materials before checking fluids.

Never service or adjust machine with the engine running unless instructed to do so in the manual.

Avoid contact with leaking hydraulic fluid or diesel fuel under pressure. It can penetrate the skin or eyes.

Never fill fuel tank with engine running, while smoking or when near open flame.

WRONG



B-16731

Keep body, jewelry and clothing away from moving parts, electrical contact, hot parts and exhaust.

Wear eye protection to guard from battery acid, compressed springs, fluids under pressure and flying debris when engines are running or tools are used.

Use eye protection approved for type of welding.

Keep engine cover closed except for service. Close and latch engine cover before operating the backhoe loader.

WRONG

B-6589

Lead-acid batteries produce flammable and explosive gases.

Keep arcs, sparks, flames and lighted tobacco away from batteries.

Batteries contain acid which burns eyes or skin on contact. Wear protective clothing. If acid contacts body, flush well with water. For eye contact flush well and get immediate medical attention.

Maintenance procedures which are given in the Operation & Maintenance Manual can be performed by the owner/operator without any specific technical training. Maintenance procedures which are **not** in the Operation & Maintenance Manual must be performed **ONLY BY QUALIFIED BOBCAT SERVICE PERSONNEL. Always use genuine Bobcat replacement parts.**

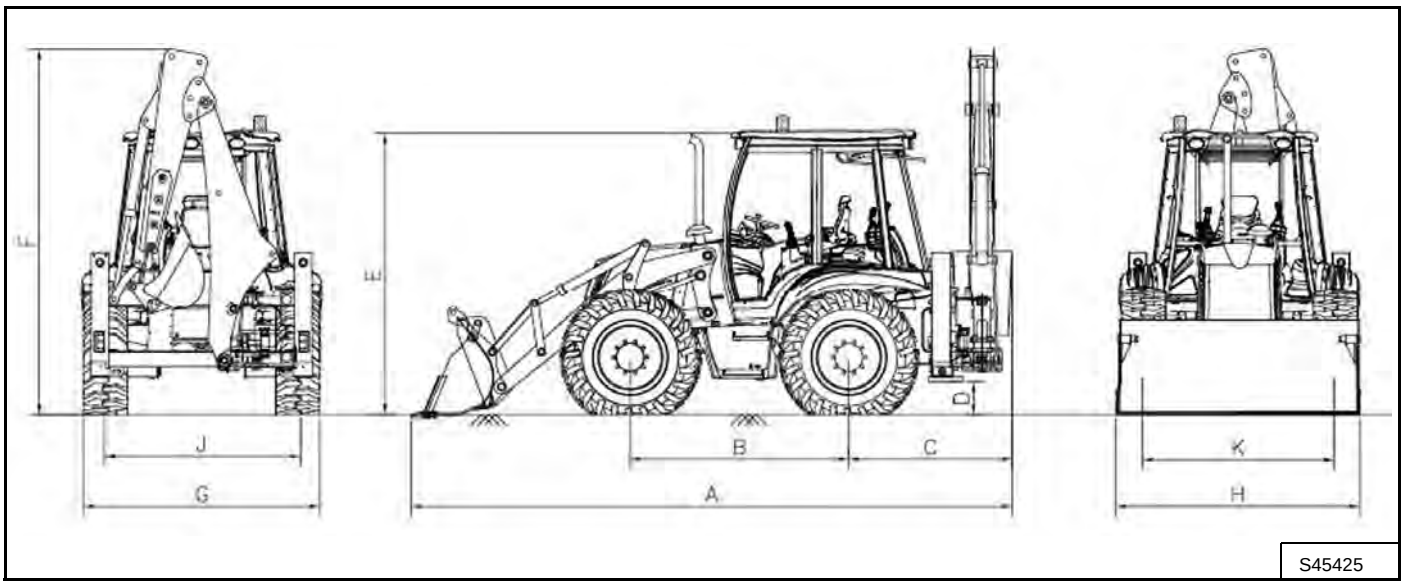
MSW46-0116

CONTENTS

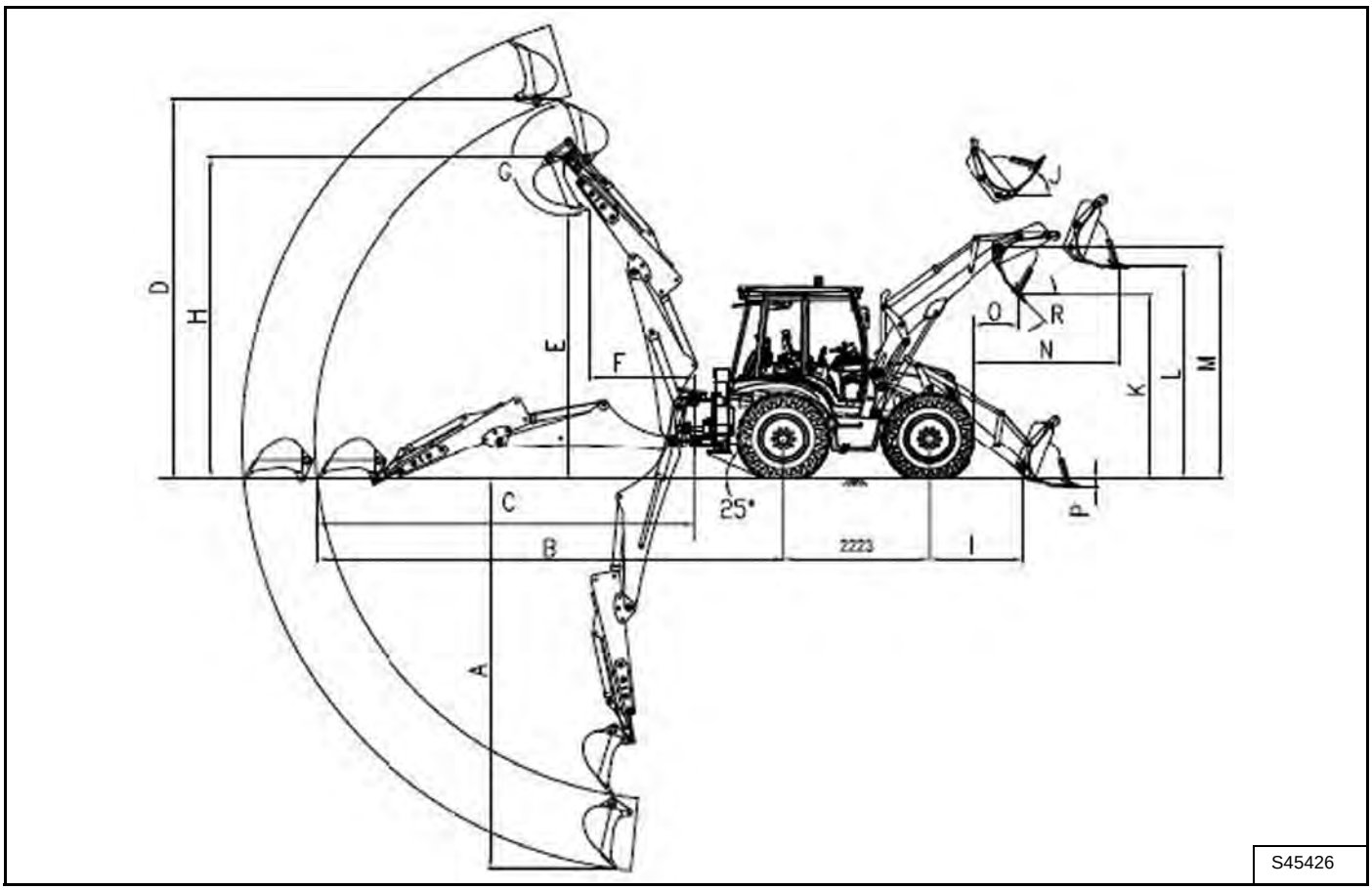
GENERAL INFORMATION

MACHINE INFORMATION

These are backhoe loaders that are designed with operating weight up to 8.7 tons, rigid frame, bucket capacity of 0,2 m³ and shovel capacity of 1,1 m³. This machine is designed to dig and load in closed and open terrain



A	Overall Machine Length In Travel Position	6375 mm (250.98 in)
B	Wheelbase	2223 mm (87.52 in)
C	Backhoe Swing Center Distance	1355 mm (53.35 in)
D	Ground Clearance	385 mm (15.16 in)
E	Cab Height	2930 mm (71.65 in)
F	Overall Transport Height	3880 mm (152.76 in)
G	Machine Width	2400 mm (94.49 in)
H	Overall Width With Bucket	2400 mm (94.49 in)
J	Rear Wheel Track	1950 mm (76.77 in)
K	Front Wheel Track	1950 mm (76.77 in)



		Retracted	Extended
A	Maximum Dig Depth	4600 mm (181.10 in)	5800 mm (228.35 in)
B	Max Reach From Rear Axle Center	7000mm (275.59 in)	8100 mm (318.90 in)
C	Max Reach From Swing Center	5700 mm (224.41 in)	6800 mm (267.72 in)
D	Maximum Digging Height	5600 mm (220.47 in)	6450 mm (253.94 in)
E	Maximum Dumping Height	3850 mm (151.57 in)	4700 mm (185.04 in)
F	Loading Reach	1800 mm (70.87 in)	2650 mm (104.33 in)
G	Bucket Rotation Angle	200.4°	200.4°
H	Max Bucket Hinge Pin Height	4750 mm (187.01 in)	5550 mm (218.50 in)
I	Distance Between Hinge Pin And Front Axle Center	1550 mm (61.02 in)	
J	Max Rollback Angle, Fully Raised	59.2°	
K	Dump Height	2865 mm (112.79 in)	
L	Loadover Height	3450 mm (135.83 in)	
M	Height To Hinge Pin	3590 mm (141.34 in)	
N	Max Reach At Full Height	1620 mm (63.78 in)	
O	Dumping Reach	595 mm (23.43 in)	
P	Digging Depth	117 mm (4.61 in)	
R	Dump Angle	45°	

TECHNICAL PROPERTIES

Engine

Make & Model	PERKINS 1104C-44T
Emission Type	EU Stage II and EPA Tier 2
Engine Type	4 stroke diesel, turbocharged
Engine Power	74.5 kW / 100 hp
Rated Speed	2200 rpm
Displacement	4.4 L (268.5 in^3)
Bore	105 mm (4.13 in)
Stroke	127 mm (5.00 in)
Number Of Cylinder	4
Maximum Torque	408 N•m (300.92 ft-lb)
Cooling	Lukoil Antifreeze G11 Green

Electrical System

Battery	12 volt / 140 Ah
Starter	3,2 kW (4.3 hp)
Alternator	75 A

Hydraulic System

Type	Open Center
Hydraulic Pump	Tandem Gear
Maximum Flow	90 + 64 L/min (23.78 + 16.91 gpm)
Maximum Pressure	22000 kPa (220 bar) (3191 psi)
Hydraulic Oil Filter	Full flow filter in return line with integrated fine filter area
Hydraulic Oil Cooler	Hydraulic and transmission oil cooler
Hydraulic Controls Backhoe Control Loader Control	Hydraulic joysticks

Transmission

Make	Carraro	
Type	Auto Powershift	
Drive	All Wheel Drive (AWD)	
2WD / 4WD Selection	By switch on dash panel	
Transmission disconnect	Push button and brake system	
Max. travel speeds:	Forward:	Reverse:
1st	5,8 km/h (3.6 mph)	5,8 km/h (3.6 mph)
2nd	9,6 km/h (6.0 mph)	9,6 km/h (6.0 mph)
3rd	21,2 km/h (13.17 mph)	21, 2 km/h (13.17 mph)
4th	40 km/h (24.9 mph)	40 km/h (24.9 mph)

TECHNICAL PROPERTIES (CONT'D)

Axles / Brakes

Type	Carraro
Front Oscillation	16 degrees
Steering angle	52 degrees
Rear Axle	Electro-hydraulic operated differential, outboard planetary design, self-adjusting high torque internal wet service brake
Service Brake Type	Boosted hydraulic wet multi-disc, dual pedal braking
Parking Brake Type	Mechanical control on rear axle

Tires

Front 4WD standard	16.9 - 28
Rear 4WD standard	16.9 - 28

Loader

Bucket capacity	1,1 m^3 (1.4 y^3)
Breakout force - arm	56,1 kN (12612 ft-lb)
Breakout force - bucket	81,6 kN (18344 ft-lb)
Bucket width	2400 mm (89.76 in)
Lift height to hinge pin	3590 mm (141.34 in)
Dump height	2865 mm (112.8 in)
Rated operating capacity (ISO 14397-1) at max. height	3178 kg (7006 lb)

Backhoe

Bucket width	600 mm (23.62 in)
Bucket capacity	0,2 m^3 (0.26 y^3)
Bucket breakout	59,1 kN (13277 lbf)
Arm break out:	
Retracted	31,8 kN (7140 lbf)
Extended (with optional extendable arm)	22,4 kN (5036 lbf)
Arm depth:	
Retracted	4600 mm (181 in)
Extended	5800 mm (228 in)
Max. reach from swing center:	
Retracted	5700 mm (224 in)
Extended	6800 mm (268 in)

Cab / Canopy

Cab	ROPS (ISO 3741) and FOPS (ISO 3449 Level II) type tinted safety glass giving total visibility, full opening rear-side windows, front and rear windshield wipers, fully adjustable front/rear and up/down seat, fresh air heater/blower, full heat control.
Canopy	ROPS (ISO 3741) and FOPS (ISO 3449 Level II), fully adjustable front/rear and up/down seat.

Steering

Steering type	2-wheel steer, 4-wheel steer, Crab
Power steering	Hydrostatic
Turning circle (unbraked). outside front tire	9485 mm (31.1 ft)
Turning circle (unbraked), outside loader bucket	11400 mm (37.4 ft)

Capacities

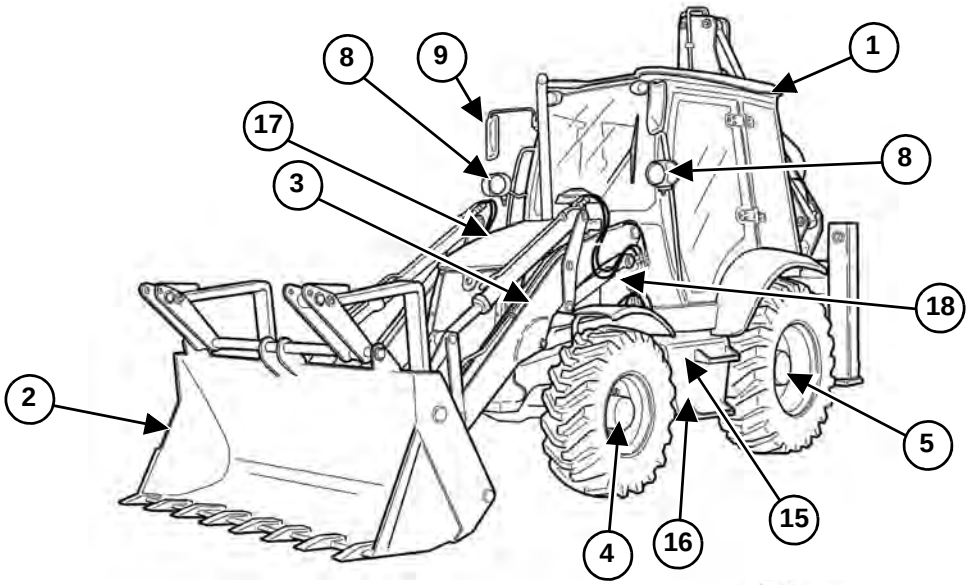
Engine oil (with filters)	8.4 L (8.9 qt)
Cooling system	25,0 L (6.6 U.S. gal)
Fuel tank	140,0 L (37.0 U.S. gal)
Hydraulic tank	75,0 L (19.8 U.S. gal)
Hydraulic system	130,0 L (34.3 U.S. gal)
Transmission	19,0 L (5.0 U.S. gal)
Axle oil:	
Front	11,5 L (3.0 U.S. gal)
Rear	16,0 L (4.2 U.S. gal)

Weights

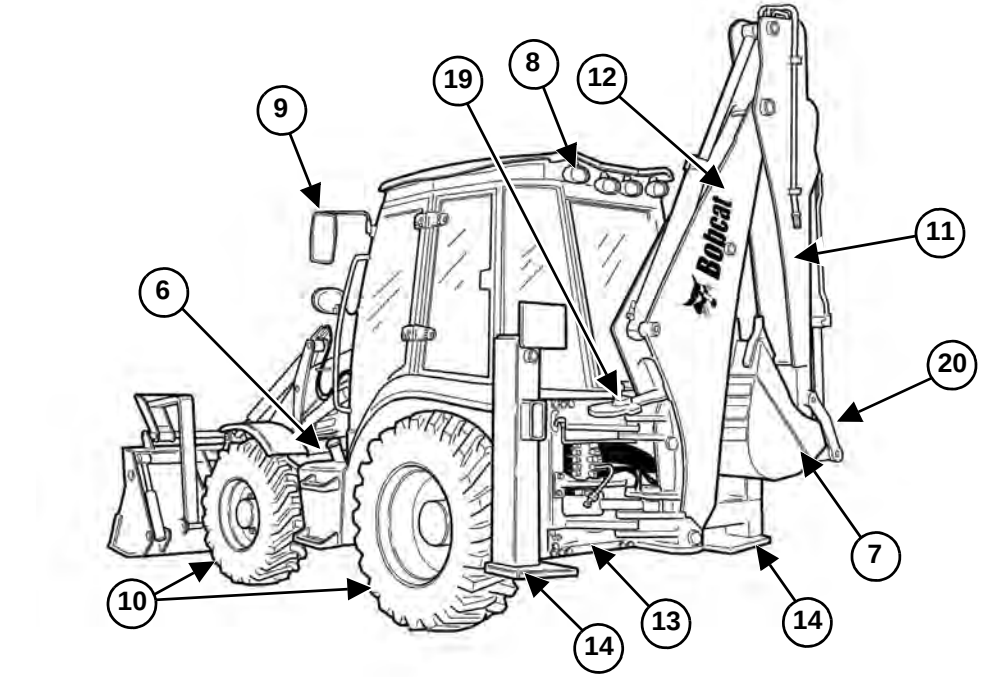
Operating Weight	8700 kg (19180 lb)


Bobcat®

MACHINE COMPONENTS



NA9989



NA9990

1	OPERATOR'S CAB (WITH ROPS / FOPS) **[A]**	11	BACKHOE ARM
2	LOADER BUCKET	12	BACKHOE BOOM
3	LIFT ARM	13	BACKHOE ATTACHMENT SIDESHIFT CARRIAGE
4	FRONT AXLE	14	STABILIZERS
5	REAR AXLE	15	HYDRAULIC OIL TANK
6	FUEL TANK	16	BATTERY BOX
7	BACKHOE BUCKET **[B]**	17	ENGINE BONNET
8	WORK LIGHTS	18	APPROVED LIFT ARM SUPPORT DEVICE
9	MIRRORS	19	BOOM LOCKOUT
10	TIRES	20	BUCKET LINK

[A] - Roll Over Protective Structure (ROPS) per ISO 3471 and Falling Over Protective Structure (FOPS) per ISO 3449, Level II.

[B] - Several different buckets and other attachments are available for the Bobcat backhoe loader.

MACHINE COMPONENTS (CONT'D)

Standard

- 6 work lights (2 front, 4 rear)
- 12 V power outlet
- 600 mm backhoe bucket
- Armrest
- Back-up alarm
- Exterior mirrors
- Floor mat
- Front headlights
- Fully equipped dashboards
- General purpose loader bucket
- Heater
- Horn
- Loader arm safety strut
- Master switch
- Mechanical suspension seat with seat belt
- Radio / MP3 player
- Rear windscreen heater
- Return to dig
- ROPS / FOPS Enclosed cab
- Rotating beacon
- Side storage
- Steering wheel knob
- Sun visor
- Tilted steering column
- Tinted front windscreen and wiper
- Tinted rear windscreen and wiper
- Visual and audible warning system for main functions

Optional

- Air conditioning

Optional Attachments

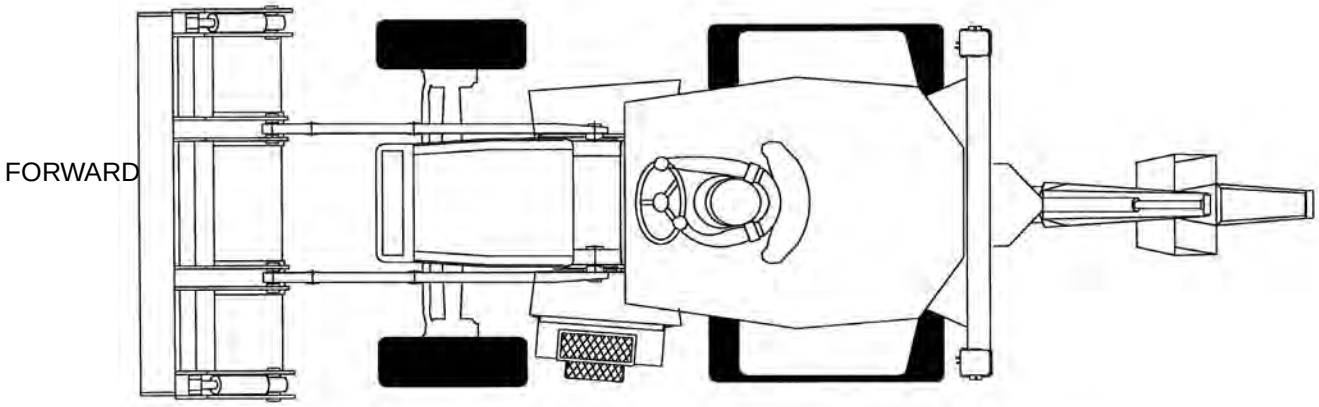
- 6 in 1 loader bucket
- Different sizes of backhoe buckets
- Extendable boom
- Hammer piping
- Hydraulic hammer
- Pallet forks

POSITION OF MACHINE

The terms right, left, front and rear are used referring to the operator seated on the driver seat for the loader and backhoe attachment position.

Loader Attachment Position

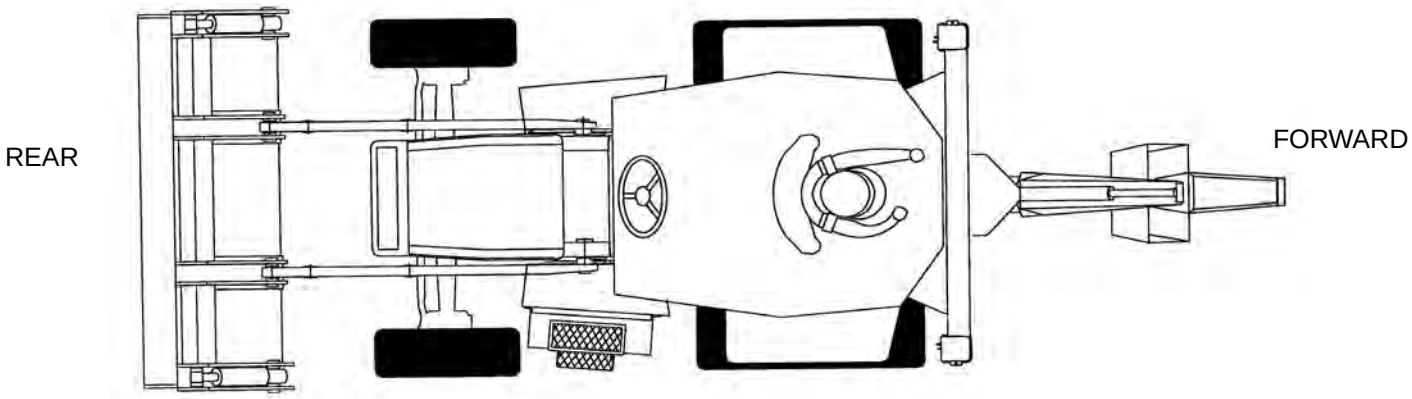
RIGHT-HAND SIDE



LEFT-HAND SIDE

Backhoe Attachment Position

LEFT-HAND SIDE



RIGHT-HAND SIDE


Bobcat®

SAFETY INSTRUCTIONS

In this manual safety signs are classified according to the relative seriousness of the hazard situation by the use of the signal word. Two signal words are used: DANGER and WARNING. The signal word alerts you to the existence and relative seriousness of a hazard and it is essential that you understand these signal words fully.

DANGER: The signal word DANGER on the machine and in the manuals indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING: The signal word WARNING on the machine and in the manuals indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

In addition to these instructions you must follow the safety regulations applicable to your work environment and job site and any federal, state and local safety requirements.

SAFETY INSTRUCTIONS (CONT'D)

General Safety Information

- Study the Operation & Maintenance Manual before operating or working on the backhoe loader, make sure that you have additional information for special attachments of your machine, read it and understand it!
- Allow only authorized personnel informed about the safety rules to operate, service or repair the backhoe loader, be sure to observe any minimum applicable age requirement.
- Allow only properly trained personnel to operate or work on the backhoe loader, make sure to clearly specify the person who is responsible for set up, maintenance and repairs.
- Make sure the operator knows his responsibility regarding the observance of traffic regulations and permit him to refuse any unsafe instructions given by a third person.
- Any person still in training should only operate or work on the machine under the supervision and guidance of an experienced person.
- Check and observe any person working or operating the backhoe loader periodically and check regularly, if they observe safety instructions and guidelines given in the Operation & Maintenance Manual.
- Wear proper work clothing when operating or working on the backhoe loader. Ring, watches, bracelets and loose clothings such as ties, scarves, unbuttoned or unzipped shirts and jackets are dangerous and could cause injury! Wear proper safety equipment, such as safety glasses, safety shoes, hard hats, work gloves, reflector vests and ear protection.
- Consult your employer or supervisor for specific safety equipment requirements and safety regulations on the job site.
- Do not carry tools, replacements parts or other supplies while climbing on or off the backhoe loader. Never use the steering column, control levers or joysticks as handholds.
- Never jump off the backhoe loader, climb on and off the backhoe loader using only the steps, rails and handles provided.
- When climbing on or off the backhoe loader, use both hands for support and face the machine.
- If needed, use the rear window or right door as an escape hatch.
- If no other guidelines are given, perform maintenance and repairs utilising the following precautions:

1. Park backhoe loader on firm and level ground. Rest the attachments on the ground.
2. Place all control in NEUTRAL position and engage park brake.
3. Turn the engine off and remove the ignition key.

- Before working on the hydraulic circuit, move all levers and pedals with the ignition key in contact position to release the hydraulic accumulator pressure and the remaining pressures in the different main circuits. In addition, relieve the pressure in the hydraulic tank as described in the Operation & Maintenance Manual.
- Make sure there is no leak in the hydraulic system and check the machine daily.
- Check the area where you will work before starting to work. Be certain that all safety systems operate properly.
- Secure all loose parts on the backhoe loader.
- Never operate the backhoe loader without a complete walk around inspection. Check if all warning decals are on the machine and if they are legible.
- Observe all danger and safety guidelines.
- For certain applications, the backhoe loader must be equipped with specific safety equipment. Use the backhoe loader only, if they are installed and functioning properly.
- Never perform any changes, additions or modifications on the machine, which could influence the safety, without obtaining written first permission from the manufacturer. This also applies to the installation and adjustment of safety devices and safety valves as well as to any welding on load carrying parts.
- Do not install any equipment or attachments made by other manufacturers or any which are not specifically authorized by BOBCAT for installation without first obtaining the written permission from BOBCAT. BOBCAT will issue any required technical documentation for approved installations.
- Should the electrical circuit be modified or additional components be installed, so the modification must be performed according to the national standards and safety regulations. The installation must be certificated by an approved organization and a copy of the certification has to be sent to the BOBCAT company.

SAFETY INSTRUCTIONS (CONT'D)

Crushing And Burning Prevention

- Never work underneath the backhoe loader unless it is safely resting on the ground and / or is properly blocked and supported.
- Never use damaged or insufficient wire ropes, slings or chains. Always wear gloves when handling wire ropes.
- Never reach into bores during attachment installation or removal. Never align bores with fingers or hands. Use proper alignment tools when installing, changing or servicing attachments.
- Keep objects away from the radiator fan. Rotating fans will swirl and throw out objects, which can become very dangerous and cause severe injury to yourself and others.
- Avoid contact with any components containing coolant. At or near operating temperature, the engine coolant is hot and under pressure and could cause severe burns.
- Check the coolant level only after the radiator cap is cool enough to touch. Remove the radiator cap slowly to relieve pressure.
- Do not allow your skin to come in contact with hot oil or components containing hot oil. At or near operating temperature, engine and hydraulic oil is hot and can be under pressure.
- Always wear safety glasses and protective gloves when handling batteries. Keep sparks or open flames away!
- Never permit anyone to hand guide the bucket or grapple into position.
- When working in the engine area, make sure loader safety strut is installed.

Fire And Explosion Prevention

- Always turn off the machine while refueling the backhoe loader.
- Never smoke or allow an open flame in refueling areas or where batteries are being charged, or where batteries or flammable materials are stored.
- Battery electrolyte can cause severe injury. If electrolyte touches your skin, wash the skin. If drunk by mistake, drink water or milk.
- Battery must be fully charged to prevent frozen electrolyte.
- Always start the engine as described in the Operation & Maintenance Manual.
- Clean the machine regularly and remove all debris which may cause a fire.
- Don't use flammable cleanser.
- Observe the following recommendations due to be protected from an explosion

1. Disconnect the negative (-) cable first and reconnect it last.
2. Never touch battery terminal with a metal object.

- Check the electrical system regularly and frequently. All defects, such as loose connections, burnt out fuses and bulbs, burnt or damaged cables must be repaired immediately by an electrician or specially trained person.
- Before work in an area including flammable gas, thoroughly ventilate this area.
- Never store flammable fluids on the machine except in storage tanks intended for the backhoe loader's operation.
- Inspect all component, lines, tubes and hoses for oil and fuel leaks and / or damage. Replace or repair any damaged components immediately. Any oil, which escapes from leaks, can easily cause a fire.
- Be certain that all clamps, guards and heat shields are installed. These components prevent vibration, rubbing, chafing and heat build-up. Install tie wraps to fasten hoses and wires, as required.
- Cold start ether is extremely flammable. Use ether only in ventilated areas and as directed. Never use it near heat sources or open flames. Do not permit anybody to smoke.
- Know the location of the backhoe loader's fire extinguisher and be familiar with its operation. Make sure you know your local fire regulations and fire reporting procedures.

SAFETY INSTRUCTIONS (CONT'D)

Hydraulic Lines And Hoses

- Hydraulic lines and hoses may never be repaired!

- All hoses, lines and fittings must be checked daily, but at least every 2 weeks for leaks and any externally visible damage! Any damaged sections must be replaced immediately! Escaping oil can cause injuries and fires!

- Even if hoses and lines are stored and used properly, they undergo a natural aging process. For that reason, their service life is limited. Improper storage, mechanical damage and improper use are the most frequent causes of hose failures.

  The service life of a hose may not exceed six years, including a storage period of not more than two years (always check the manufacturer's date on the hoses).

  Using hoses and lines close to the limit of ranges of permitted use can shorten the service life (for example at high temperatures, frequent working cycles, extremely high impulse frequencies, multi shift or around the clock operations).

- Hoses and lines must be replaced if any of the following points are found during an inspection:

1. Damage on the external layer into the inner layer (such as chaffing, cuts and rips).

2. Brittleness of the outer layer (crack formation of the hose material).

3. Changes in shape, which differ from the natural shape of the hose or line, when under pressure or when not under pressure, or in bends or curves, such as separation of layers, blister or bubble formation.

4. Leaks.

5. Non observance of installation requirements.

6. Damage or deformation of hose fittings, which might reduce the strength of the fitting or the connection between hose and fitting.

7. Any movement of hose away from the fitting.

8. Corrosion on fittings, which might reduce the function or the strength of the fitting.

9. Storage or service life has been exceeded.

10. When replacing hoses or lines, always use original replacement parts.

- Route or install the hoses and lines properly. Do not mix up the connections!

- Always take care to avoid torsional strain when installing a new hose. On high pressure hydraulic hoses, the mounting screws must be first mounted on both hose ends (full flange or half clamp) and tightened only thereafter.

  On high pressure hoses having one curved end, always tighten first the screws on the curved hose end and only then the screws on the straight hose end.

  Install and tighten the hose clips that may be mounted on the hose middle only when the both hose ends are already tightened.

- Always install hoses so to avoid any friction with other hoses and parts.

  We recommend keeping a distance between hose and other parts of at least one half of the hose outer diameter. Keep a minimum gap of 1.2 cm (1/2 in) in any case.

  After mounting a hose connecting two parts that are movable relative to each other, check during the return to service that the hose is not rubbing fall full movement.

STORAGE

Preparing The Machine For Storage

If the machine is not going to be used for a long period, it is useful to store the machine under a cover and take the following precautions:

- Clean the machine completely and paint the damaged parts of the machine.
- Grease all greasing points
- Drain the fuel tank and add approximately 10 l of special washing fuel. Run the engine for about 10 minutes until the residual normal fuel is eliminated. Fill the fuel tank with diesel fuel.
- Check the air filter, clean or replace if necessary.
- Drain the engine oil and replace the filter.
- Drain the cooling system and do not close the drain plugs. Put a label onto the control panel showing that “the cooling system is empty”.
- Check the electrolyte level. Make sure that the battery is charged. Remove the battery and place it in dry place at room temperature.
- Place blocks under the axles to prevent tire deformation.
- Lubricate shafts.
- Cover the exhaust with a cloth.
- Engage the parking brake

Preparing The Machine For Work After A Long Period Of Storage

- Fill the cooling system with engine coolant.
- Fill the engine with oil and check the oil level.
- Replace the fuel filter, fill the fuel tank and bleed the fuel system.
- Replace the battery and make sure that it is charged.
- Check the hydraulic oil level.
- Check the front drive axle and reduction gears oil level.
- Check the rear axle and reduction gears oil level.
- Check the brake oil level. (If equipped)
- Use a special solvent to clean the hydraulic cylinder rods.
- Check the tire pressures and tightness of wheel nuts.
- Check that the indicator and warning lights on the control panels work properly.
- Start the engine after removing the cloth on the exhaust. Run to the engine 20 minutes.


Bobcat®

LUBRICATION AND MAINTENANCE


Bobcat®

LIFTING AND BLOCKING THE BACKHOE LOADER

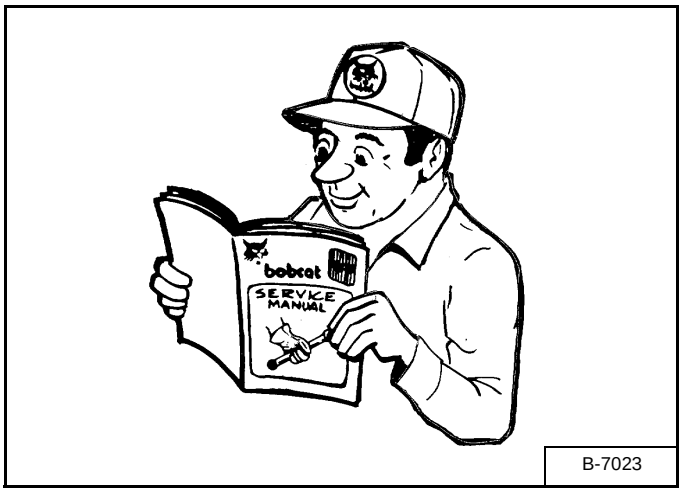
Procedure

⚠ WARNING

Instructions are necessary before operating or servicing machine. Read and understand the Operation & Maintenance Manual and signs (decals) on machine. Follow warnings and instructions in the manuals when making repairs, adjustments or servicing. Check for correct function after adjustments, repairs or service. Untrained operators and failure to follow instructions can cause injury or death.

W-2408-0801

Figure 20-10-1



Read the removal and installation, disassembly and assembly, etc., completely to become familiar with the procedure before beginning.

Always park the backhoe loader on a level surface.

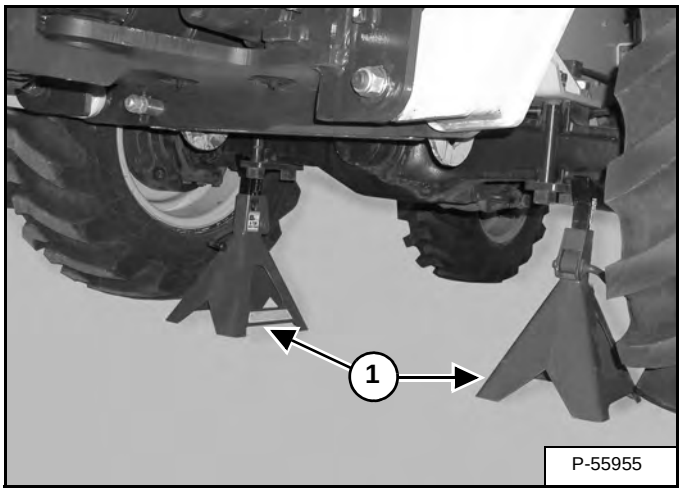
Stop the engine.

⚠ WARNING

Put jackstands under the front and rear axle before running the engine for service. Failure to use jackstands can allow the machine to fall or move and cause injury or death.

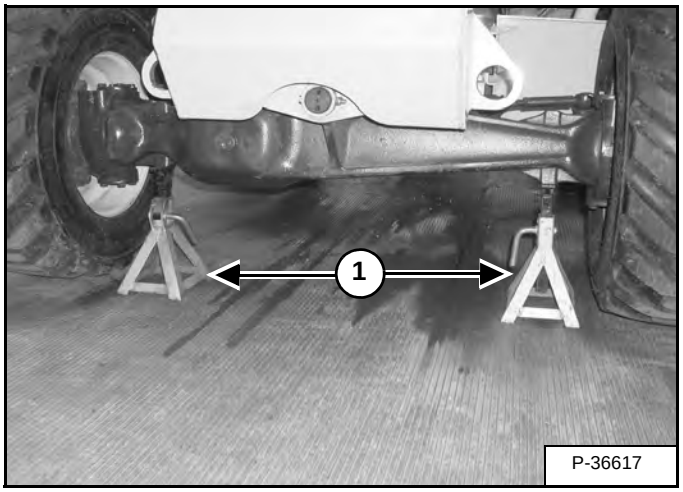
W-2461-0303

Figure 20-10-2



Lift the rear of the backhoe loader and install jackstands (Item 1) **[Figure 20-10-2]**.

Figure 20-10-3



NOTE: Loader lift arms are raised for photo clarity.

Lift the front of the backhoe loader and put jackstands (Item 1) **[Figure 20-10-3]** under the axle.

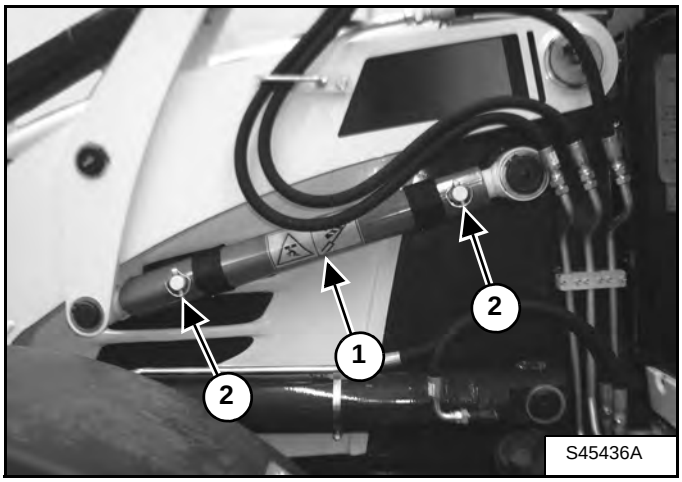
NOTE: Make sure the jackstands do not touch the tires.


Bobcat®

APPROVED LIFT ARM SUPPORT DEVICE

Description

Figure 20-20-1



The approved lift arm support device (Item 1) **[Figure 20-20-1]** is used to support the lift arms while working on a machine with the lift arms up.

⚠ WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

Service lift arm support device if damaged or if parts are missing. Using a damaged lift arm support or with missing parts can cause lift arms to drop causing injury or death.

W-2572-0407

NOTE: For installing the approved lift arm support device can be performed with just the operator. For removing the approved lift arm support device, a second person is required.

Installing The Approved Lift Arm Support Device

Park the machine on a flat level surface.

Fully lower the arm and boom and put the attachments flat on the ground.

Put all controls in NEUTRAL.

Engage the parking brake.

Stop the engine and exit the machine.

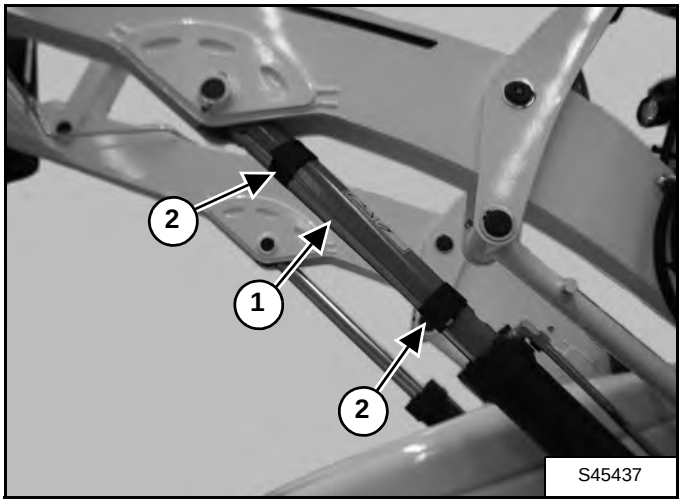
NOTE: Remove the attachment from the loader before the lift arms are raised and the approved lift arm support device is installed.

Have the second person remove the two retaining pins (Item 2) and remove the approved lift arm support device (Item 1) **[Figure 20-20-1]** from the storage position.

Reinstall the two retainer pins (Item 2) **[Figure 20-20-1]** so they are secured in the storage position.

The operator will enter the machine, fasten seat belt and start the engine.

Figure 20-20-2



Raise the lift arms.

Have the second person position the approved lift arm support device (Item 1) **[Figure 20-20-2]** on the lift cylinder rod.

Wrap the loop and hook fastener (Item 2) around the cylinder rod to hold the approved lift arm support device (Item 1) **[Figure 20-20-2]** to the cylinder rod.

The second person should move away from the machine. After the second person is away from the machine, slowly lower the lift arm until the approved lift arm support device (Item 1) **[Figure 20-20-2]** is tight against the cylinder rod.

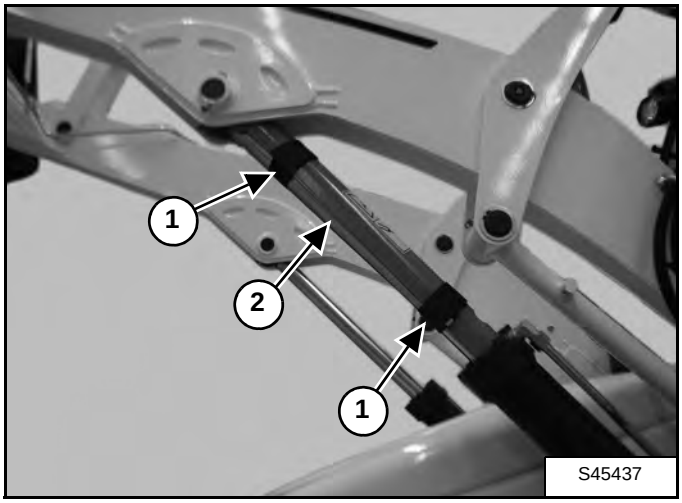
Stop the engine and exit the machine.

APPROVED LIFT ARM SUPPORT DEVICE (CONT'D)

Placing The Approved Lift Arm Support Device In The Storage Position

NOTE: A second person is required to assist in removing the approved lift arm support device.

Figure 20-20-3



Loosen the hook and loop fasteners (Item 1) from the approved lift arm support device (Item 2) **[Figure 20-20-3]**.

Have the operator enter the machine, fasten seat belt, make sure the parking brake is engaged and start the engine.

Slightly raise the lift arms so the approved lift arm support device (Item 2) **[Figure 20-20-3]** is loose on the cylinder rod.

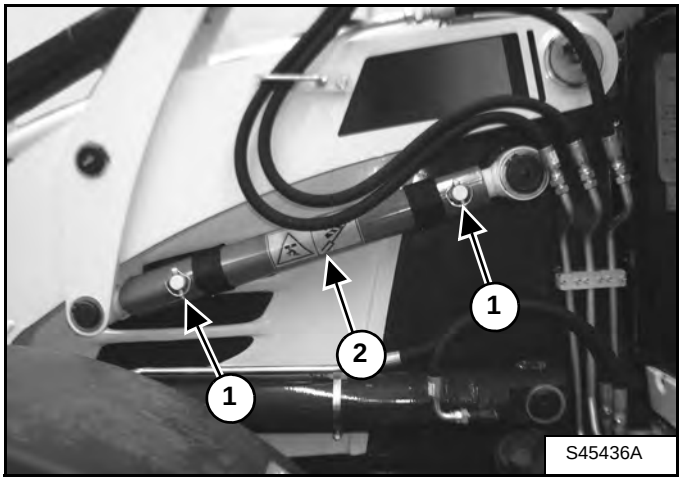
The second person will need to remove the approved lift arm support device (Item 2) **[Figure 20-20-3]**.

The second person should move away from the machine.

Slowly lower the lift arms fully.

Stop the engine and exit the machine.

Figure 20-20-4



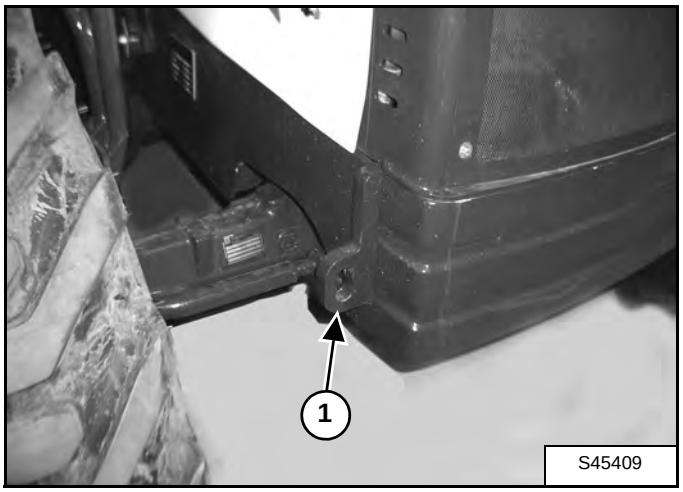
Remove the two retaining pins (Item 1) and position the approved lift arm support device (Item 2) **[Figure 20-20-4]** back in the storage position.

Install the two retainer pins (Item 1) **[Figure 20-20-4]** to secure in the storage position.

TOWING THE BACKHOE LOADER

Procedure

Figure 20-30-1



The vehicle being towed:

- Always use the towing hooks (Item 1) **[Figure 20-30-1]** for towing your backhoe loader.
- Turn on the hazard warning by pressing the hazard warning switch.
- Set the parking brake to OFF.
- Adjust the travel direction control lever and gear lever to NEUTRAL position.
- Tie the cable to the tie point to the front weight.

The vehicle towing the backhoe loader:

- Turn on the hazard warning by pressing the hazard warning switch.
- Tow the backhoe loader with the first speed.
- Don’t jerk suddenly.

The speed of vehicle towing the backhoe loader should be 10 km/h and towing distance shouldn’t be more than 2 km.

While traveling downhill, run the engine in first gear.

While traveling downhill or climbing uphill, the maximum angle of inclination is 12°.

The backhoe loader should not be towed until absolutely necessary. If it is possible carry out the repair work at the location without towing the machine.

Towing is always the responsibility of the operator.

Never allow anyone to stand near the cable when pulling or towing the backhoe loader. Keep the cable tight and free of kinks. Pull the cable slowly. The cable could snap and break if suddenly jerked.

- Only tow the backhoe loader if absolutely necessary, for example to remove it for repairs from a dangerous job site.
- The vehicle should have enough capacity for towing the machine.
- Observe traffic regulations while towing.
- Be sure all towing and pulling devices such as cables, hooks, and couplers are safe and adequate.
- Make sure that the cable or the towing rod is strong enough. Be aware that any damage to the machine caused by towing is never covered by the manufacturer's warranty.
- Engage travel slowly, and do not jerk. With a slack cable, the sudden impact of the load being towed could snap and break.
- Keep personnel out of area. If cable breaks while under stress, it could cause severe injury
- During the towing procedure, keep within the required transport position, permissible speed and distance.
- After the towing procedure is completed, return the machine to its previous state.
- Proceed as outlined in the Operation & Maintenance Manual when putting the backhoe loader back in service.


Bobcat®

AXLE TOE-IN ADJUSTMENT

Procedure

For the correct procedure, (See Toe-in / Steering Angle on Page 50-20-51.)


Bobcat®

LUBRICATION

General Safety Information

It is very important that all guidelines describing lubrication, checking the oil level, replacing the oil are strictly adhered to!

Regular maintenance increases the life of the backhoe loader and improves its reliability.

It is especially important to change the oil regularly and at the intervals noted in the maintenance schedule! Only use specified lubricants and oil!

When checking or replacing the oil, observe the following:

- Park the machine on level ground, if not otherwise stated, and turn the engine off.
- When working in the engine area, make sure the covers and side doors are secured.
- Only add fuel when the engine is turned off.
- Never smoke or allow an open flame in refueling areas.
- Cleanliness is especially important when changing engine, gear or hydraulic oil. Before removing fittings or plugs, make sure the surrounding areas are cleaned. When changing the oil, clean the fill and drain plugs.

Be sure to drain oil into a suitable container and dispose of oil and filter cartridges properly.

IMPORTANT

Fluid such as engine oil, hydraulic fluid, coolants, grease, etc. must be disposed of in an environmentally safe manner. Some regulations require that certain spills and leaks on the ground must be cleaned in a specific manner. See local, state and federal regulations for the correct disposal.

I-2067-0499

⚠ WARNING

AVOID INJURY OR DEATH

Always clean up spilled fuel or oil. Keep heat, flames, sparks or lighted tobacco away from fuel and oil. Failure to use care around combustibles can cause explosion or fire.

W-2103-0508

⚠ WARNING

AVOID INJURY OR DEATH

Wear safety glasses to prevent eye injury when any of the following conditions exist:

- **When fluids are under pressure.**
- **Flying debris or loose material is present.**
- **Engine is running.**
- **Tools are being used.**

W-2019-0907

Fluids, Lubricants And Fuel

The lubricants and fuels described below are those used in the factory and apply to operating conditions in European temperate climate areas. Please consult Bobcat for requirements under other weather conditions.

Prior to refill or draining any equipment of your Bobcat product, read and understand the according lubrication pages described later in this manual.

ENGINE SYSTEMS		
Machine Components	Fluids And Lubricants	Volume
Engine	Lukoil Avangard Ultra 10W40 Cl-4/SL	8,4 litre (2.2 US gal)
Cooling Circuit	Lukoil Antifreeze G11 Green	25 litre (6.6 US gal)
Fuel Tank	High-quality diesel fuel that meets EN590 or ASTM D975 with a sulfur content of less than 0.2%	140 litre (37 US gal)

HYDRAULIC / HYDROSTATIC SYSTEMS		
Machine Components	Fluids And Lubricants Types	Volume
Hydraulic Oil Tank	Lukoil Geyzer LT32 (HVLP)	Tank: 75 litre (19.8 US gal) Hydraulic System: 130 litre (34.3 US gal)

TRANSMISSION AND AXLES				
Machine Components	Brand	Specifications	Part Number	Volume
Transmission	Lukoil ATF	API GL4	-	19,0 litre (5.0 US gal)
Front Axle & Reduction Gear	- PETROL OFISI - MOBIL - PETRONAS	API GL4	- MAXIGEAR EP-X 85W-90LS* - MOBIL FLUID 426* - PETRONAS AMBRA MULTI-G 10W30	11,5 litre (3 US gal)
Rear Axle & Reduction Gear	- PETROL OFISI - MOBIL - PETRONAS	API GL4	- MAXITRAK TMS OIL 500* - MOBIL FLUID 426* - PETRONAS AMBRA MULTI-G 10W30	16 liter (4.2 US gal)

MECHANICAL SYSTEMS				
Machine Components	Fluids And Lubricants	Dropping Point	Packaging**	Part Number
All Mechanical Systems	- Bobcat Multi-Purpose Grease	From 260°C	E	6987888
	- Bobcat Supreme HD Grease	From 280°C	E	6987889
	- Bobcat Extreme HP Grease	From 260°C	E	6987890

(*) Source Locally / refer to Supplier Documentation

(**) Packaging Available:

A = 5 L Can
B = 25 L Container
C = 209 L Drum
D = 1000 L Tank
E = 400 gr Tube

LUBRICATION (CONT'D)

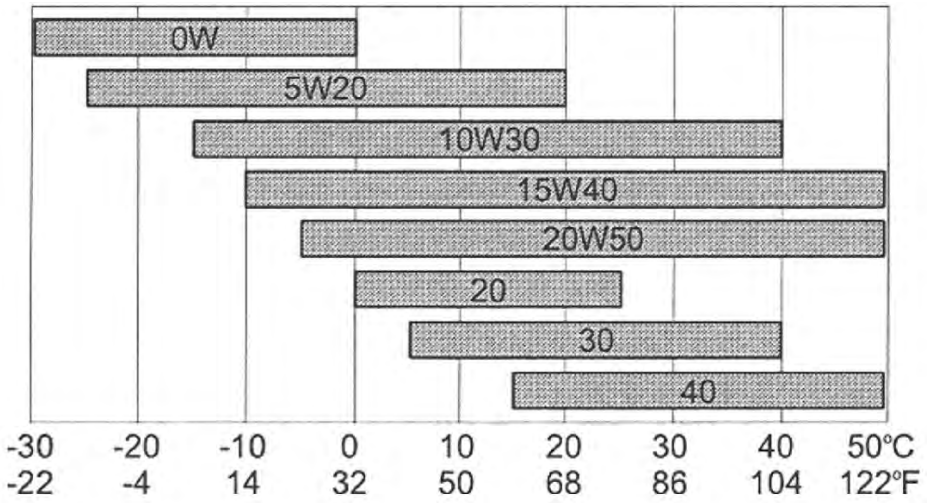
Lubricant And Operating Materials Specifications

NOTES ON LUBRICANT AND OPERATING MATERIALS CHART AND ON LUBRICATION SCHEDULE

The amounts indicated on the lubricant and operating materials chart and on the lubrication schedule are guidelines.

Check level in appropriate aggregate after every oil change or refill.

Diesel Engine Lubricants

COMPONENTS	SYMBOL	VISCOCITY SAE DIN 51512	SPECIFICATIONS
DIESEL ENGINE (Turbo Charged) LUBRICANT		 API CG4 / CH4; ACEA E3 / E5	

Lubricant regulation for diesel engines is based on the following specifications and regulations:

API Classification: CG-4, CH-4 (American Petroleum Institute)

ACEA (CCMC) Classification: E3, E5 (ACEA: Association des Constrticteurs Europeens de l'Automobile)

Lubricant And Operating Materials Specifications (Cont'd)

Diesel Fuel

Use only diesel fuel with a sulfur content of less than 0.2% and complying with one of the following standards:

Authorized diesel fuel specifications:

EN590

ASTM D975 Grade 1-D and 2-D

For complete diesel fuel specification, (See Fuel Specifications on Page 20-50-18.)

The sulfur content in diesel fuel should be less than 0.2%.

Higher sulfur contents influence oil change intervals and engine life.

Lubricity

By reducing sulfur content, the question of engine fuel lubricity arises. It has been clearly shown that engine fuels with the maximum allowable sulfur content (in Europe 0.05% by volume) can cause damage to the injector systems (especially in the case of distributor injection pumps).

Diesel fuel fluidity in cold climates

When ambient temperature are below 0°C (32°F), Diesel fuels normally used during the summer may suffer a decline in fluidity due to paraffin separation. The same occurs if diesel fuels normally used during the winter are used at temperature below -15° C (5° F).

Often, additive diesel fuel is on offer with operating temperatures down to -20°C (-4°F).