

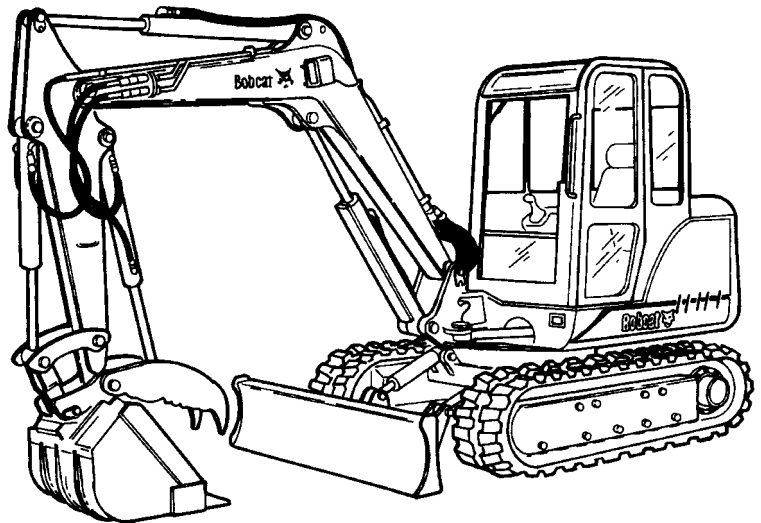
**337
341**



Bobcat®

Service Manual

**S/N 233311001 & Above
S/N 233211001 & Above
(D Series)**



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-2003-0903



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 Hydraulic Excavator without instructions.

CORRECT



B-15797

- ⚠ Use the correct procedure to lift and support the excavator.
- ⚠ Always lift the blade fully before installing jackstands.

CORRECT



B-15798

- ⚠ Cleaning and maintenance are required daily.

WRONG



B-15799

- ⚠ Have good ventilation when welding or grinding painted parts.
- ⚠ Wear dust mask when grinding painted parts. Toxic dust and gas can be produced.

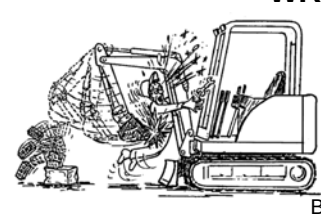
WRONG



B-15800

- ⚠ 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-15801

- ⚠ Always lower the bucket and blade to the ground before doing any maintenance.
- ⚠ Never modify equipment or add attachments not approved by Bobcat Company.

WRONG



B-15802

- ⚠ 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-15780

- ⚠ 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 rear door closed except for service. Close and latch door before operating the excavator.

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. The Service Safety Training Course is available from your Bobcat dealer.

ALPHABETICAL INDEX

AIR CLEANER	60-01	GENERAL AIR CONDITIONING SERVICE	
AIR CLEANER SERVICE	10-01	GUIDELINES.....	70-01
AIR CONDITIONING SERVICE.....	70-01	HEATER/AC FAN	70-01
AIR CONDITIONING SYSTEM FLOW	70-01	HEATER AIR FILTER	10-01
ALTERNATOR	50-01	HEATER COIL	70-01
ARM	40-01	HEATER VALVE	70-01
ARM CYLINDER	20-01	HORN	40-01
BASIC TROUBLESHOOTING	70-01	HYDRAULIC CONNECTION SPECS	SPEC-01
BATTERY	50-01	HYDRAULIC CONTROL VALVE ASSEMBLY	20-01
BLADE	30-01	HYDRAULIC EXCAVATOR SPECS	SPEC-01
BLADE CONTROL.....	40-01	HYDRAULIC FILTER.....	20-01
BLADE CYLINDER	20-01	HYDRAULIC FLUID RESERVOIR	20-01
BOOM	40-01	HYDRAULIC FLUID SPECIFICATIONS.....	SPEC-01
BOOM CYLINDER	20-01	HYDRAULIC PUMP	20-01
BOOM OFFSET CYLINDER.....	20-01	HYDRAULIC SYSTEM	10-01
BOOM OFFSET LOCK VALVE	20-01	HYDRAULIC SYSTEM INFORMATION	20-01
BUCKET	40-01	LEFT CONSOLE	40-01
BUCKET CYLINDER	20-01	LEFT CONTROL LEVER (JOYSTICK)	
BUILD UP VALVE	20-01	(S/N 233311870 & ABOVE AND	
CAB.....	40-01	233211878 & ABOVE)	20-01
CASE DRAIN FILTER	20-01	LEFT CONTROL LEVER (JOYSTICK)	
CLAMP CYLINDER	20-01	(S/N 233311869 & BELOW AND	
COMPONENTS	70-01	233211877 & BELOW)	20-01
COMPRESSOR	70-01	LIFTING AND BLOCKING THE EXCAVATOR	10-01
CONDENSOR.....	70-01	LIFTING THE EXCAVATOR	10-01
CONTROL LINKAGE ASSEMBLY	40-01	LIGHTS.....	50-01
CONTROL PATTERN SELECTOR VALVE.....	20-01	LUBRICATION OF THE EXCAVATOR	10-01
CONVERSIONS	SPEC-01	MAIN RELIEF VALVE	20-01
COOLING SYSTEM.....	10-01	MANIFOLD ASSEMBLY/ACCUMULATOR	20-01
CROSSPORT RELIEF VALVE.....	20-01	MUFFLER.....	60-01
DIAGNOSTICS SERVICE CODE	50-01	OIL COOLER.....	20-01
DIRECT TO TANK VALVE	20-01	OPERATOR CAB	10-01
DUAL SEQUENCE VALVE	20-01	PORT RELIEF VALVES.....	20-01
ELECTRICAL SYSTEM INFORMATION	50-01	PRESSURE REDUCING VALVE.....	20-01
ENGINE	60-01	PRESSURE RELIEF VALVE	70-01
ENGINE COMPONENTS AND TESTING	60-01	PRESSURE SWITCH.....	70-01
ENGINE LUBRICATION SYSTEM.....	10-01		
ENGINE SPECIFICATIONS.....	SPEC-01		
ENGINE SPEED CONTROL	40-01		
EVAPORATOR.....	70-01		
EVAPORATOR/HEATER UNIT	70-01		
EXPANSION VALVE	70-01		
FLOORMAT AND FLOOR PANELS	40-01		
FLYWHEEL AND HOUSING.....	60-01		
FUEL, COOLANT AND LUBRICANTS	SPEC-01		
FUEL LEVEL SENDER.....	50-01		
FUEL SYSTEM	10-01		
FUEL TANK.....	40-01		

ALPHABETICAL INDEX (CONT'D)

RADIATOR (S/N 233311422 & ABOVE, S/N 233211380 & ABOVE).....	60-01	TAILGATE.....	40-01
RADIATOR (S/N 233311421 & BELOW, S/N 233211379 & BELOW)	60-01	TAILGATE (S/N 233311550 & ABOVE, S/N 233211443 & ABOVE).....	10-01
RECEIVER/DRYER	70-01	TAILGATE (S/N 233311549 & BELOW, S/N 233211442 & BELOW)	10-01
RECONDITIONING THE ENGINE	60-01	TEMPERATURE/PRESSURE.....	70-01
REGULAR MAINTENANCE	70-01	THERMOSTAT	70-01
REMOVING AIR FROM HYDRAULIC SYSTEM	20-01	TORQUE SPECIFICATIONS	SPEC-01
RIGHT CONSOLE	40-01	TRACKS.....	30-01
RIGHT CONTROL LEVER (JOYSTICK) (S/N 233311870 & ABOVE AND 233211878 & ABOVE).....	20-01	TRACK DAMAGE IDENTIFICATION	30-01
RIGHT CONTROL LEVER (JOYSTICK) (S/N 233311869 & BELOW AND 233211877 & BELOW)	20-01	TRACK FRAME	30-01
RIGHT PEDAL AND LINKAGE.....	40-01	TRACK IDLER (RUBBER TRACK S/N 23331116 & ABOVE AND 23321117 & ABOVE, STEEL TRACK S/N 233311108 & ABOVE AND 233211100 & ABOVE.....	30-01
ROPS CANOPY.....	40-01	TRACK IDLER (RUBBER TRACK S/N 23331115 & BELOW AND 23321116 & BELOW STEEL TRACK S/N 233311107 & BELOW AND 233211099 & BELOW)	30-01
SAFETY	70-01	TRACK ROLLER (RUBBER TRACK S/N 23331116 & ABOVE AND 23321117 & ABOVE, STEEL TRACK S/N 233211108 & ABOVE AND 233211100 & ABOVE	30-01
SEAT AND SEAT MOUNT	40-01	TRACK ROLLER (RUBBER TRACK S/N 23331115 & BELOW AND 23321116 & BELOW, STEEL TRACK S/N 233311107 & BELOW AND 233211099 & BELOW	30-01
SERVICE SCHEDULE	10-01	TRANSPORTING THE EXCAVATOR	10-01
SPARK ARRESTOR MUFFLER (If Equipped)	10-01	TRAVEL CONTROLS.....	40-01
STARTER	50-01	TRAVEL CONTROL VALVE	20-01
SWING CIRCLE GEAR	30-01	TRAVEL MOTOR	10-01 & 20-01
SWING FRAME	40-01	TROUBLESHOOTING	60-01
SWING MOTOR	20-01	TWO SPEED SWITCH.....	50-01
SWING MOTOR DRIVE CARRIER	20-01		
SWIVEL JOINT	20-01	UPPERSTRUCTURE.....	40-01
SYSTEM CHARGING AND RECLAMATION	70-01		
SYSTEM TROUBLESHOOTING CHART	70-01	X-CHANGE TM	40-01

CONTENTS

**SAFETY &
MAINTENANCE**

**HYDRAULIC
SYSTEM**

UNDERCARRIAGE

**UPPERSTRUCTURE
& SWING SECTION**

**ELECTRICAL
SYSTEM &
ANALYSIS**

**ENGINE
SERVICE**

**HEATING,
VENTILATION,
AIR CONDITIONING**

SPECIFICATIONS

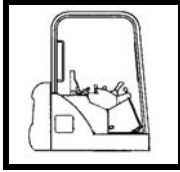
FOREWORD.....	III
SAFETY INSTRUCTIONS	V
SERIAL NUMBER LOCATIONS	IX
DELIVERY REPORT.....	IX
BOBCAT EXCAVATOR IDENTIFICATION	X
SAFETY AND MAINTENANCE.....	10-01
HYDRAULIC SYSTEM	20-01
UNDERCARRIAGE.....	30-01
UPPERSTRUCTURE & SWING SECTION	40-01
ELECTRICAL SYSTEM AND ANALYSIS	50-01
ENGINE SERVICE	60-01
HEATING, VENTILATION, AIR CONDITIONING	70-01
SPECIFICATIONS.....	SPEC-01

FOREWORD

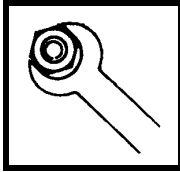
This manual is for the Bobcat Hydraulic excavator mechanic. It provides necessary servicing and adjustment procedures for the hydraulic excavator and its component parts and systems. Refer to the Operation & Maintenance Manual for operating instructions, starting procedure, daily checks, etc.

A general inspection of the following items must be made after the hydraulic excavator has had service or repair:

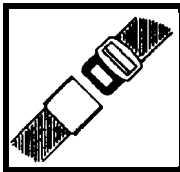
1. Check that the ROPS/TOPS/FOPS is in good condition and is not modified.



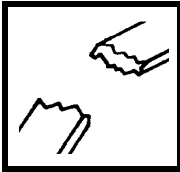
2. Check that ROPS/TOPS mounting hardware is tightened and is Bobcat approved.



3. The seat belt must be correctly installed, functional and in good condition.



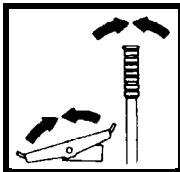
4. Inspect for loose or broken parts or connections.



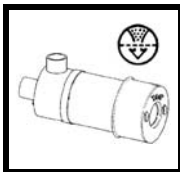
5. Machine signs must be legible and in the correct location.



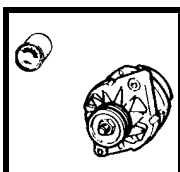
6. Steering levers, control levers and foot pedals must return to neutral. Check that foot pedals lock and control lever locks are in working order.



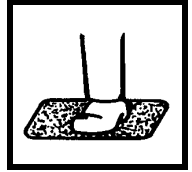
7. Inspect the air cleaner for damage or leaks. Check the condition of the element.



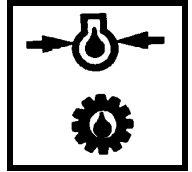
8. Check the electrical charging system.



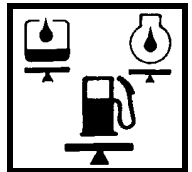
9. Safety treads must be in good condition.



10. Check for correct function of indicator lamps (Optional on some models).



11. Check hydraulic fluid level, engine oil level and fuel supply.



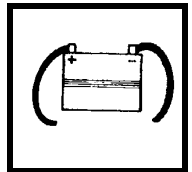
12. Inspect for fuel, oil or hydraulic fluid leaks.



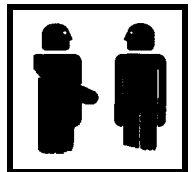
13. Lubricate the excavator.



14. Check the condition of the battery and cables.



Recommend to the owner that all necessary corrections be made before the machine is returned to service.



SAFETY INSTRUCTIONS



Safety Alert Symbol

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



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-2003-0903



WARNING

Warnings on the machine and in the manuals are for your safety. Failure to obey warnings can cause injury or death.

W-2044-1285

IMPORTANT

This notice identifies procedures which must be followed to avoid damage to the machine.

I-2019-0284

The following publications provide information on the safe use and maintenance of the Bobcat machine and attachments:

- The Delivery Report is used to assure that complete instructions have been given to the new owner and that the machine is in safe operating condition.
- The Operation & Maintenance Manual delivered with the machine or attachment contains operating information as well as routine maintenance and service procedures. It is a part of the machine and can be stored in a container provided on the machine. Replacement Operation & Maintenance Manuals can be ordered from your Bobcat dealer.
- Machine signs (decals) instruct on the safe operation and care of your Bobcat machine or attachment. The signs and their locations are shown in the Operation & Maintenance Manual. Replacement signs are available from your Bobcat dealer.
- An Operator's Handbook fastened to the operator cab. It's brief instructions are convenient to the operator. The handbook is available from your dealer in an English edition or one of many other languages. See your Bobcat dealer for more information on translated versions.
- The AEM Safety Manual delivered with the machine gives general safety information.
- The Service Manual and Parts Manual are available from your dealer for use by mechanics to do shop-type service and repair work.
- The Compact Excavator Operator Training Course is available through your local dealer or at www.training.bobcat.com or www.bobcat.com. This course is intended to provide rules and practices of correct operation of the Bobcat Excavator. The course is available in English and Spanish versions.
- Service Safety Training Courses are available from your Bobcat dealer or at www.training.bobcat.com or www.bobcat.com. They provide information for safe and correct service procedures.
- The Bobcat Compact Excavator Safety Video is available from your Bobcat dealer or at www.training.bobcat.com or www.bobcat.com.

SI EXC-0206 SM

<https://truckmanualshub.com/>
The dealer and owner/operator review the recommended uses of the product when delivered. If the owner/operator will be using the machine for a different application(s) he or she must ask the dealer for recommendations on the new use.



Call Before You Dig

1-888-258-0808

When you call, you will be directed to a location in your state/city for information about buried lines (telephone, cable TV, water, sewer, gas, etc.)

SI EXC-0206 SM

SAFETY INSTRUCTIONS (CONT'D)

Fire Prevention

The machine and attachments have components that are at high temperature under normal operating conditions. The primary source of high temperatures is the engine and exhaust system. The electrical system, if damaged or incorrectly maintained, can be a source of arcs or sparks.

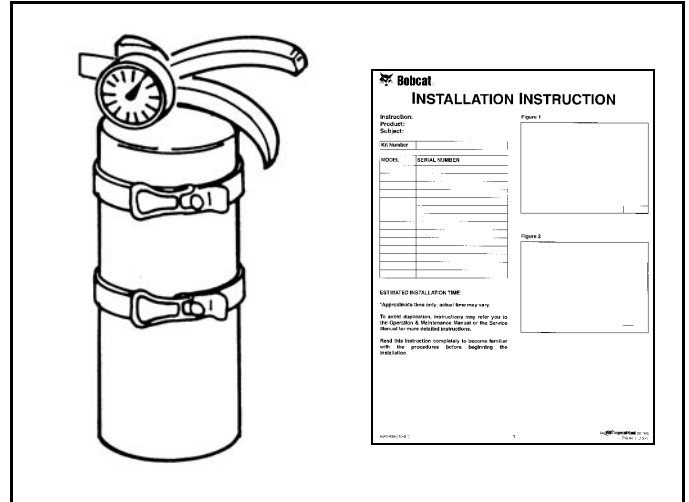
Flammable debris (leaves, straw, etc.) must be removed regularly. If flammable debris is allowed to accumulate, it will increase fire hazard. Clean often to avoid this accumulation. Flammable debris in the engine compartment is a potential hazard.

The spark arrestor muffler is designed to control the emission of hot particles from the engine and exhaust system, but the muffler and the exhaust gases are still hot.

- Do not use the machine where exhaust, arcs, sparks or hot components can contact flammable material, explosive dust or gases.
- The operator cab, engine compartment, and engine cooling system must be inspected every day and cleaned if necessary to prevent fire hazard and overheating.
- Check all electrical wiring and connections for damage. Keep the battery terminals clean and tight. Repair or replace any damaged part.
- Check fuel and hydraulic tubes, hoses and fittings for damage and leakage. Never use open flame or bare skin to check for leaks. Tighten or replace any parts that show leakage. Always clean fluid spills. Do not use gasoline or diesel fuel for cleaning parts. Use commercial nonflammable solvents.
- Do not use ether or starting fluids on any engine which has glow plugs. These starting aids can cause explosion and injure you or bystanders.
- Always clean the machine, disconnect the battery, and disconnect the wiring from the controllers before welding. Cover rubber hoses, battery and all other flammable parts. Keep a fire extinguisher near the machine when welding. Have good ventilation when grinding or welding painted parts. Wear a dust mask when grinding painted parts. Toxic dust or gas can be produced.
- Stop the engine and let it cool before adding fuel. **NO SMOKING!**

- Use the procedure in the Operation & Maintenance Manual for connecting the battery and for jump starting.
- Use the procedure in the Operation & Maintenance Manual for cleaning the spark arrestor muffler (if equipped).

Figure 1



- Know where fire extinguishers and first aid kits are located and how to use them. Fire extinguishers are available from your Bobcat dealer **[Figure 1]**.

SERIAL NUMBER LOCATIONS

Always use the FULL serial number (including the first four digits) when requesting service information or when ordering parts. Early or later models (identification made by serial number) may use different parts, or it may be necessary to use a different procedure in doing a specific service operation.

Hydraulic Excavator Serial Number

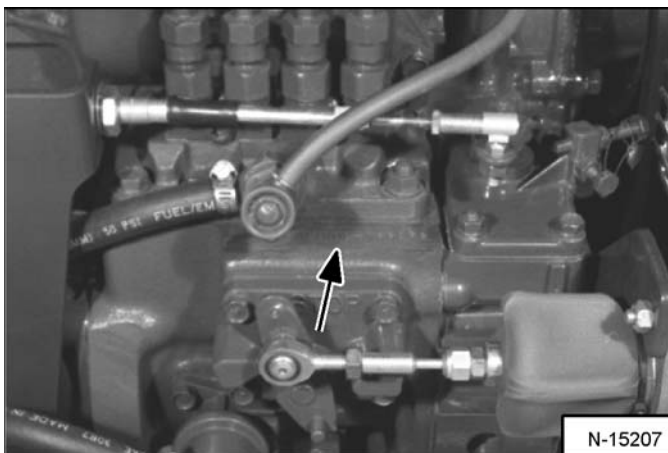
Figure 1



The excavator serial number is on the front of the machine frame, to the left of the boom [Figure 1].

Engine Serial Number

Figure 2



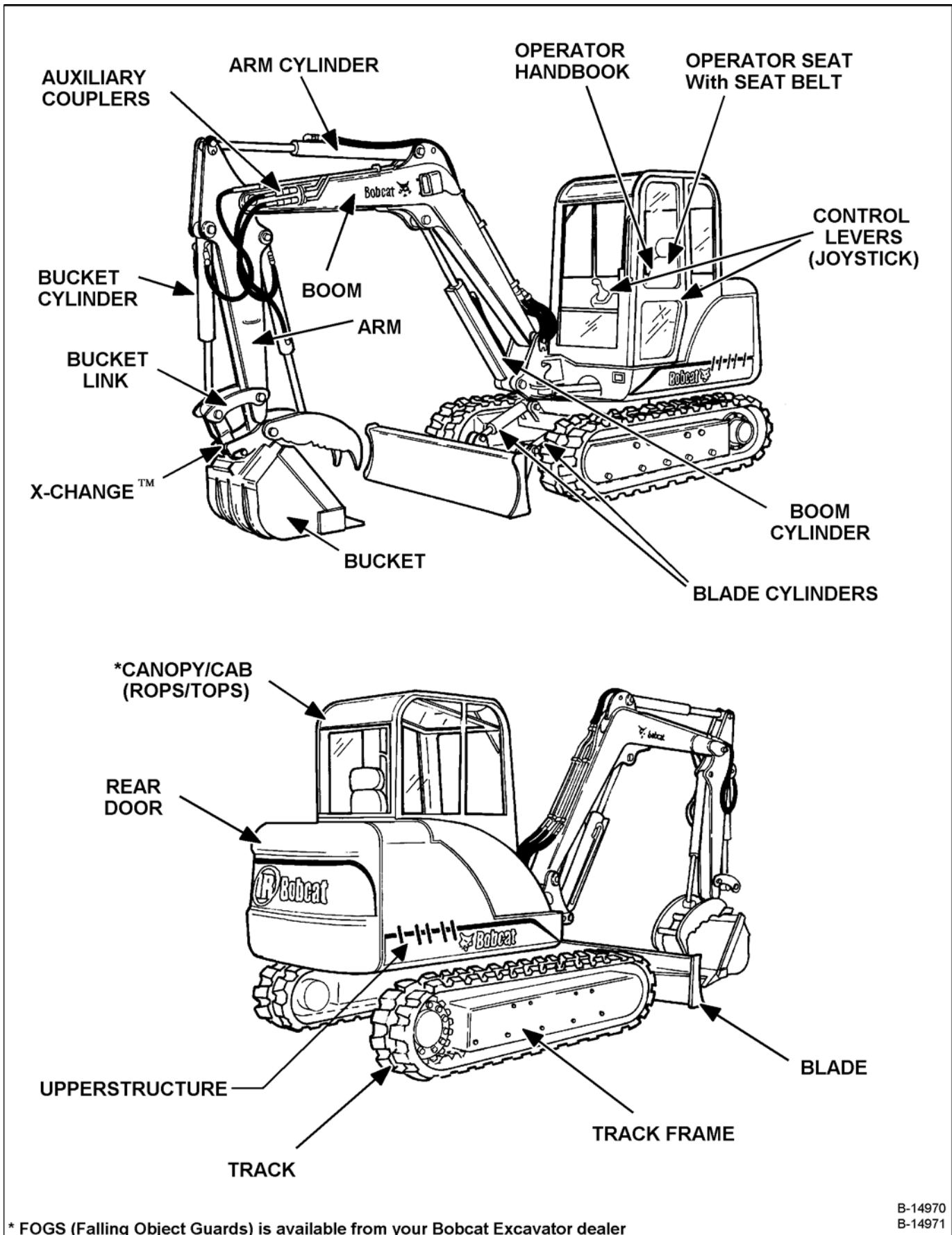
The engine serial number is located by the fuel injection pump on the engine block [Figure 2].

DELIVERY REPORT

Figure 3

The Delivery Report items must be explained to the owner/operator by the dealer. The dealer is to fill out the form and the owner/operator signs the form to indicate his understanding [Figure 3].

BOBCAT EXCAVATOR IDENTIFICATION



B-14970
B-14971

SAFETY AND MAINTENANCE

AIR CLEANER SERVICE	10-60-1
Checking	10-60-1
Replacing The Filters	10-60-1
COOLING SYSTEM	10-70-1
Checking Coolant Level	10-70-1
Cleaning The Cooling System	10-70-1
Replacing The Coolant (Early Models)	10-70-2
Replacing The Coolant (Later Models)	10-70-3
ENGINE LUBRICATION SYSTEM	10-90-1
Checking Engine Oil (Early Models)	10-90-1
Checking Engine Oil (Later Models)	10-90-3
Replacing Oil And Filter (Early Models)	10-90-1
Replacing Oil And Filter (Later Models)	10-90-3
FUEL SYSTEM	10-80-1
Draining The Fuel Tank	10-80-3
Filling The Fuel Tank	10-80-1
Fuel Filter	10-80-2
Fuel Specifications	10-80-1
Removing Air From The Fuel System	10-80-3
Removing Water From The Fuel Filter	10-80-2
HEATER AIR FILTER	10-61-1
Fresh Air Filter	10-61-1
Recirculation Filter (Early Models Only)	10-61-1
HYDRAULIC SYSTEM	10-100-1
Checking And Adding Fluid (Early Models)	10-100-1
Checking And Adding Fluid (Later Models)	10-100-2
Diagnostic Couplers	10-100-6
Replacing the Case Drain Filter	10-100-5
Replacing the Hydraulic Filter	10-100-5
Replacing The Hydraulic Oil (Early Models)	10-100-3
Replacing The Hydraulic Oil (Later Models)	10-100-4
LIFTING AND BLOCKING THE EXCAVATOR	10-10-1
Procedure	10-10-1

Continued On Next Page

SAFETY AND MAINTENANCE (CONT'D)

LIFTING THE EXCAVATOR	10-11-1
3-Point Lift Procedure	10-11-1
LUBRICATION OF THE EXCAVATOR	10-110-1
Procedure	10-110-1
OPERATOR CAB	10-20-1
Cab Door	10-20-1
Emergency Exit	10-20-1
SERVICE SCHEDULE	10-50-1
SPARK ARRESTOR MUFFLER (IF EQUIPPED)	10-130-1
Servicing	10-130-1
TAILGATE (S/N 233311550 ABOVE, S/N 233211443 & ABOVE)	10-41-1
Adjusting The Bumper	10-41-1
Adjusting The Striker	10-41-2
Opening And Closing The Tailgate	10-41-1
TAILGATE (S/N 233311549 & BELOW, S/N 233211442 & BELOW) ..	10-40-1
Adjusting The Bumper	10-40-1
Adjusting The Latch	10-40-1
Opening And Closing The Tailgate	10-40-1
TRANSPORTING THE EXCAVATOR	10-30-1
Procedure	10-30-1
TRAVEL MOTOR	10-120-1
Checking Oil Level	10-120-1
Draining The Travel Motor	10-120-1

LIFTING AND BLOCKING THE EXCAVATOR

Procedure

Always park the machine on a level surface.

WARNING

Put jackstands under the blade and rear corners of the undercarriage before working under the machine. Failure to block up the machine may allow it to move or fall and result in injury or death.

W-2218-1195

WARNING

AVOID INJURY

Keep fingers and hands out of pinch points when checking the track tension.

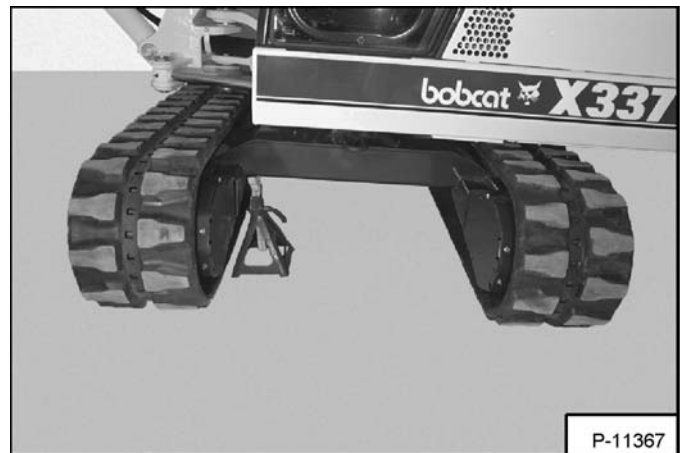
W-2142-0189

Figure 10-10-1



Raise the machine using the boom and arm [Figure 10-10-1].

Figure 10-10-2



Fully raise the blade and install jackstands under the blade [Figure 10-10-1] and track frame [Figure 10-10-2].

Lower the boom until all the machine weight is on the jackstands.

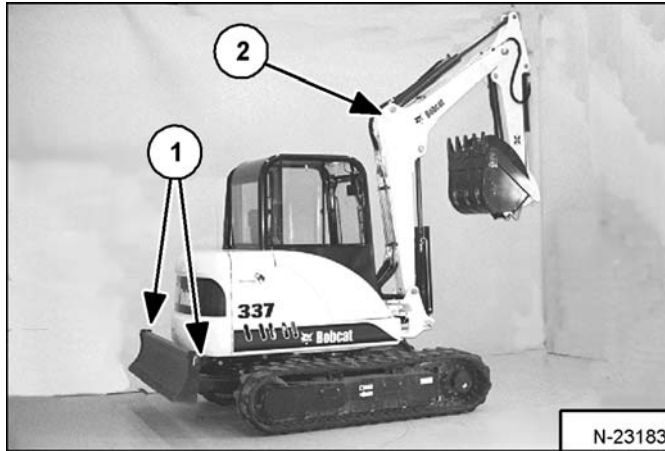
Repeat the procedure for the other side.

Stop the engine.

LIFTING THE EXCAVATOR

3-Point Lift Procedure

Figure 10-11-1

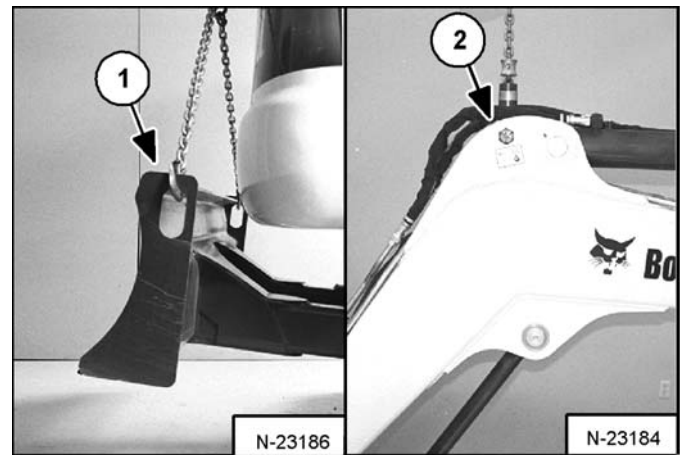


Fully extend the cylinders of the bucket, arm & boom so that the excavator is in the position as shown [Figure 10-11-1].

Raise the blade all the way.

Put all the control levers in neutral .

Figure 10-11-2



Fasten chains to the ends of the blade (Item 1) [Figure 10-11-1] & [Figure 10-11-2] and up to a lifting fixture above the canopy/cab. The lifting fixture must extend over the sides of the canopy/cab to prevent the chains from hitting the ROPS/TOPS.

Install a 1 inch (25mm) bolt and nut (Grade 5 or 8) through the holes at the top of the boom (Item 2) [Figure 10-11-1] & [Figure 10-11-2]. Fasten a chain from the bolt to the lift fixture.

WARNING

AVOID INJURY OR DEATH

- Use a lifting fixture with sufficient capacity for the weight of the excavator plus any added attachments.
- Maintain center of gravity and balance when lifting.
- Do not swing boom or upperstructure. Engage the swing locking lever.
- Never lift with operator on machine.

W-2202-0595

OPERATOR CAB

Emergency Exit

The left door and right side rear window provide exits.

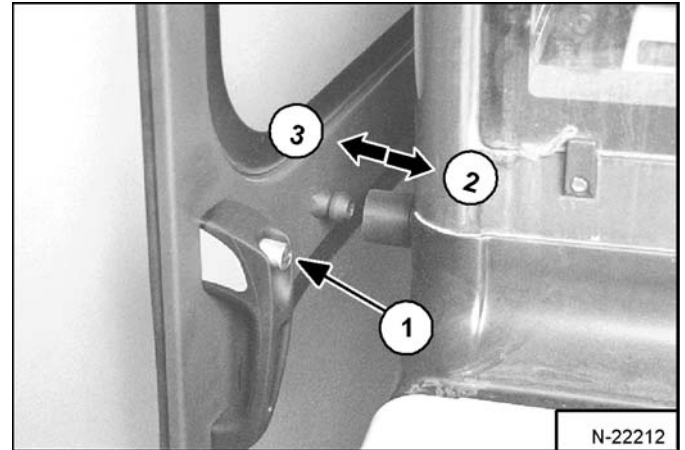
Figure 10-20-1



Slide the window to the front of the excavator and exit through the side window **[Figure 10-20-1]**.

Cab Door

Figure 10-20-2



The cab door can be locked (Item 1) **[Figure 10-20-2]** with the same key as the starter switch.

Push the door all the way open (Item 2) **[Figure 10-20-2]** until the latch engages to hold the door in the open position.

Pull the door away from the cab (Item 3) **[Figure 10-20-2]** to disengage the latch and close the door.

TRANSPORTING THE EXCAVATOR

Procedure

WARNING

Adequately designed ramps of sufficient strength are needed to support the weight of the machine when loading onto a transport vehicle. Wood ramps can break and cause personal injury.

W-2058-0494

When transporting the machine, observe the rules, motor vehicle laws and vehicle limit ordinances. Use a transport and towing vehicle of adequate length and capacity.

Secure the parking brakes and block the wheels of the transport vehicle.

Align the ramps with the center of the transport vehicle. Secure the ramps to the truck bed and be sure ramp angle does not exceed 15 degrees.

Use metal loading ramps with a slip resistant surface.

Use ramps that are the correct length and width, and can support the weight of the machine.

The rear of the trailer must be blocked or supported when loading or unloading the excavator to prevent the front of the transport vehicle from raising.

Determine the direction of the track movement before moving the machine (blade forward).

Figure 10-30-1



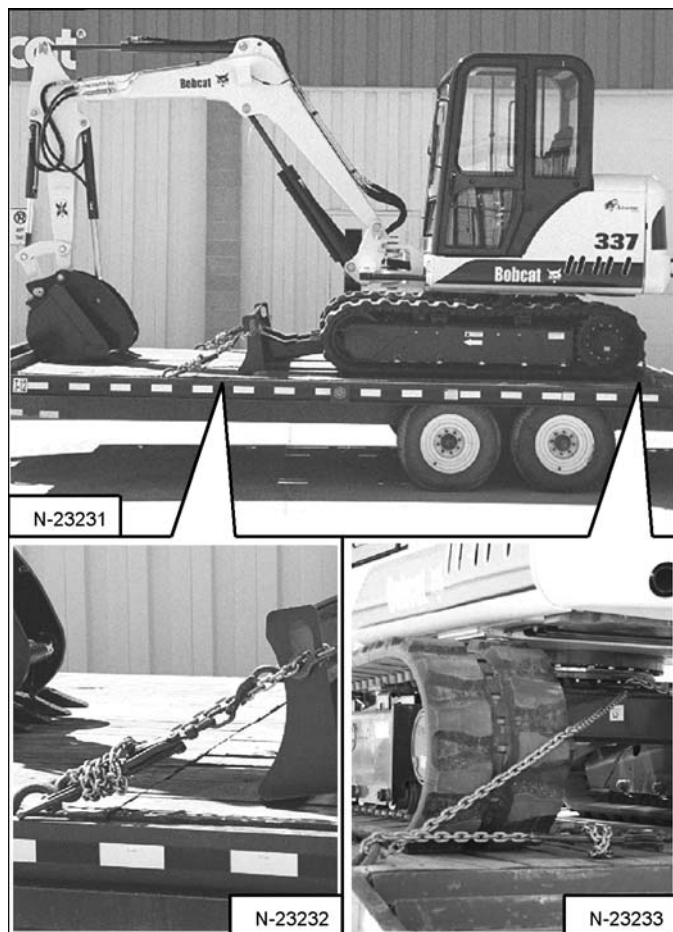
Move the machine forward onto the transport vehicle [Figure 10-30-1].

Do not change direction of the machine while it is on the ramps.

TRANSPORTING THE EXCAVATOR (CONT'D)

Procedure (Cont'd)

Figure 10-30-2



Lower the boom, arm and bucket to the transport vehicle [Figure 10-30-2].

Stop the engine and remove the key (if equipped).

Put blocks at the front and rear of the tracks.

Fasten chains to the front corners of the blade and to the tie down loop at the rear [Figure 10-30-2] to prevent it from moving when going up or down slopes, or during sudden stops.

Use chain binders to tighten the chains and then safely tie the chain binder levers to prevent loosening.

TAILGATE (S/N 233311549 & BELOW, S/N 233211442 & BELOW)

Opening And Closing The Tailgate

WARNING

AVOID INJURY

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

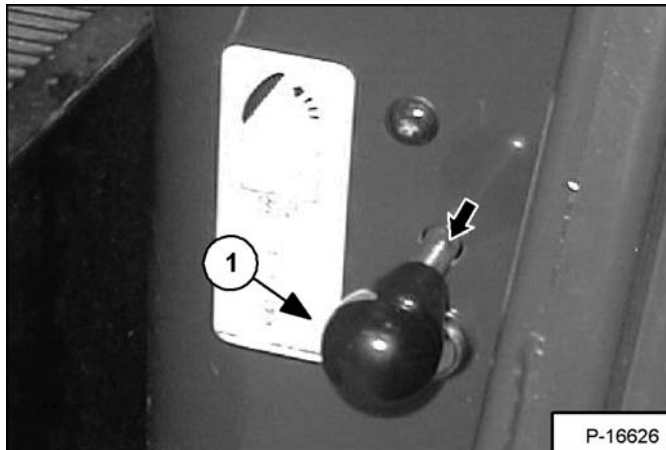
W-2012-0497

WARNING

Keep the rear door closed when operating the machine. Failure to do so could seriously injure a bystander.

W-2020-1285

Figure 10-40-1

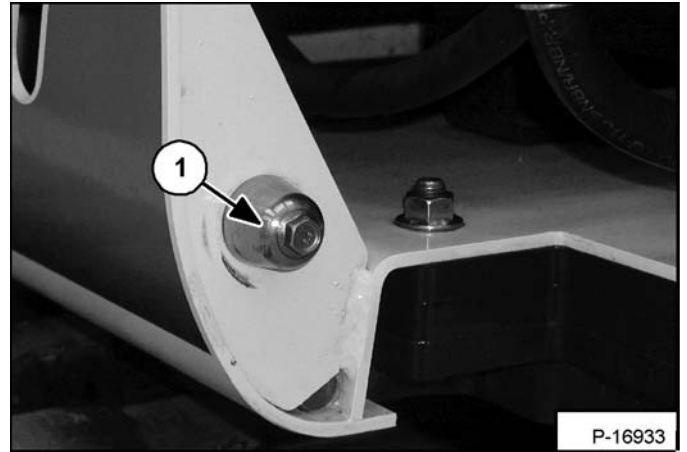


In the operator cab, pull the tailgate latch (Item 1) [Figure 10-40-1] and pull the tailgate open.

Push firmly to close the tailgate.

Adjusting The Bumper

Figure 10-40-2

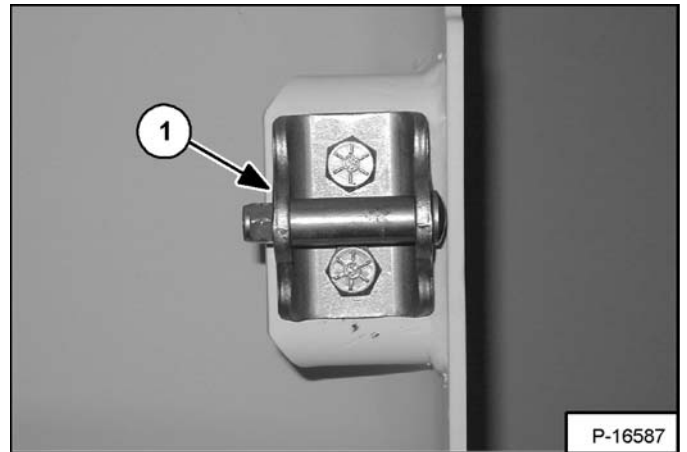


The door bumper (Item 1) [Figure 10-40-2] can be adjusted for alignment with the door.

Close the door before operating the excavator.

Adjusting The Latch

Figure 10-40-3

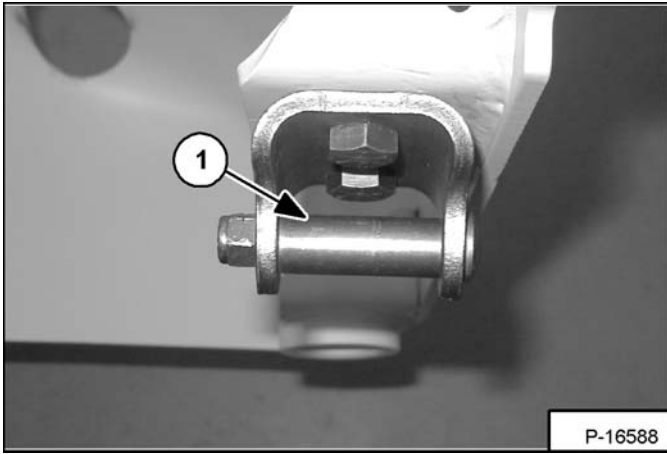


The door latch (Item 1) [Figure 10-40-3] can be adjusted in either direction for alignment with the door latch.

**TAILGATE (S/N 233311549 & BELOW, S/N 233211442
& BELOW) (CONT'D)**

Adjusting The Latch (Cont'd)

Figure 10-40-4



The door latch cylinder (Item 1) **[Figure 10-40-4]** can be adjusted by loosening the nut and moving the cylinder and tightening the nut.

Close the tailgate before operating the excavator.

TAILGATE (S/N 233311550 ABOVE, S/N 233211443 & ABOVE)

Opening And Closing The Tailgate



AVOID INJURY

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

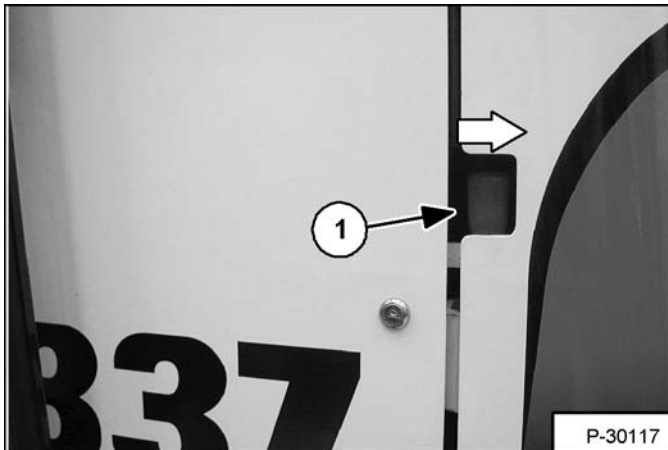
W-2012-0497



Keep the rear door closed when operating the machine. Failure to do so could seriously injure a bystander.

W-2020-1285

Figure 10-41-1

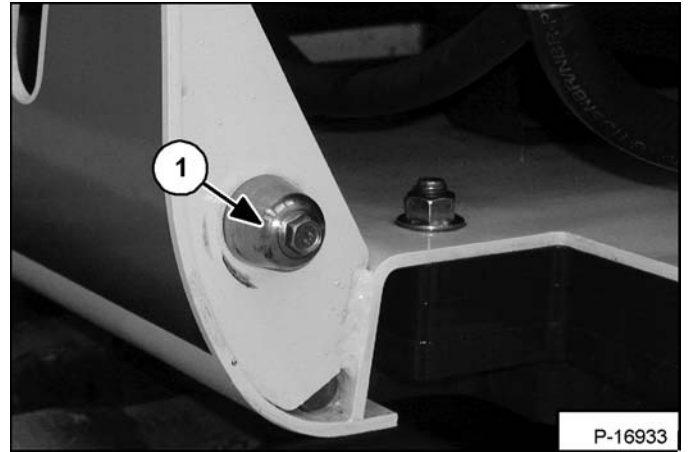


At the tailgate, pull the tailgate latch (Item 1) [Figure 10-41-1] and pull the tailgate open.

Push firmly to close the tailgate.

Adjusting The Bumper

Figure 10-41-2



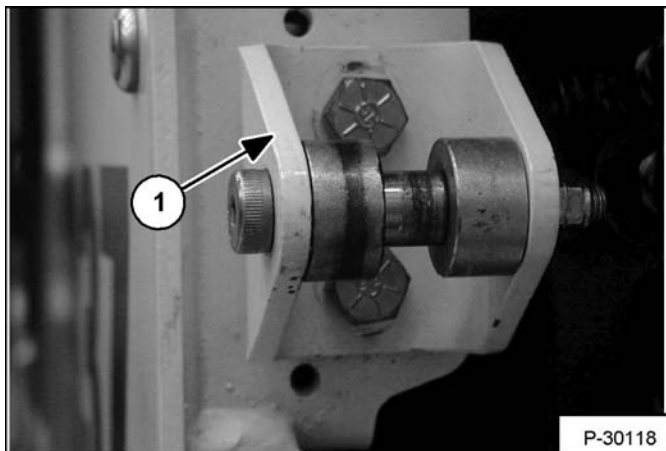
The door bumper (Item 1) [Figure 10-41-2] can be adjusted for alignment with the door.

Close the door before operating the excavator.

TAILGATE (S/N 233311550 ABOVE, S/N 233211443 & ABOVE) (CONT'D)

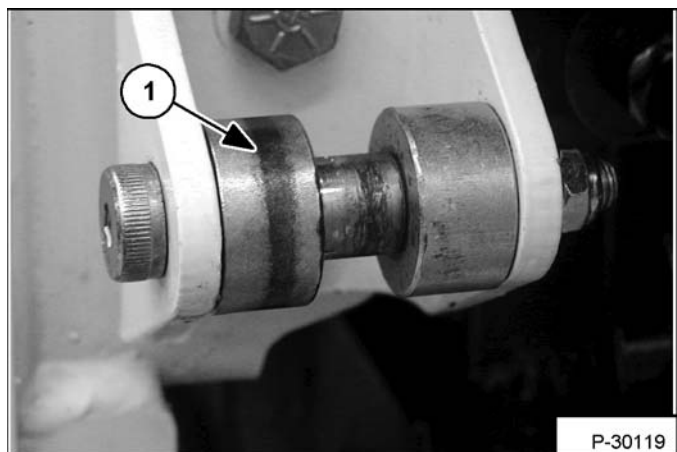
Adjusting The Striker

Figure 10-41-3



The door striker (Item 1) [Figure 10-41-3] can be adjusted in either direction for alignment with the door latch.

Figure 10-41-4



The door roller (Item 1) [Figure 10-41-4] can be removed by loosening the nut and removing the mount bolt.

Close the tailgate before operating the excavator.

SERVICE SCHEDULE

Maintenance work must be done at regular intervals. Failure to do so will result in excessive wear and early failures. The service schedule is a guide for correct maintenance of the Bobcat excavator.



WARNING

Instructions are necessary before operating or servicing machine. Read and understand the Operation & Maintenance Manual, 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-2003-0199

SERVICE SCHEDULE		HOURS					
ITEM	SERVICE REQUIRED	8-10	50	100	250	500	■ 1000
Engine Coolant	Check coolant level. Add premixed coolant as needed.						
Engine Oil	Check the engine oil level and add as needed.						
Hydraulic Fluid, Hoses and Tubelines, Reservoir Breather Cap	Check the hydraulic fluid level and add as needed. Check for dam age and leaks. Repair or replace as needed.						
Engine Air Filter and Air System	Check condition indicator and empty dust cup as needed. Check air system for leaks.						
Tracks	Check and adjust track tension as needed.						
Indicators and Lights	Check for correct operation of all indicators and lights.						
Operator Canopy / Cab	Check condition. Check mounting hardware.						
Seat Belt	Check condition. Check mounting hardware.						
Safety Signs and Safety Treads	Check for damaged signs (decals) and safety treads. Replace any signs or safety treads that are damaged or worn.						
Pivot Points	Grease all machinery pivot points. (21 Places)						
Cab Heater Air Filter	Clean the filter as needed.						
Swing Circle and Pinion	Grease three fittings.						
Fuel Tank & Filter	Drain water and sediment from fuel tank and fuel filter.						
Battery	Check battery, cables, connections and electrolyte level. Add distilled water as needed.						
Alternator / Fan Belt	Check condition of belt and adjust as needed.		•				
Spark Arrestor Muffler	Clean the spark chamber.						
Engine Oil and Filter	Replace oil & filter. Use CD or better grade oil and Bobcat filter.		•				
Fuel Filter	Replace fuel filter.						
Final Drive Case	Check lubricant level in both final drive cases.			◆			
Radiator, oil cooler, *A/C	Clean debris from the radiator fins.						
Hydraulic Filter	Replace the filter element.			••			
Alternator & Starter	Check the alternator and starter connections.		•				
Engine Valves	Check and adjust the engine valve clearance.						
Case Drain Filter	Replace the filter.						
Final Drive Case	Replace lubricant in both final drive cases.						
Engine Cooling System	Drain and flush the cooling system. Replace the coolant.						
Hydraulic System	Replace the hydraulic fluid and filter. Clean the Reservoir.			••			

* If Equipped

• Also at *first* 50 Hours

◆ Replace at first 100 hours

•• Also at *first* 100 Hours

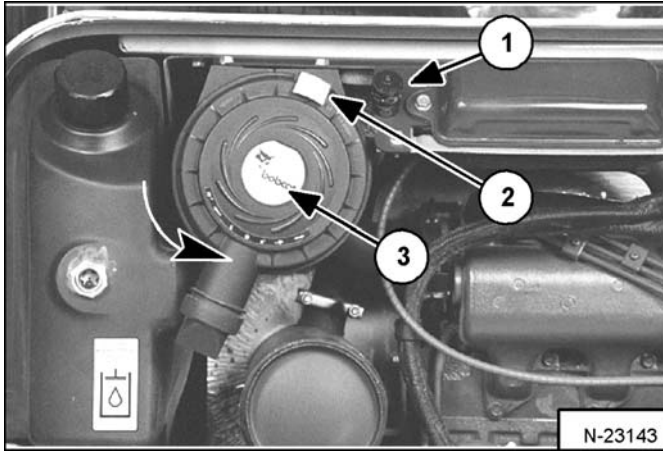
■ Or every 6 months

AIR CLEANER SERVICE

Checking

See SERVICE SCHEDULE on Page 10-50-1 for the correct service interval.

Figure 10-60-1



Check the condition indicator (Item 1) [Figure 10-60-1]. If the red ring shows in the condition indicator, the filter element needs to be replaced.

Replace the inner filter every third time the outer filter is replaced or as indicated.

Replacing The Filters

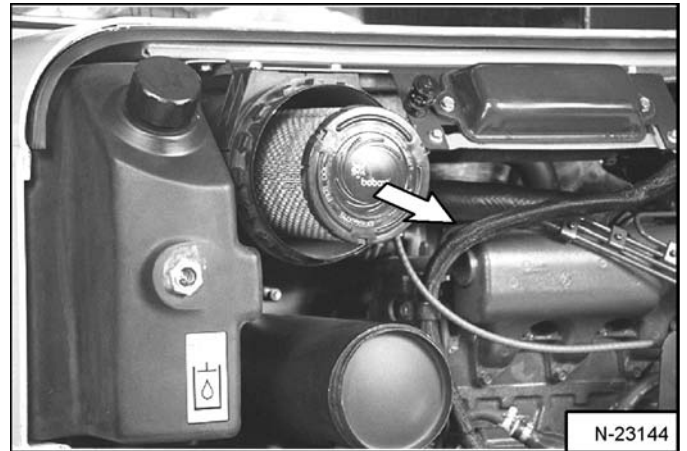
Outer Filter

Pull the locking tab (Item 2) [Figure 10-60-1].

Turn the dust cup (Item 3) [Figure 10-60-1] counterclockwise 1/8 turn.

Remove and clean the dust cup.

Figure 10-60-2



Pull the outer filter from the air cleaner housing [Figure 10-60-2].

Check the housing for damage.

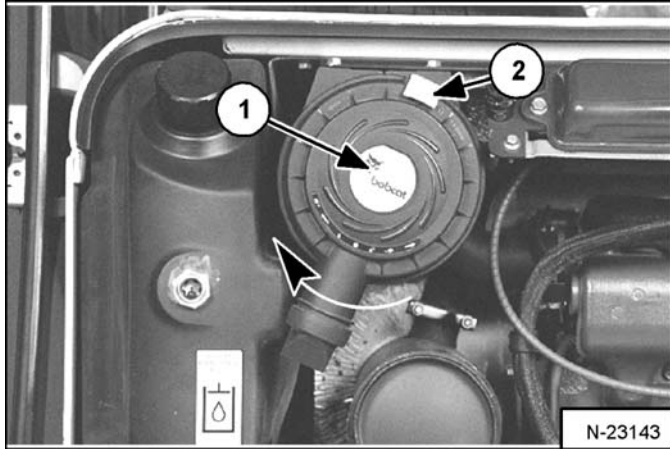
Clean the housing and the seal surface. Do Not use compressed air.

Install a new element.

AIR CLEANER SERVICE (CONT'D)

Replacing The Filters (Cont'd)

Figure 10-60-3



Install the dust cup (Item 1) [Figure 10-60-3] and turn clockwise 1/8 turn.

Push locking tab in (Item 2) [Figure 10-60-3].

Check the air intake hose and the air cleaner housing for damage. Make sure all connections are tight.

Inner Filter

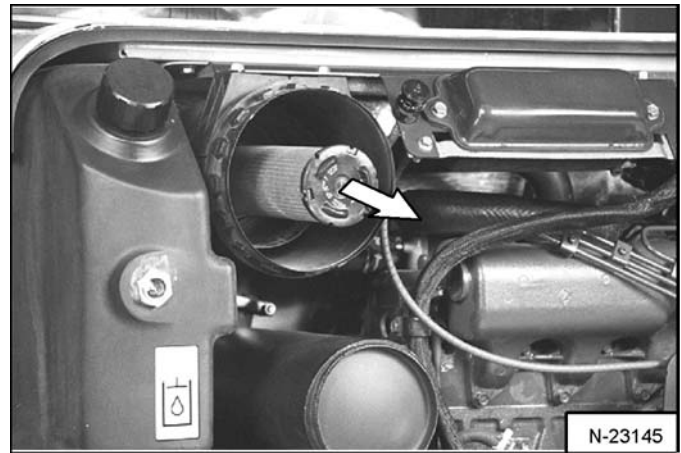
Only replace the inner filter element under the following conditions:

- Replace the inner filter element every *third* time the outer filter is replaced.
- After the outer element has been replaced, press the button (Item 2) [Figure 10-60-3] on the top of the condition indicator and start the engine. Run at full RPM, then reduce engine speed and stop the engine. If the red ring shows in the condition indicator, replace the inner filter element.

Remove the dust cup, outer filter and inner filter.

NOTE: Make sure all sealing surfaces are free of dirt and debris.

Figure 10-60-4



Install the new inner element [Figure 10-60-4].

Install the outer element and the dust cup [Figure 10-60-3].

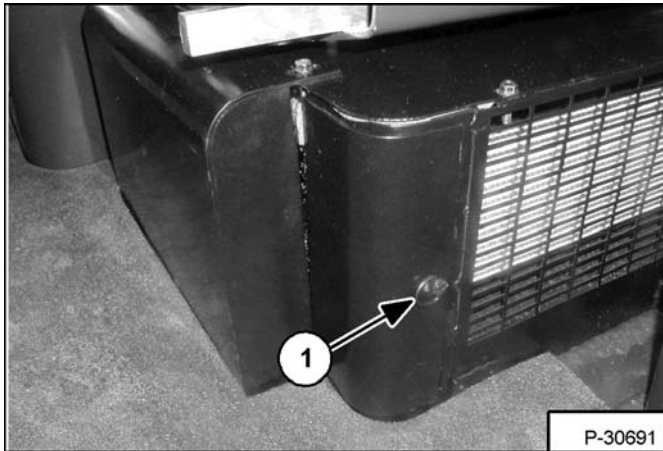
Press the button on the condition indicator to reset the red ring.

HEATER AIR FILTER

Fresh Air Filter

Later Models

Figure 10-61-1

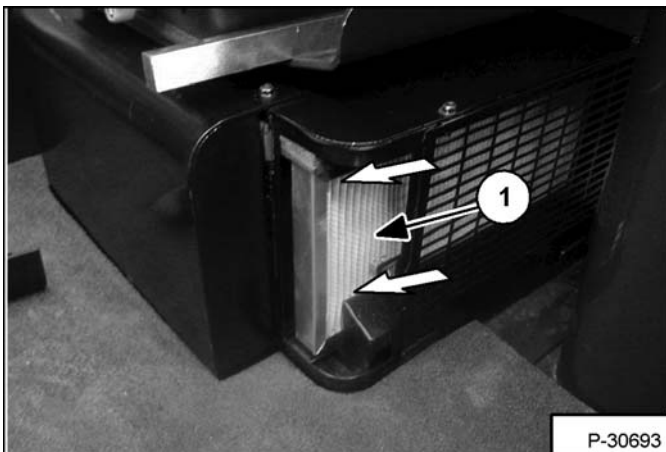


The heater filter must be cleaned regularly. The filter is located at the left of the operator seat **[Figure 10-61-1]**.

Remove the fastener (Item 1) **[Figure 10-61-1]** from the front access panel.

Remove the access panel.

Figure 10-61-2

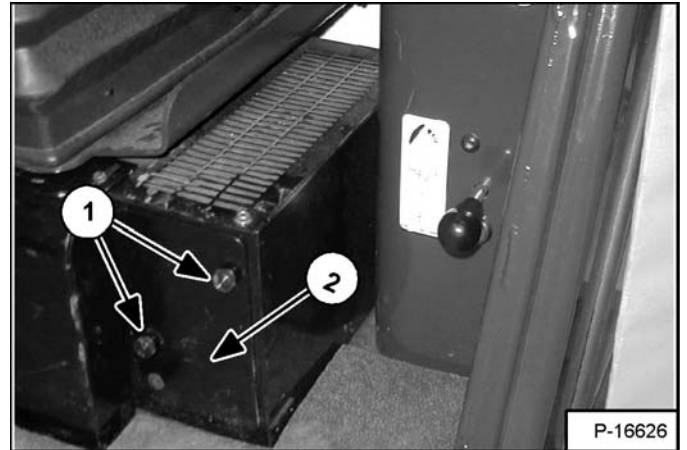


Remove the filter (Item 1) **[Figure 10-61-2]**.

Use low air pressure to clean the filter; replace when very dirty.

Early Models

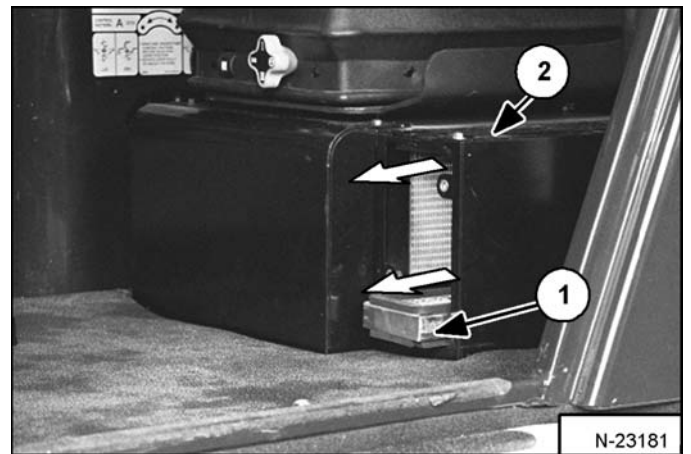
Figure 10-61-3



The heater filters must be cleaned regularly. The filters are located at the left of the operator seat **[Figure 10-61-3]**.

Remove the two knobs (Item 1) and front panel (Item 2) **[Figure 10-61-3]**.

Figure 10-61-4



Remove the fresh air filter (Item 1) **[Figure 10-61-4]**. Use low air pressure to clean the filter; replace when very dirty.

Recirculation Filter (Early Models Only)

Remove the recirculation filter (Item 2) **[Figure 10-61-4]**. Use air pressure to clean the filter; replace when very dirty.

Install the filters, front panel and tighten knobs.

COOLING SYSTEM

Check the cooling system every day to prevent overheating, loss of performance or engine damage.

Cleaning The Cooling System

Open the tailgate.

Use air pressure or water pressure to clean the radiator and oil cooler. Be careful not to damage fins when cleaning.

Checking Coolant Level



WARNING

Do not remove radiator cap when the engine is hot. You can be seriously burned.

W-2070-1285

Open the tailgate.

Figure 10-70-1

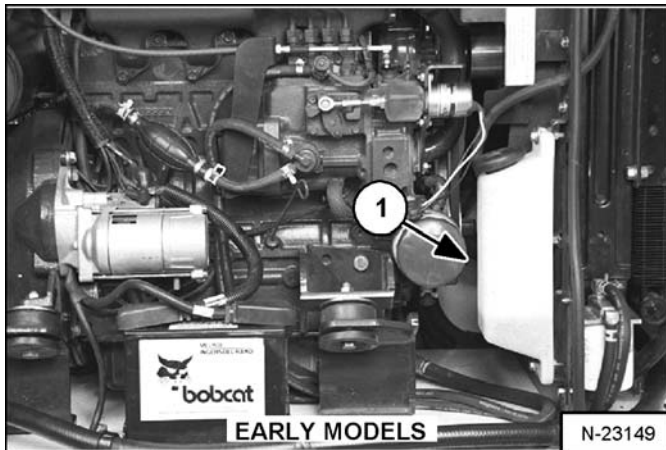
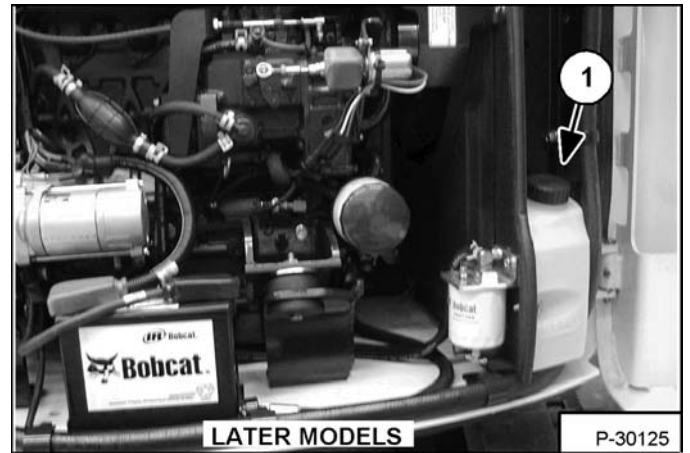


Figure 10-70-2



Check the coolant level in the coolant recovery tank (Item 1) [Figure 10-70-1] & [Figure 10-70-2].

The coolant level must be between the MIN and MAX marks on the coolant recovery tank when the engine is cold.

NOTE: The cooling system is factory filled with propylene glycol (purple color). **DO NOT** mix propylene glycol with ethylene glycol.

IMPORTANT

AVOID ENGINE DAMAGE

Always use the correct ratio of water to anti freeze. Too much antifreeze reduces cooling system efficiency and may cause serious premature engine damage.

Too little antifreeze reduces the additives which protect the internal engine components; reduces the boiling point and freeze protection of the system.

Always add a premixed solution. Adding full strength concentrated coolant can cause serious premature engine damage.

I-2124-0497



WARNING

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-2019-1285

COOLING SYSTEM (CONT'D)

Replacing The Coolant (Early Models)

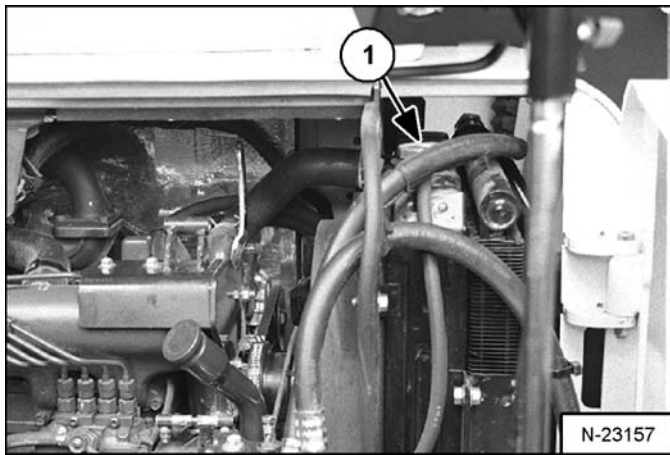
See SERVICE SCHEDULE on Page 10-50-1 for the correct service intervals.

WARNING

Do not remove radiator cap when the engine is hot. You can be seriously burned.

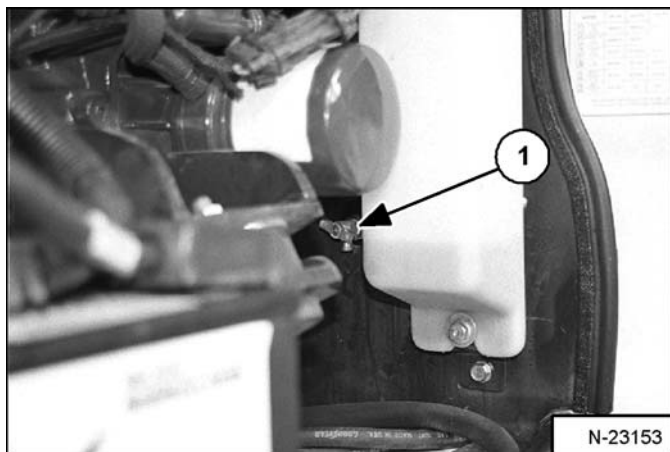
W-2070-1285

Figure 10-70-3



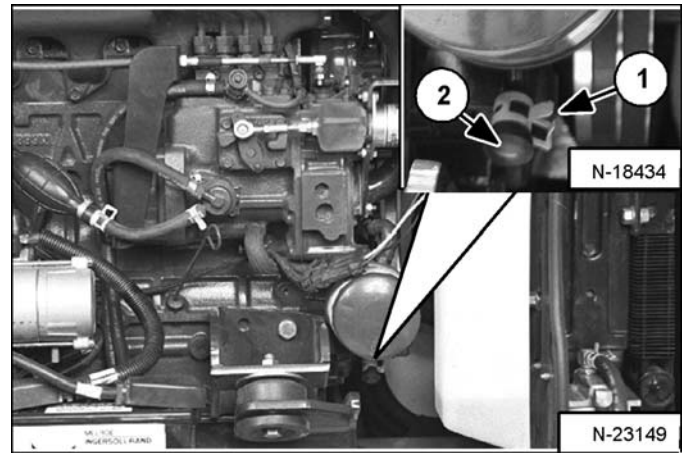
When the engine is cool, loosen and remove the radiator cap (Item 1) [Figure 10-70-3].

Figure 10-70-4



Put a hose on the drain valve (Item 1) [Figure 10-70-4] at the bottom of the radiator. Open the drain valve and drain the coolant into a container.

Figure 10-70-5



Release the constant tension clamp (Item 1) [Figure 10-70-5] and remove the plug (Item 2) [Figure 10-70-5] and drain the coolant into a container.

After all the coolant is removed, install the plug and clamp.

Recycle or dispose of the used coolant in an environmentally safe manner.

Mix the coolant in a separate container. (See FUEL, COOLANT AND LUBRICANTS on Page SPEC-60-1 for correct capacity.)

NOTE: The cooling system is factory filled with propylene glycol (purple color). DO NOT mix propylene glycol with ethylene glycol.

Add premixed coolant; 47% water and 53% propylene glycol to the recovery tank if the coolant level is low.

One gallon and one pint of propylene glycol mixed with one gallon of water is the correct mixture of coolant to provide a -34°F (-37°C) freeze protection. (See **IMPORTANT** on Page 10-70-1.)

Use a refractometer to check the condition of propylene glycol in your cooling system.

Add premixed coolant until the level is correct.

Run the engine until it is at operating temperature. Stop the engine. Check the coolant level and add as needed. Be sure the radiator cap is tight.

Add coolant to the recovery tank as needed.

Close the tailgate.

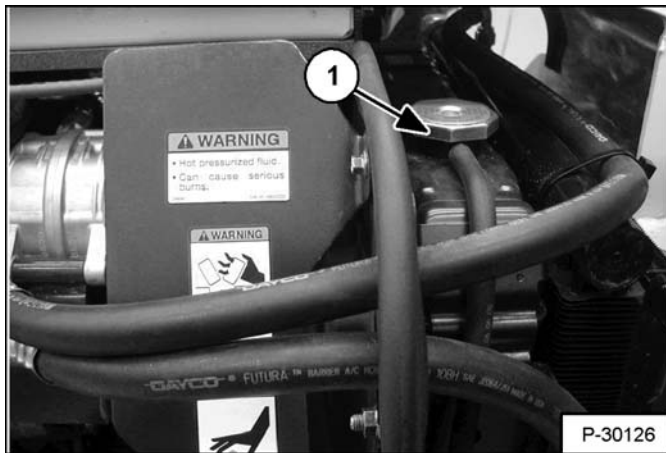
COOLING SYSTEM (CONT'D)

Replacing The Coolant (Later Models)

See SERVICE SCHEDULE on Page 10-50-1 for the correct service intervals.

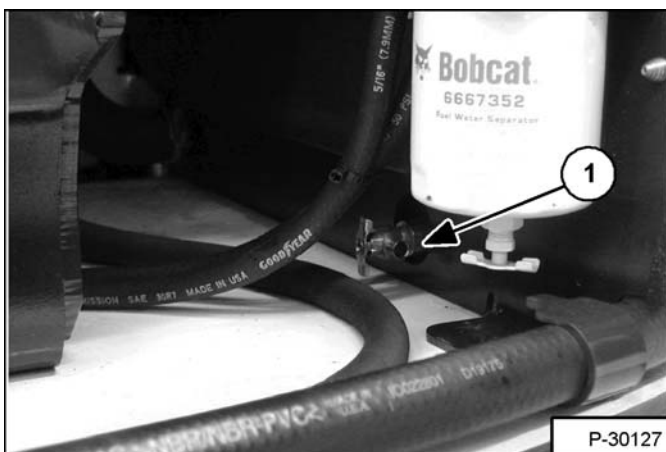


Figure 10-70-6



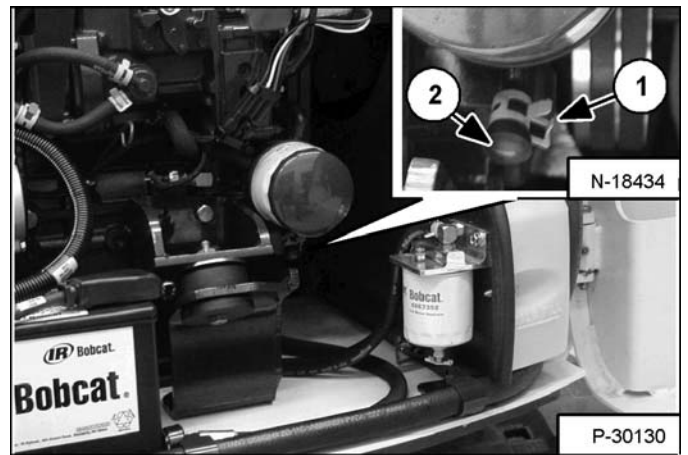
When the engine is cool, loosen and remove the radiator cap (Item 1) [Figure 10-70-6].

Figure 10-70-7



Put a hose on the drain valve (Item 1) [Figure 10-70-7] at the bottom of the radiator. Open the drain valve and drain the coolant into a container.

Figure 10-70-8



Release the constant tension clamp (Item 1) [Figure 10-70-8] and remove the plug (Item 2) [Figure 10-70-8] and drain the coolant into a container.

After all the coolant is removed, install the plug and clamp..

Recycle or dispose of the used coolant in an environmentally safe manner.

Mix the coolant in a separate container. (See FUEL, COOLANT AND LUBRICANTS on Page SPEC-60-1 for correct capacity.)

NOTE: The cooling system is factory filled with propylene glycol (purple color). DO NOT mix propylene glycol with ethylene glycol.

Add premixed coolant; 47% water and 53% propylene glycol to the recovery tank if the coolant level is low.

One gallon and one pint of propylene glycol mixed with one gallon of water is the correct mixture of coolant to provide a -34°F (-37°C) freeze protection. (See **IMPORTANT** on Page 10-70-1.)

Use a refractometer to check the condition of propylene glycol in your cooling system.

Add premixed coolant until the level is correct.

Run the engine until it is at operating temperature. Stop the engine. Check the coolant level and add as needed. Be sure the radiator cap is tight.

Add coolant to the recovery tank as needed.

Close the tailgate.

FUEL SYSTEM

Fuel Specifications

Use only clean, high quality diesel fuel, Grade No. 2 or Grade No. 1.

The following is a suggested blending guideline which should prevent fuel gelling problems during freezing temperatures:

TEMP. F° (C°)	NO. 2	NO.1
+15°(9°)	100%	0%
Down to -20° (-29°)	50%	50%
Below -20° (-29°)	0%	100%

See your fuel supplier for local recommendations.

Filling The Fuel Tank

! WARNING

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 which can result in injury or death.

W-2103-1285

! WARNING

Stop and cool the engine before adding fuel. NO SMOKING! Failure to obey warnings can cause an explosion or fire.

W-2063-0887

Figure 10-80-1

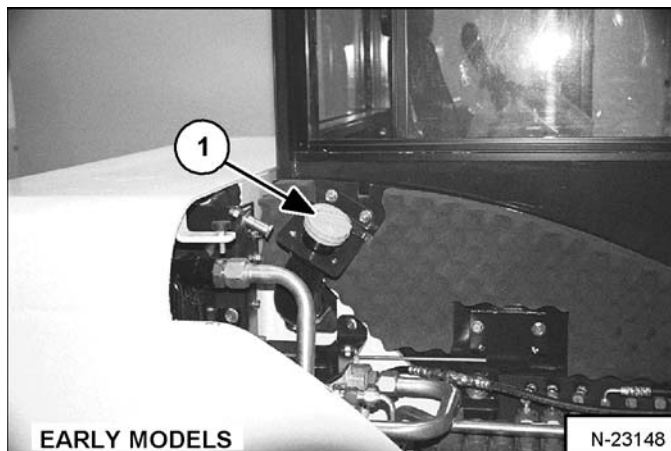
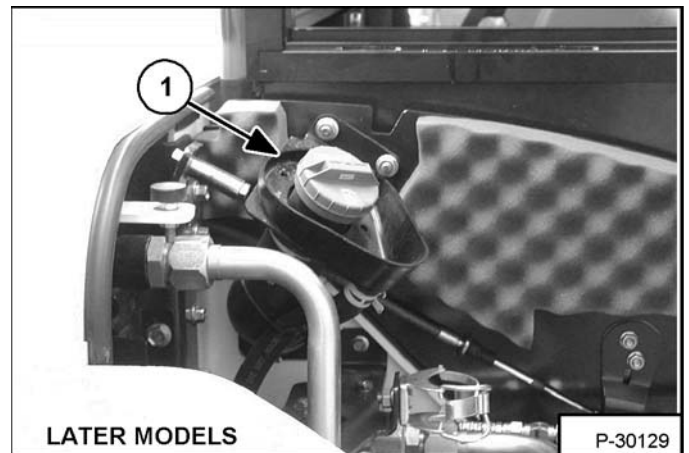


Figure 10-80-2



Open the side cover and remove the fuel fill cap (Item 1) [Figure 10-80-1] & [Figure 10-80-2].

Use a clean, approved safety container to add fuel. Add fuel only in an area that has a free movement of air and no flames or sparks. **NO SMOKING!**

Install and tighten the fuel fill cap. Close the side cover.

See SERVICE SCHEDULE on Page 10-50-1 for the service interval when to remove water from or replace the fuel filter.

FUEL SYSTEM (CONT'D)

Removing Water From The Fuel Filter

Open the tailgate.

Figure 10-80-3

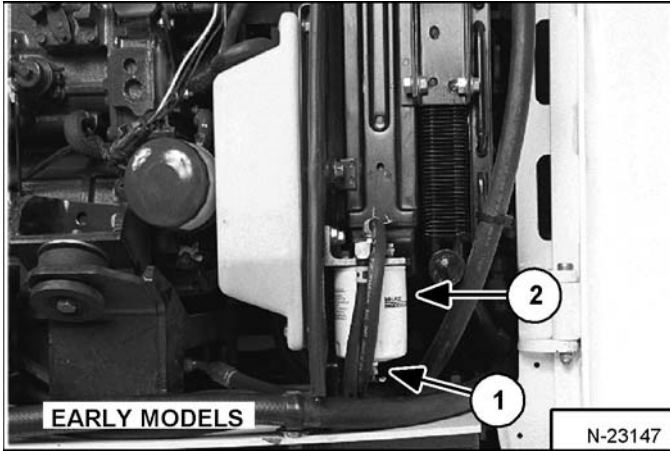
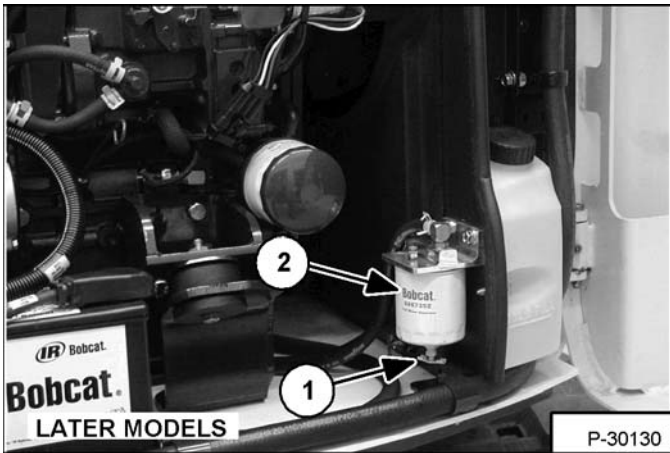


Figure 10-80-4



Loosen the drain (Item 1) [Figure 10-80-3] & [Figure 10-80-4] at the bottom of the filter element to drain water from the filter.

Fuel Filter

See SERVICE SCHEDULE on Page 10-50-1 for the service interval when to remove the water from the fuel filter.

Loosen the drain (Item 1) [Figure 10-80-3] & [Figure 10-80-4] at the bottom of the filter element to drain water from the filter.

See SERVICE SCHEDULE on Page 10-50-1 for the service interval when to replace the fuel filter.

Remove the filter element (Item 2) [Figure 10-80-3] & [Figure 10-80-4].

Clean the area around the filter housing.

Put oil on the seal of the new filter element.

Install the fuel filter, and hand tighten.

Remove the air from the fuel system. (See Removing Air From The Fuel System on Page 10-80-3.)

FUEL SYSTEM (CONT'D)

Draining The Fuel Tank



Diesel fuel or hydraulic fluid under pressure can penetrate skin or eyes, causing serious injury or death. Fluid leaks under pressure may not be visible. Use a piece of cardboard or wood to find leaks. Do not use your bare hand. Wear safety goggles. If fluid enters skin or eyes, get immediate medical attention from a physician familiar with this injury.

W-2072-0496

See SERVICE SCHEDULE on Page 10-50-1 for the correct service interval.

Figure 10-80-5

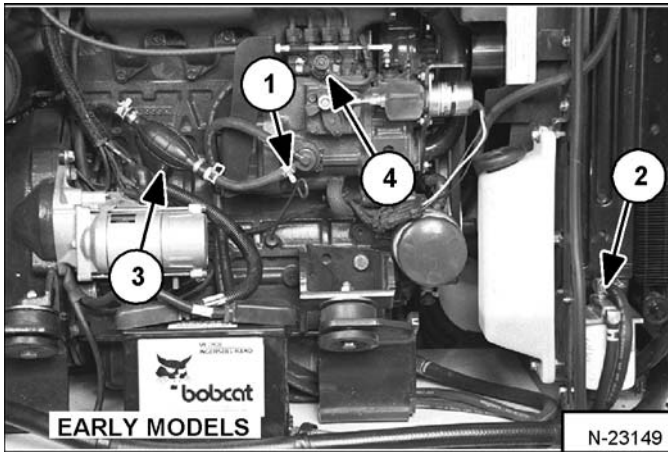
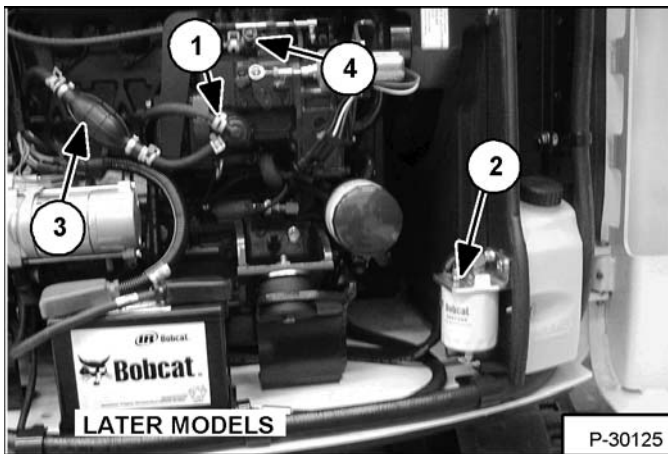


Figure 10-80-6



Remove the hose (Item 1) [Figure 10-80-5] & [Figure 10-80-6] from the fuel injection pump. Route the hose to

the bottom of the engine compartment and out the tailgate.

Drain the fuel into a container.

Reuse, recycle or dispose of fuel in an environmentally safe manner.

Removing Air From The Fuel System

After replacing the fuel filter or when the fuel tank has run out of fuel, air must be removed from the fuel system before starting the engine.

Open the fuel filter vent (Item 2) [Figure 10-80-5] & [Figure 10-80-6].

Operate the hand pump (priming bulb) (Item 3) [Figure 10-80-5] & [Figure 10-80-5] until the fuel flows from the vent with no air bubbles.

Close the fuel filter vent.

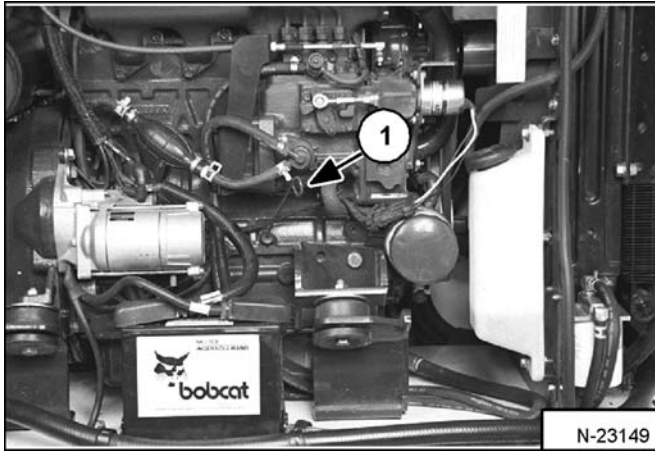
Start the engine. It may be necessary to open the vent (Item 4) [Figure 10-80-5] & [Figure 10-80-6] (at the fuel injection pump) briefly until the engine runs smoothly.

ENGINE LUBRICATION SYSTEM

Checking Engine Oil (Early Models)

Check the engine oil every day before starting the engine for the work shift.

Figure 10-90-1



Open the tailgate and remove the dipstick (Item 1) [Figure 10-90-1].

Keep the oil level between the marks on the dipstick.

Use a good quality motor oil that meets the correct API Service Classification. (See FUEL, COOLANT AND LUBRICANTS on Page SPEC-60-1.)

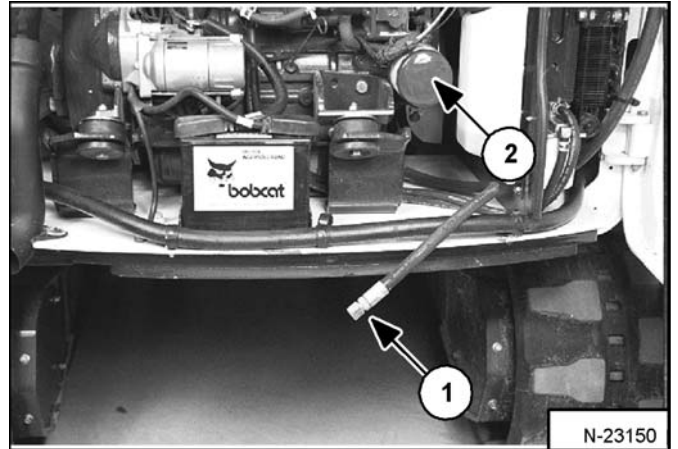
Replacing Oil And Filter (Early Models)

See SERVICE SCHEDULE on Page 10-50-1 for the service interval for replacing the engine oil and filter.

Run the engine until it is at operating temperature. Stop the engine.

Open the tailgate.

Figure 10-90-2



Remove the drain cap (Item 1) [Figure 10-90-2]. Drain the oil into a container.

Recycle or dispose of used oil in an environmentally safe manner.

Remove the oil filter (Item 2) [Figure 10-90-2] and clean the filter housing surface.

Use a genuine Bobcat replacement filter element.

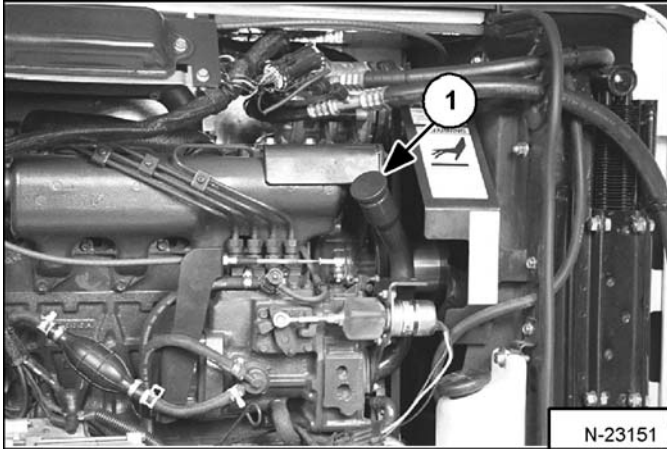
Put clean oil on the filter gasket. Install the filter and hand tighten.

Install and tighten the oil drain cap.

ENGINE LUBRICATION SYSTEM (CONT'D)

Replacing Oil And Filter (Early Models) (Cont'd)

Figure 10-90-3



Remove the fill cap (Item 1) [Figure 10-90-3].

Put oil in the engine. (See FUEL, COOLANT AND LUBRICANTS on Page SPEC-60-1.)

Install the fill cap.

Start the engine and let it run for several minutes.

Stop the engine. Check for leaks at the oil filter. Check the oil level.

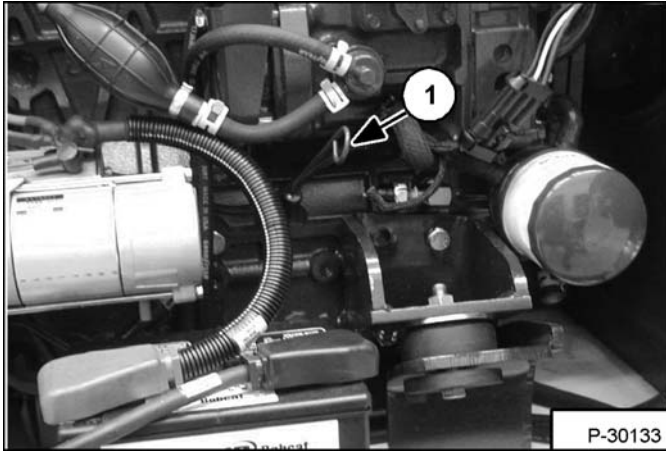
Add oil as needed if it is not at the top mark on the dipstick.

ENGINE LUBRICATION SYSTEM (CONT'D)

Checking Engine Oil (Later Models)

Check the engine oil every day before starting the engine for the work shift.

Figure 10-90-4



Open the tailgate and remove the dipstick (Item 1) [Figure 10-90-4].

Keep the oil level between the marks on the dipstick.

Use a good quality motor oil that meets the correct API Service Classification. (See FUEL, COOLANT AND LUBRICANTS on Page SPEC-60-1.)

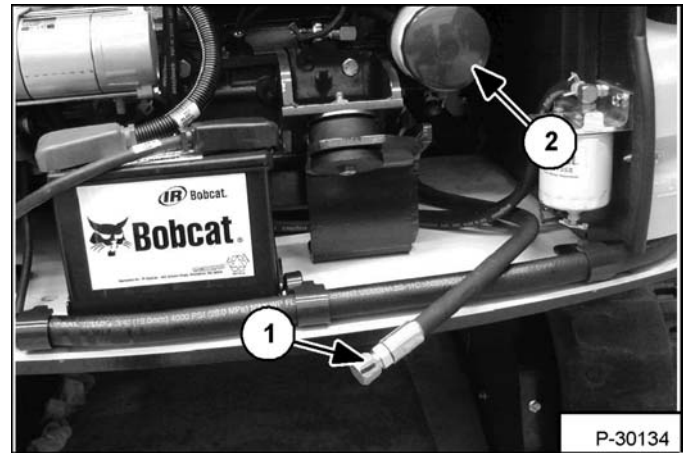
Replacing Oil And Filter (Later Models)

See SERVICE SCHEDULE on Page 10-50-1 for the service interval for replacing the engine oil and filter.

Run the engine until it is at operating temperature. Stop the engine.

Open the tailgate.

Figure 10-90-5



Remove the drain cap (Item 1) [Figure 10-90-5]. Drain the oil into a container.

Recycle or dispose of used oil in an environmentally safe manner.

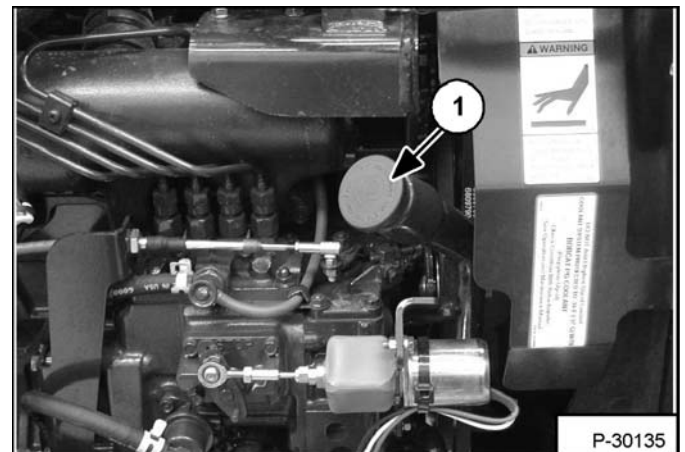
Remove the oil filter (Item 2) [Figure 10-90-5] and clean the filter housing surface.

Use a genuine Bobcat replacement filter element.

Put clean oil on the filter gasket. Install the filter and hand tighten.

Install and tighten the oil drain cap.

Figure 10-90-6



Remove the fill cap (Item 1) [Figure 10-90-6].

Put oil in the engine. (See FUEL, COOLANT AND LUBRICANTS on Page SPEC-60-1.)

Install the fill cap.

Start the engine and let it run for several minutes.

Stop the engine. Check for leaks at the oil filter. Check the oil level.

Add oil as needed if it is not at the top mark on the dipstick.

HYDRAULIC SYSTEM

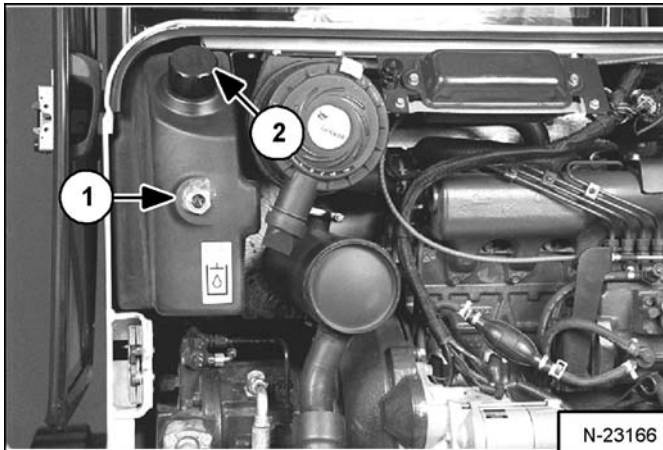
Checking And Adding Fluid (Early Models)

Put the machine on a flat level surface.

Retract the arm and bucket cylinders, put the bucket on the ground and raise the blade. Stop the engine.

Open the tailgate.

Figure 10-100-1



Check the hydraulic fluid level, it must be visible in the sight gauge (Item 1) **[Figure 10-100-1]**.

Clean the surface around the reservoir (breather) cap and remove the cap from the reservoir (Item 2) **[Figure 10-100-1]**.

Figure 10-100-2

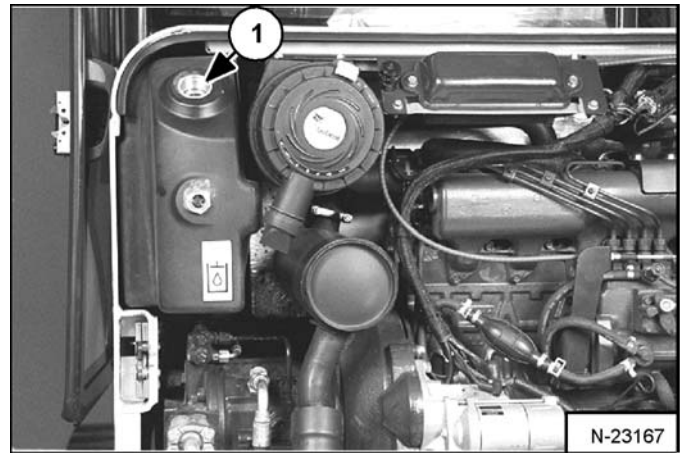
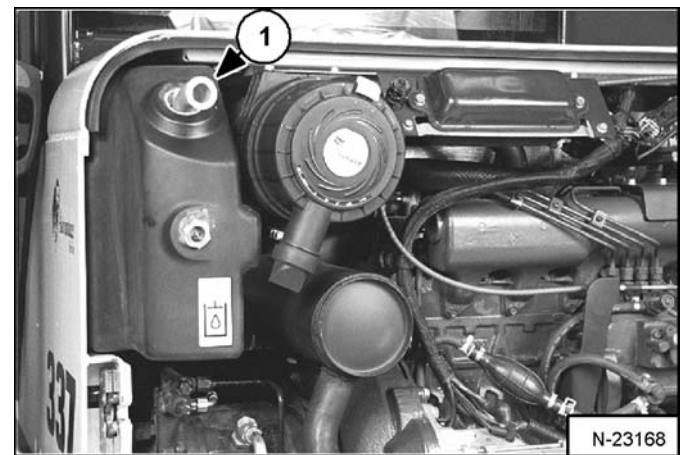


Figure 10-100-3



Check the condition of the fill strainer screen (Item 1) **[Figure 10-100-2]** & **[Figure 10-100-3]**. Clean or replace as necessary.

Be sure the screen is installed before adding oil.

Add the correct fluid to the reservoir until it is visible in the sight gauge. (See FUEL, COOLANT AND LUBRICANTS on Page SPEC-60-1.)

Check the breather cap and clean as necessary. Replace the cap if damaged.

Install the reservoir cap.

Close the tailgate.

HYDRAULIC SYSTEM (CONT'D)

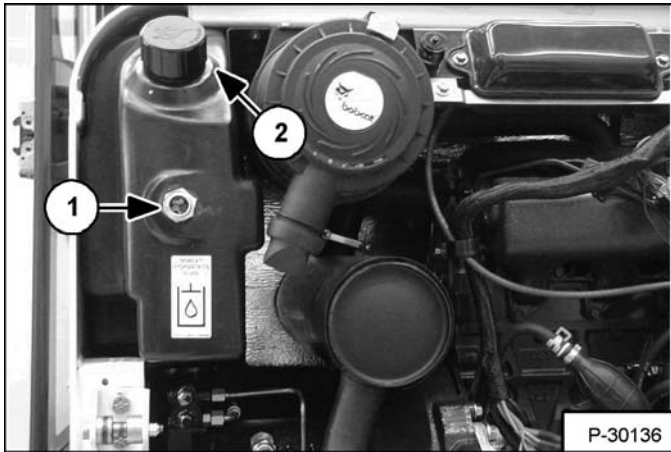
Checking And Adding Fluid (Later Models)

Put the machine on a flat level surface.

Retract the arm and bucket cylinders, put the bucket on the ground and raise the blade. Stop the engine.

Open the tailgate.

Figure 10-100-4



Check the hydraulic fluid level, it must be visible in the sight gauge (Item 1) **[Figure 10-100-4]**.

Clean the surface around the reservoir (breather) cap and remove the cap from the reservoir (Item 2) **[Figure 10-100-4]**.

Figure 10-100-5

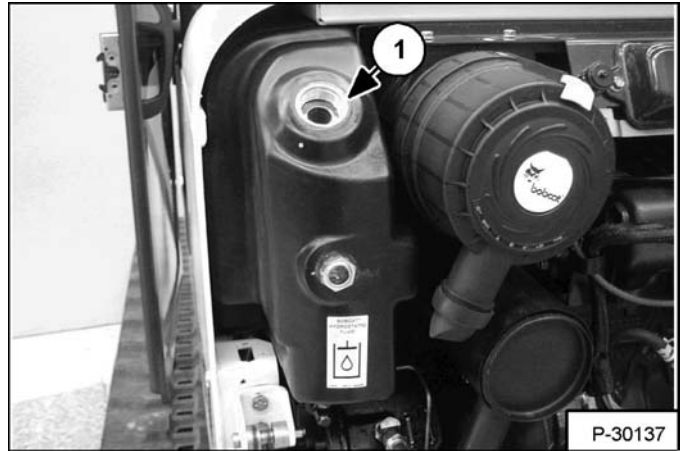


Figure 10-100-6



Check the condition of the fill strainer screen (Item 1) **[Figure 10-100-5]** & **[Figure 10-100-6]**. Clean or replace as necessary.

Be sure the screen is installed before adding oil.

Add the correct fluid to the reservoir until it is visible in the sight gauge. (See FUEL, COOLANT AND LUBRICANTS on Page SPEC-60-1.)

Check the breather cap and clean as necessary. Replace the cap if damaged.

Install the reservoir cap.

Close the tailgate.

HYDRAULIC SYSTEM (CONT'D)

Replacing The Hydraulic Oil (Early Models)

WARNING

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 which can result in injury or death.

W-2103-1285

WARNING

Diesel fuel or hydraulic fluid under pressure can penetrate skin or eyes, causing serious injury or death. Fluid leaks under pressure may not be visible. Use a piece of cardboard or wood to find leaks. Do not use your bare hand. Wear safety goggles. If fluid enters skin or eyes, get immediate medical attention from a physician familiar with this injury.

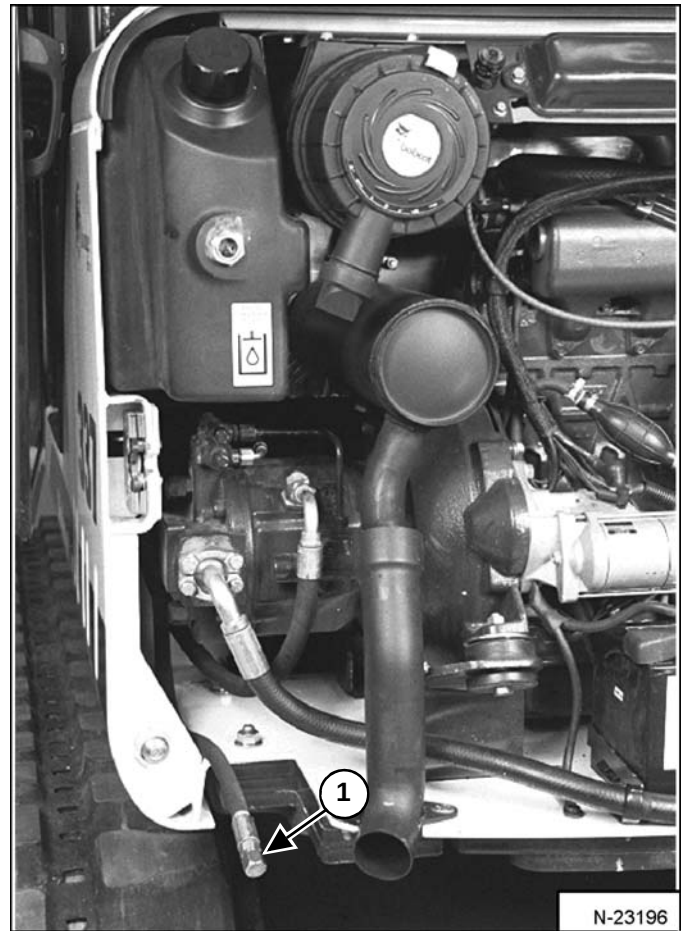
W-2072-0496

See SERVICE SCHEDULE on Page 10-50-1 for the correct service interval.

Retract the arm and bucket cylinders, lower the bucket to the ground. Stop the engine.

Open the tailgate.

Figure 10-100-7



Route the drain hose out the tailgate [Figure 10-100-7].

Remove the drain cap (Item 1) [Figure 10-100-7].

Drain the fluid into a container.

Recycle or dispose of the fluid in an environmentally safe manner.

Install the drain cap (Item 1) [Figure 10-100-7].

Add fluid to the reservoir. (See FUEL, COOLANT AND LUBRICANTS on Page SPEC-60-1.)

Run the machine through the hydraulic functions. Stop the engine. Check the fluid level and add as needed.

HYDRAULIC SYSTEM (CONT'D)

Replacing The Hydraulic Oil (Later Models)



WARNING

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 which can result in injury or death.

W-2103-1285



WARNING

Diesel fuel or hydraulic fluid under pressure can penetrate skin or eyes, causing serious injury or death. Fluid leaks under pressure may not be visible. Use a piece of cardboard or wood to find leaks. Do not use your bare hand. Wear safety goggles. If fluid enters skin or eyes, get immediate medical attention from a physician familiar with this injury.

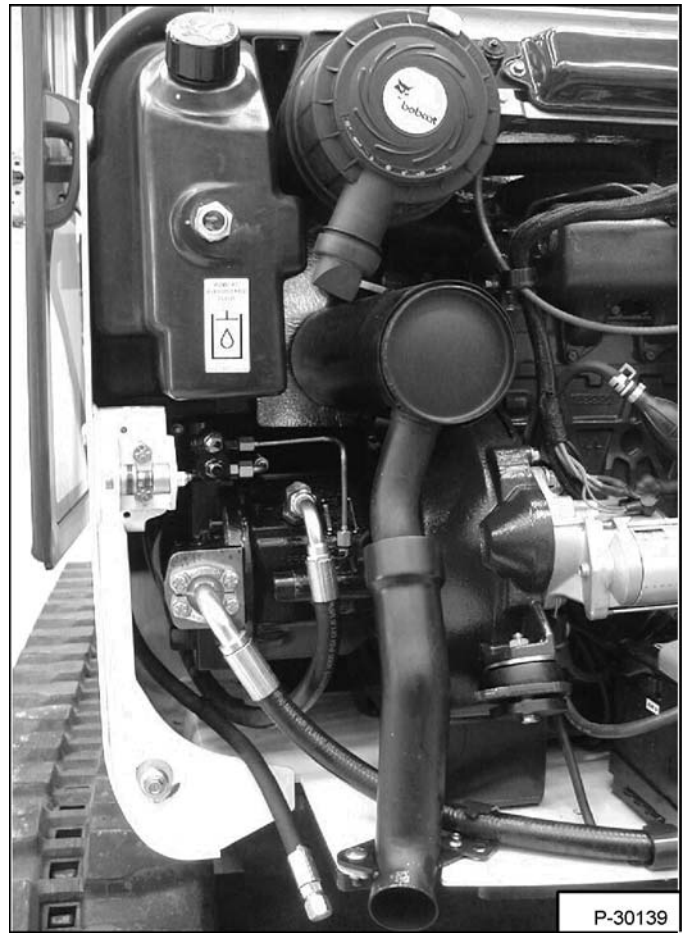
W-2072-0496

See SERVICE SCHEDULE on Page 10-50-1 for the correct service interval.

Retract the arm and bucket cylinders, lower the bucket to the ground. Stop the engine.

Open the tailgate.

Figure 10-100-8



Route the drain hose out the tailgate [Figure 10-100-8].

Remove the drain cap (Item 1) [Figure 10-100-8].

Drain the fluid into a container.

Recycle or dispose of the fluid in an environmentally safe manner.

Install the drain cap (Item 1) [Figure 10-100-8].

Add fluid to the reservoir. (See FUEL, COOLANT AND LUBRICANTS on Page SPEC-60-1.)

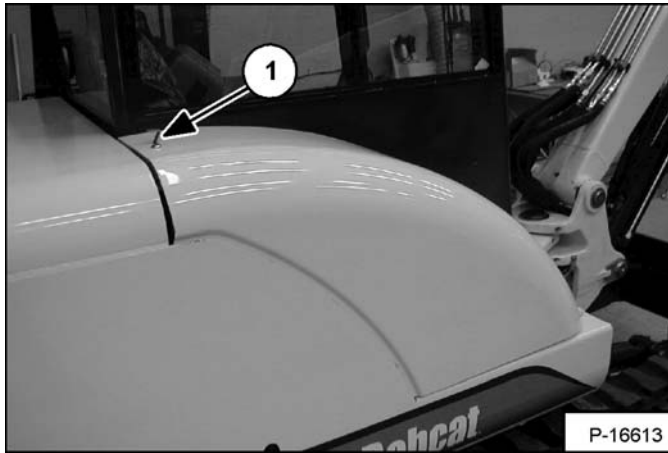
Run the machine through the hydraulic functions. Stop the engine. Check the fluid level and add as needed.

HYDRAULIC SYSTEM (CONT'D)

Replacing the Hydraulic Filter

See SERVICE SCHEDULE on Page 10-50-1 for the correct service interval.

Figure 10-100-9



Pull the latch (Item 1) [Figure 10-100-9] and open the right side cover.

Tilt the cover forward until the stop engages.

Figure 10-100-10

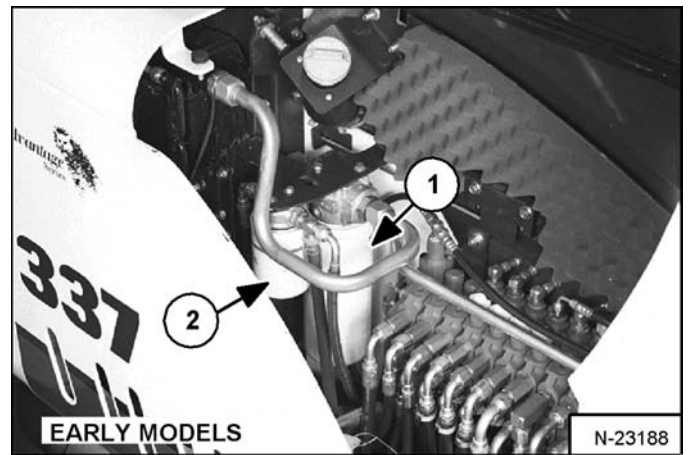
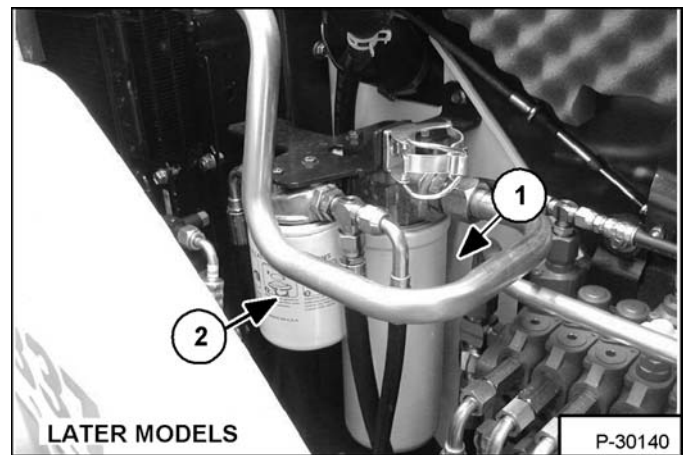


Figure 10-100-11



Remove the filter element (Item 1) [Figure 10-100-10] & [Figure 10-100-11].

Clean the housing where the filter gasket makes contact.

Put clean hydraulic fluid on the gasket. Install the new filter element and hand tighten only.

Replacing the Case Drain Filter

Open the right side cover [Figure 10-100-9].

Remove the filter element (Item 2) [Figure 10-100-10] & [Figure 10-100-11].

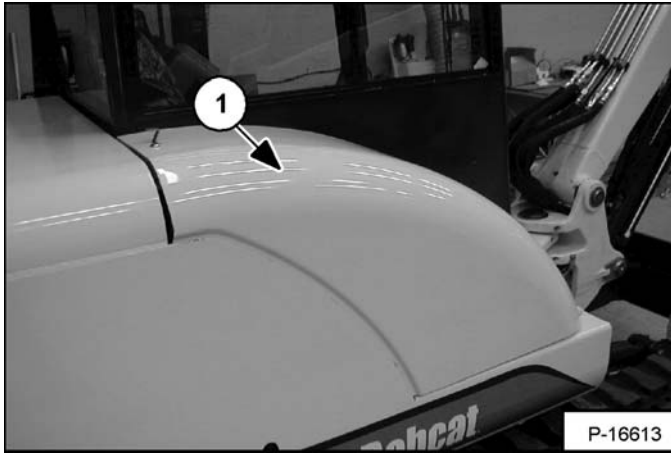
Clean the housing where the filter gasket makes contact.

Put clean hydraulic fluid on the gasket. Install the new filter element and hand tighten only.

HYDRAULIC SYSTEM (CONT'D)

Diagnostic Couplers

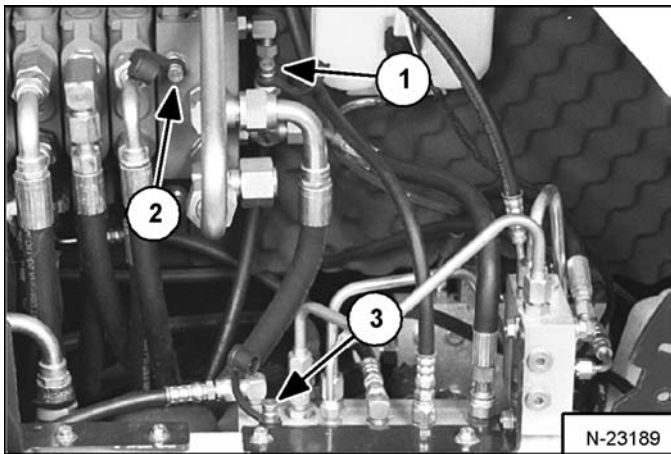
Figure 10-100-12



Open the right side cover (Item 1) [Figure 10-100-12].

There are four diagnostic ports located on the hydraulic circuitry.

Figure 10-100-13

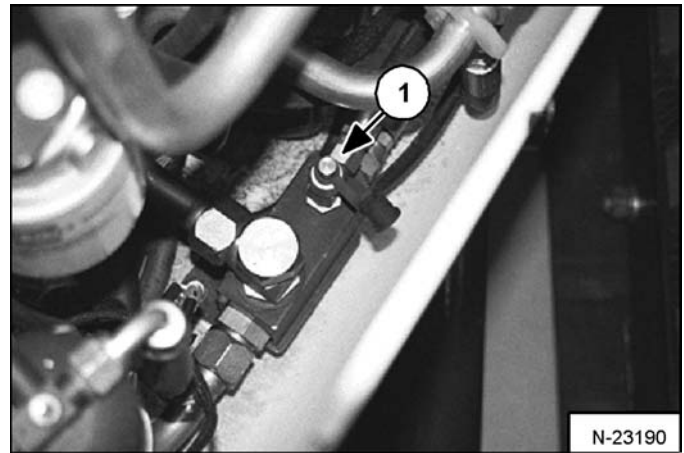


The port (Item 1) [Figure 10-100-13], located on the control valve is to test hydraulic pump pressure.

The test port (Item 2) [Figure 10-100-13] on the hydraulic control valve is used to check hydraulic pump load sense pressure.

The test port (Item 3) [Figure 10-100-13] located on the manifold assembly, is used to check pilot pressure to the left joystick, right joysticks and auxiliary pedal.

Figure 10-100-14



The test port (Item 1) [Figure 10-100-14] located on the build up valve, is used to bleed air out of the hydraulic system after a major hydraulic service has been completed. (See REMOVING AIR FROM HYDRAULIC SYSTEM on Page 20-190-1.)

LUBRICATION OF THE EXCAVATOR

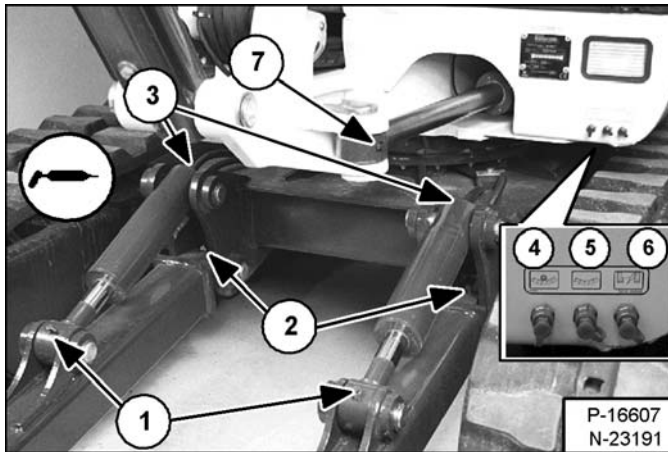
Procedure

Lubricate the Hydraulic Excavator as specified in the *Service Schedule* for the best performance of the machine. See SERVICE SCHEDULE on Page 10-50-1.

Always use a good quality lithium based multipurpose grease when lubricating the machine. Apply the lubricant until extra grease shows.

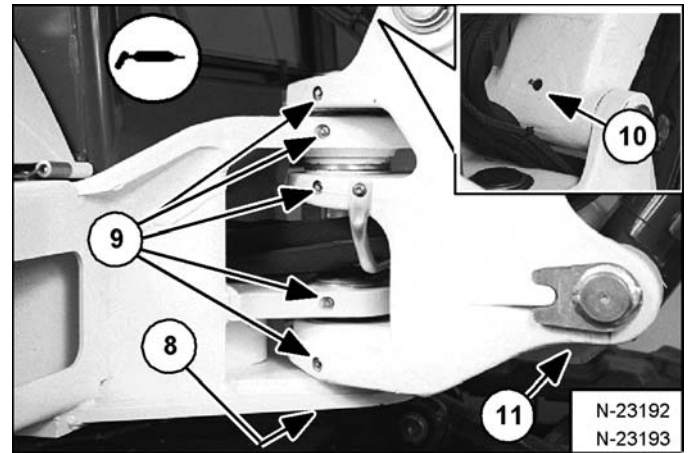
Lubricate the following locations on the Hydraulic Excavator **EVERY 8-10 HOURS**:

Figure 10-110-1



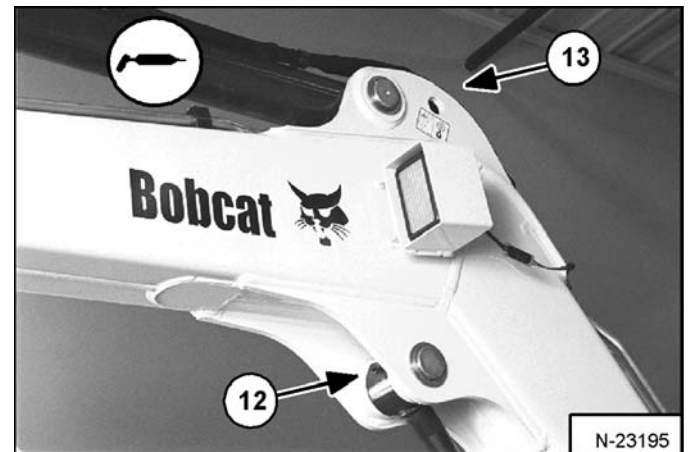
REF.	DESCRIPTION (# OF FITTINGS)
1.	Blade Cylinder Rod End (2) [Figure 10-110-1].
2.	Blade Pivots (2) [Figure 10-110-1].
3.	Blade Cylinder Base End (2) [Figure 10-110-1].
4.	Swing Circle Pinion (1) [Figure 10-110-1].
5.	Swing Circle Bearing (1) [Figure 10-110-1].
6.	Boom Offset Cylinder Base End (1) [Figure 10-110-1].
7.	Boom Offset Cylinder Rod End (1) [Figure 10-110-1].

Figure 10-110-2



REF.	DESCRIPTION (# OF FITTINGS)
8.	Boom Swing Pin (1) [Figure 10-110-2].
9.	Boom Swing Pivot (5) [Figure 10-110-2].
10.	Boom / Swing Frame Pivot (1) [Figure 10-110-2].
11.	Boom Cylinder Base End (1) [Figure 10-110-2].

Figure 10-110-3

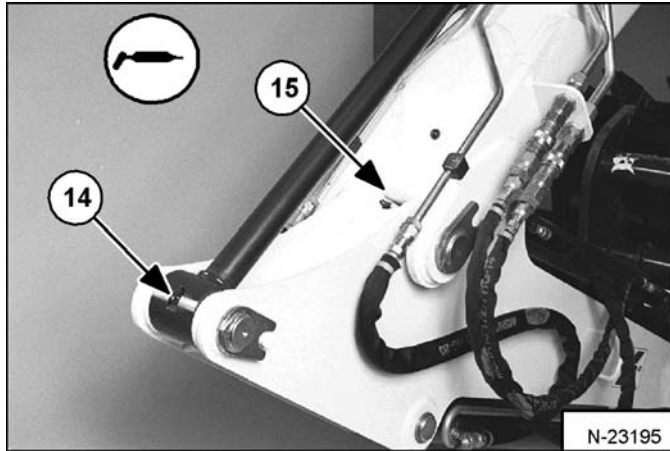


REF.	DESCRIPTION (# OF FITTINGS)
12.	Boom Cylinder Rod End (1) [Figure 10-110-3].
13.	Arm Cylinder Base End (1) [Figure 10-110-3].

LUBRICATION OF THE EXCAVATOR (CONT'D)

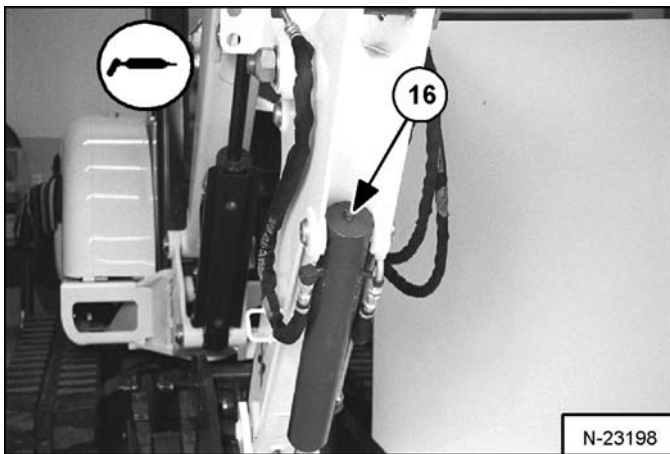
Procedure (Cont'd)

Figure 10-110-4



REF.	DESCRIPTION (# OF FITTINGS)
14.	Arm Cylinder Rod End (1) [Figure 10-110-4].
15.	Arm / Boom Pivot (1) [Figure 10-110-4].

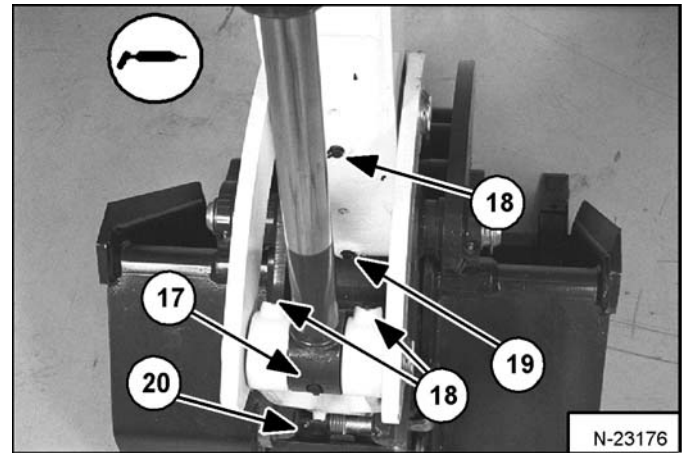
Figure 10-110-5



REF.	DESCRIPTION (# OF FITTINGS)
16.	Bucket Cylinder Base End (1) [Figure 10-110-5].

Shown with optional Hydraulic Clamp

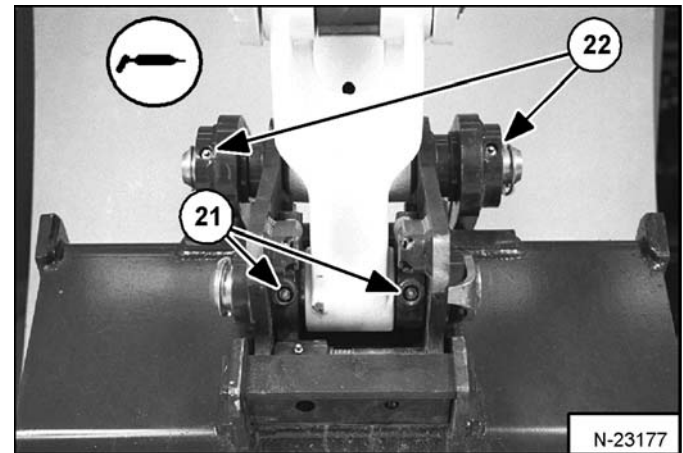
Figure 10-110-6



REF.	DESCRIPTION (# OF FITTINGS)
17.	Bucket Cylinder Rod End (1) [Figure 10-110-6].
18.	Bucket Link Pins (3) [Figure 10-110-6].
19.	Bucket / Arm Pivot (1) [Figure 10-110-6].
20.	X-Change™ Latch (1) [Figure 10-110-6]

Shown with optional Hydraulic Clamp

Figure 10-110-7

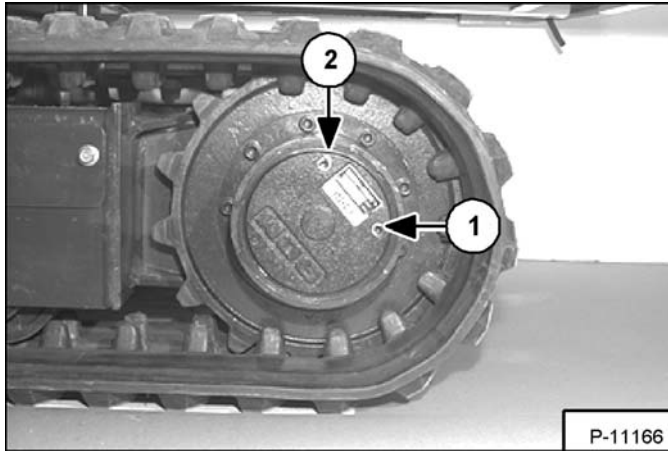


REF.	DESCRIPTION (# OF FITTINGS)
21.	X-Change™ Pivot Pin (2) [Figure 10-110-7].
22.	Clamp Pivot (2) [Figure 10-110-7].

TRAVEL MOTOR

Checking Oil Level

Figure 10-120-1



Put the machine on a level surface with the plugs positioned as shown (Items 1 & 2) [Figure 10-120-1].

Remove the plug (Item 1) [Figure 10-120-1]. The oil level should be at the bottom edge of the plug hole.

Add gear lube through the hole if the oil level is below the hole. (See FUEL, COOLANT AND LUBRICANTS on Page SPEC-60-1 for capacity and type.)

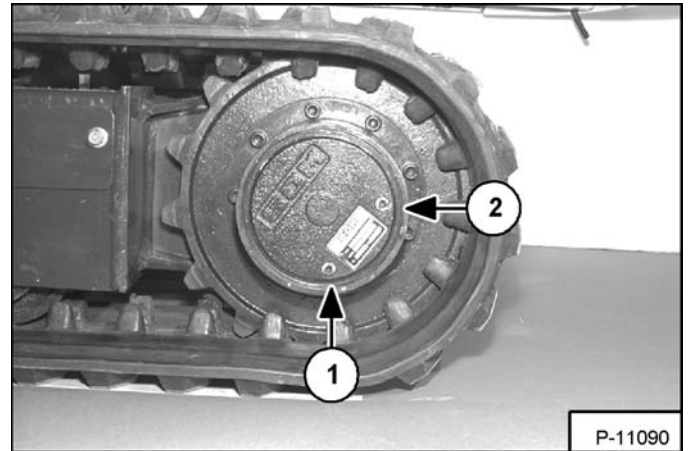
Install and tighten both plugs.

Repeat the procedure for the other side.

Draining The Travel Motor

See SERVICE SCHEDULE on Page 10-50-1 for the correct service interval.

Figure 10-120-2



Put the machine on a level surface with the plugs positioned as shown (Items 1 & 2) [Figure 10-120-2].

Remove the bottom plug (Item 1) and top plug (Item 2) [Figure 10-120-2] and drain into a container. Recycle or dispose of the used lubricant in an environmentally safe manner.

After all the gear lube is removed, install plug (Item 1) [Figure 10-120-2].

Add gear lube to the plug hole (Item 2) until the gear lube level is at the bottom edge of the plug hole (Item 1) [Figure 10-120-2]. (See FUEL, COOLANT AND LUBRICANTS on Page SPEC-60-1 for capacity and type.)

Install and tighten the plugs.

Repeat the procedure for the other side.

SPARK ARRESTOR MUFFLER (IF EQUIPPED)

Servicing

See SERVICE SCHEDULE on Page 10-50-1 for the correct service interval.

Do not operate the excavator with a defective exhaust system.

IMPORTANT

This excavator is factory equipped with a U.S.D.A. Forestry Service approved spark arrestor muffler. It is necessary to do maintenance on this spark arrestor muffler to keep it in working condition. The spark arrestor muffler must be serviced by dumping the spark chamber every 100 hours of operation. If this machine is operated on flammable forest, brush or grass covered land, it must be equipped with a spark arrestor attached to the exhaust system and maintained in working order. Failure to do so will be in violation of California State Law, Section 4442 PRC.

Make reference to local laws and regulations for spark arrestor requirements.

I-2061-0195

! WARNING

When the engine is running during service, the steering levers must be in neutral. Failure to do so can cause injury or death.

W-2203-0595

Stop the engine.

Open the tailgate. (See TAILGATE (S/N 233311550 ABOVE, S/N 233211443 & ABOVE) on Page 10-41-1 or See TAILGATE (S/N 233311549 & BELOW, S/N 233211442 & BELOW) on Page 10-40-1.)

Figure 10-130-1

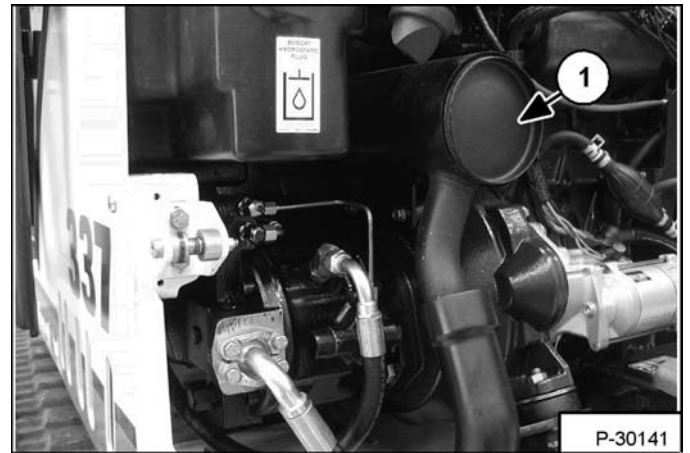
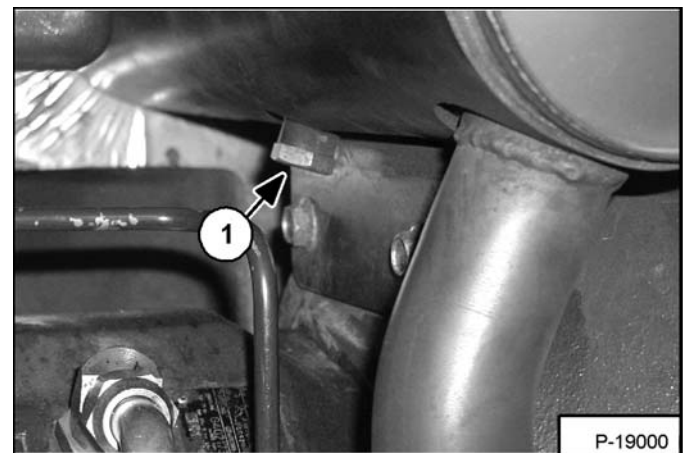


Figure 10-130-2

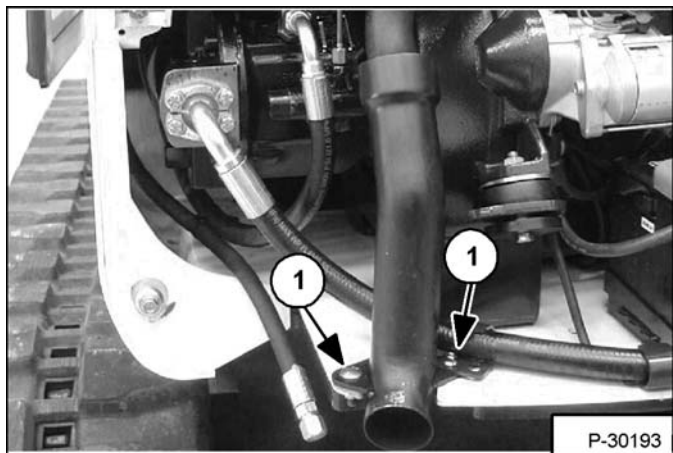


At the engine muffler (Item 1) [Figure 10-130-1], remove the plug (Item 1) [Figure 10-130-2] from the bottom of the muffler.

SPARK ARRESTOR MUFFLER (IF EQUIPPED) (CONT'D)

Servicing (Cont'd)

Figure 10-130-3



Remove the two muffler extension mount bolts (Item 1) [Figure 10-130-3] and remove the muffler extension.

Start the engine and run for about 10 seconds while a second person, wearing safety glasses, holds a piece of wood over the outlet of the muffler. The carbon deposits will be forced out of the muffler plug hole (Item 1) [Figure 10-130-2].

Stop the engine. Install and tighten the plug and muffler extension.

Close the tailgate.

HYDRAULIC SYSTEM

HYDRAULIC SYSTEM

ARM CYLINDER	20-21-1
Assembly	20-21-8
Disassembly	20-21-5
Parts Identification	20-21-4
Removal and Installation	20-21-2
Testing	20-21-1
BLADE CYLINDER	20-24-1
Assembly	20-24-6
Disassembly	20-24-4
Parts Identification	20-24-3
Removal And Installation	20-24-2
Testing	20-24-1
BOOM CYLINDER	20-20-1
Assembly	20-20-10
Disassembly	20-20-6
Parts Identification	20-20-5
Removal And Installation	20-20-3
Testing	20-20-1
BOOM SWING CYLINDER	20-22-1
Assembly	20-22-7
Disassembly	20-22-4
Parts Identification	20-22-3
Removal And Installation	20-22-2
Testing	20-22-1
BOOM OFFSET LOCK VALVE	20-200-1
Assembly	20-200-6
Description	20-200-1
Disassembly	20-200-4
Parts Identification	20-200-3
Removal And Installation	20-200-1
BUCKET CYLINDER	20-23-1
Assembly	20-23-8
Disassembly	20-23-5
Parts Identification	20-23-4
Removal And Installation	20-23-3
Testing	20-23-1
BUILD UP VALVE	20-170-1
Disassembly And Assembly	20-170-2
Removal And Installation	20-170-1

Continued On Next Page

HYDRAULIC SYSTEM (CONT'D)

CASE DRAIN FILTER	20-180-1
Removal And Installation	20-180-1
CLAMP CYLINDER	20-25-1
Assembly	20-25-7
Disassembly	20-25-4
Parts Identification	20-25-3
Removal And Installation	20-25-2
Testing	20-25-1
CONTROL PATTERN SELECTOR VALVE	20-100-1
Assembly	20-100-3
Disassembly	20-100-2
Removal And Installation	20-100-1
CROSSPORT RELIEF VALVE	20-32-1
Disassembly And Assembly	20-32-5
Removal And Installation	20-32-3
Testing And Adjusting The Crossport Relief Valve	20-32-1
DIRECT TO TANK VALVE	20-160-1
Disassembly And Assembly	20-160-2
Removal And Installation	20-160-1
DUAL SEQUENCE VALVE	20-150-1
Disassembly And Assembly	20-150-2
Removal And Installation	20-150-1
HYDRAULIC CONTROL VALVE ASSEMBLY	20-40-1
Arm Valve Section	20-40-35
Auxiliary Valve Section	20-40-47
Blade Valve Section	20-40-22
Boom Offset Valve Section	20-40-15
Boom Valve Section	20-40-41
Bucket Valve Section	20-40-30
Control Valve Identification	20-40-5
Disassembly And Assembly	20-40-6
Inlet Section	20-40-63
Left Side Travel Valve Section	20-40-59
Removal And Installation	20-40-1
Right Side Travel Valve Section	20-40-55
Swing Valve Section (Slew Valve Section)	20-40-7
HYDRAULIC FILTER	20-120-1
Removal And Installation	20-120-1

Continued On Next Page

HYDRAULIC SYSTEM (CONT'D)

HYDRAULIC FLUID RESERVOIR	20-130-1
Removal And Installation	20-130-1
HYDRAULIC PUMP	20-50-1
Assembly	20-50-48
Coupler Removal And Installation	20-50-18
Disassembly	20-50-39
Hydraulic Pump Work Sheet	20-50-1
Initial Torque Limiter Valve Setting	20-50-28
Parts Identification	20-50-38
Pump Control Disassembly And Assembly	20-50-32
Pump Control Parts Identification	20-50-31
Pump Control Removal And Installation	20-50-32
Pump Testing	20-50-4
Removal And Installation	20-50-16
Torque Limiter Valve Assembly	20-50-25
Torque Limiter Valve Disassembly	20-50-20
Torque Limiter Valve Installation	20-50-30
Torque Limiter Valve Parts Identification	20-50-19
Torque Limiter Valve Removal	20-50-20
HYDRAULIC SYSTEM INFORMATION	20-10-1
Description	20-10-6
Troubleshooting Chart	20-10-1
LEFT CONTROL LEVER (JOYSTICK) (S/N 233311870 & ABOVE AND 233211878 & ABOVE)	20-113-1
Assembly	20-113-14
Disassembly	20-113-9
Handle Removal And Installation	20-113-3
Joystick Assembly Removal And Installation	20-113-6
Parts Identification	20-113-8
Testing	20-113-1
LEFT CONTROL LEVER (JOYSTICK) (S/N 233311869 & BELOW AND 233211877 & BELOW)	20-111-1
Disassembly And Assembly	20-111-10
Handle Removal And Installation	20-111-3
Joystick Assembly Removal And Installation	20-111-6
Parts Identification	20-111-9
Testing	20-111-1
MAIN RELIEF VALVE	20-30-1

Continued On Next Page

HYDRAULIC SYSTEM (CONT'D)

MANIFOLD ASSEMBLY/ACCUMULATOR	20-60-1
Adjusting The Pilot Pressure	20-60-3
Description	20-60-1
Disassembly And Assembly (S/N 233311637 & Above, S/N 233211537 & Above)	20-60-18
Disassembly And Assembly (S/N 233311636 & Below, S/N 233211536 & Below)	20-60-8
Manifold Assembly/Accumulator Parts Identification (S/N 233311637 & Above, S/N 233211537 & Above)	20-60-17
Manifold Assembly/Accumulator Parts Identification (S/N 233311636 & Below, S/N 233211536 & Below)	20-60-7
Removal And Installation	20-60-4
Testing Pilot Pressure	20-60-1
 OIL COOLER	20-140-1
Removal And Installation	20-140-1
 PORT RELIEF VALVES	20-31-1
Adjustment Procedure	20-31-2
Parts Identification	20-31-1
Port Relief Valve Pressure Setting	20-31-1
 PRESSURE REDUCING VALVE	20-33-1
Description	20-33-1
 REMOVING AIR FROM HYDRAULIC SYSTEM	20-190-1
Procedure	20-190-1
 RIGHT CONTROL LEVER (JOYSTICK) (S/N 233311870 & ABOVE AND 233211878 & ABOVE)	20-112-1
Assembly	20-112-15
Disassembly	20-112-10
Handle Removal And Installation	20-112-2
Joystick Assembly Removal And Installation	20-112-7
Parts Identification	20-112-9
Testing	20-112-1
 RIGHT CONTROL LEVER (JOYSTICK) (S/N 233311869 & BELOW AND 233211877 & BELOW)	20-110-1
Disassembly And Assembly	20-110-10
Handle Removal And Installation	20-110-2
Joystick Assembly Removal And Installation	20-110-6
Parts Identification	20-110-9
Testing	20-110-1

Continued On Next Page

HYDRAULIC SYSTEM (CONT'D)

SWING MOTOR	20-90-1
Assembly	20-90-13
Disassembly	20-90-7
Inspection	20-90-12
Removal And Installation	20-90-1
 SWING MOTOR DRIVE CARRIER	20-91-1
Assembly	20-91-6
Checking The Drive Carrier Shaft End Play	20-91-3
Disassembly	20-91-4
Inspection	20-91-5
Parts Identification	20-91-2
Removal And Installation	20-91-1
 SWIVEL JOINT	20-80-1
Assembly	20-80-4
Disassembly	20-80-3
Parts Identification	20-80-2
Removal And Installation	20-80-1
 TRAVEL CONTROL VALVE	20-114-1
Disassembly And Assembly	20-114-1
Removal and Installation	20-114-1
 TRAVEL MOTOR	20-70-1
Assembly	20-70-13
Checking Oil Level	20-70-1
Disassembly	20-70-4
Draining And Refilling	20-70-1
Parts Identification	20-70-3
Removal And Installation	20-70-2

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