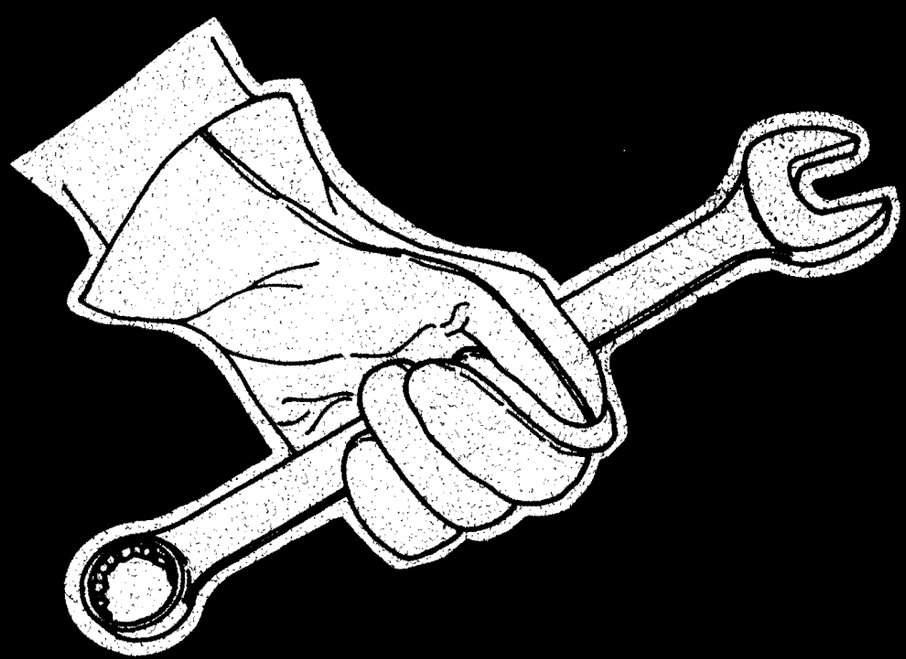
https://truckmanualshub.com/

bobcat

741
742, 742B
743, 743B
743DS

SERVICE MANUAL



MELROE COMPANY

6566109 (4-88)-1.5M Revised

A BUSINESS UNIT OF [illegible] EQUIPMENT COMPANY

Printed in U.S.A.

https://truckmanualshub.com/

MAINTENANCE SAFETY

⚠ WARNING

Instructions are necessary before operating or servicing machine. Read Operator's 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. Failure to follow instructions can cause injury or death.

W-2003-1285

⚠ Safety Alert Symbol: This symbol is used for important safety messages. When you see this symbol, follow the safety message to avoid personal injury or death.

CORRECT



B-10731

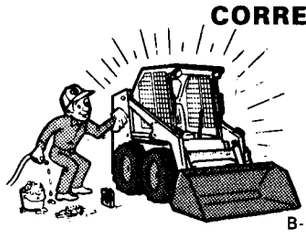
⚠ Never service the Bobcat loader without instructions.

CORRECT



⚠ Don't lift or lower operator cab without instruction.

CORRECT

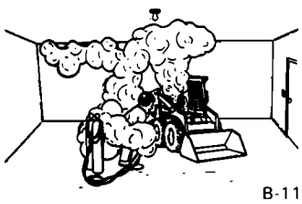


B-7469

⚠ Cleaning and maintenance are required daily.

⚠ Keep rear door closed except for service. Close and latch door before operating the loader.

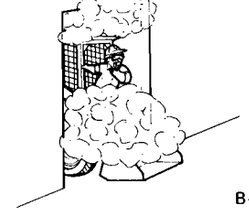
WRONG



B-11799

⚠ 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-3724

⚠ 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 6593

⚠ Never work on loader with lift arms up unless lift arms are held by a lift arm stop.

⚠ Never modify equipment or add attachments not approved by Melroe Company.

WRONG



B 6590

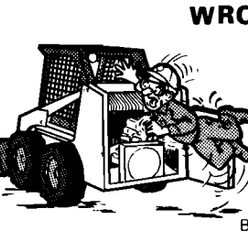
⚠ Stop, cool and clean engine of flammable materials before checking fluids.

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

⚠ Avoid contact with leaking hydraulic fluids or diesel fuel which is 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 6580

⚠ Keep body, jewelry and clothing away from moving parts, electrical contacts, 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.

WRONG



B 6589

⚠ Lead-acid batteries produce flammable and explosive gases.

⚠ Keep arcs, sparks, flams 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.

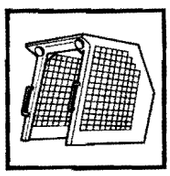
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FOREWORD

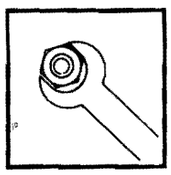
This manual is for the Bobcat loader mechanic. It provides necessary servicing and adjustment procedures for the Bobcat loader and its component parts and systems. Refer to the Operator's Manual for operating instructions, starting procedure, daily checks, etc.

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

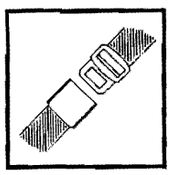
1. Check that the ROPS/FOPS (Including sidescreens) is in good condition and is not modified.



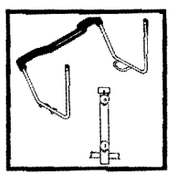
2. Check that ROPS mounting hardware is tightened and is Melroe approved.



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



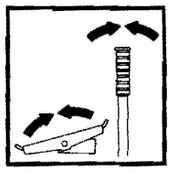
4. The seat bar and pedal locks must be correctly adjusted, clean and lubricated.



5. Machine signs must be legible and in the correct location as shown in the plastic handbook in the cab.



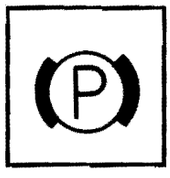
6. Steering levers and foot pedals must return to neutral and be adjusted correctly.



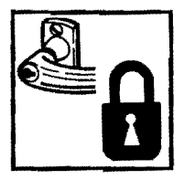
7. Check for correct function of the work lights.



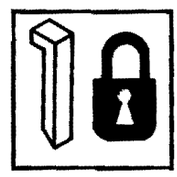
8. The parking brake must function correctly.



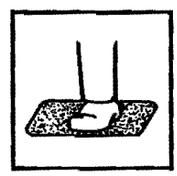
9. Enclosure door latches must open and close freely.



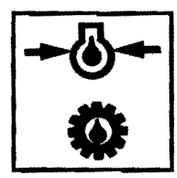
10. Bob-Tach wedges and linkages must function correctly and be in good condition.



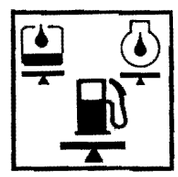
11. Safety treads must be in good condition.



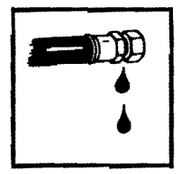
12. Check for correct function of indicator lamps.



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



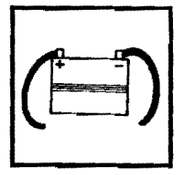
14. Inspect for fuel, oil or hydraulic fluid leaks.



15. Lubricate the loader.

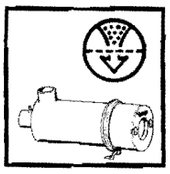


16. Check the condition of the battery and cables.

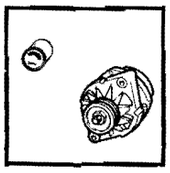


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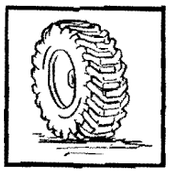
17. Inspect the air cleaner for damage or leaks. Check the condition of the element.



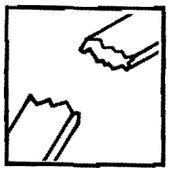
18. Check the electrical charging system.



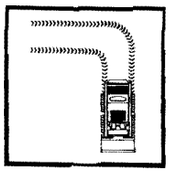
19. Check tires for wear and pressure.



20. Inspect for loose or broken parts or connections.



21. Operate the loader and check all functions.



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



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SAFETY INSTRUCTIONS i
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DELIVERY REPORT iii
APPROVED USE OF 743 DS BOBCAT LOADER iii
BOBCAT LOADER IDENTIFICATION vii
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HYDRAULIC SYSTEM . . . . . 2—1
HYDROSTATIC SYSTEM . . . . . 3—1
DRIVE SYSTEM . . . . . 4—1
MAIN FRAME . . . . . 5—1
ELECTRICAL SYSTEM . . . . . 6—1
ENGINE SERVICE . . . . . 7—1
SPECIFICATIONS . . . . . 8—1

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SAFETY INSTRUCTIONS

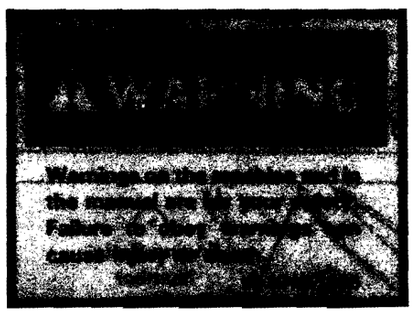
⚠ WARNING

Instructions are necessary before operating or servicing machine. Read Operator's 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. Failure to follow instructions can cause injury or death.

W-2003-0284

The following publications provide information on the safe use of the loader and attachments.

1. 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.
2. The Operator's Manual delivered with the loader gives operating information as well as routine maintenance and service procedures. It is a part of the loader and must stay with the machine when it is sold.
3. The loader has machine signs (decals) which instruct on the safe care and operation. The signs and their locations are shown in the Operator's Manual. Replacement signs are available from Bobcat loader dealers.
4. The FIEI Manual delivered with the loader gives general safety information.
5. The Service Manual and Parts Manual are available from Bobcat loader dealer for use by mechanics to do shop type service and repair work.



IMPORTANT

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

I-2019-0284

⚠ This symbol is used for important safety messages. When you see this symbol, follow the safety message to avoid personal injury.

- Wear tight fitting clothing and any other required safety apparel when operating or servicing the loader.
- Wear safety glasses when maintaining or servicing the loader.
- Exhaust gases can kill, vent engine exhaust outdoors.
- Know where fire extinguishers and first aid kits are located and how to use them.
- Do not run the Bobcat loader where exhaust, arcs, sparks or hot components can contact flammable material, explosive dust or gases.
- 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 no use gasoline or diesel fuel for cleaning parts. Use commercial nonflammable solvents.
- Do not use ether or starting fluids on an engine that has glow plugs. These starting aids can explode and injure you or bystanders.
- Clean the loader before doing any welding. Cover rubber hoses, battery and all other flammable parts. Keep a fire extinguisher near the loader when welding.
- Have good ventilation when welding or grinding painted parts. Wear a dust mask when grinding painted parts. Toxic dust and gas can be produced.
- Stop the engine and let it cool before adding fuel. No smoking.
- Use the procedure in this manual for connecting and charging batteries.
- Use the procedure in the Operator's Manual for cleaning the spark arrestor muffler after each 100 hours of operation.

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I. SERIAL NUMBER LOCATIONS

Always use the serial number of the loader 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.

A. LOADER SERIAL NUMBER

The loader serial number plate is located on the inside of the left upright, above the grill [A].

Explanation of loader Serial Number:

XXXX XXXXX

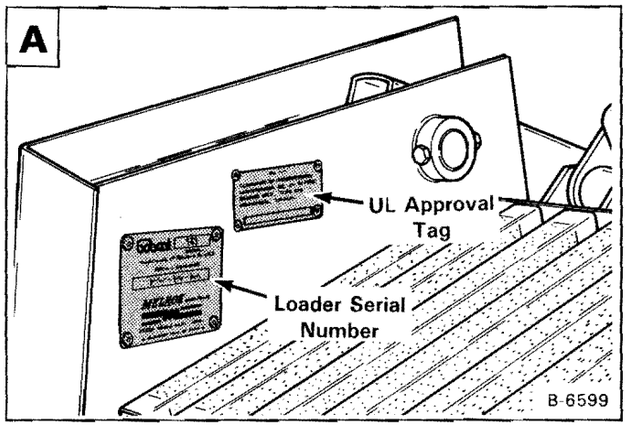
- XXXXX — Production Sequence (Series)
- XXXX — Model, Engine Version

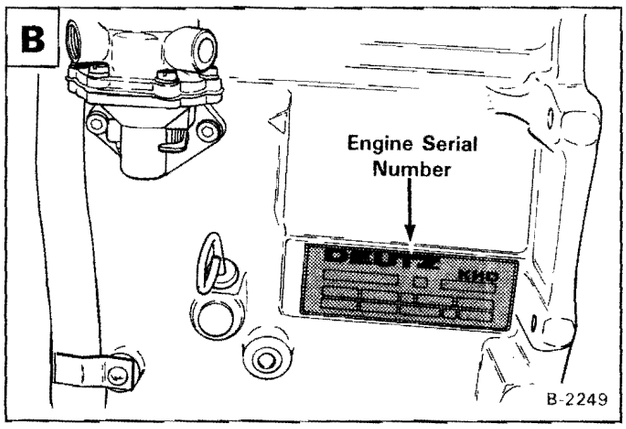
U.L. Approved Tag

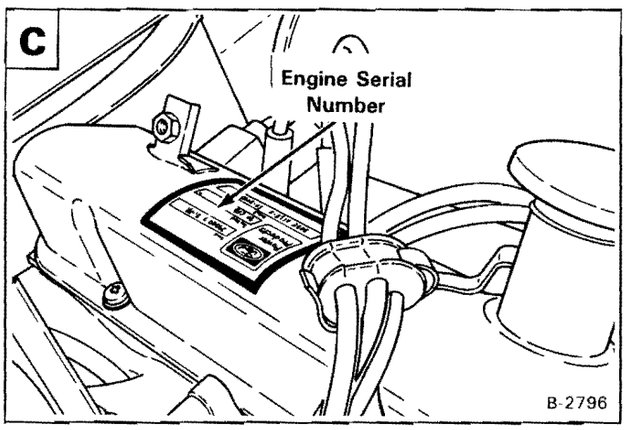
The U.L. approved tag location is on the inside of the left upright above the grill and to the right of the loader serial number [A].

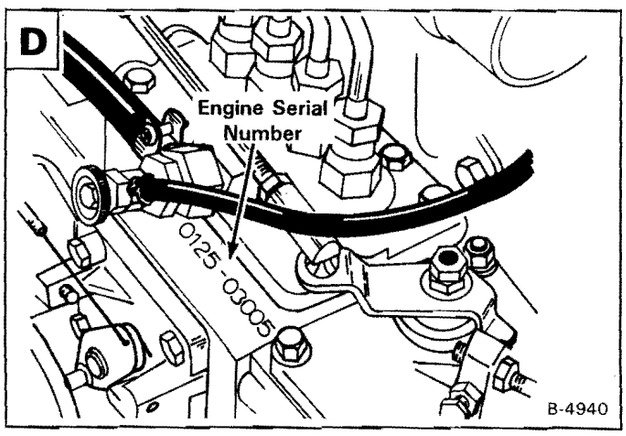
B. ENGINE SERIAL NUMBER LOCATION

MODEL	ENGINE	LOCATION
741	Deutz	The serial number is on the blower housing on the right side of the engine [B].
742	Ford	The serial number is on top of the valve cover [C].
743	Kubota	The serial number is on the left side of the block, near the fuel injection pump [D].







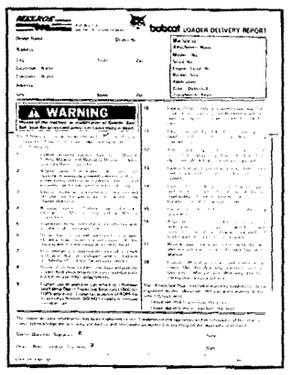


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II. DELIVERY REPORT

The Delivery Report must be filled out by the dealer and signed by the owner or operator when the Bobcat loader is delivered. An explanation of the form must be given to the owner. Make sure it is filled out completely [A].

A



III. APPROVED USE OF 743 DS BOBCAT LOADER

Melroe Company has obtained Underwriters Laboratory approval File No. AU 2177 for the 743 DS Bobcat loader.

A DS Bobcat is a diesel powered Bobcat that has additional safeguards against fire hazard such that it is rated DS by Underwriters Laboratories, Inc.

Typt DS Bobcat loaders carry a metal approved tag next to serial number tag designated "UL approval of DS rating for fire hazard only" in compliancer with ANSI-UL 558 standard for industrial trucks - internal combustion engine powered. UL 558 STD defines industrial truck as forklift trucks, platform lift truck, tractors, and other specialized machines for industrial use.

Type DS Bobcat loaders were approved as manufactured and to keep this approval must be maintained without modifications.

The electrical and fuel system plugs the engine have special features necessary for the type DS approval.

The electrical system includes the following features:

1. Specified wiring routes.
2. Boots on electrical connections.
3. Conduits for wiring.
4. Master disconnect switch.

The fuel system has the following features:

1. Special fuel tank.
2. Explosion proof threaded fuel cap.
3. Fuel tank shield with spill chute.
4. Special insulation behind and under fuel tank.

The engine has special features including:

1. Special filter bowl.
2. Conduit on fuel hose.
3. Special fuel hose installation.
4. Special muffler.
5. Enclosed alternator.
6. Special insulation on glow plugs.

The above special features are listed as an explanation that the loader must not be changed as manufactured if the advantages of the type DS approval are to be maintained. In order to maintain UL approval on 743 DS loader the exact repair parts and service should be obtained from an authorized Melroe dealer.

IMPORTANT

Do not modify 743 DS loader which has special parts and features necessary for the Underwriter's Laboratory approval and control of certain fire hazards. Obtain exact replacement parts and service from a Melroe dealer (See Page vi).

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743 DS Bobcat will satisfy certain areas of fire hazard application defined by National Fire Protection Association Standard - NFPA - 505 (also ANSI B56.2). This has also been adopted in general by OSHA as defined in Code of Federal Regulations - 29 CFR 1910.178.

Depending on "AUTHORITY HAVING JURISDICTION"*, type DS equipment can be used in locations which have certain hazardous materials designated per NFPA 505 and PSHA 29 CFR 1910.178.

General categories of hazardous material are defined as classes. Classes are further sub-divided into groups. Division 1 and 2 are levels of hazard defining condition of hazardous material in location. Division 1 is the most hazardous level.

Depending on approval of "AUTHORITY HAVING JURISDICTION", type DS equipment can be used as follows using general guideline of NFPA 505-1982,

CLASS I (Liquids & Vapors)	GROUP D (Liquids)	DIVISION 2
CLASS II (Dust)	GROUP G (Grain-Organic Dust)	DIVISION 2
CLASS III (Fiber)	NO GROUPS	DIVISION 2

Further detail is provided by attached charts of Table N-1 from OSHA 29 CFR 1910.178 and Table 1-7 NFPA 505-1975.

*"AUTHORITY HAVING JURISDICTION" is officially defined by NFPA as the organization, office or individual responsible for "approving" equipment, an installation or a procedure.

As further defined by NFPA, where public safety is primary, the "AUTHORITY HAVING JURISDICTION" may be a federal, state, local or other regional department or individual such as a fire chief, fire marshall, chief of a fire prevention bureau, labor department, health department, building official, electrical inspector, or others having statutory authority. For insurance purposes, and insurance inspection department, rating bureau, or other insurance company representative may be the "AUTHORITY HAVING JURISDICTION". In many circumstances, the property owner or his designated agent assumes the role of the "AUTHORITY HAVING JURISDICTION". At government installations the commanding officer or department official may be the "AUTHORITY HAVING JURISDICTION".

Table 1-7 — Summary Table on Use of Powered Industrial Trucks as Described in Chapter 1 of this Standard

	Diesel-Powered			Electric-Powered				Gas-Powered		LP/Gas/Powered		Dual-Fuel		Text Par.
Locations	**D**	**DS**	**DY**	**E**	**ES**	**EE**	**EX**	**G**	**GS**	**LP**	**LPS**	**G/LP**	**GS/LPS**	**Reference**
Class I														
Division 1														
Group A														1-7.1
Group B														1-7.1
Group C														1-7.1
Group D							A							1-7.1
Class I														
Division 2														
Group A		X	X		X	X	X		X		X		X	1-7.9
Group B		X	X		X	X	X		X		X		X	1-7.9
Group C		X	X		X	X	X		X		X		X	1-7.9
Group D		*	A		*	A	A		*		*		*	1-7.3
Class II														
Division 1														
Group E							*							1-7.4
Group F							*							1-7.4
Group G							A							1-7.5
Class II														
Division 2														
Group E		X	X		X	X	X		X		X		X	1-7.9
Group F		X	X		X	X	X		X		X		X	1-7.9
Group G		*	A		*	A	A		*		*		*	1-7.6
Class III														
Division 1			A			A	A							1-7.7
Class III														
Division 2		A	A	*	A	A	A		A		A		A	1-7.8

Key To Table Symbols

A = Type truck authorized in location described.
* = Type truck authorized in location described with approval of the authority having jurisdiction.
X = Type truck authorized to be determined by the authority having jurisdiction.
Blank spaces = Type truck not authorized in location described.

NFPA 505-1982

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TABLE N-1. — Summary Table on Use of Industrial Trucks in Various Locations

Classes	Unclassified	Class I Locations				Class II Locations			Class III Locations	
Description of classes.	Locations not possessing atmospheres as described in other columns.	Locations in which flammable gases or vapors are, or may be, present in the air in quantities sufficient to produce explosive or ignitible mixtures.				Locations which are hazardous because of the presence of combustible dust.			Locations where easily ignitible fibers or flyings are present but not likely to be in supension in quantities sufficient to produce ignitible mixtures.	
Groups in Classes	**None**	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**None**	
Examples of locations or atmospheres in classes and groups.	Piers and wharves inside and outside general storage, general industrial or commercial properties.	Acetylene	Hydrogen	Ethyl ether	Gasoline, Naphtha Alcohols Acetone Lacquer Solvent, Benzene,	Metal dust	Carbon black, coal dust, coke dust	Grain dust, flour dust, starch dust, organic dust	Bales waste, cocoa fiber, cotton excelsior, hemp, istle, jute, kapok, oakum, sisal, spanish moss, synthetic fibers, tow	
	1	2	1		2	1		2		
Divisions (nature of hazardousconditions)	Above condition exists continuously, intermittently, or periodically under normal operating conditions.	Above condition may occur accidentally as due to a puncture of a storage drum.	Explosive mixture may be present under normal operating conditions, or where failure of equipment may cause the condition to exist simultaneously with arcing or sparking or electrical equipment, or where dusts of an electrically conducting nature may be present.		Explosive mixture not normally present, but where deposits of dust may cause heat rise in electrical equipment, or where such deposits may be ignited by arcs or sparks from electrical equipment.	Locations in which easily ignitible fibers or materials producing combustible flyings are handled, manufactured, or used.		Locations in which easily ignition fibers are stored or handled (except in the process of manufacture).		

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The following is reprinted with permission from the NFPA-505 Manual.

Chapter 4 Maintenance of Industrial Trucks

4-1 General. It is essential that the fire safety built into power-operated industrial trucks be maintained; any power-operated industrial truck not in safe operating condition shall be removed from service.

4—2 Precautions

4-2.1 Repairs shall not be made in Class I, II and III locations.

4-2.2 Repairs to the fuel and ignition systems of industrial trucks which involve fire hazards shall be conducted only in locations designated for such repairs.

4-2.3 Repairs to the electrical system of battery-powered industrial trucks shall be performed only after the battery has been disconnected.

4-3 All parts of any industrial truck requiring replacement shall be replaced only with parts providing the same degree of fire safety as those used in the original design.

4-5 When the temperature of any part of any truck is found to be in excess of its normal operating temperature and which creates a hazardous condition, the vehicle shall be removed from service and not returned to service until the cause for such overheating has been eliminated.

4-6 Industrial trucks shall be kept in a clean condition, reasonably free of lint, excess oil, and grease. Noncombustible agents are preferred for cleaning trucks. Flammable liquids — i.e., having a flash point below 100°F (37.8°C) — shall not be used. Combustible liquids — i.e., having a flash point at or above 100°F (37.8°C) — may be used. Precautions regarding toxicity, ventilation, and fire hazard shall be consonant with the agent or solvent used.

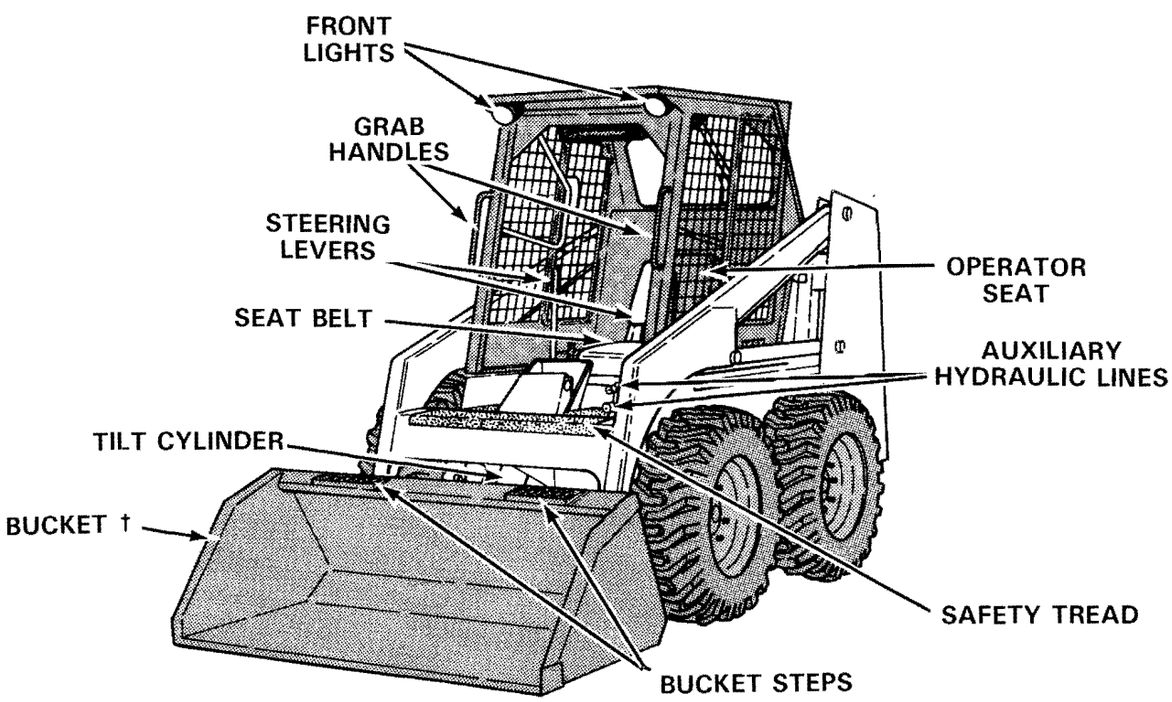
4-7 When antifreeze is required in the engine cooling system only glycol base material shall be used.

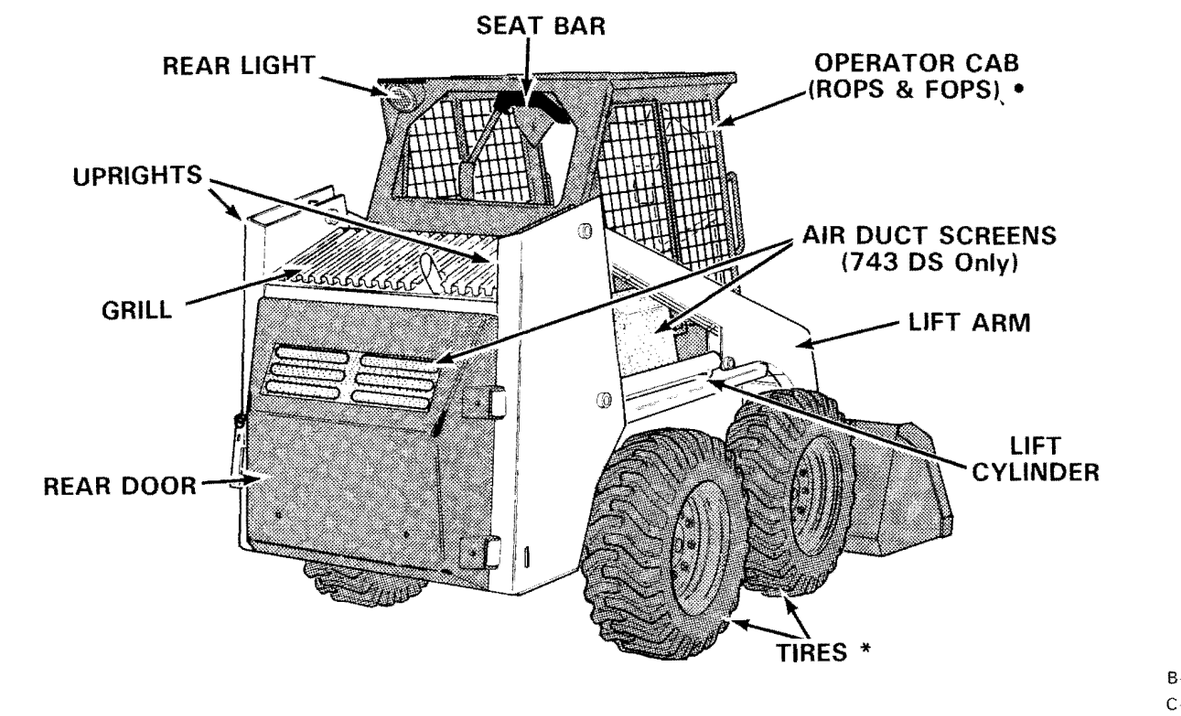
4-8 The truck designations (See Section 1-3) as shown on the nameplate and the type markers (Sec. 5-4.2) shall not be painted over so as to obscure their content.

The "UL Approval of DS Rating For Fire Hazard Only" is described in full in the publication NFPA-505, Powered Industrial Trucks, which can be ordered from National Fire Protection Association, Inc. Batterymarch Park, Quincy, MA 02269. Table 1-7 and Pages 21 and 22 from NFPA-505 which refer in part to this loader are included in this manual.

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IV. BOBCAT LOADER IDENTIFICATION





B-7377
C-2886

* TIRES — Flotation tires are shown. The Bobcat loader is base-equipped with standard tires.

† BUCKET — Several different buckets and other attachments are available for the Bobcat loader.

• ROPS, FOPS — Roll-Over Protective Structure, Falling Object Protective Structure, per SAE J1040 and SAE J1043 is standard equipment.

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PREVENTIVE MAINTENANCE

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SERVICE SCHEDULE

The service schedule is a guide for correct servicing of the Bobcat loader that must be done regularly. Use these service intervals unless very hot, cold, dusty or corrosive operating conditions make it necessary to increase the frequency of service. Failure to do so can cause damage to the machine.

MODEL			SERVICE SCHEDULE		HOURS					
741	742	743	ITEM	SERVICE REQUIRED	8-10	50	100	* 250	* 500	* 1000
■	■	■	Engine Oil	Check oil level and add oil as needed.	■					
■	■	■	Engine Air Cleaner	Empty dust cup. Replace the outer filter element when red ring shows in condition indicator. Check for leaks or damage.	■					
	■	■	Engine Cooling System	Check coolant level. Add coolant as needed. Clean the radiator grill area.	■					
■	■	■	Engine Cooling Inlet	Check rear door grill & blower inlet for restriction of air. Clean cooling fins & blower as needed.	■					
■	■	■	Tires	Check for damaged tires & correct air pressure.	■					
■	■	■	Seat Belt & Seat Bar	Check condition of seat belt. Check seat bar for correct operation.	■					
■	■	■	Safety Signs (Decals) and Safety Treads	Check for damaged signs (decals) and safety treads. Replace any signs and safety treads that are damaged or worn.	■					
■	■	■	All Piovt Points	Add grease to the fittings until the extra grease shows.	■					
■	■	■	Fuel Filter	Remove water from filter.	■					
■	■	■	Operator Cab	Check the fastening bolts, washers and nuts.	■					
■	■	■	Wheel Nuts	★ Check for loose wheel nuts. Tighten to correct torque.		■				
■	■	■	Engine Oil & Filter	Replace the oil and filter.		■				
■	■	■	Battery	Check the water level. Check cable ends for corrosion & being tight.		■				
■	■	■	Parking Brake	Check operation adjust as needed.		■				
■	■	■	Hydraulic Fluid, Tubelines & Hoses	Check fluid level & add as needed. Check for damage & replace as needed.		■				
■	■	■	Alternator Drive Belt	Check the tension & adjust as needed.		■				
■	■	■	Crankcase Breather	Clean breather cap.		■				
■	■	■	Bob-Tach	Check levers & wedges for correct operation & condition.		■				
■	■	■	Controls & Brake	Check for correct operation & adjust as needed.		■				
■	■	■	Chaincase	Check for oil level & add as needed.			■			
■	■	■	Hydraulic Filter	Replace filter element (S/N 14999 & Below).			■			
■			Crankcase Breather	Clean breather cap.			■			
■	■	■	Spark Arrestor Muffler	Remove the plug & clean the spark chamber.			■			
■	■	■	Ignition System	Check spark plugs, points & timing. Repair as needed.			■			
	■		Governor	Check oil level & add as needed.			■			
■	■	■	Seat Bar	Grease pivot as needed.				■		
■	■	■	Steering Shaft Pivots	Add grease to two fittings. Add oil to steering shaft.				■		
■	■	■	U-Joint	Grease three fittings with the correct grease.				■		
■	■	■	Engine Fuel Filter	Replace filter element & inline filter element.				■		
■	■	■	Hydraulic Filter	☆ Replace the filter element.				■		
■	■	■	40 Micron Filter	Replace the filter in port block (S/N 14999 & Below)					■	
■	■	■	Hyd./Hydro. Breather Cap	Replace the breather cap.					■	
■	■	■	Chaincase	Replace the oil.						■
■	■	■	Hydraulic Fluid Reservoir	Replace the hydraulic fluid & filter element.						■
■	■	■	Starting Motor	Remove, clean & service as needed.						■
		■	Engine Compression	Check compression & repair engine as needed.						■

★ Check wheel nut torque every 8 hours for the first 24 hours of operation.

☆ Also replace the filter element when the transmission warning light stays on for 5 minutes after the hydrostatic fluid is at operating temperature.

* Or every 12 months.

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PREVENTIVE MAINTENANCE

⚠ WARNING

Instructions are necessary before operating or servicing machine. Read Operator's 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. Failure to follow instructions can cause injury or death.

W-2003-1285

⚠ WARNING

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

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

W-2019-1285

LIFTING AND BLOCKING THE BOBCAT LOADER

Procedure

Always park the loader on a level surface.

⚠ WARNING

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

W-2017-0286

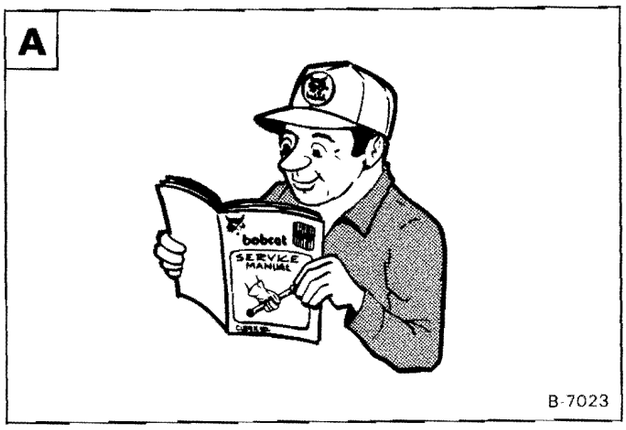
Put a floor jack under the rear of the loader [B].

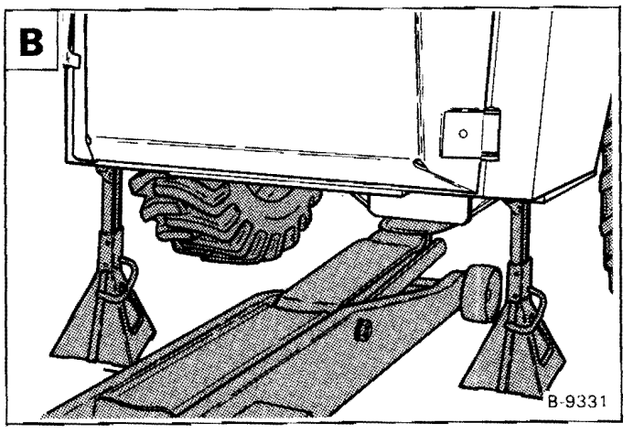
Lift the rear of the loader and install jackstands [B].

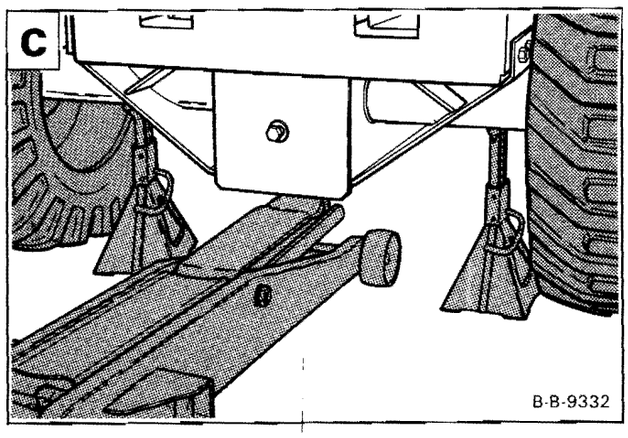
Put the floor jack under the front of the loader [C].

Lift the front of the loader and install jackstands [C].

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







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TRANSPORTING THE BOBCAT LOADER

Procedure

⚠ WARNING

Steel loading ramps are needed to support the weight of the machine when loading onto a transport vehicle. Wood ramps may break and cause personal injury.

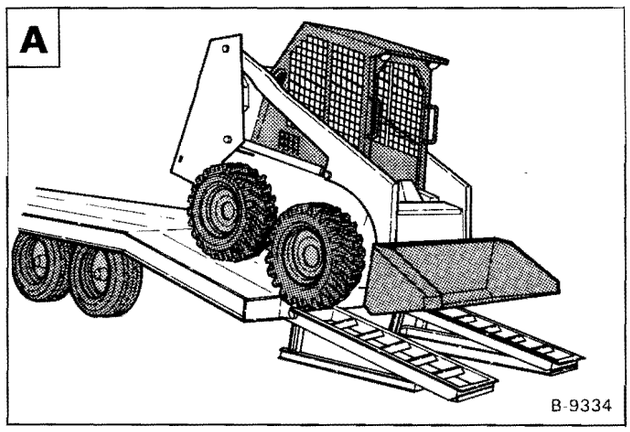
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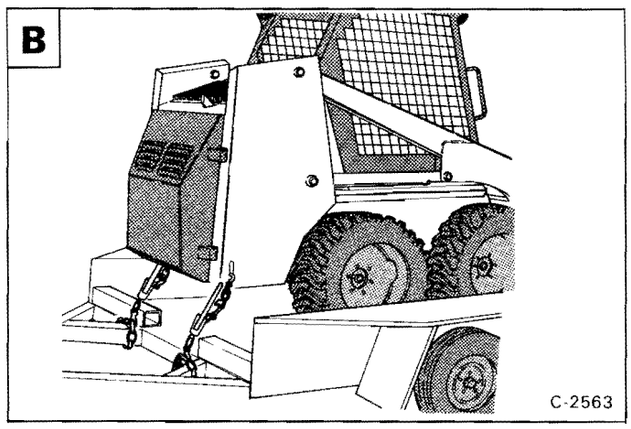
A loader with an empty bucket or no attachment must be driven backwards onto the transport vehicle [A].

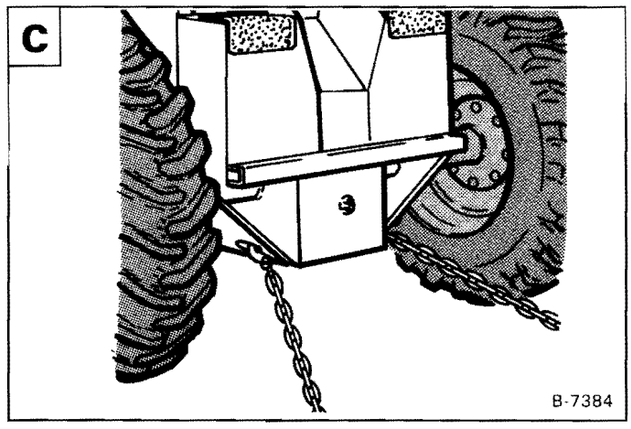
Lower the lift arms and bucket to the transport vehicle.

Stop the engine. Engage the parking brake.

Install chains as shown [B] and [C] to prevent the loader from moving during sudden stops or when going up or down slopes.







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LIFT ARM STOP

Installation

NOTE: **Maintenance or service work can be done with the lift arms lowered. Put jackstands under the rear corners of the loader before raising the operator cab or lift arms.**

One person must stay in the operator cab with the seat belt fastened and the seat bar lowered, while the second person installs the stop over the rod of one lift cylinder [A].

Start the engine and raise the lift arms.

Have a second person install the lift arm stop over the rod of one lift cylinder [A].

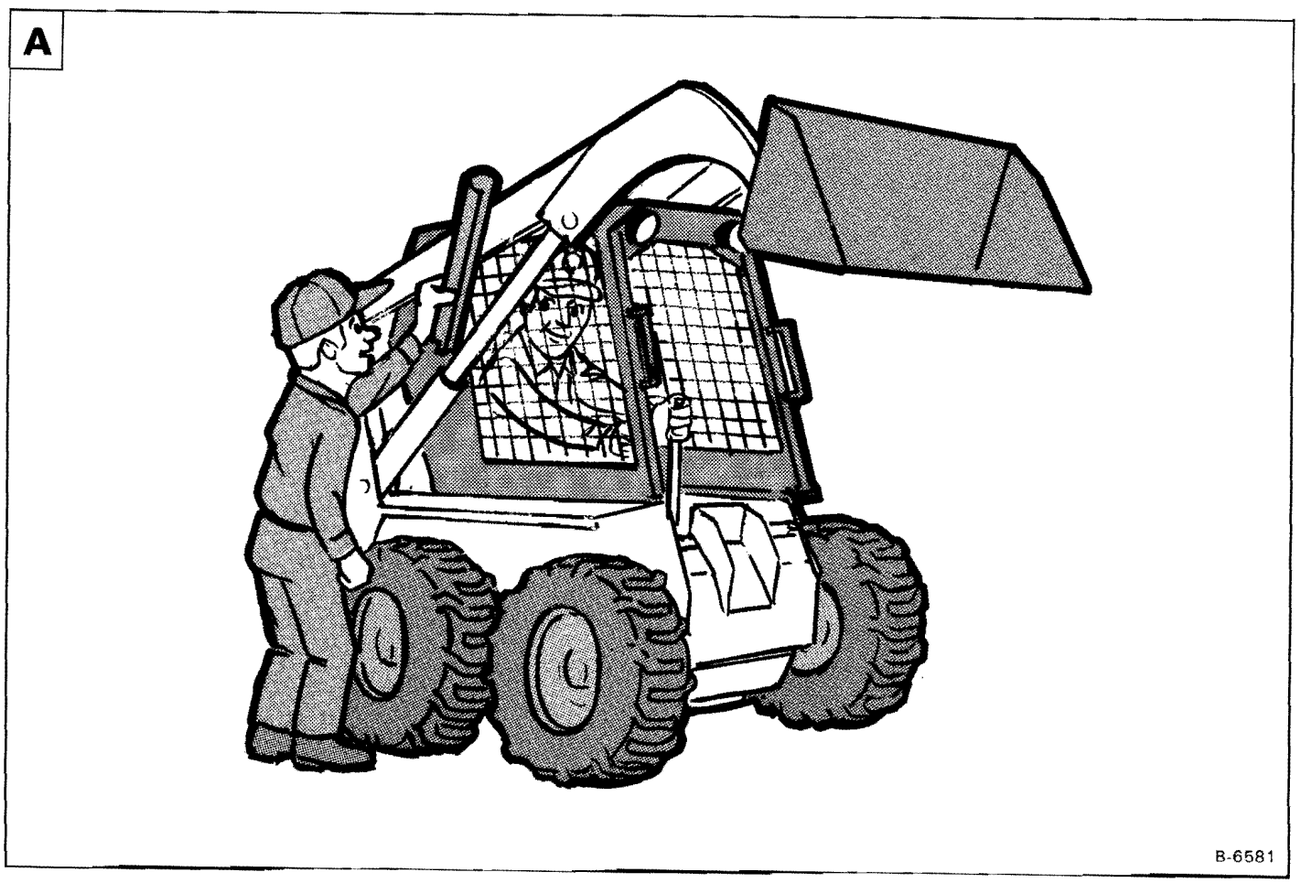
The lift arm stop must be tight against the cylinder rod.

Lower the lift arms slowly until the stop is held between the lift arm and the lift cylinder.

⚠ WARNING

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

W-2059-0487



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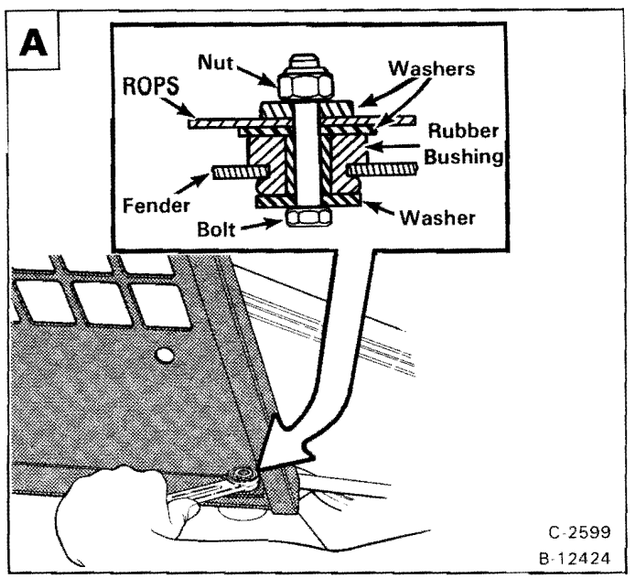
OPERATOR CAB

The loader has an operator cab (ROPS and FOPS) as standard equipment. The ROPS and FOPS protect the operator from roll-over and falling objects.

⚠ WARNING

Never modify operator cab by welding, grinding, drilling holes or adding attachments unless instructed to do so by Melroe Company. Changes to the cab can cause loss of operator protection from rollover and falling objects, and result in injury or death.

W-2069-1285



Check with your dealer if the operator cab has been damaged. The operator cab fastening bolts and nuts must be tight [A].

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OPERATOR CAB (Cont'd)

Raising the Operator Cab

The cab can be raised or lowered with the lift arms up or down.

If the lift arms are up, a lift arm stop must be installed (See Page 1–4).

⚠ WARNING

Before the cab or the lift arms are raised for service, jackstands must be put under the rear corners of the frame. Failure to use jackstands may allow the machine to tip backwards causing injury or death.

W-2014-1285

⚠ WARNING

AVOID INJURY

Cylinders for raising and lowering operator cab have gas under pressure. Do not open cylinder. Only qualified service personnel can remove the cylinder.

W-2112-0987

Stop the loader on a level surface. Stop the engine and engage the brake. Put jackstands under the rear of the loader.

Disconnect the two front fasteners.

If the lift arms are down, stand on the safety tread [A].

If the lift arms are up, stand beside the loader [B].

Slowly raise the cab until it is all the way up [A] or [B].

Lowering the Operator Cab

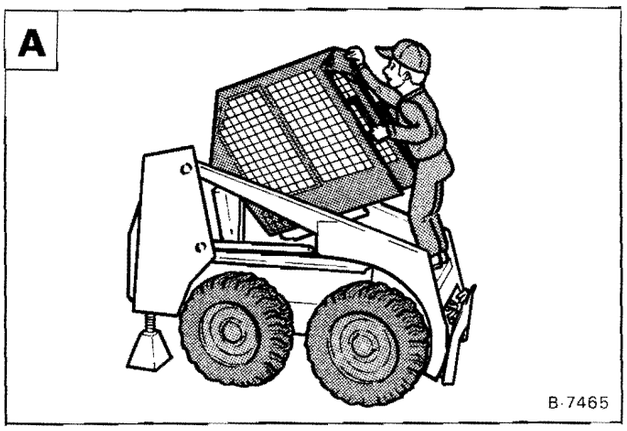
Stand on the safety tread [A] or beside the loader [B] and slowly lower the operator cab.

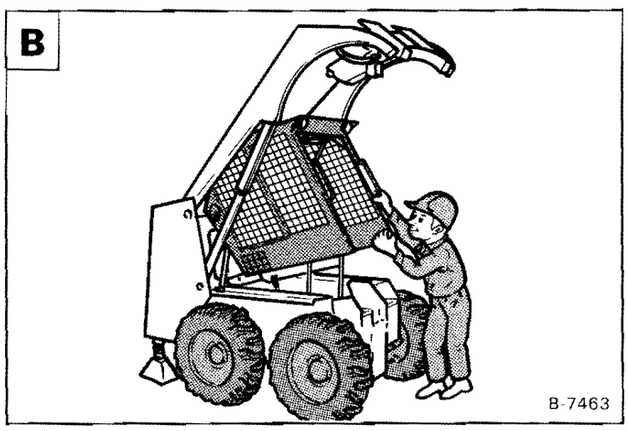
⚠ WARNING

Both sets of fasteners at the front of the operator cab (ROPS) must be assembled as shown in this Operator's Manual. Failure to secure ROPS correctly can cause injury or death.

W-2005-1285

Install the fasteners before operating the loader.





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OPERATOR CAB (Cont'd)

Seat Bar Description

The seat bar system has a pivoting seat bar with arm rests and has spring loaded latches for the lift and tilt control pedals.

The operator controls the use of the seat bar. The seat bar in the down position helps to keep the operator in the seat and unlocks the foot pedals.

When the seat bar is up, the lift and tilt pedals are locked in neutral position.

⚠ WARNING

AVOID INJURY OR DEATH

The seat bar system must lock the lift and tilt control pedals in neutral when the seat bar is up. Service the system if pedals do not lock correctly.

W-2105-1285

Seat Bar Inspection

Sit in the seat and fasten the seat belt. Engage the parking brake.

Pull the seat bar all the way down and start the engine.

Operate each foot pedal to check both lift arm and tilt functions. Raise the lift arms until the level bucket is about 2 feet (600 mm) off the ground.

Raise the seat bar. Try to move each foot pedal. Pedals must be firmly locked in the neutral position [B]. There must be no motion of the lift arms or tilt (bucket) when the pedals are pushed.

Pull the seat bar down, lower the lift arms fully and place the bucket flat on the ground.

Stop the engine. Raise the seat bar and operate the foot pedals to be sure that the pedals are firmly locked in the neutral position [B]. Unfasten the seat belt.

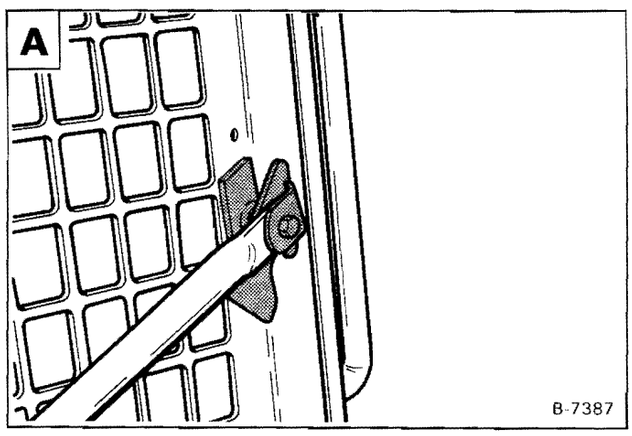
Seat Bar Maintenance

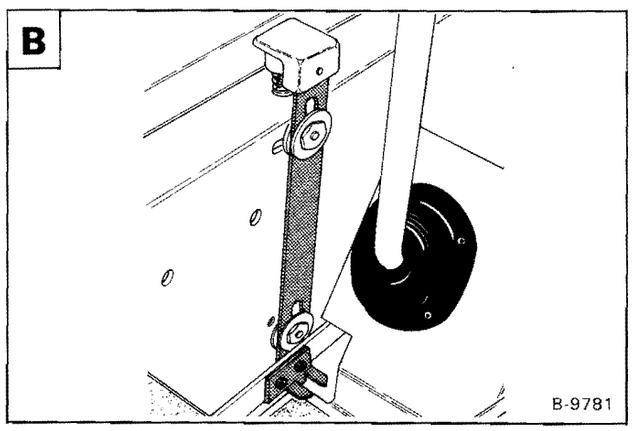
Clean any debris or dirt from moving parts [A] [B].

Inspect the linkage bolts and nuts for being tight. The correct torque is 25-28 ft.-lbs. (34-38 Nm).

Use general purpose grease to lubricate the seat bar pivot points at each side of the operator cab [A].

If the seat bar system does not function correctly, check for free movement of each linkage part. Check for excessive wear. Adjust pedal control linkages. Replace parts that are worn or damaged. Use only genuine Melroe replacement parts.





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USING AN EXTRA BATTERY (JUMP STARTING)

Procedure

If it is necessary to use an extra battery to start the engine. BE CAREFUL! There must be one person in the operator's seat and one person to connect and disconnect the battery cables. The extra battery must be the same voltage as the loader battery.

Use the following procedure [A]:

The ignition must be in the "OFF" position.

NOTE: Never connect the negative (−) cable to the negative (−) terminal of the loader battery.

Connect the end of the first cable to the positive terminal (+) of the booster battery. Connect the other end of the same cable to the starter [A].

Connect the end of the second cable to the negative terminal (−) of the bosster battery. Connect the other end of the second cable to the engine [A].

Keep the cables away from moving parts.

Start the engine.

After the engine has started, remove the ground cable connected to the engine first.

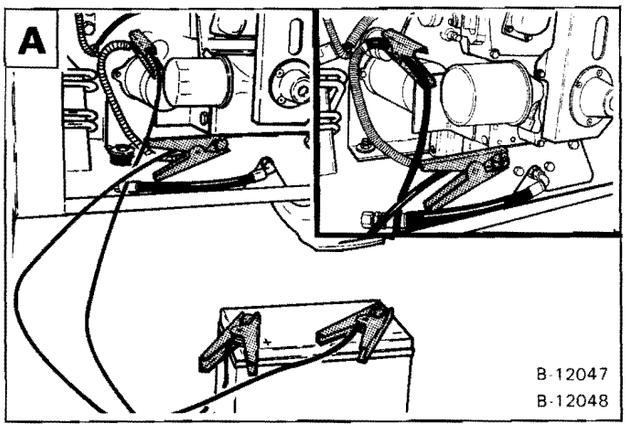
Remove the cable connected to the starter.

IMPORTANT

Damage to the alternator can occur if:

- **Engine is operated with battery cables disconnected.**
- **Battery cables are connected when using a fast charger or when welding on the loader (Remove both cables from the battery).**
- **Extra battery cables (booster cables) are connected wrong.**

I-2023-1285



B-12047
B-12048

⚠ WARNING

Batteries contain acid which burns eyes and skin on contact. Wear goggles, protective clothing and rubber gloves to keep acid off body.

In case of acid contact, wash immediately with water for several minutes and get medical attention in case of eye contact.

W-2065-1286

Keep arcs, sparks, flames and lighted tobacco away from batteries. When "jumping" from an extra battery make final connection (negative) at engine frame.

Do not jump start or charge a frozen battery. Warm battery to 60°F (16°C) before connecting to a charger. Unplug charger before connecting or disconnecting cables at battery. Battery gas can explode and cause serious injury.

W-2066-1285

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REMOTE START SWITCH

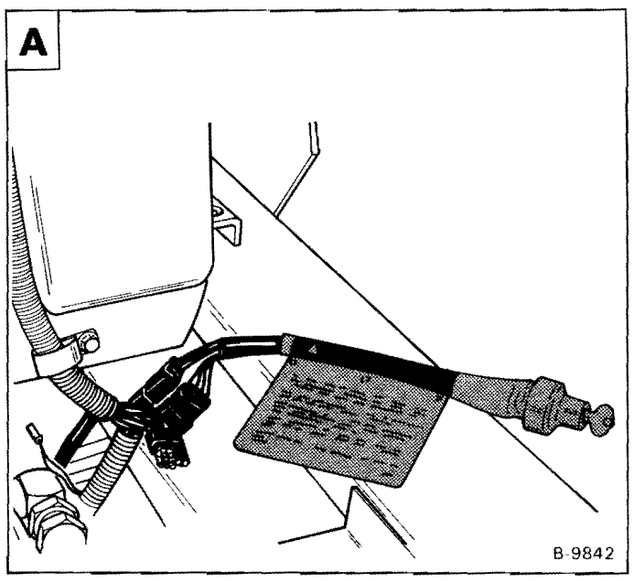
Procedure

The tool listed will be needed to do the following procedure:

MEL-1138A — Remote Start Switch

The remote start switch is required when the operator cab is in the raised position for service and the service technician needs to start the engine. The wire harness must be separated at the operator cab and engine wiring harness connectors [A].

Place the loader on jackstands before centering the steering linkage, checking the main relief valve, or check pump flow.



⚠ WARNING

Put jackstands under the front axles and rear corners of the frame when the engine is running for service. Failure to use jackstands can allow the machine to fall or move and cause injury or death.

W-2017-0486

The remote start switch is connected to the engine harness connector.

This remote start switch is required when the service technician is adjusting the steering linkage or checking the hydraulic or hydrostatic system.

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bobcat

HYDRAULIC / HYDROSTATIC SYSTEM OPERATION

To Be Used With

HYDRAULIC / HYDROSTATIC FLOW CHART

For Models

741, 742, 743, 743 DS (Starting With S/N 15001)

Chart # 6570293 (Printed July 86)

CHART LEGEND

1. **FLUID RESERVOIR,** Capacity . . . . . 3.5 Gals. (13,2 L)
2. **HYDROSTATIC MOTOR**
3. **HYDRAULIC PUMP,** Vane Type 12.1 GPM (45,8 Lmin.) @ 2500 RPM
4. **AUXILIARY HYDRAULIC QUICK COUPLERS (Front)**
5. **AUXILIARY HYDRAULICS (Rear)**
6. **TILT CYLINDER**
7. **LIFT CYLINDERS**
8. **LOAD CHECK VALVES (4)**
9. **ONE WAY RESTRICTOR,** 0.125" Orifice
10. **MAIN RELIEF VALVE** . 2250-2400 PSI (15513-16548 kPa)
11. **PORT RELIEF VALVE** . . . . . 3500 PSI (24132 kPa)
12. **ANTI-CAVITATION VALVE**
13. **HYDRAULIC CONTROL VALVE**
14. **HYDRAULIC/HYDROSTATIC FILTER,** #3 Element
15. **DIFFERENTIAL PRESSURE SWITCH** 19 PSI (131 kPa) 40 PSI (276 kPa) (See Microfiche for S/N)
16. **FILTER BY-PASS VALVE,** 25 PSI (172 kPa) 50 PSI (345 kPa) (See Microfiche for S/N)
17. **OIL COOLER**
18. **PORT BLOCK**
19. **CASE DRAIN RELIEF VALVE,** 45-55 PSI (310-379 kPa)
20. **TEMPERATURE SWITCH** . 225-232°F (106-112°C)
21. **COOLER BY-PASS VALVE,** 177-227 PSI (1220-1565 kPa)
22. **CHARGE PRESSURE SWITCH,** 17-23 PSI (117-159 kPa)
23. **HYDROSTATIC PUMPS**
24. **CHARGE RELIEF VALVE,** 85 PSI (586 kPa)
25. **HIGH PRESSURE RELIEF/ REPLENISHING VALVES (2),** 3500 PSI (24132.5 kPa)
26. **REPLENISHING VALVES (2)**

NOTE: "A" and "B" - Bucket Positioning Hydraulic Circuitry Connection.

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OIL FLOW EXPLANATION

The fluid flows by gravity from the reservoir (1) to the port block (18) which is on the inside of the right fender. Return fluid from the cooler by-pass valve (21) and the oil cooler (17) joins with the fluid from the hydrostatic pump (23) through the bearing of the pump (23) and also supplies fluid to the hydraulic pump (3) .

The hydraulic pump (3) is a "vane type" pump and is driven by a shaft through the hydrostatic pumps (23) . The fluid goes from the hydraulic pump (3) to the hydraulic control valve (13) .

The hydraulic control valve (13) has an adjustable relief valve (10) . When all the spools of the control valve are in the neutral position, the fluid goes through the control valve (13) and to the oil cooler (17) . If one of the spools is activated, the fluid goes out the respective port and to either the base end, or the rod end of the cylinder(s)(6) (7) . As the fluid goes into one end of the cylinder(s) the fluid from the other side of the cylinder flows back into the control valve (13) . When the cylinder(s) reaches the end of the stroke, the fluid reaches the setting of the relief valve (10) , it will open and let the fluid by-pass the hydraulic circuit (internally) and go back to the oil cooler (17) .

If you let the spool go back to the neutral position, then there is fluid available for the other sections of the control valve (13) . Two sections of the control valve (13) can be used at the same time if the main relief valve (10) is not open.

The fluid flows from the oil cooler (17) through the #3 element filter (14) to the center section of the hydrostatic pumps (23) . This fluid is called "charge supply fluid". In the center section of the hydrostatic pumps (23) the fluid is against two high pressure relief/replenishing valves (25) , two replenishing valves (26) and the charge relief valve (24) . When the fluid gets to the hydrostatic pumps (23) it activates the high pressure relief/replenishing valves (25) . The replenishing valves open and let fluid into the hydrostatic pumps (23) for replenishing, lubrication and cooling.

The hydrostatic pumps (23) do not need the full volume of fluid flow so there is extra fluid. This extra fluid goes to the charge relief valve (24) .

There are two hydrostatic pumps (23) and two hydrostatic motors (2) . One pump and one motor work together as a pair to drive on one side of the loader. The other pump and motor work as a pair to drive the opposite side of the loader.

When the replenishing valves (26) open and fluid goes into the hydrostatic pumps (23) , the flow of fluid becomes the "drive loop fluid". When the steering levers are in neutral, the hydrostatic pumps (23) and the hydrostatic motors (2) are not working, but do have charge pressure. When the steering levers are moved, the swashplates in the pumps (23) are angled

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and the fluid is forced out of the pressure side of the hydrostatic pumps (23) and to the hydrostatic motors (2) . This flow of fluid is called "drive pressure". Drive pressure is much higher than charge pressure causing the replenishing valves (25) or (26) to close, allowing the flow of the fluid to go to the motors (2) . There are four replenishing valves (25) and (26) , two for each hydrostatic pump (23) . One is for forward travel and one for reverse travel. When the loader is driven with the bucket down, into a pile of material, there is resistance causing high pressure fluid in the drive loop. There is a relief valve built into the high pressure replenishing/relief valves (25) (for forward travel). This relief valve releases the high pressure fluid in the drive loop. When the relief valve opens, the extra fluid goes from the drive loop to the charge loop to be used again.

The hydrostatic motors (2) are a "roller-geroler type". The case drain fluid from the motors (2) is controlled by the case drain relief valve (19) in the port block (18) .

The filter (14) has a by-pass valve (16) to allow fluid flow when the fluid will not go through the filter element (plugged).

The cooler by-pass valve (21) will open when the lift arms are lowered quickly with a heavy load in the bucket. This happens because a large amount of fluid is pushed out of the lift cylinders (7) through the control valve (13) and into the port block (18) . The by-pass valve (21) will also open when the fluid is cold and is too thick for fluid flow to go through the oil cooler (17) and filter (14) .

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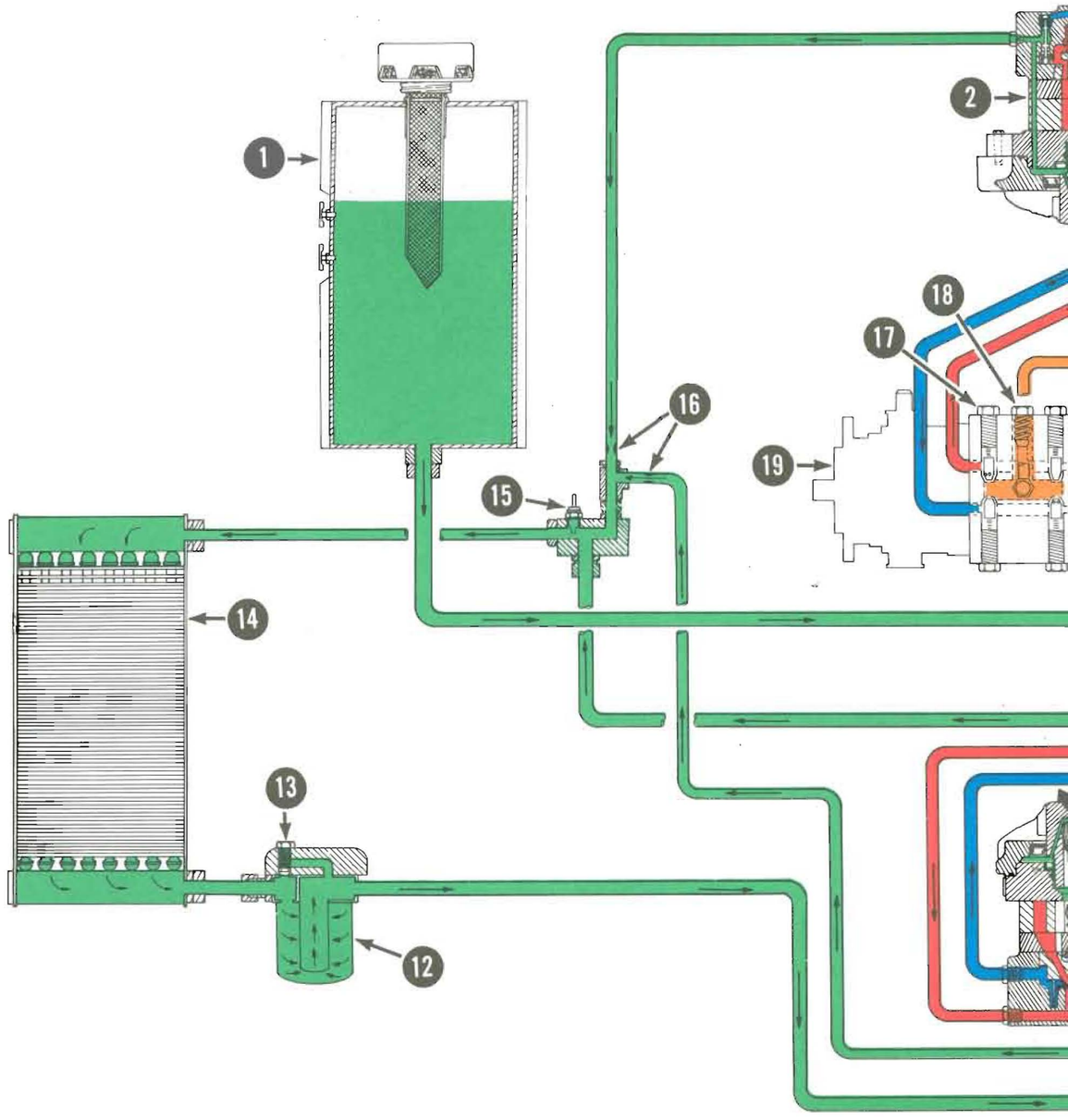
HYDRAULIC / HYDROSTATIC FLOW CHART

For Models

741, 742, 743, 743 DS (S/N 11001 Thru 14999)

With Charge Line Filter and Melroe Valve

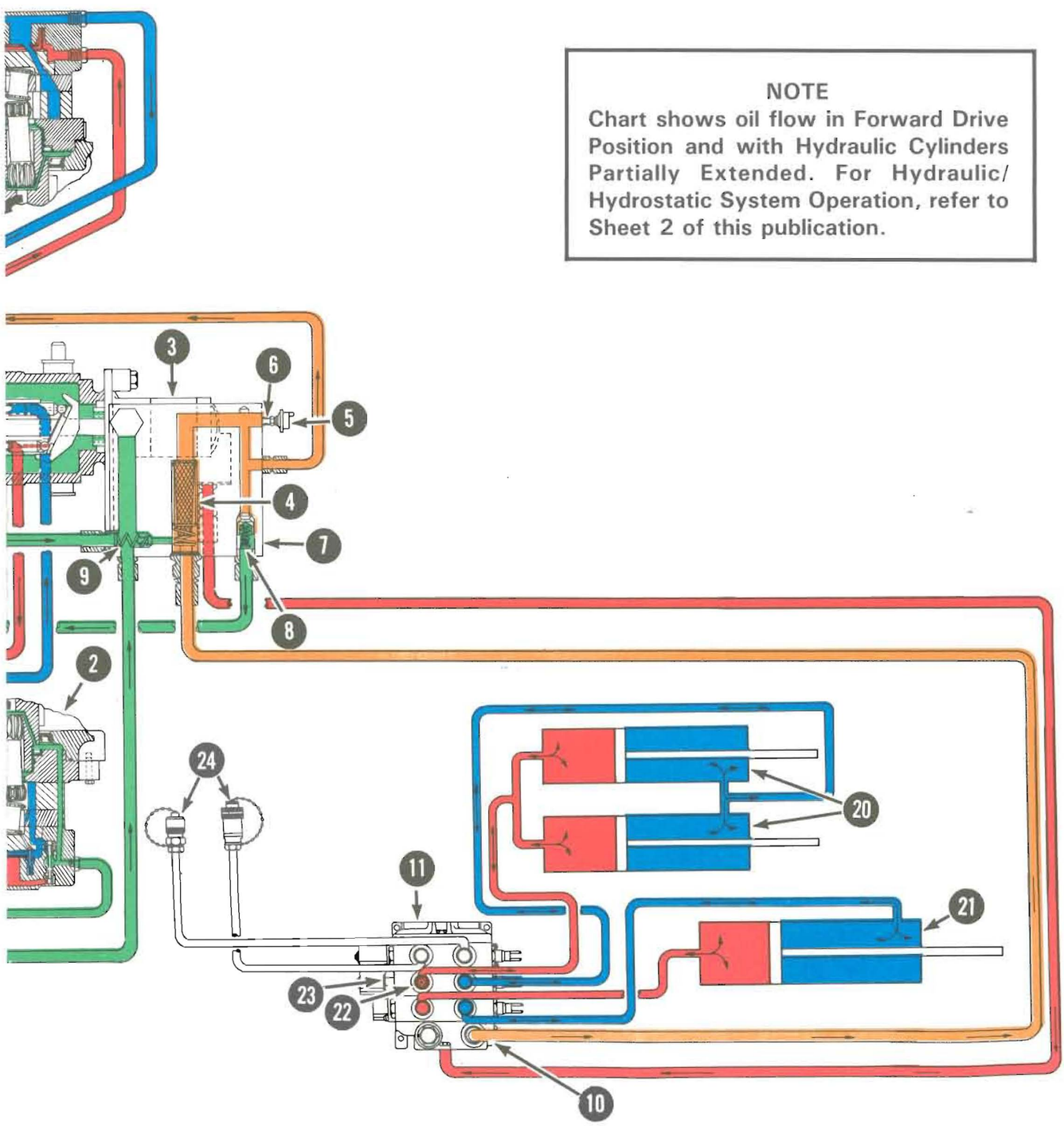
Chart # 6570767 (Printed April 1988)



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RED - - - - - - - - High Pressure
BLUE - - - - - - - Low Pressure
GREEN - - - - - - Case Drain & Reservoir
ORANGE - - - - - Charge Pressure

NOTE
Chart shows oil flow in Forward Drive Position and with Hydraulic Cylinders Partially Extended. For Hydraulic/ Hydrostatic System Operation, refer to Sheet 2 of this publication.



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HYDRAULIC / HYDROSTATIC SYSTEM OPERATION

To Be Used With

HYDRAULIC / HYDROSTATIC FLOW CHART

For Models

741, 742, 743, 743 DS (S/N 11001 Thru 14999)

Chart # 6570767 (Printed April 88)

CHART LEGEND

1. **FLUID RESERVOIR,**
   System Cap. . . . . 6 Gals. (22,7 L)
   Working Cap. . . . . 3.5 Gals. (13,2 L)
2. **HYDROSTATIC MOTOR**
3. **HYDRAULIC PUMP** (Vane), 11.9 GPM (45 L/min.) at 2850 RPM
4. **FILTER,** . . . . . 40 Micron
5. **TEMPERATURE SWITCH,** (Early Models) 225-232°F (107-111°C), PRESSURE SWITCH (Later Models), 17-21 PSI (118-144 kPa)
6. **PRESSURE RESTRICTOR**
7. **PORT BLOCK**
8. **CHARGE BY-PASS VALVE,** 43-57 PSI (296-393 kPa)
9. **COLD WEATHER BY-PASS VALVE,** 200-224 PSI (1379-1544 kPa)
10. **MAIN RELIEF VALVE**. 2300-2350 PSI (15859-16203 kPa) Measure at the Auxiliary Quick Couplers
11. **HYDRAULIC CONTROL VALVE**
12. **FILTER**. . . . . 10 Micron
13. **FILTER BY-PASS**. . 72 PSI (496 kPa)
14. **OIL COOLER**
15. **PRESSURE SWITCH (Early Models),** 2.5-3.5 PSI (17-24 kPa), TEMPERATURE SWITCH (Later Models), 225-232°F (107-111°C)
16. **ORIFICE**. . . . .156'' (3,962 mm) Dia.
17. **HIGH PRESSURE REPLENISHING VALVE,** 3500 PSI
18. **CHARGE RELIEF (Non-Functional)**
19. **HYDROSTATIC PUMP**
20. **LIFT CYLINDERS**
21. **TILT CYLINDER**
22. **RESTRICTOR** .125'' (3.175 mm) Dia.
23. **PORT RELIEF**. 3500 PSI (24132 kPa)
24. **AUXILIARY QUICK COUPLERS**

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OIL FLOW EXPLANATION

The fluid flows by gravity from the reservoir (1) to the port block (7) which is on the top of the hydraulic pump (3) . Return fluid from the cold weather by-pass valve (9) and the oil cooler (14) join with reservoir fluid to supply fluid to the hydraulic pump (3) . ''Case drain'' fluid from the hydrostatic pump (2) and also supplies fluid to the hydraulic pump (3) .

The hydraulic pump (3) is a ''vane type'' pump and is driven by a shaft through the hydrostatic pumps (19) . The fluid goes from the hydraulic pump (3) to the hydraulic control valve (11) .

The hydraulic control valve (11) has a shim adjustable relief valve (10) . When all three spools are in the neutral position, the fluid goes through the control valve (11) and to the port block (7) . If one of the spools is activated, the fluid goes out the respective port and to either the base end, or the rod end of the cylinder(s) (20) (21) . As the fluid goes into one end of the cylinder(s) (20) (21) return fluid comes from the opposite end of the cylinder(s) and back into the control valve (11) . When the cylinder(s) reaches the end of the stroke, the fluid flow stops and causes hydraulic pressure to increase. When the pressure reaches the setting of the relief valve (10) , it will open and let the fluid by-pass the hydraulic circuit (internally) and go back to the pot block (7) . If you let the spool go back to the neutral position, then there is fluid available for the other sections. Two sections of the control valve (11) can be used at the same time if the main relief valve (10) is not open.

The fluid which goes back to the port block (7) goes through the 40 micron filter (4) . The normal flow of the fluid is through the 40 micron filter (4) and to the hydrostatic pumps (2) . But if the fluid is to cold or there is a sudden increase of pressure from the control valve (11) the pressure will cause the cold weather by-pass valve (8) to open and put the excess fluid back to the reservoir (1) until the excess pressure decreases.

From the 40 micron filter (4) the fluid flows through the pressure restrictor (6) past the temperature switch (Early Model) (5) or the pressure switch (Later Model) (5) . The fluid flows from the port block (7) to the center section of the hydrostatic pumps (19) . This fluid is called ''charge supply fluid''. In the center section of the hydrostatic pumps (19) the fluid is against two high pressure replenishing relief valves (17) , two replenishing valves and the nonfunctional charge relief valve (18) . The charge relief valve (18) has a heavy spring holding it shut. When the fluid gets to the hydrostatic pumps (19) it activates the high pressure replenishing relief valves (17) . The replenishing valves open and let fluid into the hydrostatic pumps (19) for replenishing, lubrication and cooling.

The hydrostatic pumps (19) do not need the full volume of fluid, so there is extra fluid. This extra fluid goes to the charge by-pass valve (8) . When the pressure reaches the setting of the charge by-pass valve (8) it opens and let the extra fluid go to the oil cooler (14) .

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There are two hydrostatic pumps (19) and two hydrostatic motors (2) . One pump and one motor work together as a pair to drive on one side of the loader. The other pump and motor work as a pair to drive the opposite side of the loader.

When the replenishing valves (17) open and the fluid goes into the hydrostatic pumps (19) , the flow of fluid becomes ''drive loop fluid''. When the steering levers are in neutral, the hydrostatic pumps (19) and the hydrostatic motors (2) are not working, but do have charge pressure. When the steering levers are moved, the swashplates in the hydrostatic pumps (19) are angled and the fluid is forced out of the pressure side of the hydrostatic pumps (19) and to the hydrostatic motors (2) . This flow of fluid is called ''drive pressure''. Drive pressure is much higher than charge pressure causing the replenishing valves (17) to close allowing the flow of the fluid to go to the hydrostatic motors (2) . There are four replenishing valves (17) two for each hydrostatic pump (19) . One is for forward travel and one for reverse travel. When the loader is driven, with the bucket down, into a pile of dirt, there is resistance causing high pressure fluid in the drive loop. There is a relief valve built into two of the high pressure replenishing relief valves (17) (for forward travel). This relief valve releases the high pressure fluid in the drive loop. When the relief valve opens, the extra fluid goes from the drive loop to the charge loop to be used again. If the fluid pressure gets above the relief valve setting in the drive loop, the pressure can break tubelines, damage the hydrostatic pumps (19) or the hydrostatic motors (2) . The two replenishing valves for reverse travel do not have the relief function.

The hydrostatic motors (2) are a ''roller-geroler type'' and have a built-in shuttle valve that meters the fluid through to the ''tee block'' past the pressure switch (Early Model) (15) or the temperature switch (Later Model) (15) and to the oil cooler (14) . The fluid flows from the oil cooler (14) to the hydraulic filter (12) and to the inlet of the port block (7) on the top of the hydraulic pump (3) . The shuttle valve in the hydrostatic motors (2) opens to let fluid flow through the oil cooler (14) so that the drive loop fluid does not get to hot.

The hydraulic filter (12) has a by-pass valve (13) to allow fluid flow when the fluid will not go through the filter element if filter element is plugged.

The cold weather by-pass valve (9) will open when the lift arms are lowered quickly with a heavy load in the bucket. This happens because a large amount of fluid is pushed out of the lift cylinders through the control valve (11) and into the port block (7) . The cold weather by-pass valve (9) will also open when the fluid if cold and is too thich for all the fluid to go through the 40 micron filter (4) .

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HYDRAULIC / HYDROSTATIC FLOW CHART

For Models

741, 742, 743, 743 DS (Starting With S/N 15001)

With Charge Line Filter and Melroe Valve

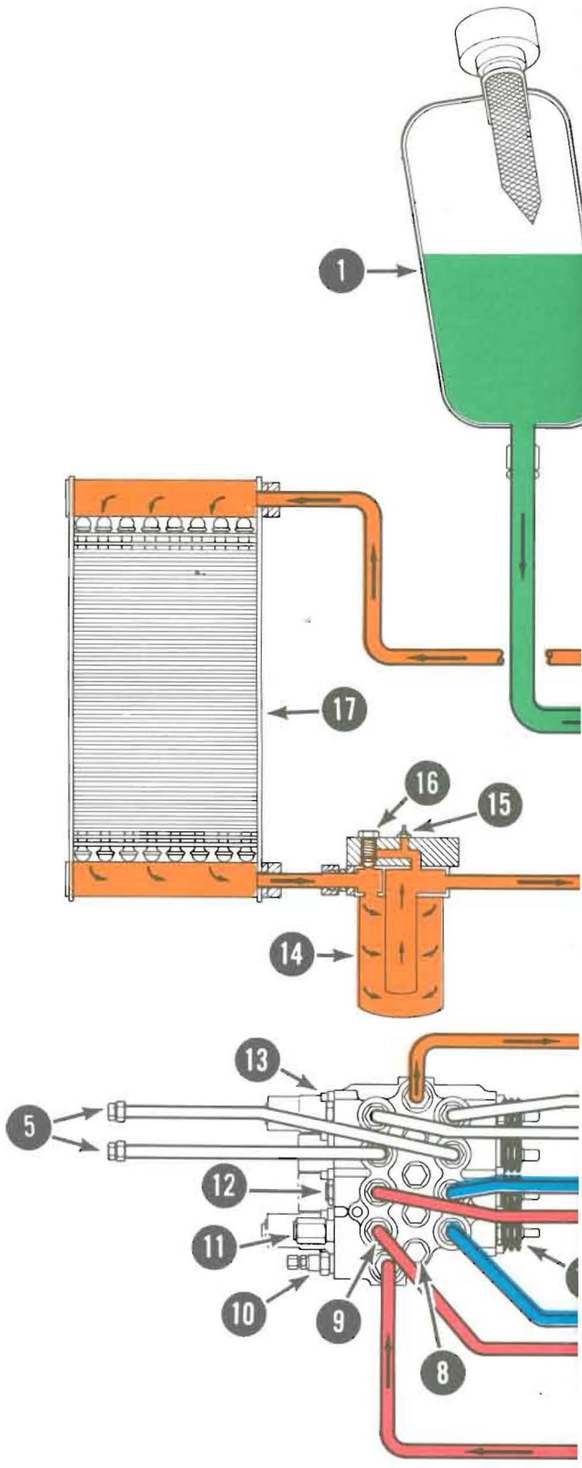
Chart # 6570293 (Printed July 1986)

NOTE

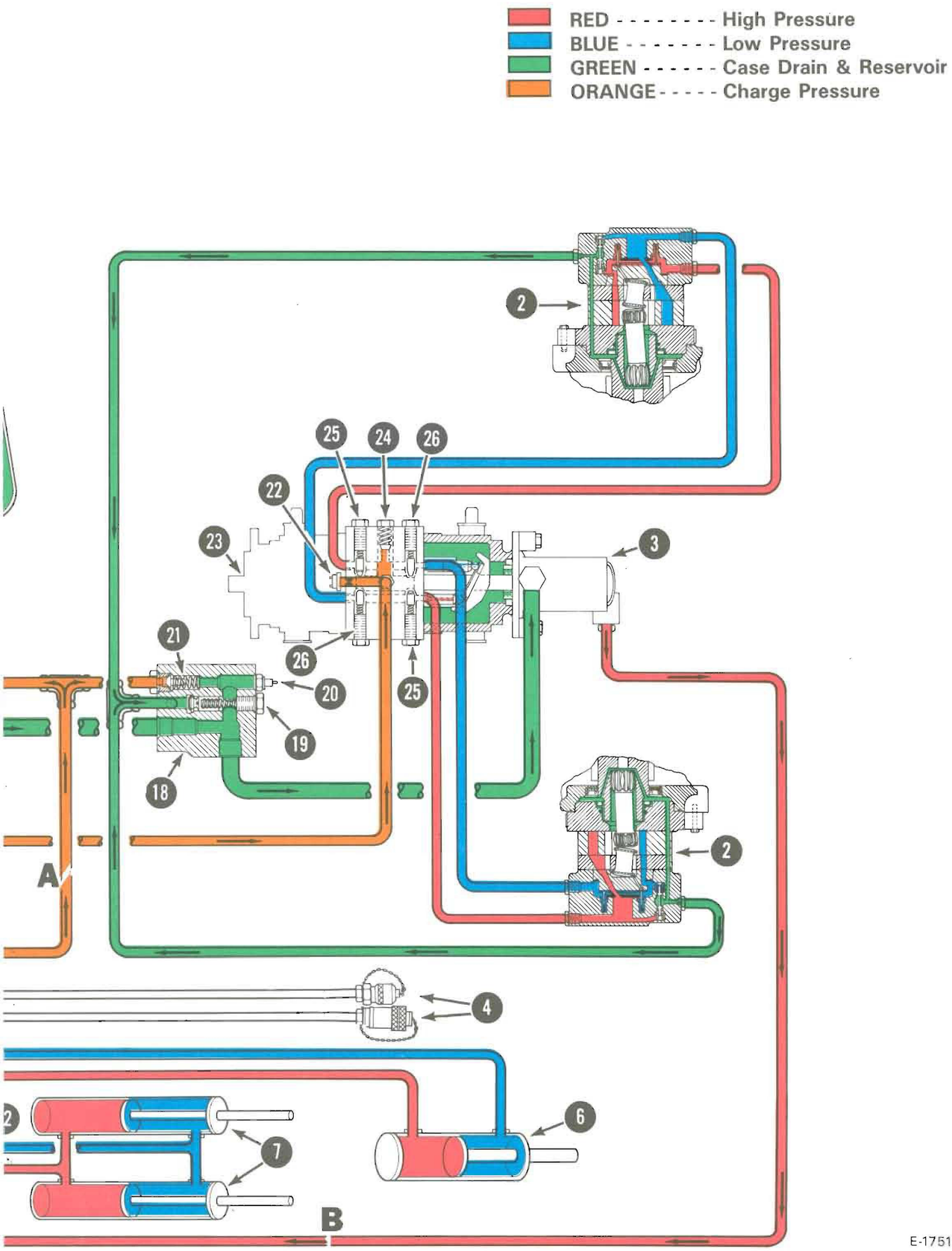
Chart shows oil flow in Forward Drive Position and with Hydraulic Cylinders Partially Extended. For Hydraulic/ Hydrostatic System Operation, refer to Sheet 2 of this publication.

NOTE

Refer to Chart # 6570281 for machines equipped with optional Bucket Positioning Valve. Reference "A" and "B" indicate location of hydraulic circuitry connection.



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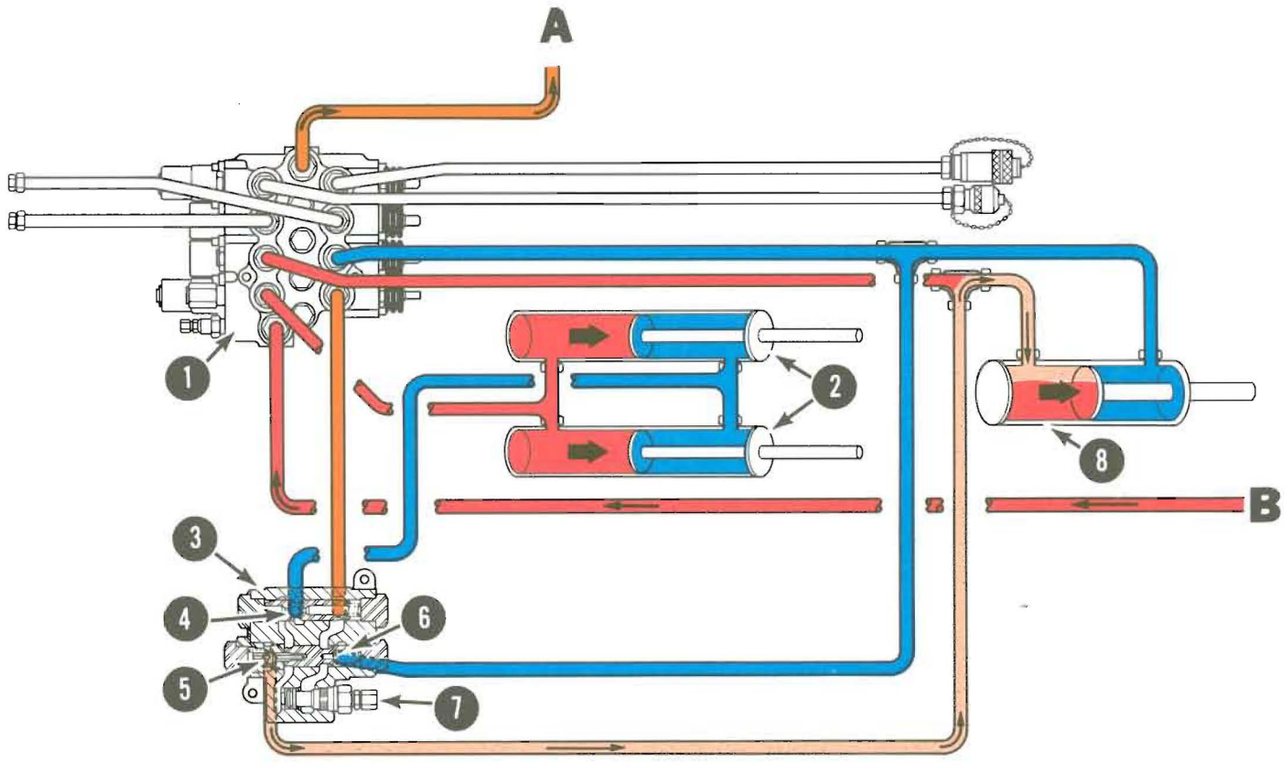
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BUCKET POSITION FLOW CHART

For Models

741, 742, 743, 743DS W/Melroe Hydraulic Control Valve and Optionally Equipped W/Dukes Bucket Position Valve



D-1690

NOTE
Chart shows fluid flow in the Lifting Position and with the Bucket Positioning Valve in operation.

NOTE
Use with Hydraulic Chart #6570293. References "A" & "B" indicate location of hydraulic circuitry connection.

RED - - - - - - - - High Pressure
BLUE - - - - - - - Low Pressure
ORANGE - - - - - Charge Pressure
LT. ORANGE- - - Bucket Position Fluid

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CHART LEGEND

1. HYDRAULIC CONTROL VALVE (Melroe)
2. LIFT CYLINDERS
3. BUCKET POSITION VALVE (Optional)
4. FLOW DIVIDER SPOOL
5. CHECK POPPET VALVE
6. FLOW RETURN SPOOL
7. RELIEF VALVE
8. TILT CYLINDER

OIL FLOW EXPLANATION

BUCKET POSITIONING SYSTEM OPERATION

When the lift spool of the control valve 1 is engaged to raise the lift arms, the fluid from the rod end of the lift cylinders 2 is directed through the bucket position valve 3 . The bucket position valve has a flow divider spool 4 which directs 20% of the returning fluid directly back to the lift section of the control valve 1 . The remaining 80% of the fluid goes through a check poppet valve 5 and to the base end of the tilt cylinder 8 . This forces the tilt cylinder rod out and adjusts the position of the bucket as the lift arms are raisedd. Since the fluid is trapped in the base end of the tilt cylinder (tilt pedal is in neutral), the pressure will increase and push the flow return spool 6 open and allow fluid from the rod end of the tilt cylinder 8 to the return to the lift section of the control valve 1 along with the 20% of the returning fluid from the rod end of the lift cylinders 2 . When the tilt cylinder is fully extended and the lift arms are still raising, fluid goes over the relief valve 7 and back to the lift section of the control valve 1 .

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HYDRAULIC / HYDROSTATIC SYSTEM OPERATION

To Be Used With

HYDRAULIC / HYDROSTATIC FLOW CHART

For Models

742B, 743B

(With 3-Spool Melroe Control Valve)

Chart # 6722141 (Printed January 1992)

CHART LEGEND

1. **RESERVOIR,** . . . . . 3.5 Gals. (13,2 L)
2. **FILL CAP**
3. **SCREEN,** . . . . . 60 Mesh
4. **HYDROSTATIC MOTOR**
5. **HYDRAULIC PUMP,** Rated @ 2500 RPM
   742B (S/N 11251 & Above);
   743B (S/N 13888 & Above)
   Gear Type . . . 12.1 GPM (45,8 L/min.)
   742B (S/N 11250 & Below);
   743B (S/N 13887 & Below)
   Vane Type . . . 12.1 GPM (45,8 L/min)
6. **HYDROSTATIC PUMPS**
7. **REPLENISHING VALVES (2)**
8. **CHARGE RELIEF VALVE** . . . 95-115 PSI (655-793 kPa)
9. **HIGH PRESSURE RELIEF/REPLENISHING VALVES (2):** . . 3500 PSI (24133 kPa)
10. **CHARGE PRESSURE SWITCH** 17-23 PSI (117-159 kPa)
11. **OIL COOLER BY-PASS** . . . 117-228 PSI (1220-1265 kPa)
12. **PORT BLOCK**
13. **TEMPERATURE SWITCH**. 225-232°F (106-112°C)
14. **CASE DRAIN RELIEF VALVE** 45-55 PSI (310-379 kPa)
15. **AUXILIARY QUICK COUPLERS (OPT.)**
16. **TILT CYLINDER**
17. **LIFT CYLINDERS**
18. **FLOW RETURN SPOOL**
19. **RELIEF VALVE** . . . . . 500-600 PSI (3448-4136 kPa)
20. **CHECK POPPET VALVE**
21. **BUCKET POSITIONING VALVE (OPT.)**
22. **FLOW DIVIDER SPOOL**
23. **RESTRICTOR (ONE WAY)** 0.125'' (3,2 mm) Dia. Orifice
24. **MAIN RELIEF VALVE,** 2250-2400 PSI (15513-16548 kPa)
25. **PORT RELIEF VALVE** . . . . . 3500 PSI (24132 kPa)
26. **ANTI-CAVITATION VALVE (2)**
27. **HYDRAULIC CONTROL VALVE**
28. **LOAD CHECK VALVES (3)**
29. **HYDRAULIC/HYDROSTATIC FILTER** #3 Element
30. **DIFFERENTIAL PRESSURE SWITCH** 40 PSI (276 kPa)
31. **FILTER BY-PASS VALVE** . . . . . 50 PSI (345 kPa)
32. **OIL COOLER**

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FLUID FLOW EXPLANATION

The fluid flows by gravity from the reservoir (1) to the port block (12) which is located inside the right fender. Return fluid from the oil cooler by-pass valve (12) joins with the fluid from the oil cooler (32) and hydrostatic pump (6) through the bearing of the pump (6) and supplies fluid to the hydraulic pump (5).

The hydraulic pump (5) is driven by a shaft through the hydrostatic pumps (6). The fluid goes from the hydraulic pump (5) to the hydraulic control valve (27).

The control valve (27) has an adjustable relief valve (24). When all three spools of the control valve are in the neutral position, the fluid goes through the control valve (27) and to the oil cooler (32). If one of the spools is activated, the fluid goes out the respective port and to either the base end, or the rod end of the cylinder(s) (16) (17). ALSO SEE OPTIONAL BUCKET POSITIONING SYSTEM OPERATION. As the fluid goes into one end of the cylinder(s) (16) (17), the fluid from the other side of the cylinder flows back into the control valve (27). When the cylinder(s) (16) (17) reach the end of the stroke, the fluid pressure reaches the setting of the relief valve (24), it will open and let the fluid by-pass the hydraulic circuit (internally) and go back to the oil cooler (32). When the spool goes back to neutral position, then there is fluid available for the other sections of the control valve (27). Two sections of the control valve (27) can be used at the same time if the main relief valve (24) is not open.

The fluid flows from the oil cooler (32) through the filter (29) to the center section of the hydrostatic pumps (6). This fluid is called ''charge supply fluid''. In the center section of the pumps (6) the fluid is against two high pressure relief/replenishing valves (9), two replenishing valves (7) and the charge relief valve (8). When the fluid gets to the pumps (6) it activates the high pressure relief/replenishing valves (9) and replenishing valve (7). The replenishing valves (7) (9) open and let fluid into the pumps (6) for replenishing, lubrication and cooling. The pumps (6) do not need the full volume of fluid flow so there is extra fluid. This extra fluid goes to the charge relief valve (8).

There are two hydrostatic pumps (6) and hydrostatic motors (4). One pump and one motor work together as a pair to drive on one side of the loader. The other pump and motor work as a pair to drive the opposite side of the loader.

When the steering levers are in neutral, the pumps (6) and the motors (4) are not working, but do have charge pressure. When the steering levers are moved, the swashplates in the pumps (6) are angled and the fluid is forced out of the pressure side of the pumps (6) and to the motors (4).

This flow of fluid is called ''drive pressure fluid''. Drive pressure is much higher than charge pressure causing the replenishing valves (7) (9) to close, allowing the flow of fluid to go to the motors (4). There are four replenishing valves (7) (9), two for each pump (6). One

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is for forward travel and one for reverse travel. When the loader is driven with the bucket, into a pile of material, there is resistance causing high pressure in the drive loop.

There is a relief valve built into the high pressure relief/replenishing valves (9) (for forward travel). This relief valve (9) opens, the extra fluid goes from the drive loop to the charge loop to be used again.

The hydrostatic motors (4) are a ''roller-geroler type''. The case drain fluid from the motors (4) is controlled by the case drain relief valve (14) in the port block (12) .

The filter has a by-pass valve (31) to allow fluid flow when the fluid will not go through the filter element (29) (plugged).

The cooler by-pass valve (11) will open when the lift arms are lowered quickly with a heavy load in the bucket. This happens because a large amount of fluid is pushed out of the lift cylinders (17) through the control valve (27) and into the port block (12) . The oil cooler by-pass valve (11) will also open when the fluid is cold and is too thick for fluid flow to go through the oil cooler (32) and filter (29) .

OPTIONAL BUCKET POSITIONING SYSTEM OPERATION

The lift section and tilt section of the control valve (28) work together to position the bucket as the lift aarms, of the loader, are being raised. When the lift spool of the control valve (27) is engaged to raise the lift arms, the fluid from the rod end of the lift cylinders (17) is directed through the bucket position valve (21) . The bucket position valve (21) has a flow divider spool (22) which directs 20% of the returning fluid directly back to the lift section of the control valve (27) . The remaining 80% of the fluid goes through a check poppet valve (20) and to the base end of the tilt cylinder (16) . This forces the tilt cylinder (16) rod out and adjusts the position of the bucket as the lift arms are raised. Since the fluid is trapped in the base end of the tilt cylinder (16) (tilt pedal in neutral), the pressure will increase and push the flow return spool (18) open and allow fluid from the rod end of the tilt cylinder (16) to return to the lift section of the control valve (27) along with the 20% of the returning fluid from the rod end of the lift cylinders (17) . When the tilt cylinder is fully extended and the lift arms are still raising, fluid goes over the relief valve (19) and back to the lift section of the control valve (27) .

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HYDRAULIC / HYDROSTATIC FLOW CHART

For Models

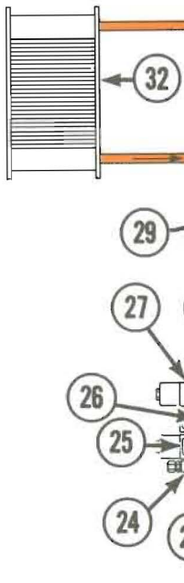
742B, 743B

(With 3-Spool Melroe Control Valve)

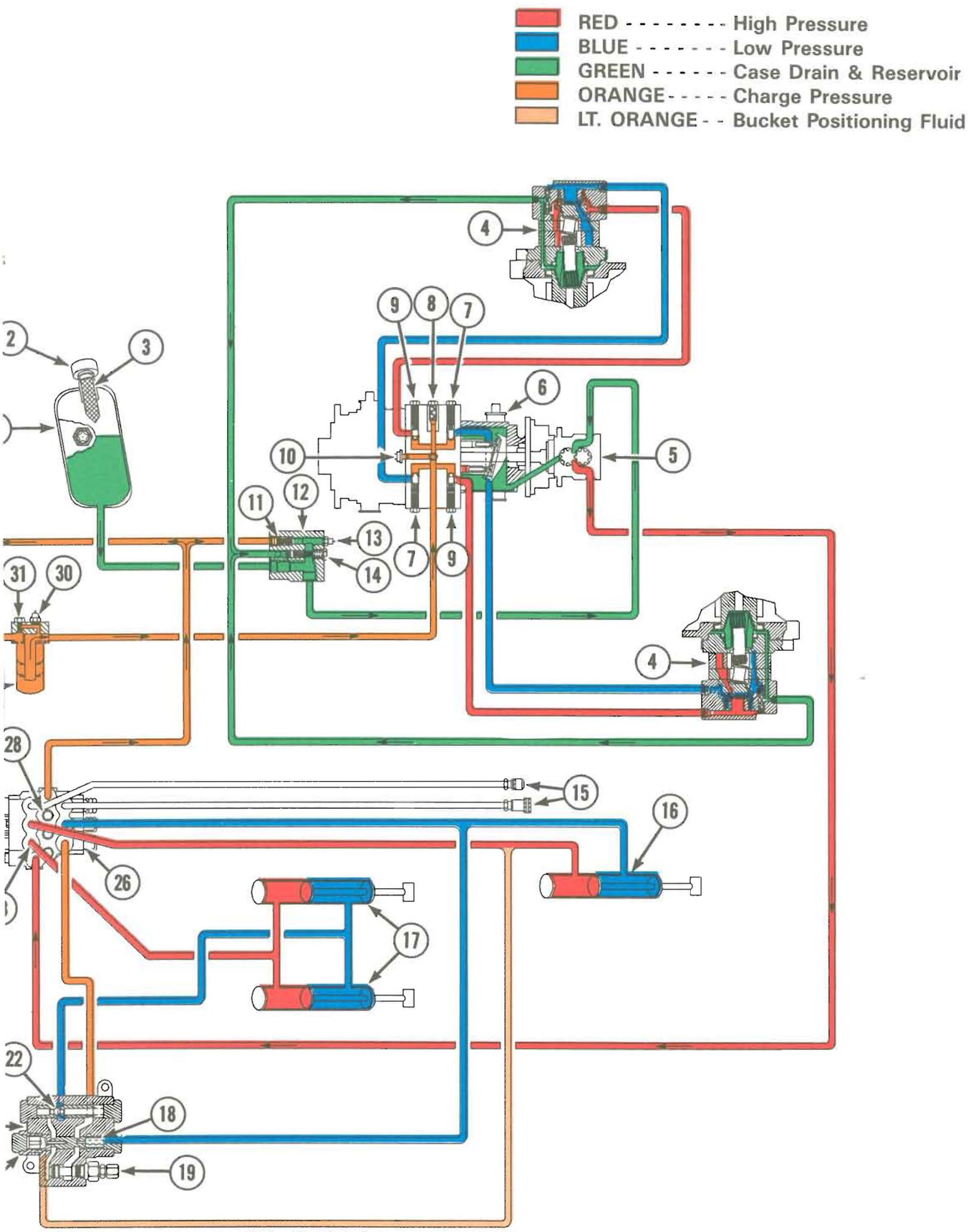
Chart # 6722141 (Printed January 1992)

NOTE

Chart shows oil flow in Forward Drive Position and with Hydraulic Cylinders Partially Extended. For Hydraulic/ Hydrostatic System Operation, refer to Sheet 2 of this publication.



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HYDRAULIC SYSTEM

TROUBLESHOOTING

The following troubleshooting chart is provided as an assistance in locating and correcting problems which are most common. Many of the recommended procedures must be done by authorized Bobcat Service Personnel only.

PROBLEM	CAUSE
The hydraulic system will not operate.	1, 2, 3
Slow hydraulic system action.	1, 3, 4, 5, 6
Hydraulic action is not smooth.	1, 4, 5, 6, 7
Lift arms go up slowly at full engine RPM.	1, 3, 4, 5, 6, 7, 9
The lift arms or Bob-Tach will move the pedal in neutral position.	4
The lift arms come down with the pedal in the neutral position.	4, 9, 10, 11

KEY TO CORRECT THE CAUSE
1. The fluid level is not correct.
2. The pedal linkage is disconnected.
3. The hydraulic pump has a defect.
4. The pedal linkage is not adjusted correctly.
5. Relief valve is not at the correct pressure.
6. Suction leak on the inlet side of the hydraulic pump.
7. Fluid is cold.
8. Using the loader for more than its rated capacity.
9. Internal leak at the lift cylinder(s).
10. External leak at the lift cylinder(s).
11. Leaking seal in port relief valve, lift section.

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HYDRAULIC SYSTEM INFORMATION

IMPORTANT

When making repairs on hydrostatic and hydraulic systems, clean the work area before disassembly and keep all parts clean. Always use caps and plugs on hoses, tubelines and ports to keep dirt out. Dirt can quickly damage the system.

I-2003-0284

Flare Connections

Use the following procedure to tighten the flare fitting:

Tighten the nut until it makes contact with the seat.

Make a mark across the "flats" of both the male and female parts of the connection [A].

Use the chart to find the correct tightness needed [B].

If the fitting leaks after tightening, disconnect it and inspect the seat area for damage.

Straight Thread O-ring Fitting

When installing this fitting, the O-ring must be first lubricated. Loosen the jam nut, install the fitting into place, then tighten the jam nut. Tighten the jam nut until it and the washer are tight against the surface [C].

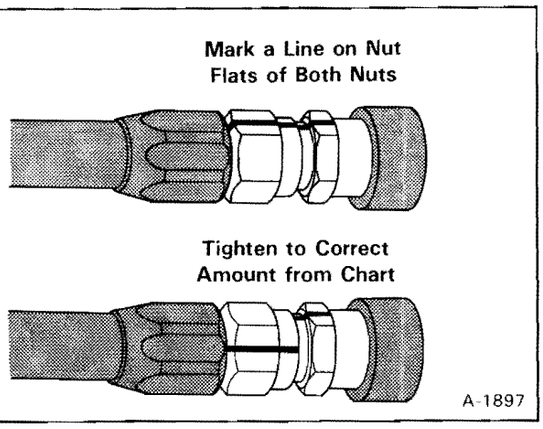
Tubelines and Hoses

Make replacement of tubelines which are bent or have become flat. There will be restriction of fluid flow, which will give a slow hydraulic action and cause heat.

Make replacement of hoses which show signs of wear, damage or weather cracked rubber.

When installing tubelines or hoses, make sure you use two wrenches when loosening and tightening them.

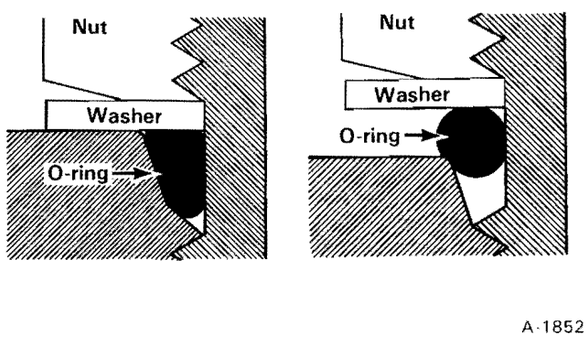
A



B

Wrench Size	Tube Size Outside Dia.	Thread Size	Rotate No. of Hex Flats
5/8"	5/16"	1/2" - 20	2-1/2
11/16"	3/8"	9/16" - 18	2
7/8"	1/2"	3/4" - 16	2
1"	5/8"	7/8" - 14	1-1/2 - 2
1-1/4"	3/4"	1-1/16" - 12	1
1-3/8"	1"	1-5/16" - 12	3/4 - 1
2"	1-1/4"	1-5/8" - 12	3/4 - 1
2-1/4"	1-1/2"	1-7/8" - 12	1/2 - 3/4

C



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LIFT CYLINDER

Checking

NOTE: **Maximum cylinder drift allowed is 1.3'' (33 mm) in 10 minutes with no bucket (measured at the cylinder rod).**

Lower the lift arms. Stop the engine.

Open the rear door. Disconnect the hose from the tubeline which goes to the base end of the lift cylinder [A] or [B].

Only check one cylinder at a time. Put a plug in the hose.

⚠ WARNING

Diesel fuel or hydraulic fluid under pressure can penetrate skin or eyes causing serious injury. 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.

W-2074-1285

Start the engine and push the top (toe) of the lift pedal. If there is any leakage from the open port, remove the cylinder for repairs. Repeat the procedure for the lift cylinder at the other side.

Removal and Installation

Lower the lift arms. Stop the engine. Activate the hydraulic controls to release the hydraulic pressure.

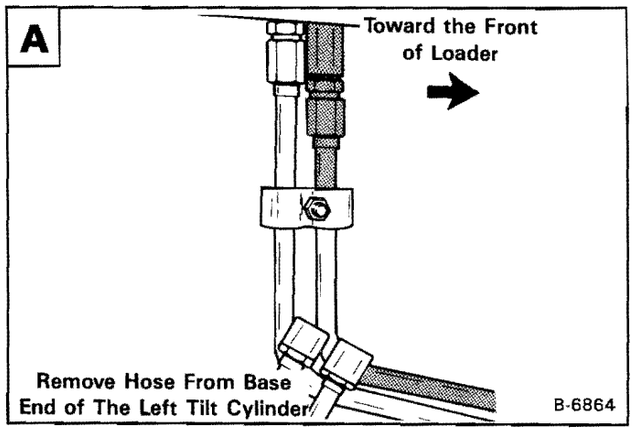
Raise the operator cab (See Page 1—7).

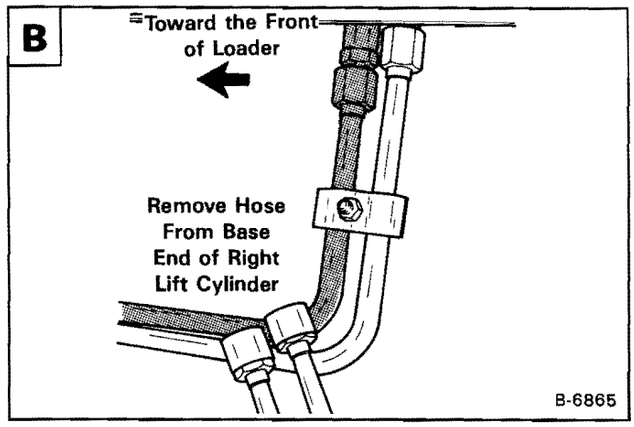
Disconnect the hoses at the base end of the cylinder [A] or [B].

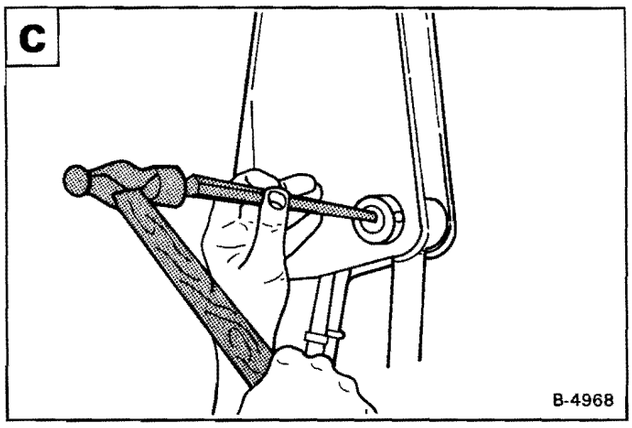
Remove the locknut and bolt at the rod end of the cylinder.

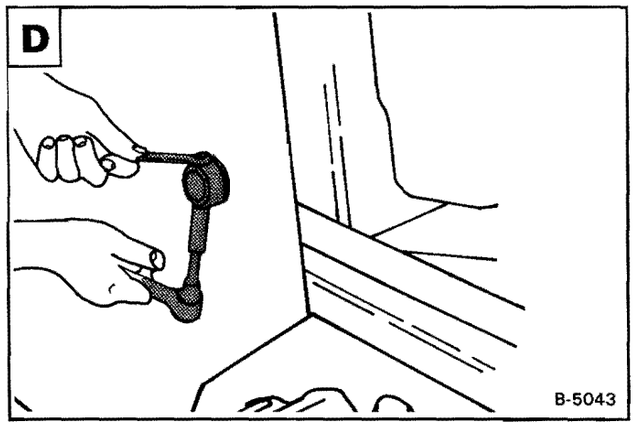
Remove the pivot pin [C].

Remove the locknut and bolt at the base end of the cylinder [D].

* 

* 



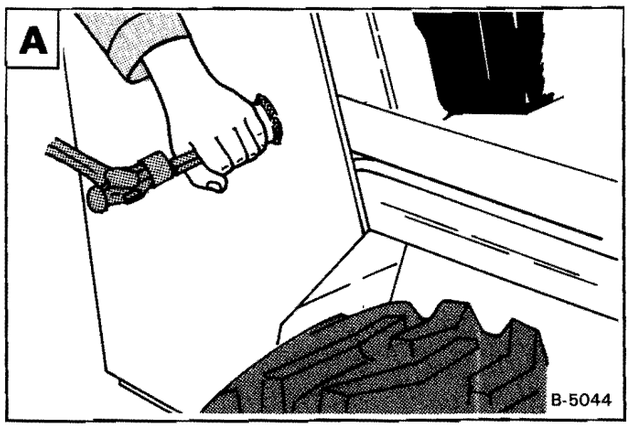


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LIFT CYLINDER (Cont'd)

Remove the pivot pin [A].

Remove the lift cylinder from the loader.



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TILT CYLINDER

Checking

Remove the bucket. Stop the engine. Move the tilt pedal to release the hydraulic pressure.

Disconnect the hose that goes to the base end of the tilt cylinder [A].

⚠ WARNING

Diesel fuel or hydraulic fluid under pressure can penetrate skin or eyes causing serious injury. 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.

W-2074-1285

Put a plug in the hose.

Start the engine. Push the bottom (heel) of the tilt pedal. If there is leakage from the open port, remove the tilt cylinder for repair.

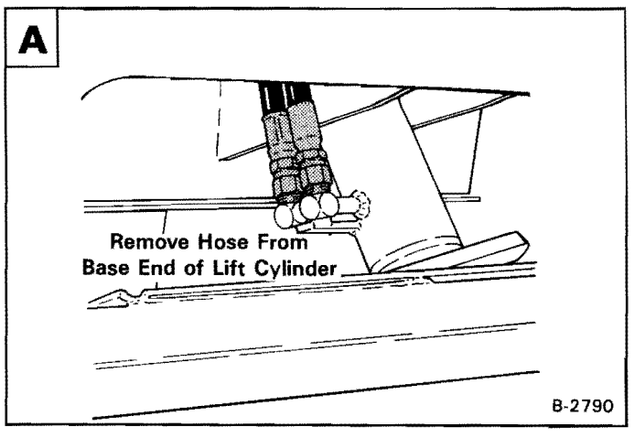
Removal and Installation

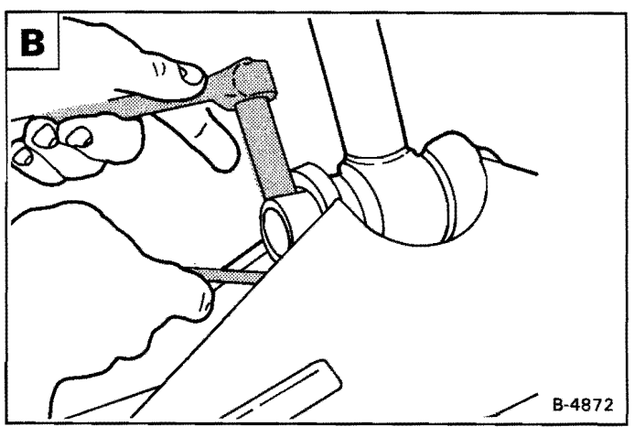
Stop the engine. Remove the bucket. Move the tilt pedal to release the hydraulic pressure.

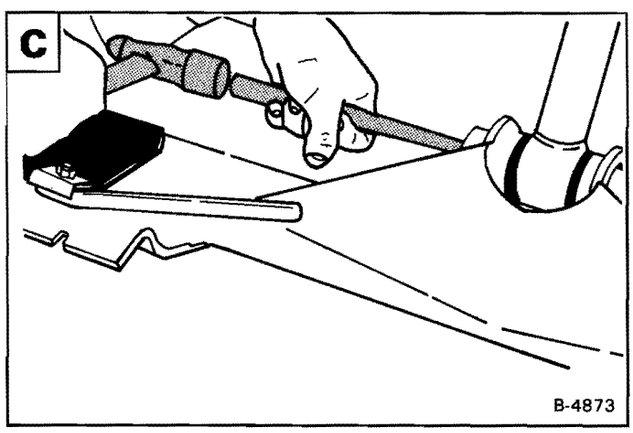
Remove the locknut and bolt from the pin at the rod end of the cylinder [B].

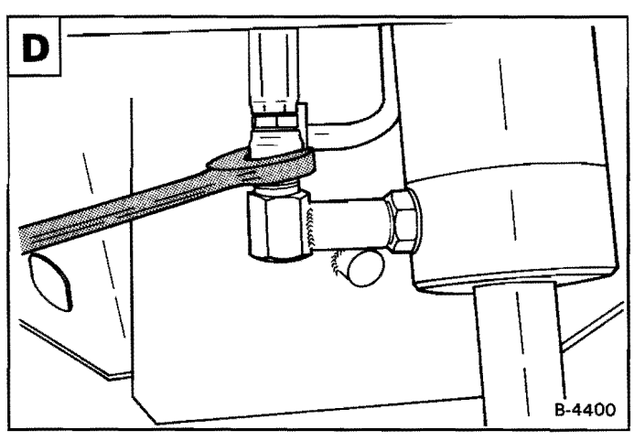
Remove the pin at the rod end [C].

Disconnect the hoses from the tilt cylinder [D].





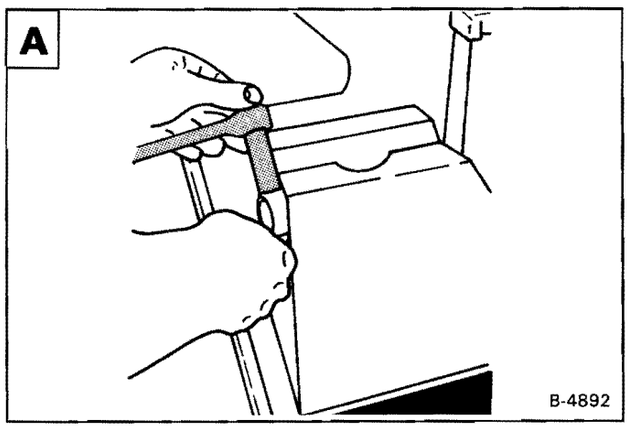




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TILT CYLINDER (Cont'd)

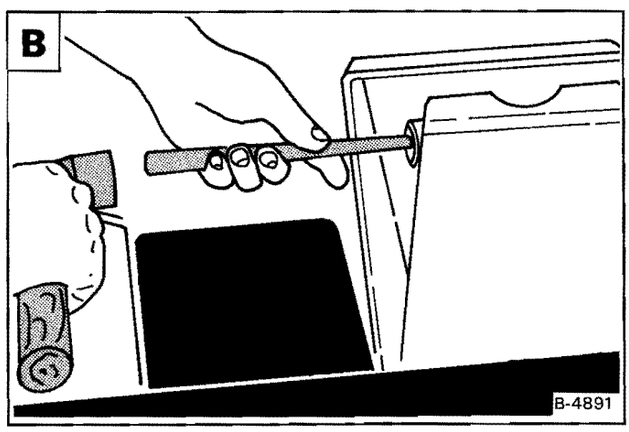
Remove the locknut and bolt from the base end of the cylinder [A].



Remove the pin at the base end of the cylinder [B].

Remove the tilt cylinder from the lift arms.

NOTE: Refer to the Component Repair Manual for disassembly and assembly procedures.



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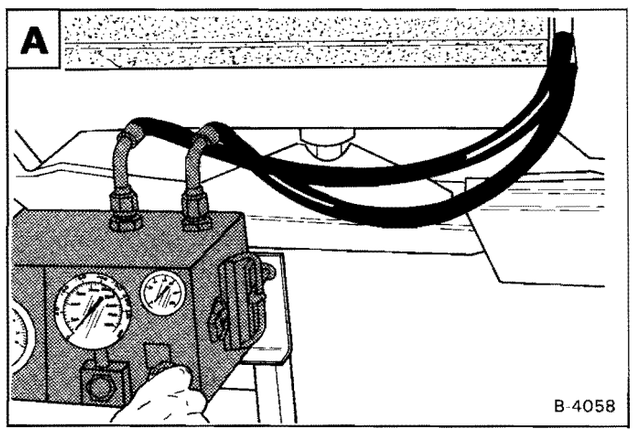
HYDRAULIC CONTROL VALVE (Gresen)

NOTE: **Melroe Control Valve repair procedure can be found in the Component Repair Manual.**

IMPORTANT

When making repairs on hydrostatic and hydraulic systems, clean the work area before disassembly and keep all parts clean. Always use caps and plugs on hoses, tubelines and ports to keep dirt out. Dirt can quickly damage the system.

I-2003-0284



Checking the Relief Valve

The tools listed will be needed to do the following procedure:

OEM-1238 — Hydraulic Tester
MEL-10006 — Hydraulic Test Kit

Stop the engine. Move the auxiliary control (right steering lever) to release the hydraulic pressure.

Lift and block the loader (See Page 1—2 for the correct procedure).

WARNING

Put jackstands under the front axles and rear corners of the frame when the engine is running for service. Failure to use jackstands can allow the machine to fall or move and cause injury or death.

W-2017-0486

Connect the hydraulic tester to the auxiliary couplers [A].

Start the engine and run at idle.

Engage the right steering lever into detent position. Watch the flow of the hydraulic tester to be sure it is correct.

Increase the engine RPM to maximum.

Turn the restrictor control, at the tester, to increase the pressure until the main relief valve opens.

The correct pressure is 2250-2400 PSI (15167-16546 kPa) free flow.

If not, stop the engine.

Replace or adjust the main frame relief valve (See Page 2—9).

WARNING

When an engine is running in an enclosed area, fresh air must be added to avoid concentration of exhaust fumes. If the engine is stationary, vent the exhaust outside. Exhaust fumes contain odorless, invisible gases which can kill without warning.

W-2050-1285

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HYDRAULIC CONTROL VALVE (Gresen) (Cont'd)

Main Relief Valve Removal and Installation

The tool listed will be needed to do the following procedure:

MEL-1185 – Socket

Stop the engine. Activate the hydraulic controls to release the hydraulic pressure.

Raise the operator cab (See Page 1–7).

IMPORTANT

When making repairs on hydrostatic and hydraulic systems, clean the work area before disassembly and keep all parts clean. Always use caps and plugs on hoses, tubelines and ports to keep dirt out. Dirt can quickly damage the system.

I-2003-0284

Loosen the relief valve [A].

Remove the relief valve from the control valve [B].

Installation: When installing the main relief valve always use new O-rings.

Clean and inspect the relief valve. Replace parts as needed.

If the pressure is not correct add or subtract shims (Item 1) in the relief valve [C].

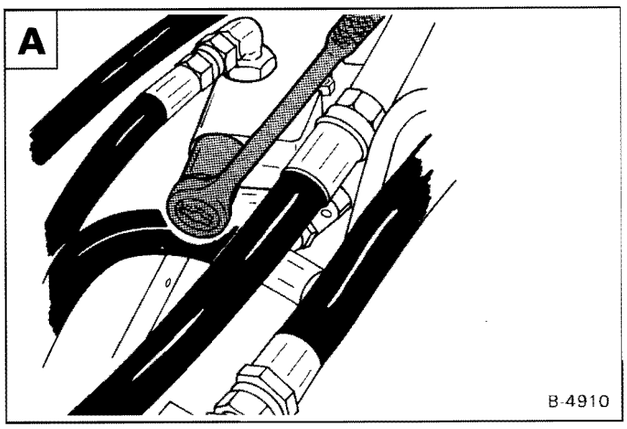
Removal and Installation

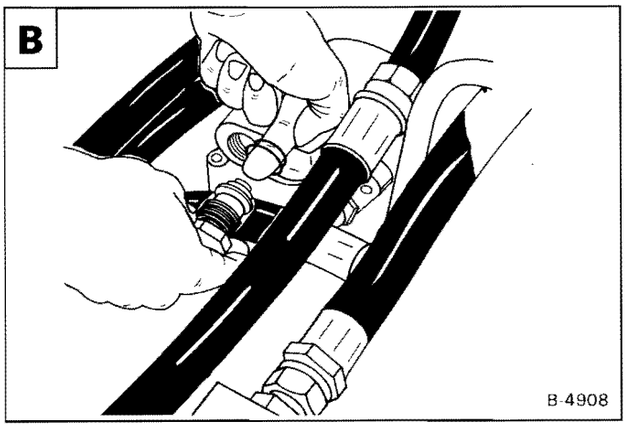
⚠ WARNING

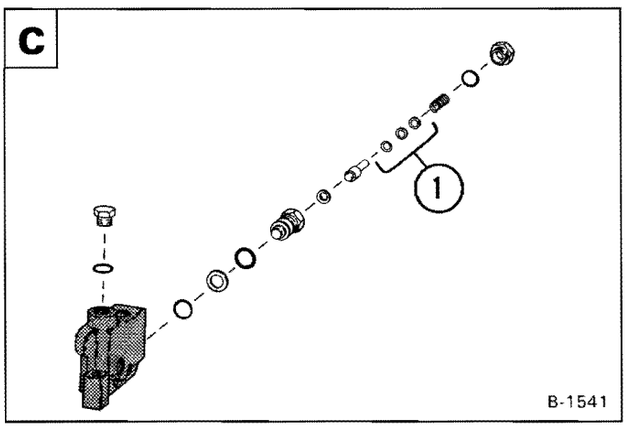
Put jackstands under the front axles and rear corners of the frame before running the engine for service. Failure to use jackstands can allow the machine to fall or move and cause injury or death.

W-2017-0286

Stop the engine. Move the foot pedals to release the hydraulic pressure.







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HYDRAULIC CONTROL VALVE (Gresen) (Cont'd)

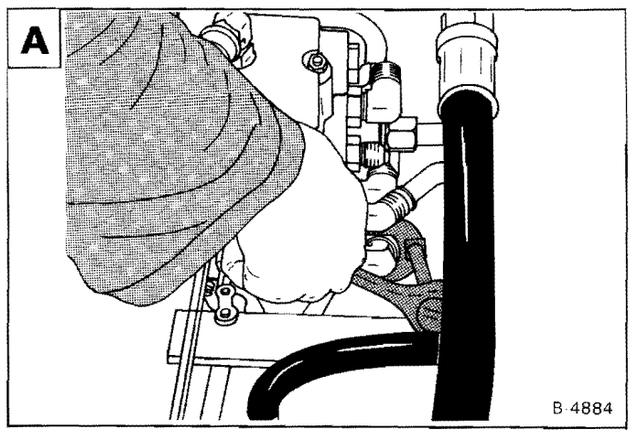
Lift and block the loader (See Page 1 – 2).

Raise the operator cab (See Page 1 – 7).

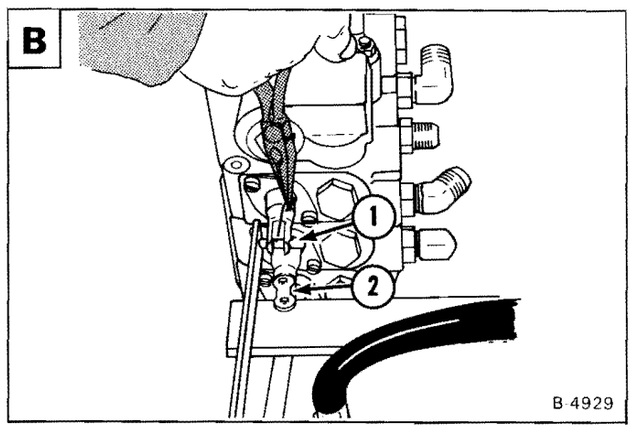
Remove the front panel.

Clean the area around the control valve and use caps and plugs in ports and tubelines.

Remove all tubelines from the control valve [A].



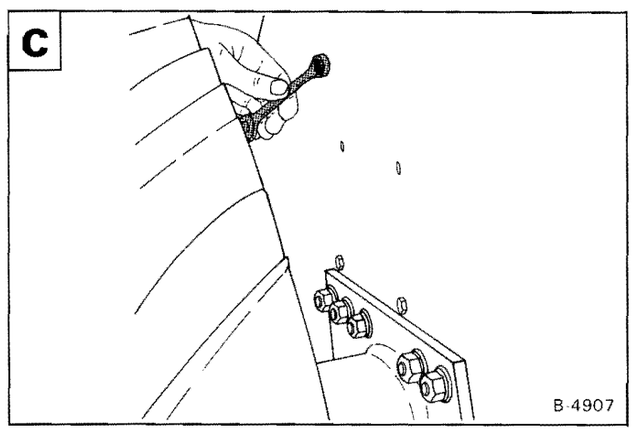
Remove the pedal control linkage at the valve spool [B].



Remove the three bolts at the outside of the fender [C].

Installation: Tighten the bolts to 180-200 in.-lbs. (21-23 Nm) torque.

Remove the control valve from the fender.



Disassembly and Assembly

IMPORTANT

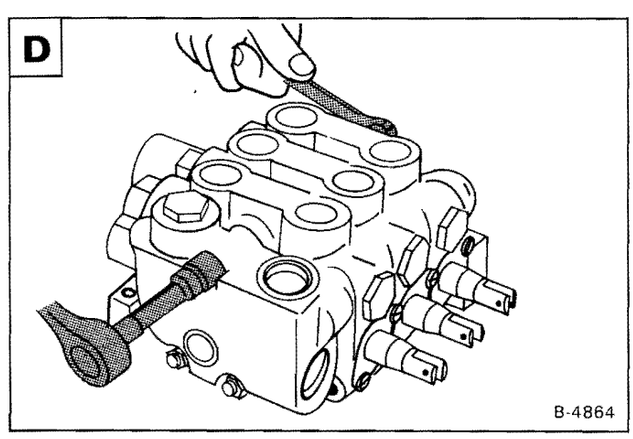
When making repairs on hydrostatic and hydraulic systems, clean the work area before disassembly and keep all parts clean. Always use caps and plugs on hoses, tubelines and ports to keep dirt out. Dirt can quickly damage the system.

I-2003-0284

Mark each section of the control valve for identification for correct assembly.

Remove the control valve thru-bolts [D].

Installation: Tighten the bolts to 20 ft.-lbs. (27 Nm) torque.

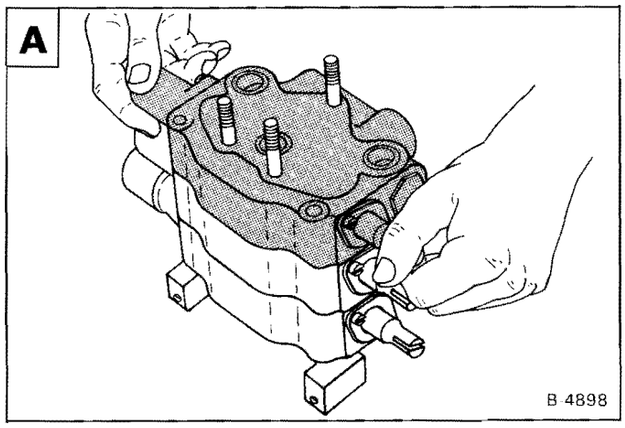


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HYDRAULIC CONTROL VALVE (Gresen) (Cont'd)

Position the valve on end and remove the inlet, tilt, lift and auxiliary sections [A].

NOTE: **Disassembly, repair and assembly must be done to one section at a time.**

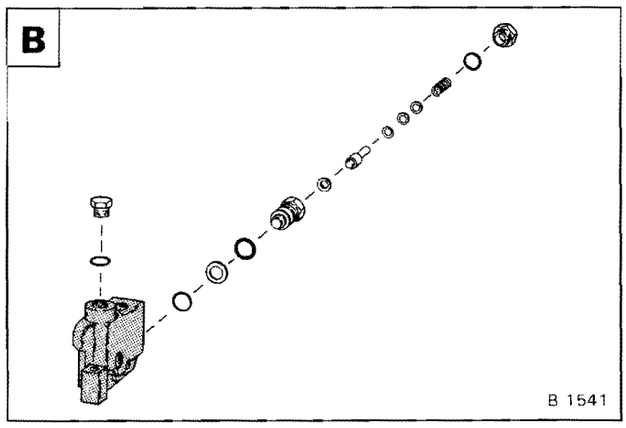


Inlet Section

Remove the main relief valve [B].

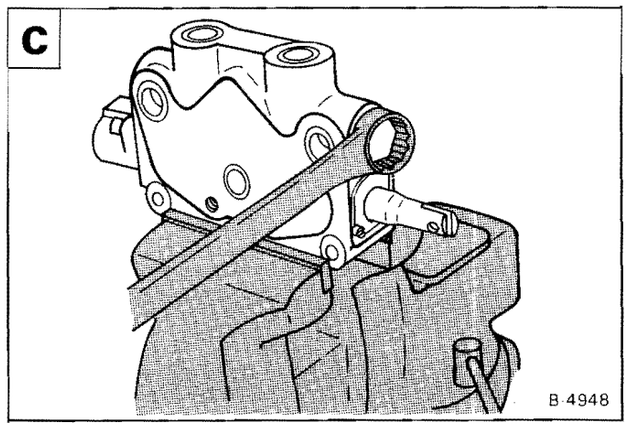
Remove and replace all O-rings and back up washers.

Clean and check the relief valve and inlet section. Replace parts as needed.

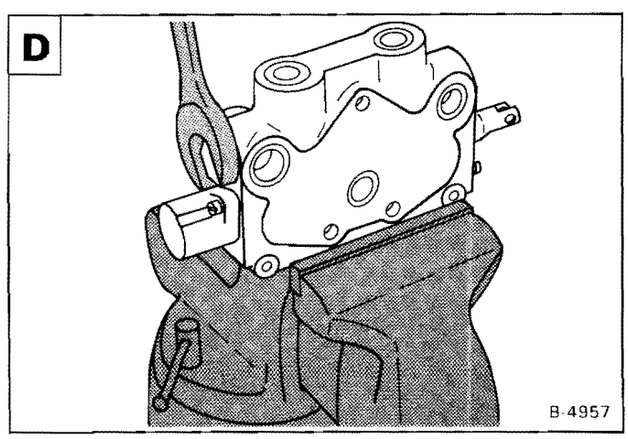


Tilt Section

Put the tilt section in a vise and remove the load check [C].



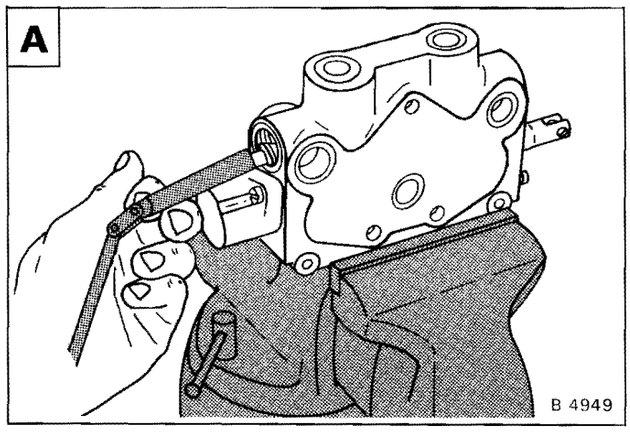
Remove the other load check [D].



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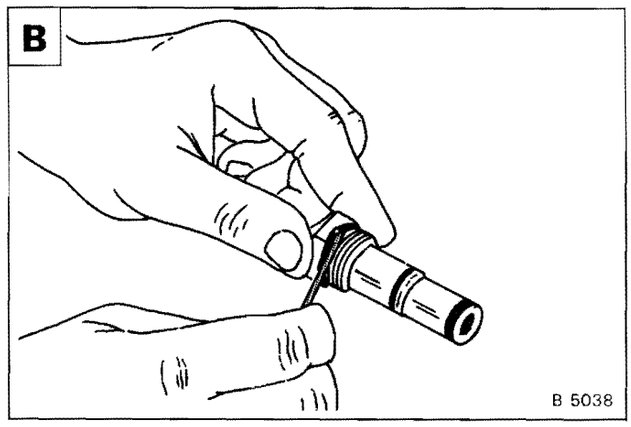
HYDRAULIC CONTROL VALVE (Gresen) (Cont'd)

Using a magnet remove the spring and poppet from the two load check positions [A].



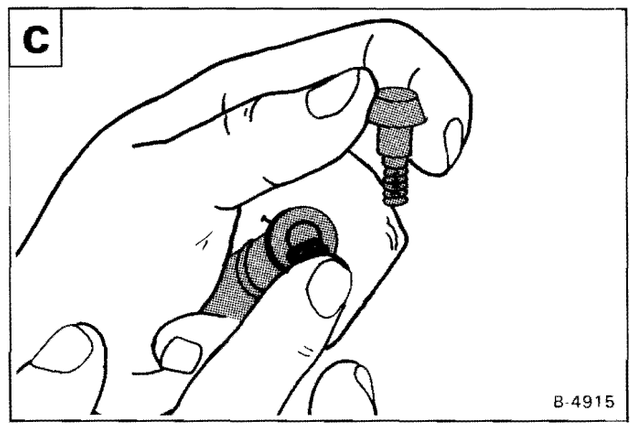
Remove the O-rings from the load checks [B].

NOTE: Always use new O-rings when assembling the control valve sections.



Put grease on the spring and poppet [C].

Install and tighten both load checks.

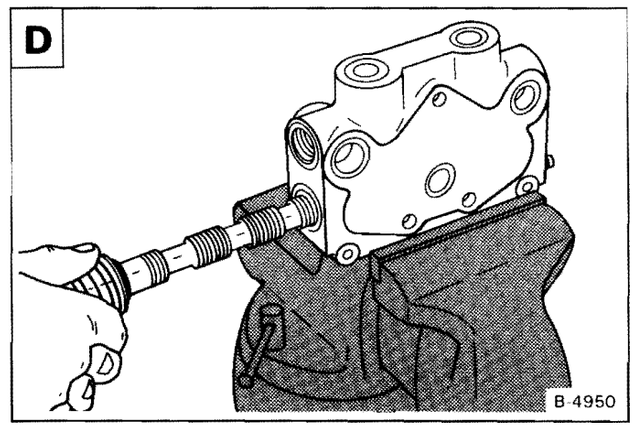


Remove the valve spool assembly [D].

Installation: CAREFULLY install the spool into the tilt section. DO NOT damage the O-ring.

NOTE: Check the valve spool, it must move freely in the bore. If not rotate it 180°.

NOTE: DO NOT remove the spool bolt from the spool unless the spring is broken. If the spool bolt is to be removed (See Page 2–17 for the correct procedure).

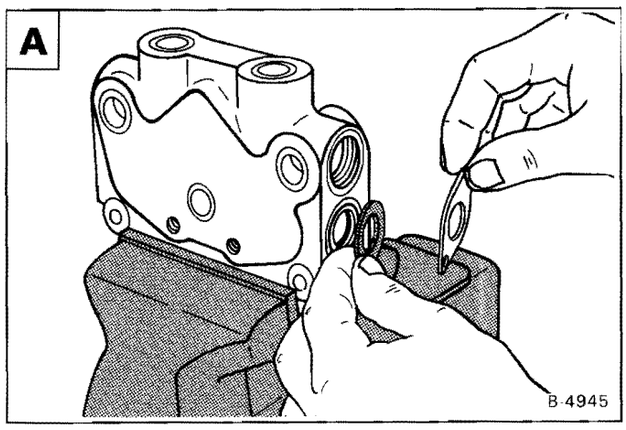


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HYDRAULIC CONTROL VALVE (Gresen) (Cont'd)

Remove the screws from the seal plate. Remove the seal plate and the retainer washer [A].

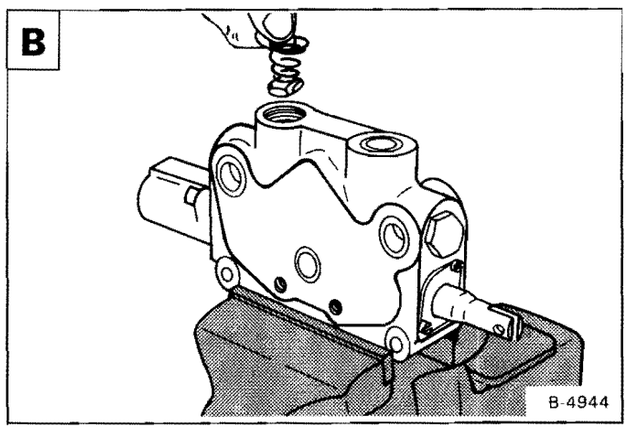
Remove and destroy the backup washer and the O-ring [A].



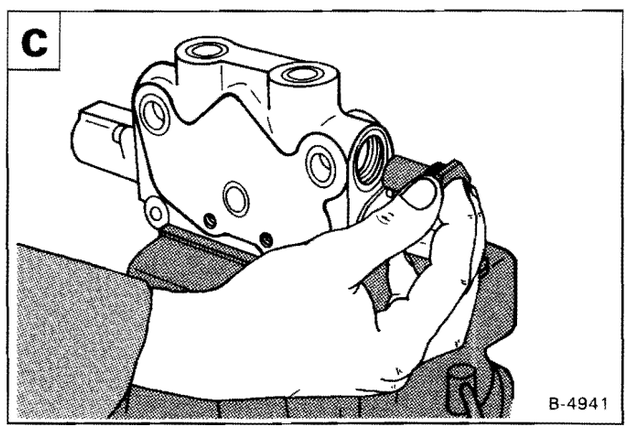
Lift Section

Install the lift section in a vise.

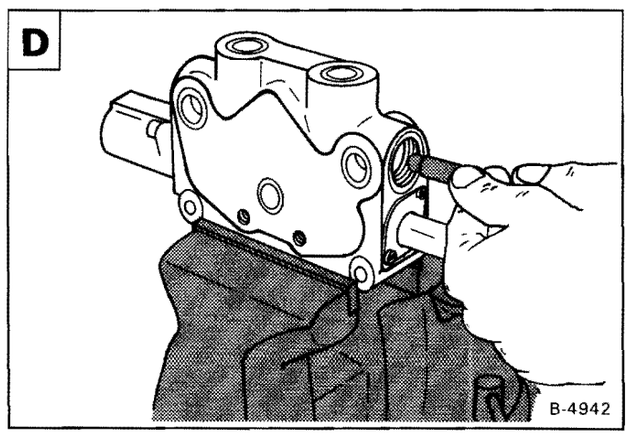
Remove the orifice and spring from the base end lift cylinder part of the control valve [B].



Loosen and remove the anti-cavitation valve [C].



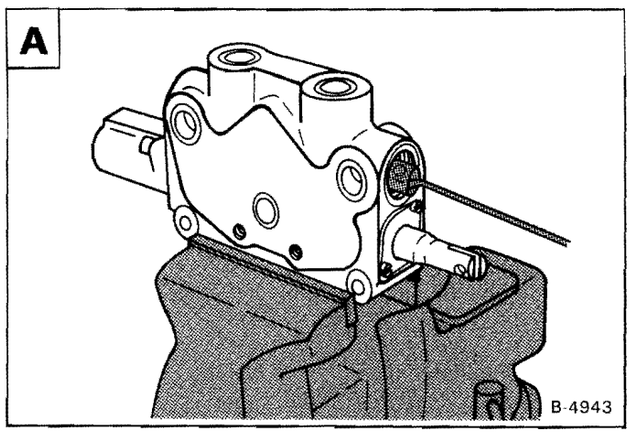
Using a magnet remove the ball [D].



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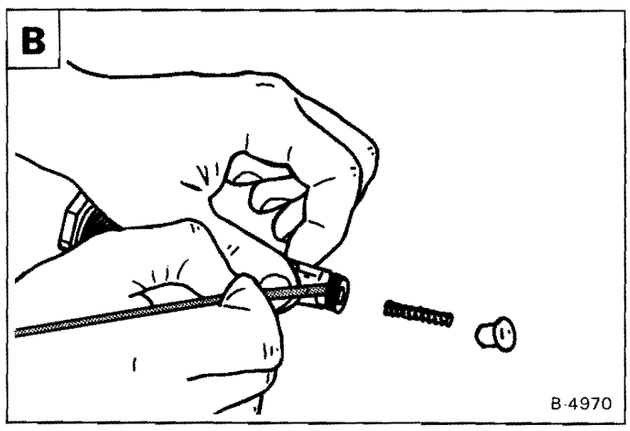
HYDRAULIC CONTROL VALVE (Gresen) (Cont'd)

Using a wire hooked on the end remove the ball seat [A].

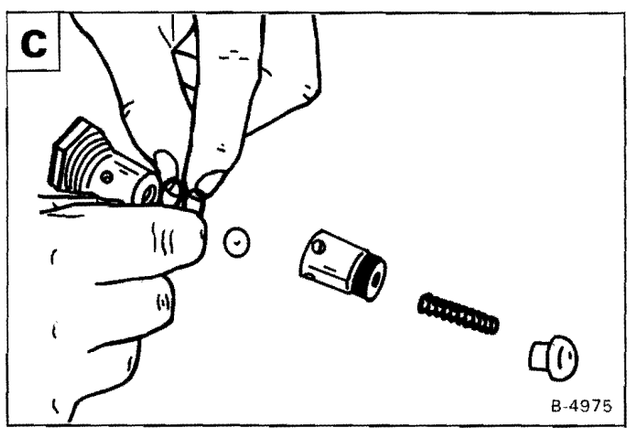


Using a magnet remove the spring and poppet from inside the lift section.

Remove and discard the O-rings from the anti-cavitation valve [B].

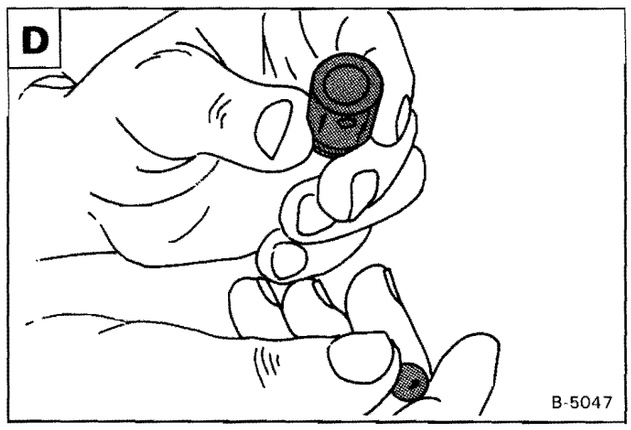


Check the anti-cavitation parts for wear [C].



Put grease in the anti-cavitation seat. Install the ball on the seat [D].

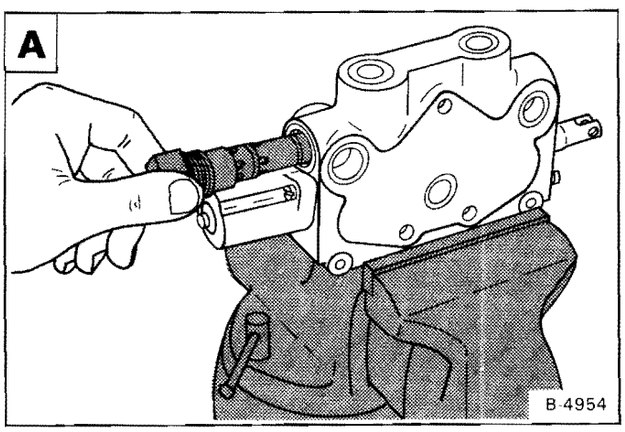
Install and tighten the anti-cavitation valve in the lift section.



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HYDRAULIC CONTROL VALVE (Gresen) (Cont'd)

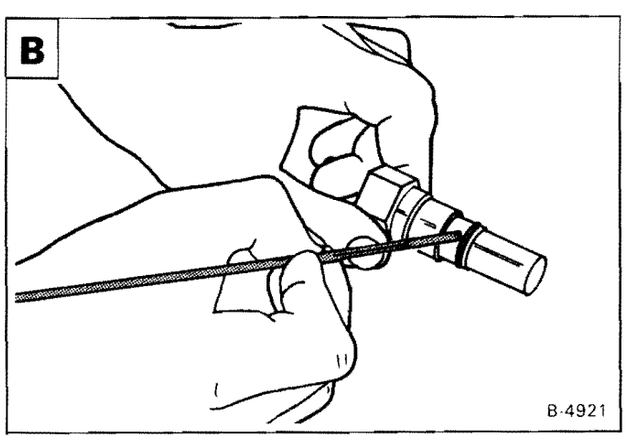
Remove the port relief valve [A].



Remove and discard the O-rings from the port relief valve [B].

Lubricate and install new O-rings on the port relief valve.

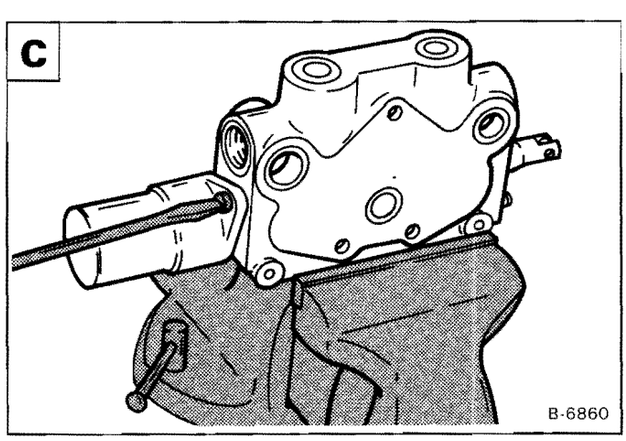
Install the port relief valve into the lift section.



Remove the cap screws and remove the cap [C].

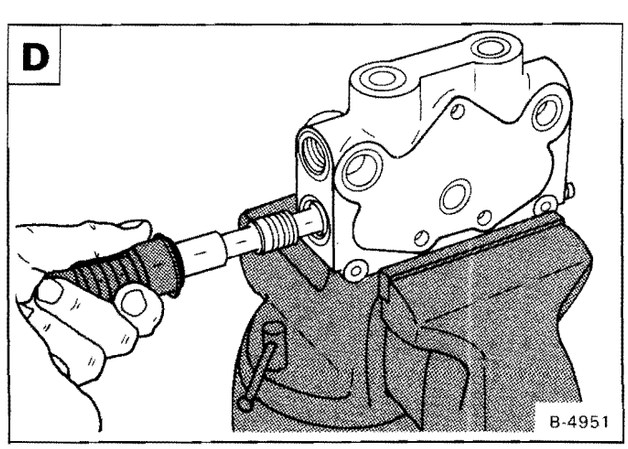
IMPORTANT

Be careful not to lose the detent balls when the end cap is removed.



Remove the valve spool from the lift section [D].

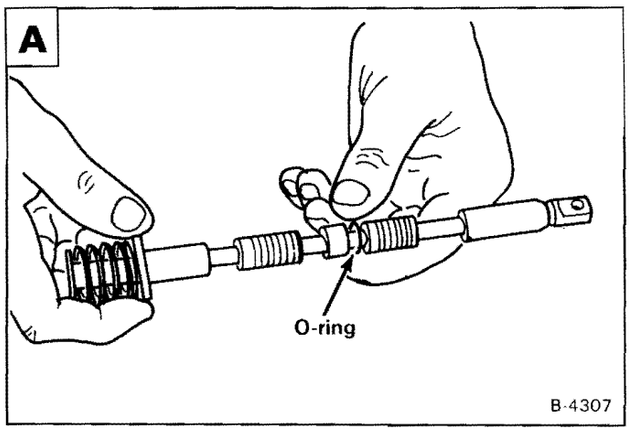
NOTE: DO NOT remove the spool bolt from the valve spool unless the spring is broken. If the bolt is to be removed (See Page 2—17 for the correct procedure).



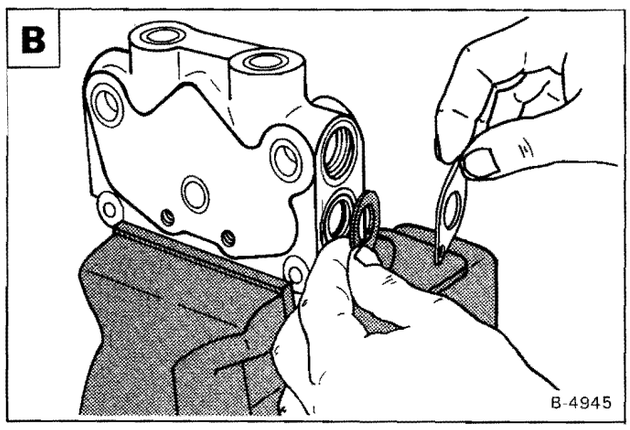
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HYDRAULIC CONTROL VALVE (Gresen) (Cont'd)

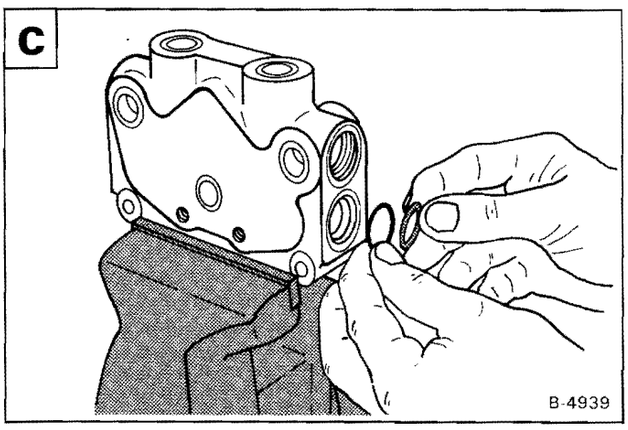
Remove and discard the O-ring from the valve spool [A].



Remove the screws from the seal plate. Remove the seal plate and the retainer washer [B].



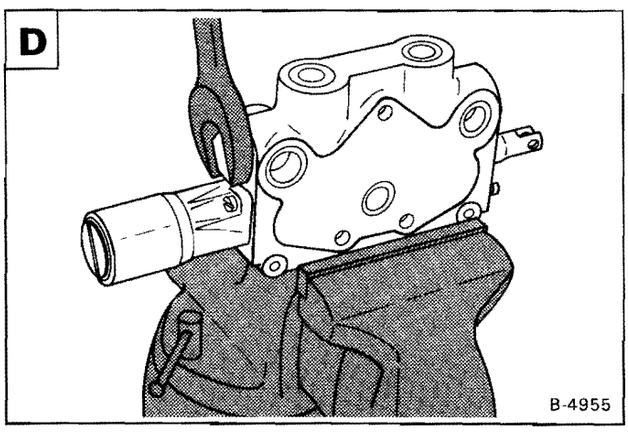
Remove the back-up washer and the O-ring [C].



Auxiliary Section

Remove the load check from the auxiliary section [D].

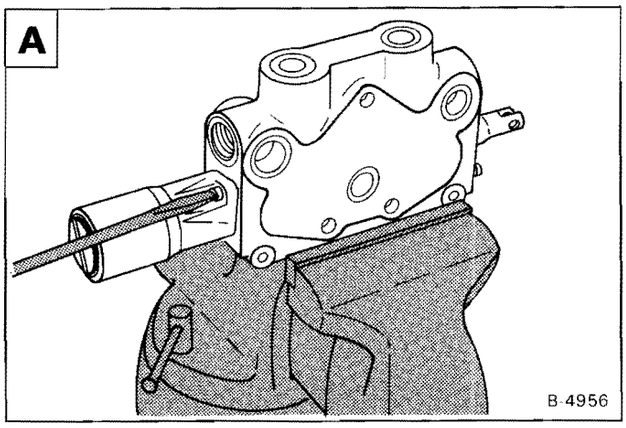
Remove the other load check.



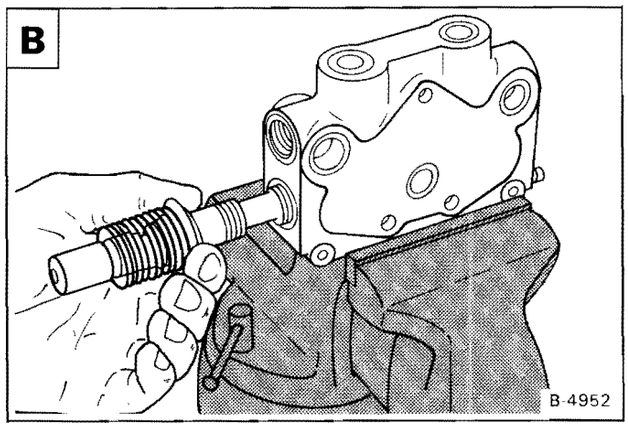
https://truckmanualshub.com/

HYDRAULIC CONTROL VALVE (Gresen) (Cont'd)

Remove the screws holding the detent cap in position [A].

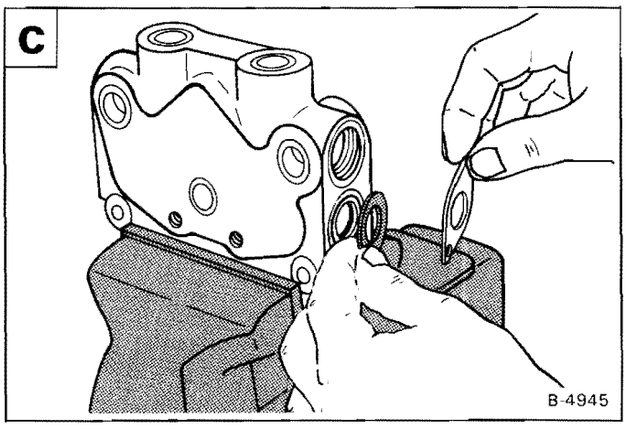


Remove the spool from the valve section [B].

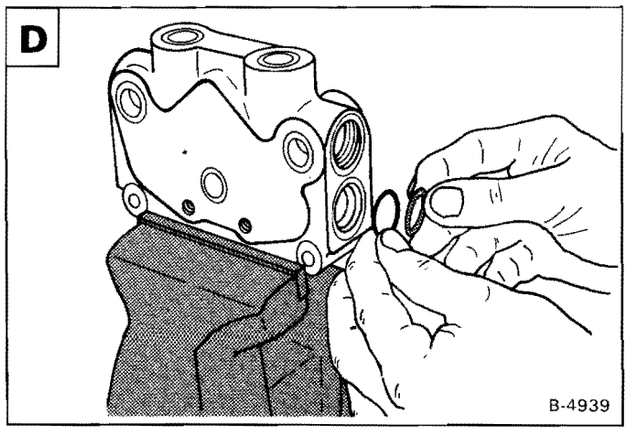


Remove the screws, remove the seal plate and the retainer washer [C].

Installation: ALWAYS use new O-rings on the valve spool.



Remove the back-up washer and the O-ring [D].



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HYDRAULIC CONTROL VALVE (Gresen) (Cont'd)

Valve Spool Bolt

NOTE: DO NOT remove the spool bolt from the spool unless the spring is broken.

IMPORTANT

The spool bolt is held tightly by lock tite. Failure to apply heat to the spool will result in the spool bolt breaking.

Put the yoke end of the spool in a vise and remove the spool bolt [A].

Apply heat to the spool bolt for removal.

Installation: Apply lock tite to the spool bolt and tighten the bolt to 60-96 in.-lbs (6,8-10,8 Nm) torque.

Adjusting the Auxiliary Detent

The tool listed will be needed to do the following procedure.

MEL-1191 – Drag Link Socket

Remove the detent cap screws and remove the detent cap [B].

Use the tool listed to loosen the cap screws [C].

Remove the cap from the vise.

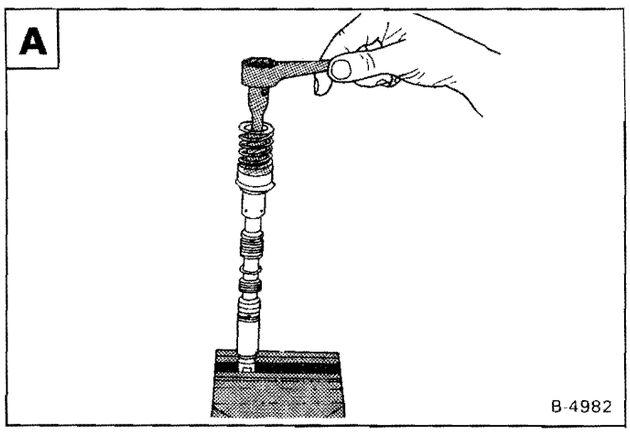
Check the spring. Check that there is twelve balls and they are not damaged.

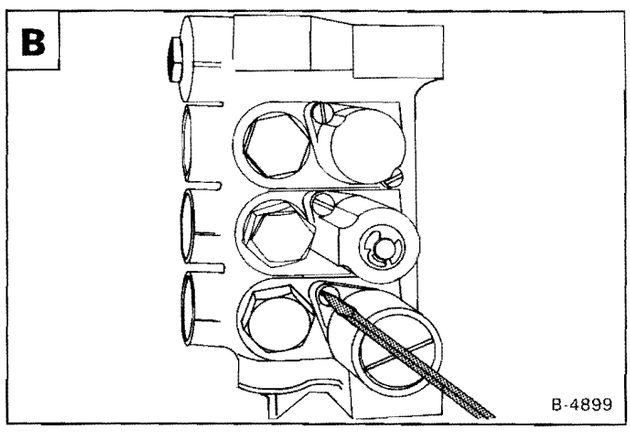
If there is any damage replace the complete detent assembly.

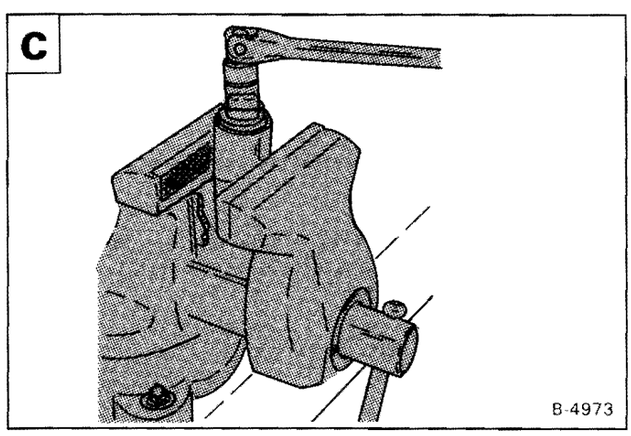
Install the cap back on the control valve and tighten the screws.

Turning the adjustment screw IN will increase the force it takes to move the auxiliary lever.

Turning the adjustment screw OUT will decrease the force it takes to move the auxiliary lever.







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HYDRAULIC PUMP (S/N 14999 & Below)

Checking the Output of the Hydraulic Pump

The tools listed will be needed to do the following procedure:

OEM-1238 — Hydraulic Tester
MEL-10006 — Flowmeter Fitting Kit
MEL-1138A — Remote Start Switch

⚠ 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.**

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IMPORTANT

Do not turn the flow control valve (on tester) all the way off. If you do, there will not be a relief valve in the system.

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NOTE: Make sure that all air is removed from the system before beginning the test. Air in the system can give an inaccurate test.

Lift and block the loader (See Page 1—2 for the correct procedure).

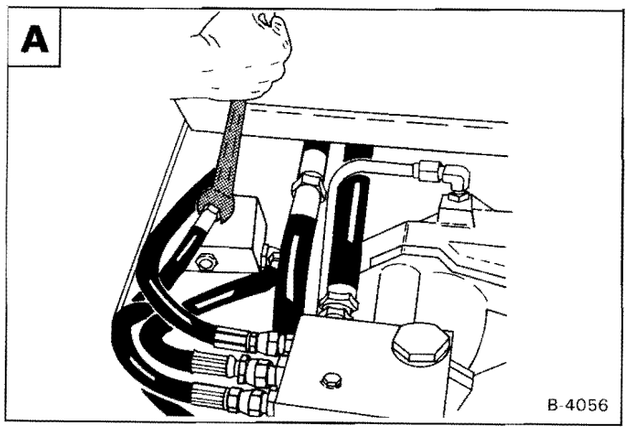
Connect the remote start switch (See Page 1—9 for the correct procedure).

Disconnect the hose at the outlet of the hydraulic pump [A].

Connect the inlet of the tester to the outlet of the hydraulic pump.

Connect the outlet of the tester to the hose disconnected from the hydraulic pump.

NOTE: Make sure that the restrictor valve on the tester is fully open.



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HYDRAULIC PUMP (S/N 14999 & Below) (Cont'd)

Start the engine and run at low RPM.

If no flow is indicated on the tester, the hoses are connected wrong. Increase the engine speed to full RPM*.

Warm the hydraulic fluid to 140°F (60°C) by turning the restrictor knob on the tester to about 1000 PSI (6895 kPa). DO NOT exceed system relief pressure [A].

Open the restrictor and record the free flow (GPM) at full RPM.

Activate the auxiliary hydraulics (right steering lever) into the detent position. Record the highest pressure (PSI) and flow (GPM) at full RPM.

The high pressure flow must be at least 80% of free flow.

$$\% = \frac{\text{HIGH PRESSURE FLOW (GPM)}}{\text{FREE FLOW (GPM)}} \times 100$$

A low percentage may indicate a failed hydraulic pump or it may be caused by air in the system. Make sure that all the air is removed from the system.

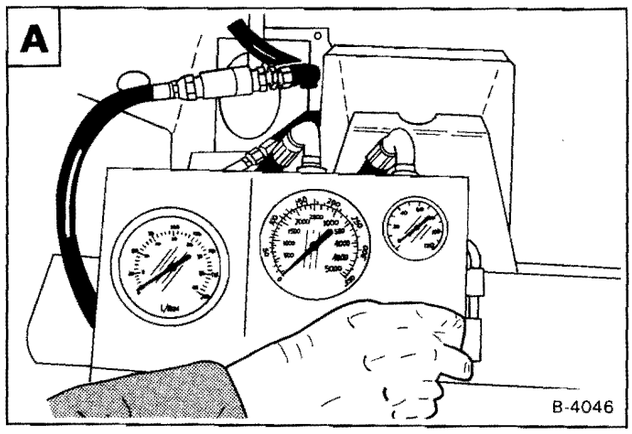
Removal and Installation (S/N 14999 & Below)

IMPORTANT

When making repairs on hydrostatic and hydraulic systems, clean the work area before disassembly and keep all parts clean. Always use caps and plugs on hoses, tubelines and ports to keep dirt out. Dirt can quickly damage the system.

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*See the specifications (Section 8) for system relief pressure and full RPM. The system relief pressure must be per specification before the test is run.



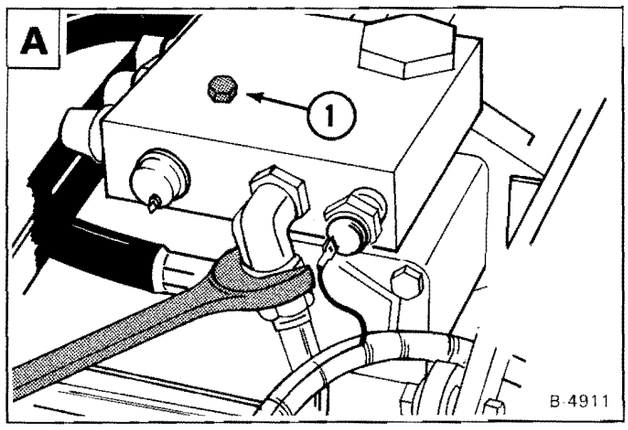
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HYDRAULIC PUMP (S/N 14999 & Below) (Cont'd)

Drain the hydraulic/hydrostatic reservoir (See Page 2—34)

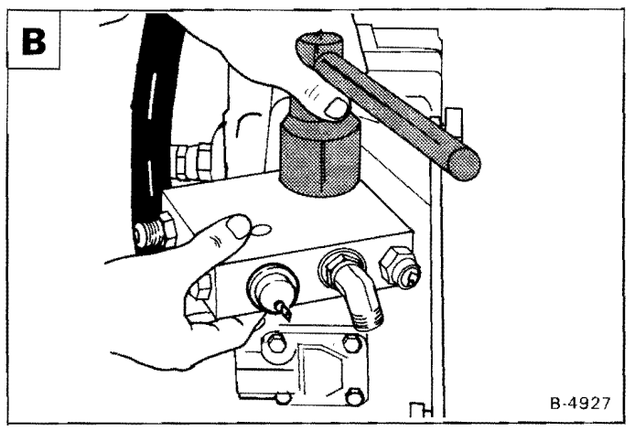
Remove the hydraulic hoses and tubelines from the port block [A].

Remove the small mounting bolt (Item 1) at the top of the port block [A].



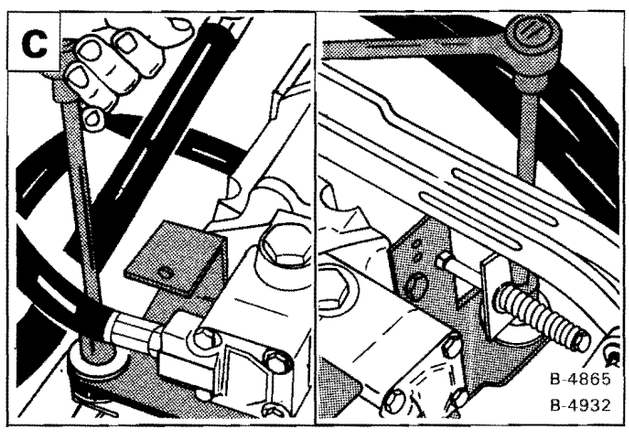
Remove the large screw at the top of the port block [B].

Remove the port block.

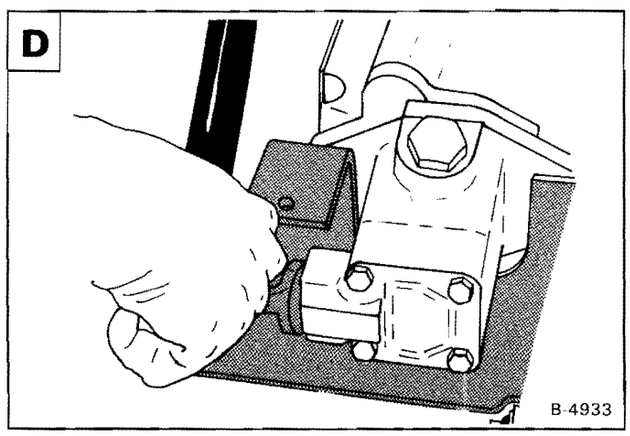


Remove the nuts from the pump mounting bolts [C].

Installation: Tighten the bolts to 40-50 ft.-lbs. (55-67 Nm) torque.



Remove the outlet hose from the hydraulic pump [D].

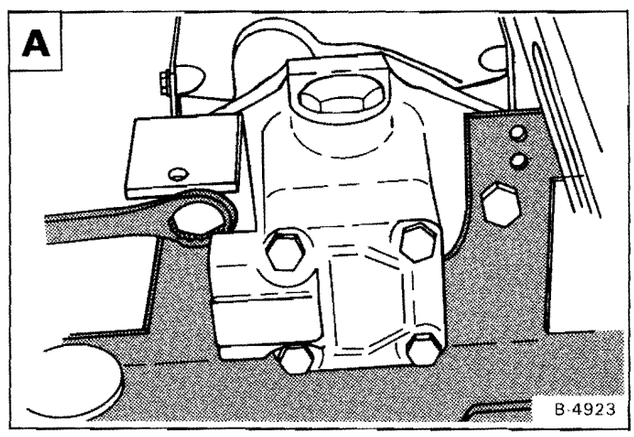


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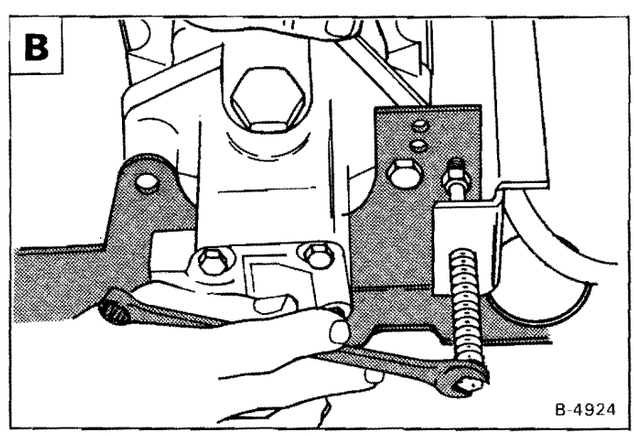
HYDRAULIC PUMP (S/N 14999 & Below) (Cont'd)

Remove the pump bracket bolts [A].

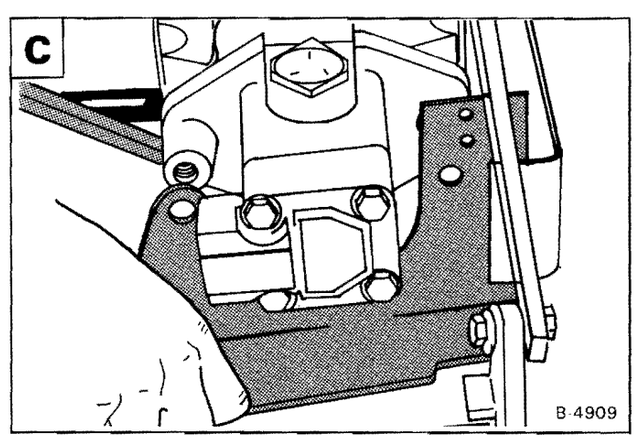
Installation: Tighten the bolts to 65-70 ft.-lbs. (89-94 Nm) torque.



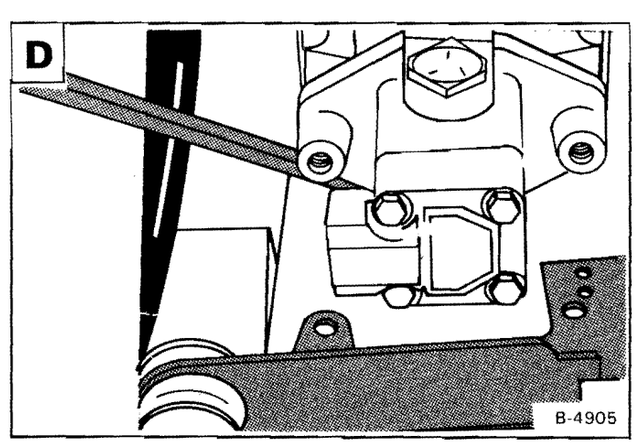
Remove the steering linkage and adjustment bolt [B].



Raise the pump a small amount and move the pump mount forward [C].



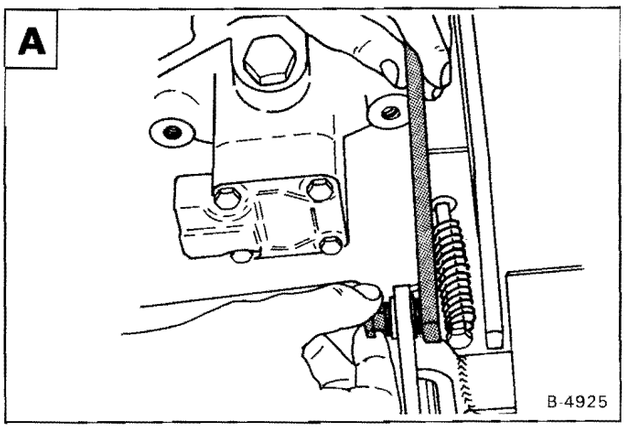
Position the pump mount forward as shown [D].



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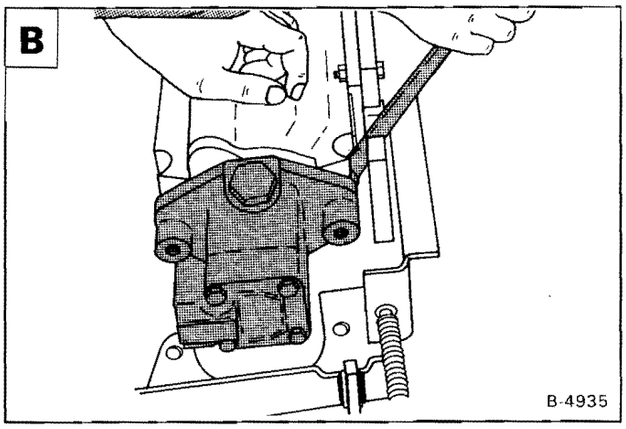
HYDRAULIC PUMP (S/N 14999 & Below) (Cont'd)

Remove the inside steering linkage bar [A].

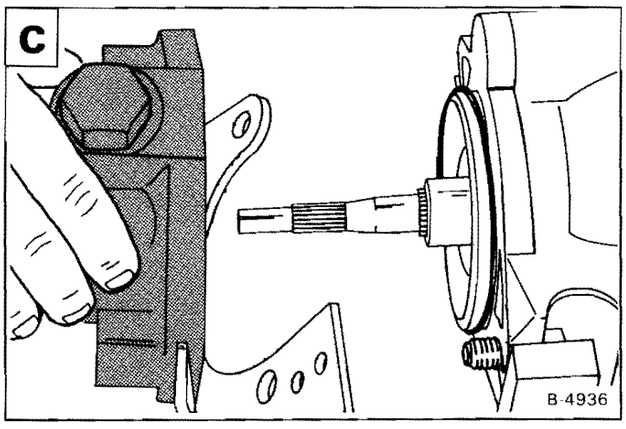


Remove the hydraulic pump mounting bolts [B].

Installation: Tighten the bolts to 65-70 ft.-lbs. (89-94 Nm) torque.



Remove the hydraulic pump [C].



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HYDRAULIC PUMP (S/N 15001 & Above)

Removal and Installation

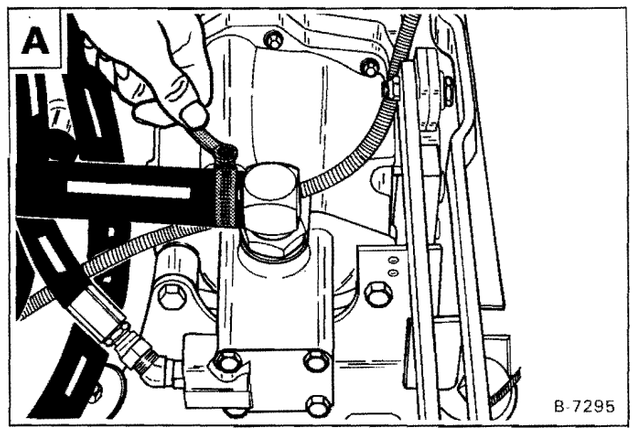
IMPORTANT

When making repairs on hydrostatic and hydraulic systems, clean the work area before disassembly and keep all parts clean. Always use caps and plugs on hoses, tubelines and ports to keep dirt out. Dirt can quickly damage the system.

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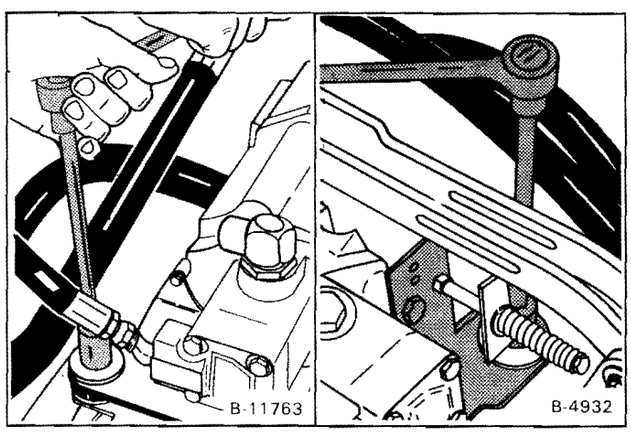
Drain the hydraulic/hydrostatic reservoir (See Page 2—34).

Remove the inlet hose at the top of the hydraulic pump [A].

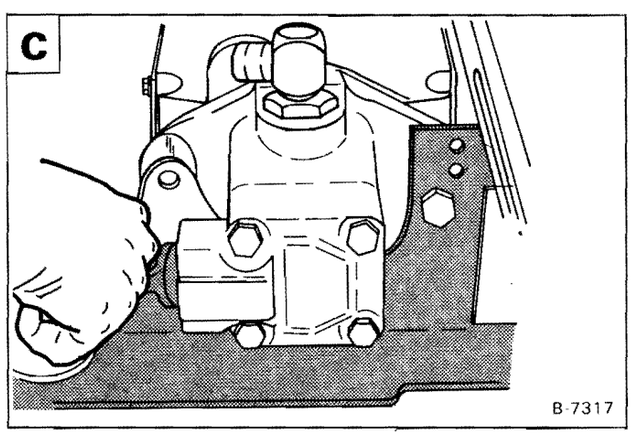


Remove the nuts at the pump mounting bolts [B].

Installation: Tighten the bolts to 40-50 ft.-lbs. (55-67 Nm) torque.

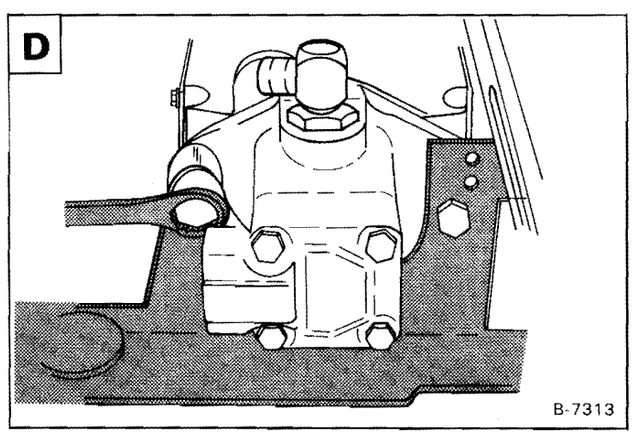


Remove the outlet hose from the hydraulic pump [C].



Remove the pump mounting bracket bolts [D].

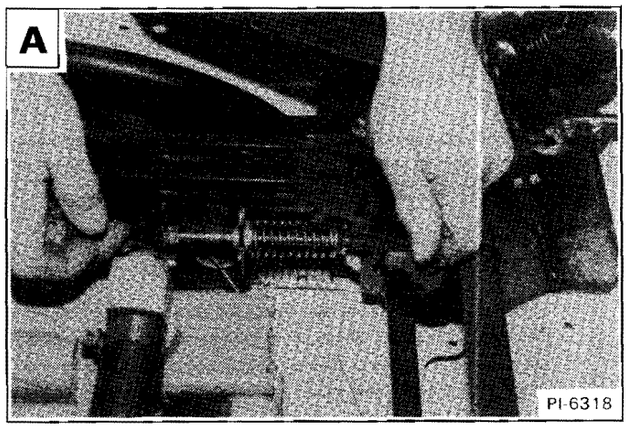
Installation: Tighten the bolts to 65-70 ft.-lbs. (89-94 Nm) torque.



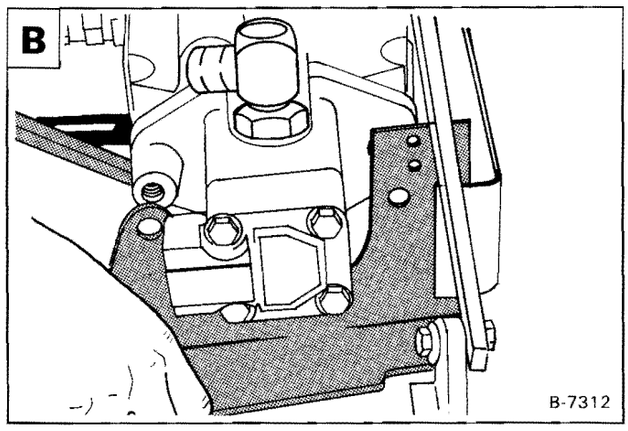
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HYDRAULIC PUMP (S/N 15001 & Above) (Cont'd)

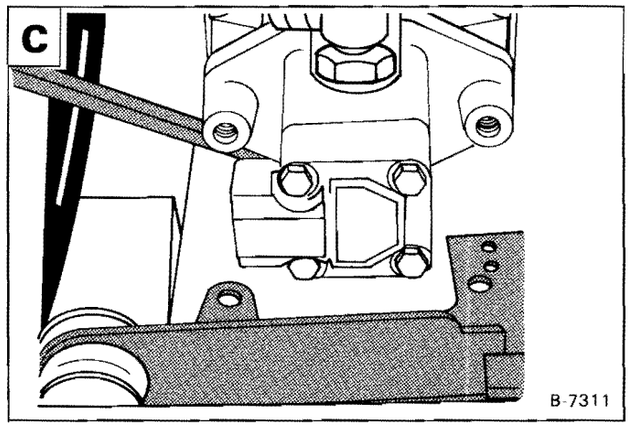
Remove the steering linkage and adjustment bolt [A].



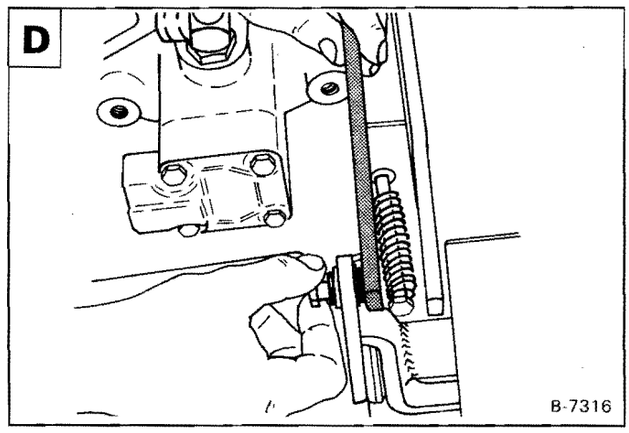
Raise the pump with a pry bar a small amount and move the pump mounting bracket forward [B].



Position the pump mount forward as shown [C].



Remove the steering linkage from the steering levers [D].

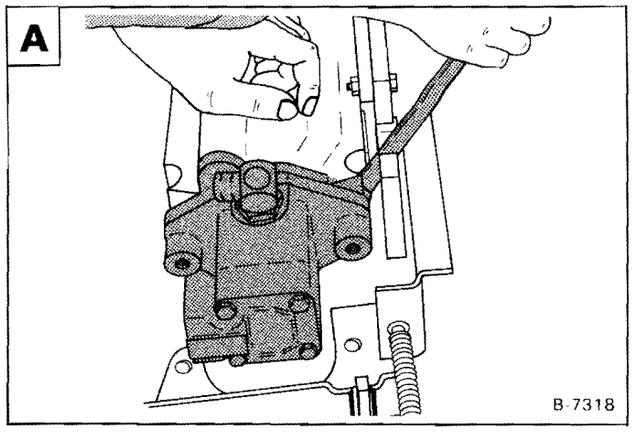


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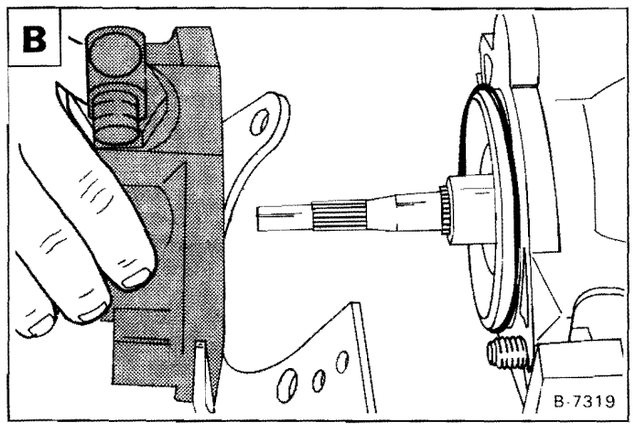
HYDRAULIC PUMP (S/N 15001 & Above) (Cont'd)

Remove the hydraulic pump mounting bolts [A].

Installation:Tighten the bolts to 65-70 ft.-lbs. (98-94 Nm) torque.

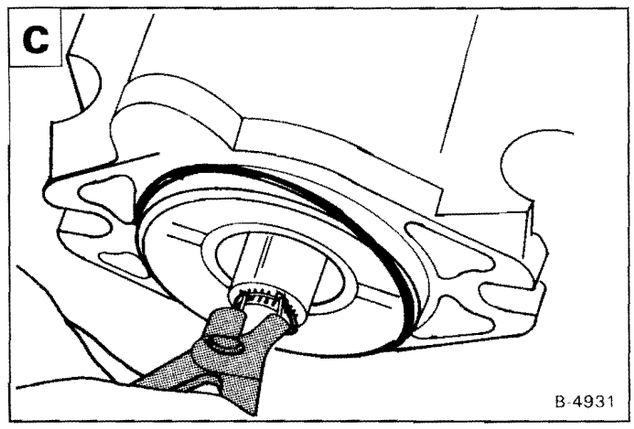


Remove the hydraulic pump [B].

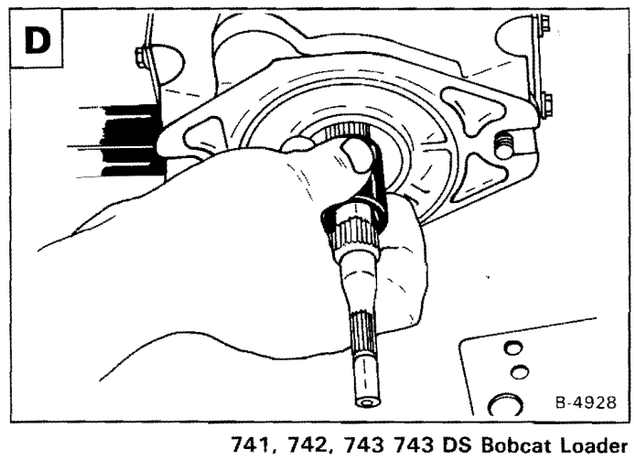


Vane Pump Drive Shaft Removal and Checking

Remove the snap ring [C].



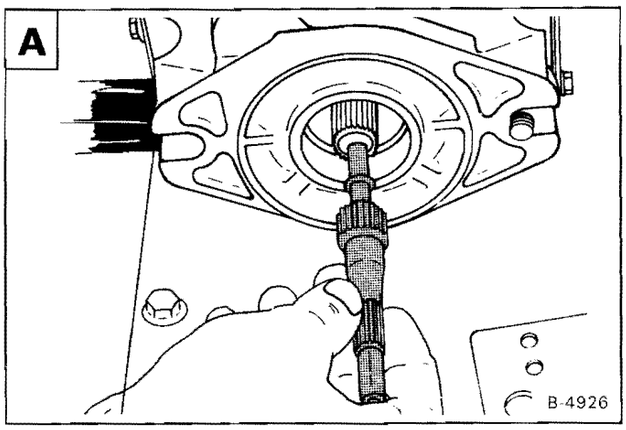
Remove the coupler [D].



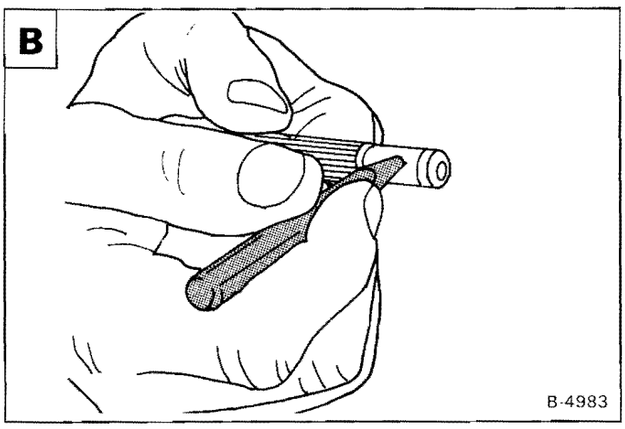
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HYDRAULIC PUMP (S/N 15001 & Above) (Cont'd)

Remove the shaft [A].



Check the shaft for damage and wear [B].



Hydraulic Pump Starting Procedure

Check the hydraulic/hydrostatic reservoir and add oil as needed (See specifications for the correct oil).

⚠ WARNING

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

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Start the engine and run at half throttle for several minutes.

Operate the hydraulic control valve at 3 second intervals for several minutes to build up pressure.

Increase engine speed to full throttle.

Operate the hydraulic control valve again for several minutes.

Slow the engine and check for leaks.

Check the reservoir and add oil as needed.

Remove the jackstands.

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PORT BLOCK (S/N 14999 & Below)

40 Micron Filter (Bronze)

The tool listed will be needed to do the following procedure.

MEL-1177 — Filter Removal Tool

Replace the bronze (40 micron) filter every 500 hours of loader operation.

IMPORTANT

When making repairs on hydrostatic and hydraulic systems, clean the work area before disassembly and keep all parts clean. Always use caps and plugs on hoses, tubelines and ports to keep dirt out. Dirt can quickly damage the system.

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Stop the engine and raise the operator cab.

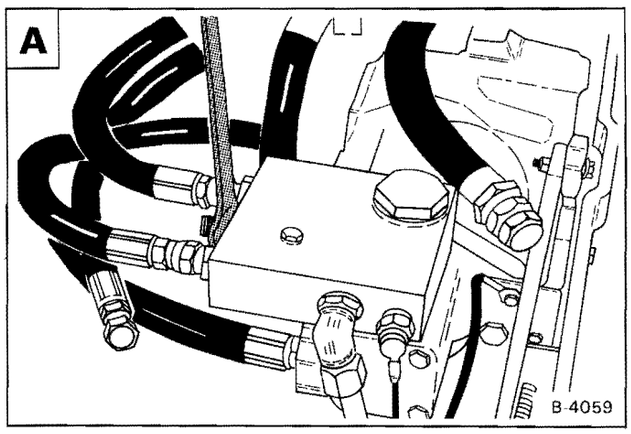
Drain the hydraulic reservoir (See Page 2—34).

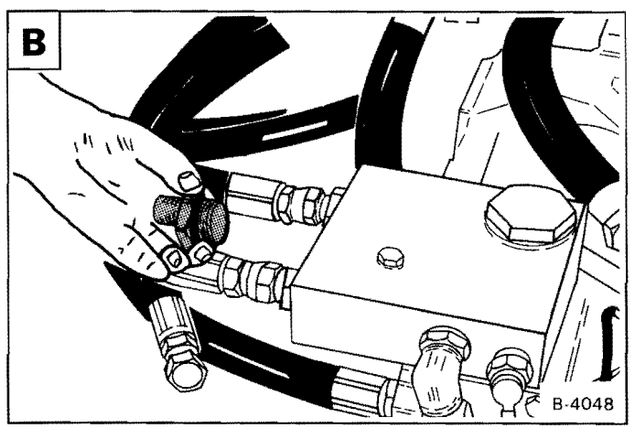
Remove the center hose at the port block [A].

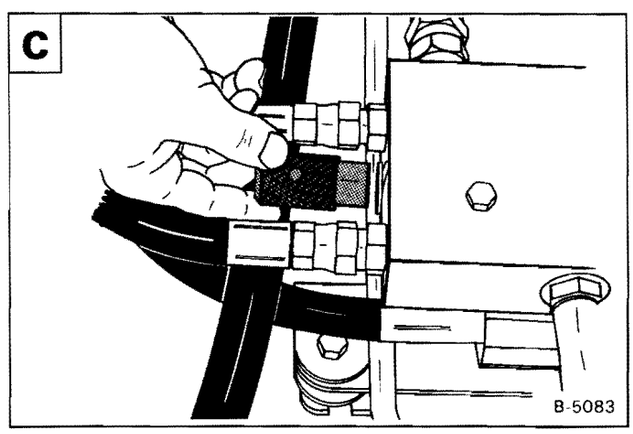
Remove the fitting from the port block [B].

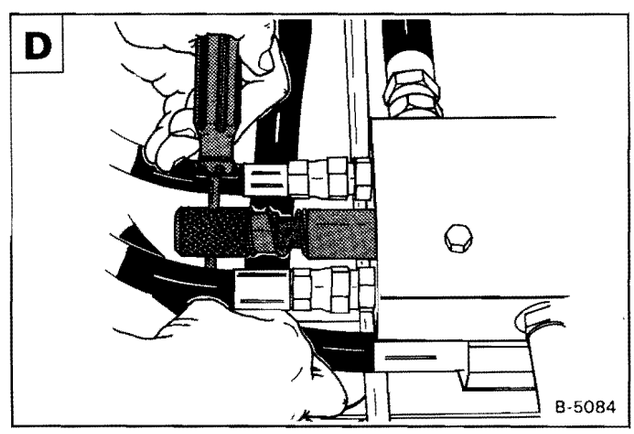
Install the filter removal tool on the filter [C].

Remove the filter and sleeve from the port block [D].









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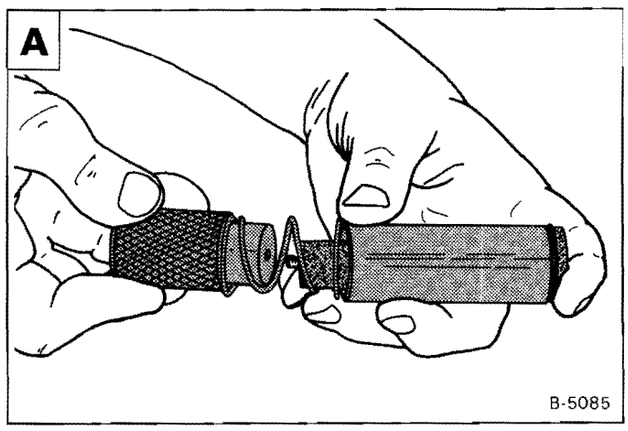
PORT BLOCK (S/N 14999 & Below) (Cont'd)

Remove the tool from the filter [A].

NOTE: **DO NOT remove the sleeve before removing the bronze filter. Particles trapped by the filter may drop into the port block and enter the system. Always check the port block for debris and clean the bore.**

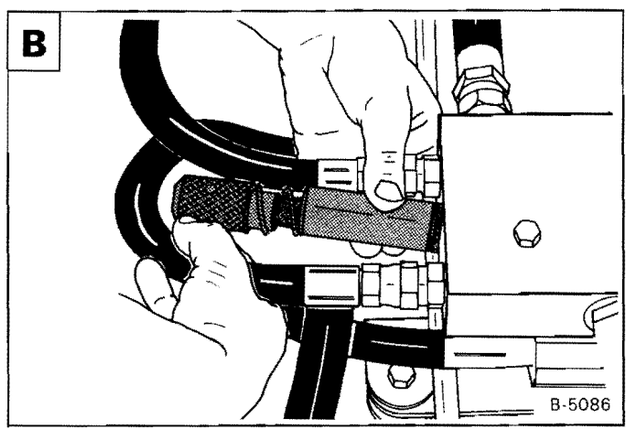
Clean the filter and sleeve in solvent, use air pressure to dry them.

Install the spring, filter and sleeve on the tool [A].



Install the assembly into the port block [B].

Remove the tool, install the fitting and connect the hose.

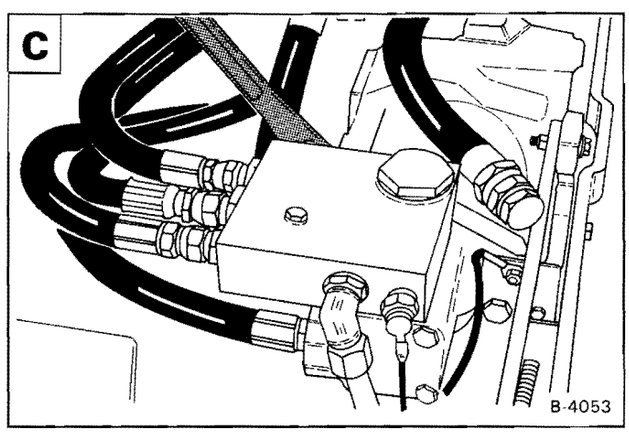


Cold Weather By-Pass Valve

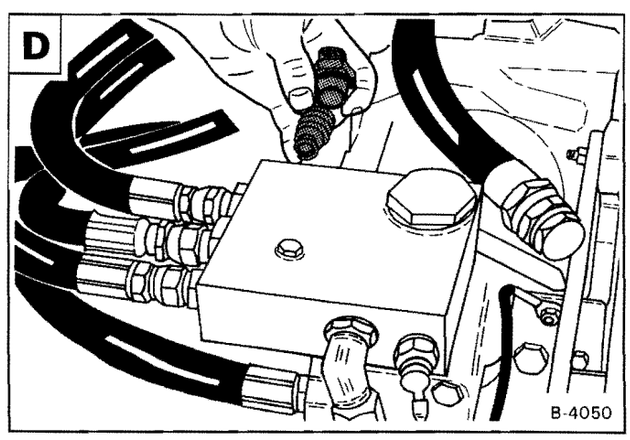
Stop the engine. Drain the hydraulic reservoir (See Page 2 – 34).

Raise the operator cab.

Remove the hose fitting on the port block [C].



Remove the spring from the port block [D].



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PORT BLOCK (S/N 14999 & Below) (Cont'd)

Remove the poppet from the port block [A].

Clean the valve and check the valve seat in the port block. Replace the parts as needed.

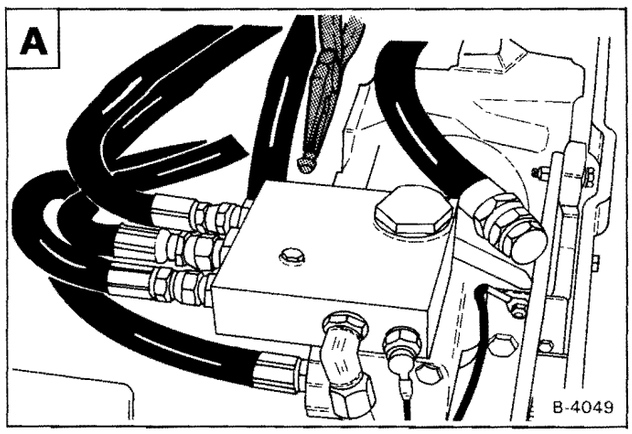
NOTE: **Always use new O-ring when assembling the port block.**

Install the fitting in the port block and tighten.

Install the hose and fill the reservoir with hydraulic fluid.

Start the engine and run for several minutes.

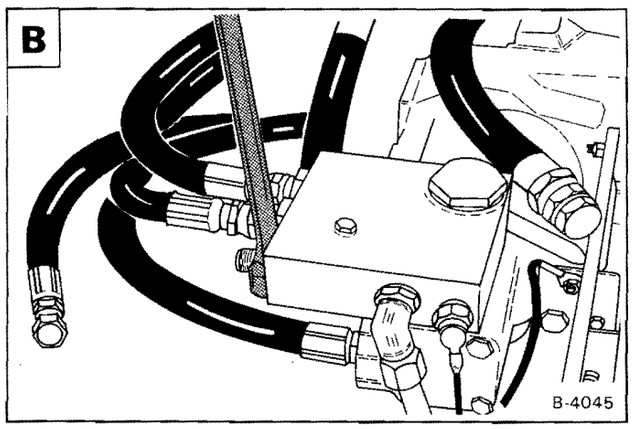
Stop the engine. Check the reservoir and add oil as needed.



Neutral By-Pass Valve

Stop the engine and raise the operator cab.

Remove the hose and fitting from the port block [B].



Remove the by-pass valve from the port block [C].

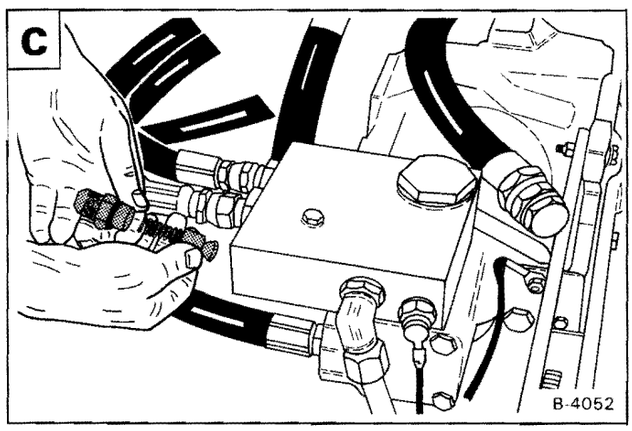
Clean the valve. Check the seat in the port block. Replace the parts as needed.

Install the by-pass valve in the port block.

Install the hoses and fill the reservoir with hydraulic fluid.

Start the engine and run for several minutes.

Stop the engine. Check the reservoir and add fluid as needed.



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PORT BLOCK (S/N 14999 & Below) (Cont'd)

Removal and Installation

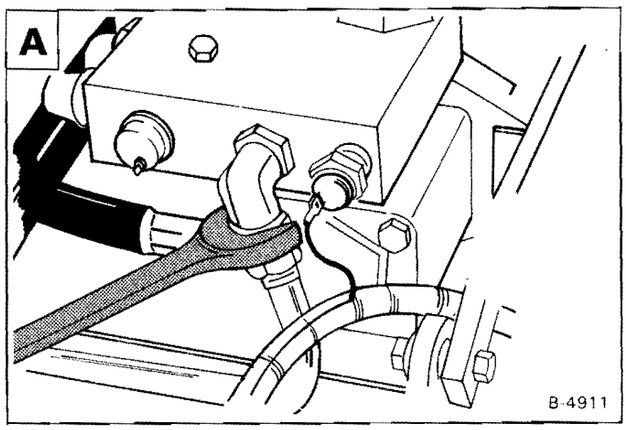
Stop the engine and drain the hydraulic reservoir (See Page 2—34).

Raise the operator cab (See Page 1—7).

Remove the hoses and tubelines from the port block [A].

Remove the small bolt (Item 1) from the port block [A].

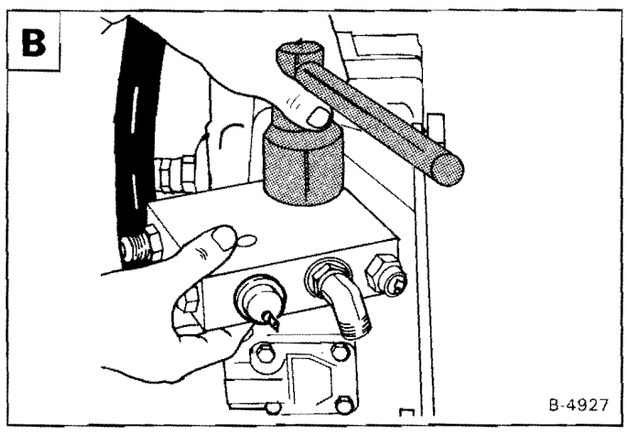
Installation: Tighten the bolt to 25-28 ft.-lbs. (34-38 Nm) torque.



Remove the large screw at the top of the port block [B].

Remove the port block.

Clean all parts in solvent. Use air pressure to dry them.



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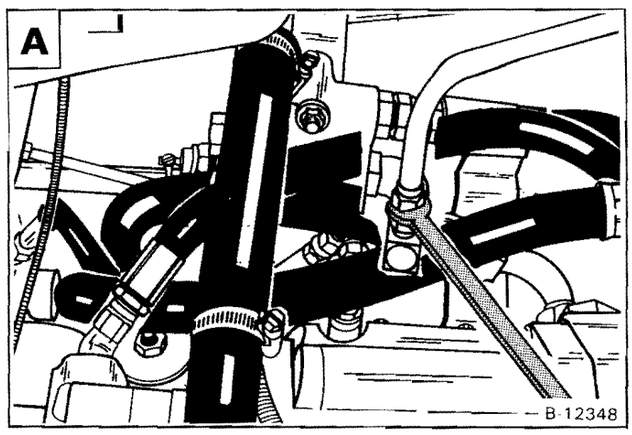
PORT BLOCK (S/N 15001 & Above)

Cold Weather By-Pass Valve Removal and Installation

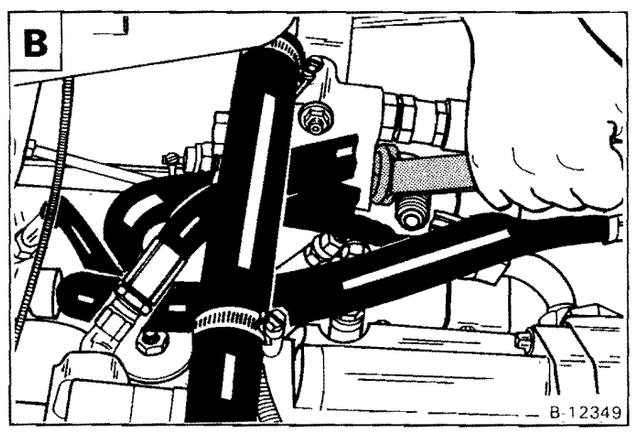
Stop the engine. Raise the operator cab (See Page 1—7).

Drain the hydraulic reservoir (See Page 2—34).

Remove the hoses and tubelines from the tee fitting at the port block [A].



Remove the tee fitting and the elbow from the port block [B].



Remove the poppet and spring from the port block [C].

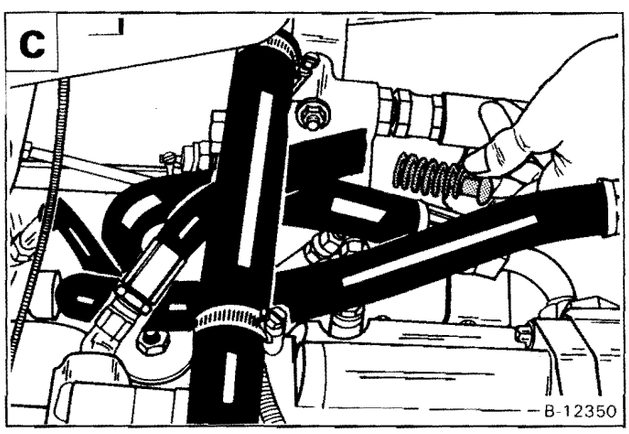
Clean the valve in solvent and check the seat in the elbow fitting.

Replace the parts as needed.

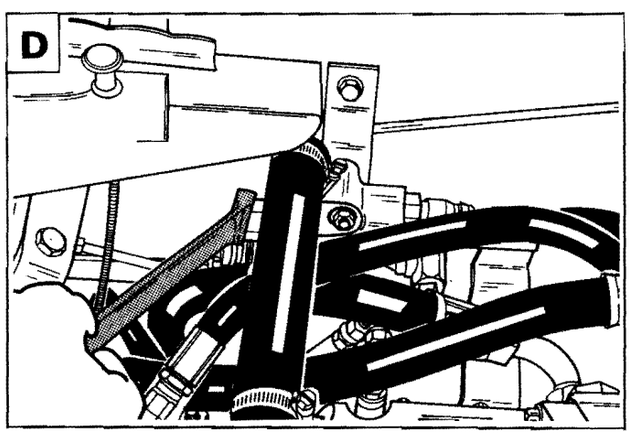
Case Drain Relief Valve Removal and Installation

Stop the engine and raise the operator cab.

Drain the hydraulic reservoir (See Page 3—34).



Remove the plug from the port block [D].

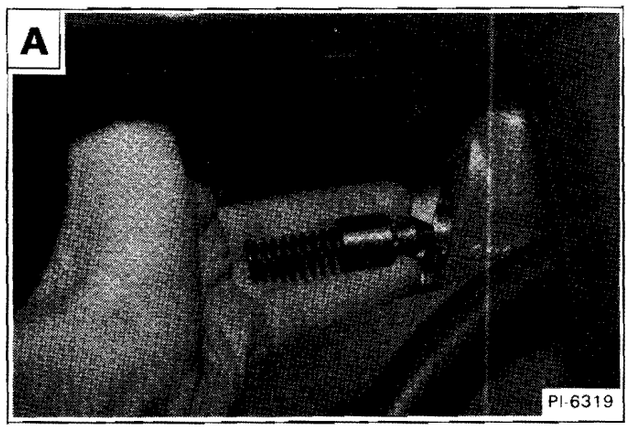


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PORT BLOCK (S/N 15001 & Above) (Cont'd)

Remove the spring and poppet, use magnet if needed [A].

Clean the valve with solvent. Check the valve seat in the port block. Replaced the parts as needed.



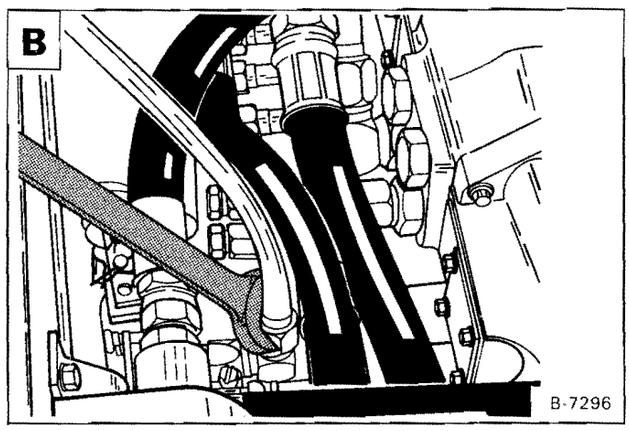
Removal and Installation

Stop the engine and raise the operator cab (See Page 1 – 7).

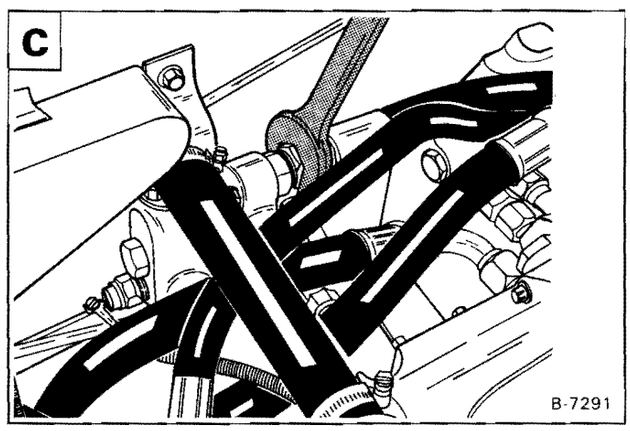
Drain the hydraulic reservoir (See Page 2 – 34).

Remove the tubeline that goes to the cooler [B].

Remove the tee fitting from the port block with case drain hoses that come from the hydrostatic motors.



Remove the hose which comes from the hydraulic reservoir [C].



Disconnect the wire from the sender switch [D].



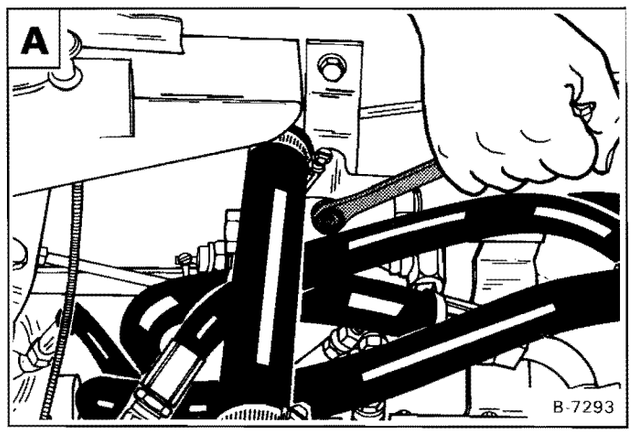
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PORT BLOCK (S/N 15001 & Above) (Cont'd)

Loosen the clamp on the hose which goes to the hydraulic pump

Remove the port block mounting nut [A].

Remove the port block by moving it up and backwards. At the same time disconnect the large hose (Item 1) [A].



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HYDRAULIC/HYDROSTATIC RESERVOIR

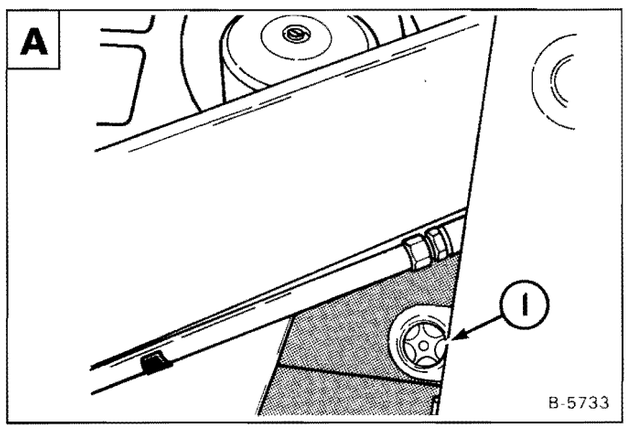
Use only recommended oil in the hydraulic system (Clark Bobcat fluid P/N 6563328 or 10W-30, 10W-40 Class SE motor oil). Use 5W-30 where temperatures are below -10°F (-23°C).

Checking and Adding Oil

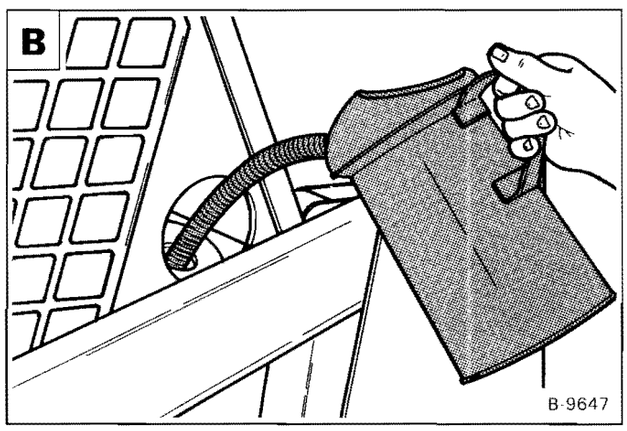
Put the loader on a level surface.

The reservoir will be different according to the loader S/N's.

Check the fluid level using the dipstick, pet cock or the sight gauge [A].



Add oil as needed [B].

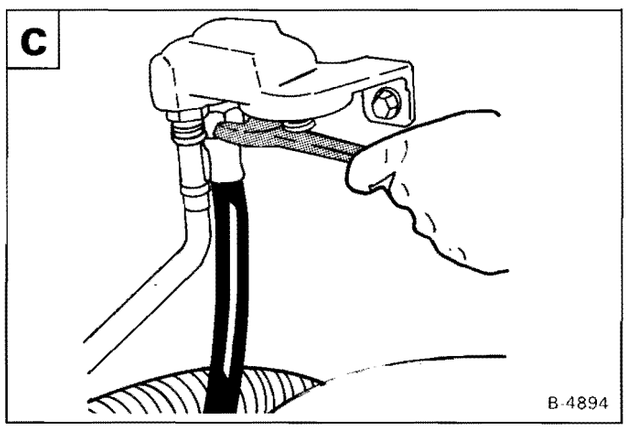


Removing Hydraulic Oil

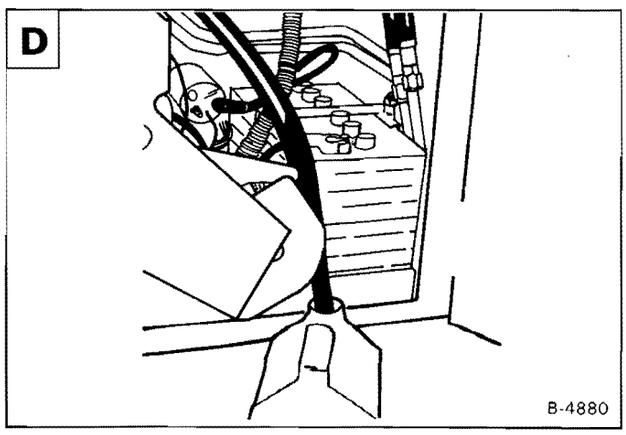
Remove the oil from the hydraulic reservoir and replace it with new oil every 1000 hours of operation. Also replace the oil after it has become dirty or after major repairs.

Remove the hydraulic filter element.

Remove the hose from the filter housing [C].



Drain the hydraulic fluid into a container [D].



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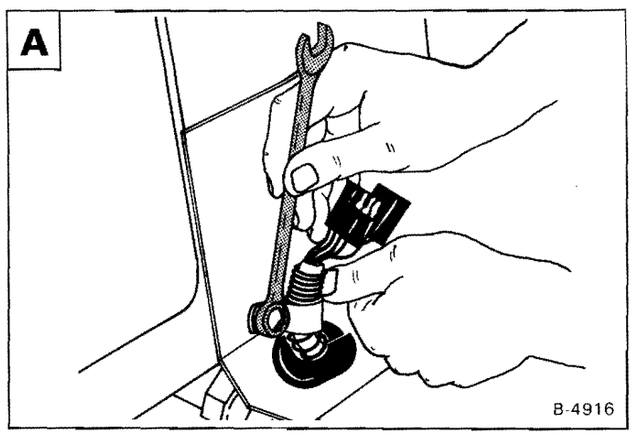
HYDRAULIC/HYDROSTATIC RESERVOIR (Cont'd)

Removal and Installation

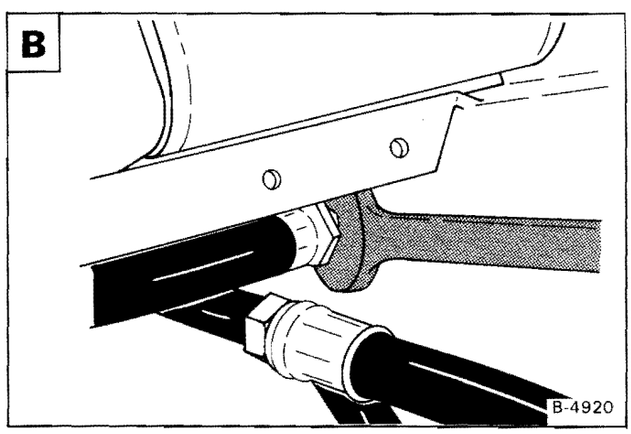
Raise the operator cab (See Page 1 – 7).

Remove the harness bracket [A].

Drain the hydraulic reservoir (See Page 2 – 34).



Remove the reservoir hose [B].



Remove the bolt holding the tank strap in position [C].

Remove the reservoir.

Installation: Install the reservoir with the strap and bolt.

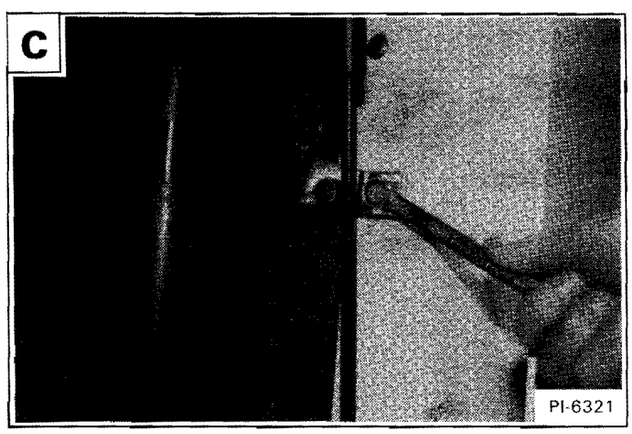
Install the reservoir hose and the harness bracket.

Fill the reservoir with the specified oil (See Page 2 – 34).

Lower the operator cab.

Start the engine and operate the hydraulic controls. Stop the engine and check for leaks.

Check the reservoir oil level and add oil as needed.



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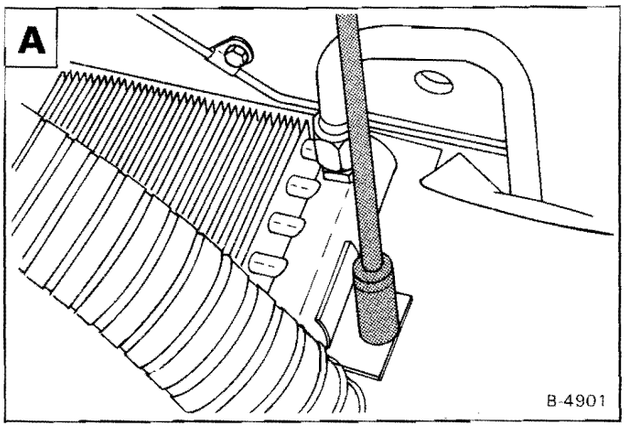
OIL COOLER

Removal and Installation (741)

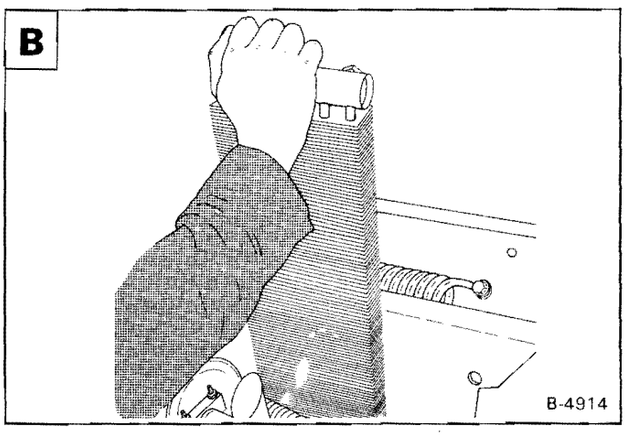
Remove the grill.

Drain the hydraulic reservoir (See Page 2—34).

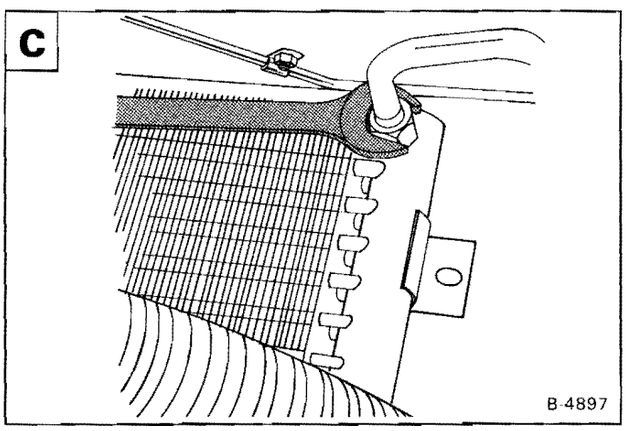
Remove the oil cooler mounting bolts [A].



Remove the tubelines from the oil cooler [B].



Remove the oil cooler [C].

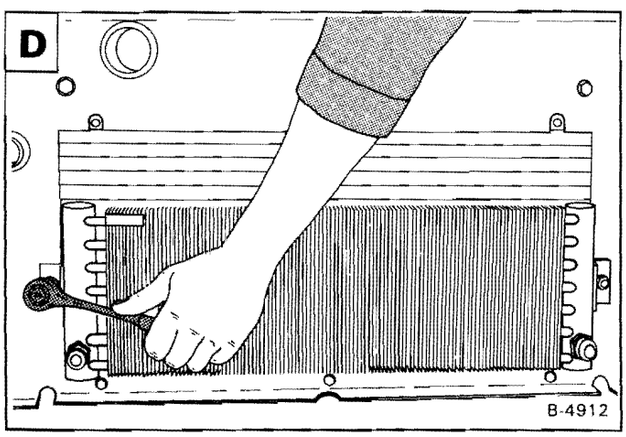


Removal and Installation (742 & 743)

Remove the radiator as follows:

742 (See Page 7B—36)
743 (See Page 7C—12)

Remove the oil cooler from the radiator [D].



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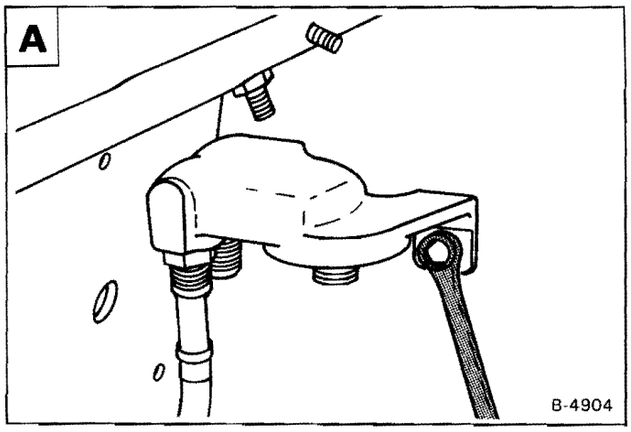
10 MICRON FILTER BY-PASS VALVE

Removal and Installation

Remove the hydraulic filter.

Remove the hoses and tubelines from the filter head.

Remove the filter head [A].

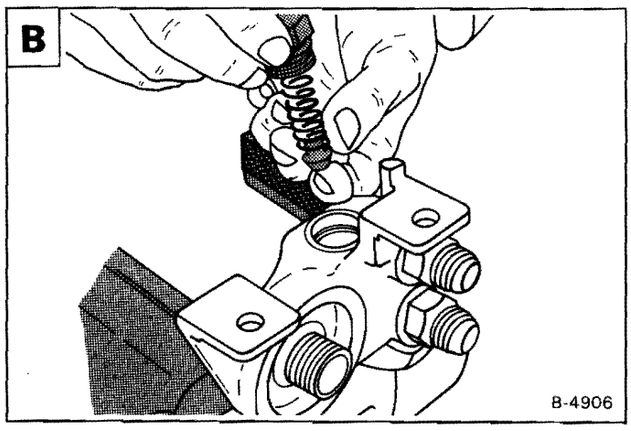


Put the filter head in a vise. Remove the cap, spring and poppet [B].

Check the poppet and the seating area for damage.

Replace the parts as needed.

NOTE: Always use new O-rings when installing the by-pass valve.

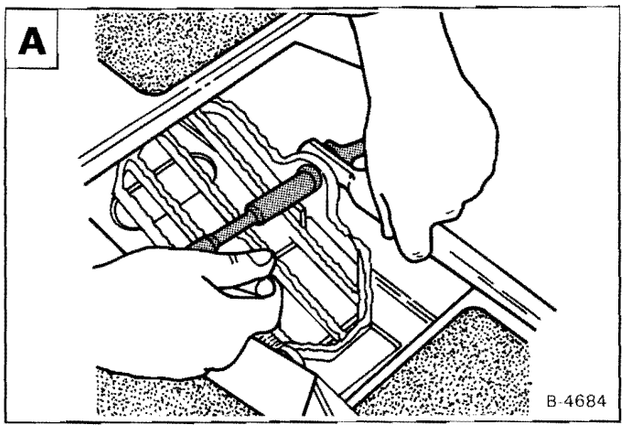


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HYDRAULIC CONTROL PEDALS (S/N 14999 & Below)

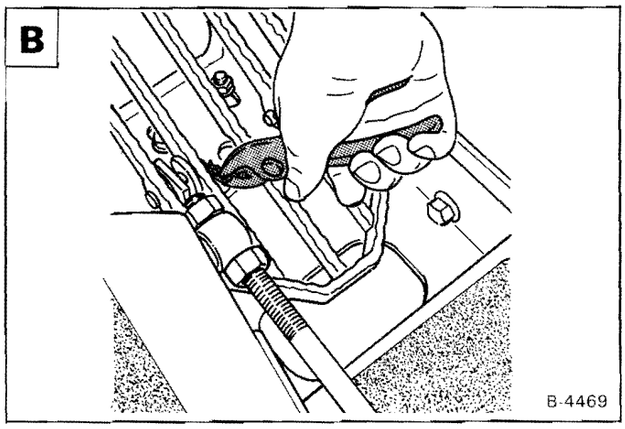
Removal and Installation

Disconnect the linkage at the pedal [A].

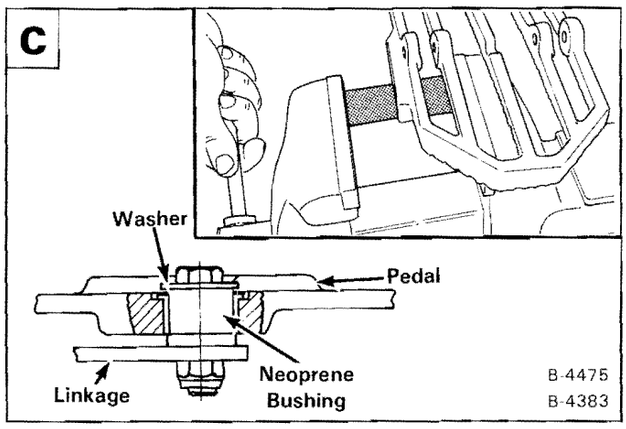


Remove the hair pins at the pivot pins [B].

Remove the pedal from the bracket.



Remove the bushing from the pedal, using a vise, install the new bushing in the pedal [C].

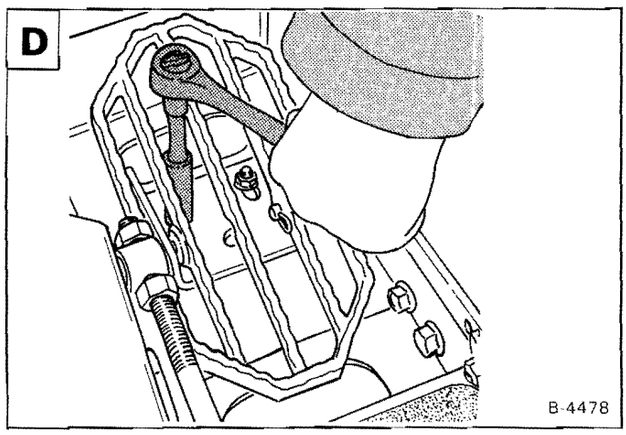


Adjustment

Loosen the nuts at the mounting bracket [D].

Slide the mounting bracket backward or forward until there is about 1-1/2'' (38 mm) under the rear edge of the pedal.

Tighten the nuts to 25-28 ft.-lbs. (34-38 Nm) torque.



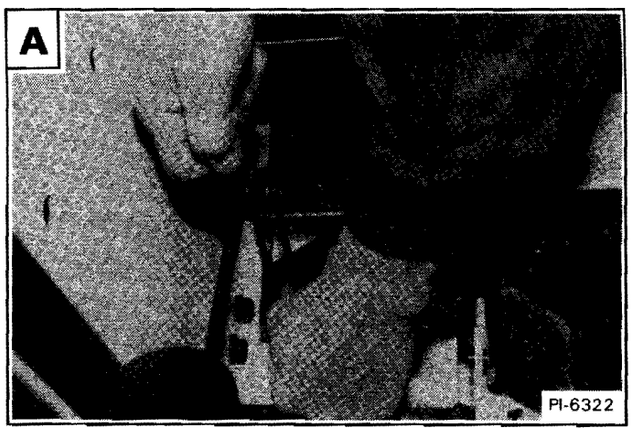
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HYDRAULIC CONTROL PEDALS (S/N 15001 & Above)

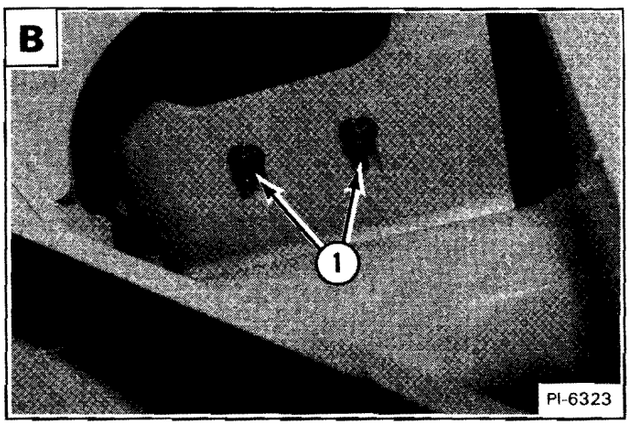
Removal and Installation

Remove the bolt and nut at the linkage [A].

Check the rubber bushing in the pedal for wear and replace as needed.



Remove the two pedal mounting nuts (Item 1) [B] below the mounting plate.



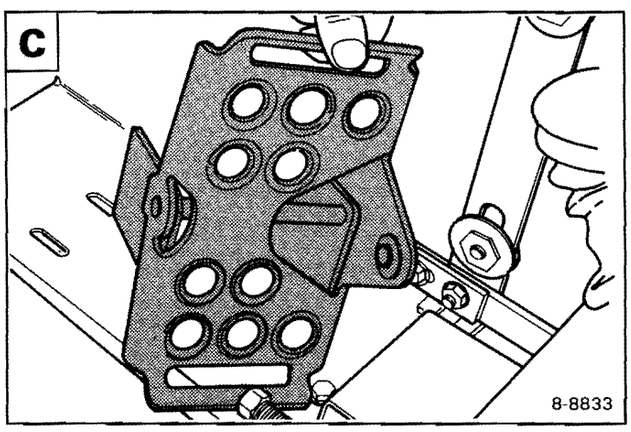
Remove the pedal from the loader [C].

Adjustment

After installing the pedal, adjust the pedal so that there is clearance under the rear of the pedal so the valve spool will travel full stroke without the pedal hitting.

If the linkage bar is to be removed, disconnect it from the valve, the foot pedal and the pedal lock.

Slide the linakge bar toward the rear of the loader to remove.



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PEDAL LOCK LINKAGE

Installation

If the pedal lock linkage was removed, use the following procedure to install the linkage.

1. Install the bolts (Item 1) from outside the fender [A].
2. Install the plastic washer (Item 2) [A].
3. Install the lock (Item 3) [A].
4. Install the plastic washer (Item 4) [A].
5. Put Loctite on the threads of the bolts.
6. Install the special nuts (Item 5) [A]. Make sure the special nut goes tight against the fender and that the plastic washer (Item 2 & 4) go over the shoulder of the special nut [A].
7. Tighten the special nut to 25 ft.-lbs. (34 Nm) torque.

⚠ WARNING

Adjust locking tabs on pedal control linkage so that lift and tilt control pedals are locked in neutral when seat bar is up.

W-2104-1285

Adjustment

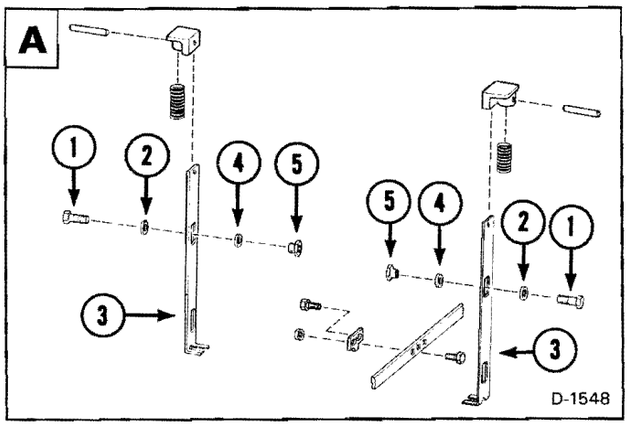
Check that the pedal lock linkage is free and locks the pedals in neutral.

Check that the tab goes into the slot at the lock [B].

If not, loosen the bolts (Item 1) and adjust the tab for engagement [B].

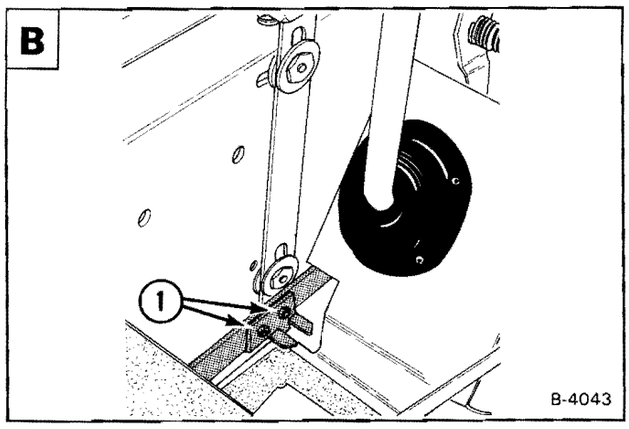
Installation: Tighten the bolts to 25 ft.-lbs. (34 Nm) torque.

* A



D-1548

B



B-4043

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HYDROSTATIC SYSTEM

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TOW VALVES	3–16
TROUBLESHOOTING	3–1

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HYDROSTATIC SYSTEM

TROUBLESHOOTING

The following troubleshooting chart is provided as an assistance in locating and correcting problems which are most common. Many of the recommended procedures must be done by authorized Bobcat Service Personnel only.

PROBLEM	CAUSE
No drive on one side, in one direction.	1, 2, 3, 4
No drive on one side in both directions.	2, 5, 6, 7, 8
The loader does not move in a straight line.	2, 3, 4, 6, 8, 9, 10
The hydrostatic system is overheating.	4, 11, 12, 13, 14, 15
The oil light comes "ON".	16, 17, 18

KEY TO CORRECT THE CAUSE
1. The hydrostatic system has a fluid leak.
2. The steering linkage needs adjustment.
3. The high pressure replenishing valve(s) has damage.
4. The shuttle valve in the hydrostatic motor has damage.
5. The balance plate in the hydrostatic motor has damage.
6. The hydrostatic pump has damage.
7. The final drive chain(s) is broken.
8. The hydrostatic motor has damage.
9. The tires do not have the correct pressure.
10. The tires are not the same size.
11. The hydrostatic fluid is not at the correct level.
12. The oil cooler has a restriction.
13. The temperature sending switch is not operating correctly.
14. The control valve is not operating correctly.
15. The loader is not being operated at the correct RPM.
16. The sender is damaged.
17. There is low charge pressure.
18. The charge relief valve is damaged.

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HYDROSTATIC SYSTEM INFORMATION

IMPORTANT

When making repairs on hydrostatic and hydraulic systems, clean the work area before disassembly and keep all parts clean. Always use caps and plugs on hoses, tubelines and ports to keep dirt out. Dirt can quickly damage the system.

I-2003-0284

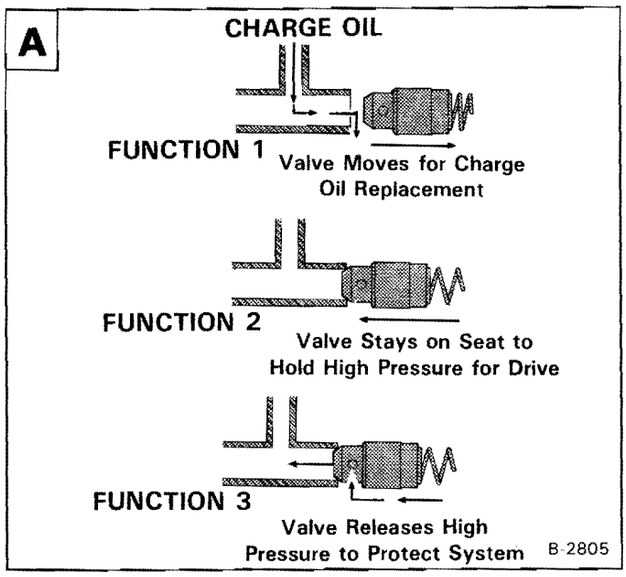
High Pressure Relief Replenishing Valves

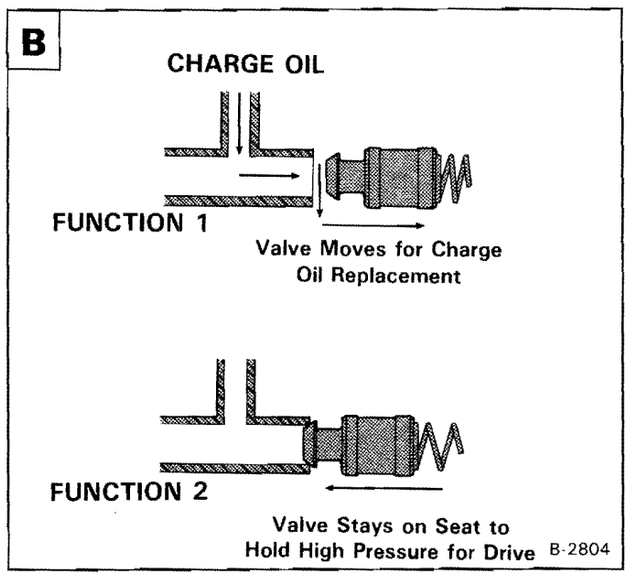
The replenishing valves for forward are also high pressure relief valves.

The replenishing valves for forward also release very high pressure.

The functions of the replenishing valves are as follows:

1. To give replacement oil to the low pressure side of the closed hydrostatic circuit (Function 1) [A] & [B].
2. To keep high pressure flow of oil out of the low pressure side of the closed hydrostatic circuit (Function 2) [A] & [B].
3. To release high pressure caused by a heavy load of the machine when moving forward (Function 3) [A].





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STEERING LEVERS

Removal and Installation

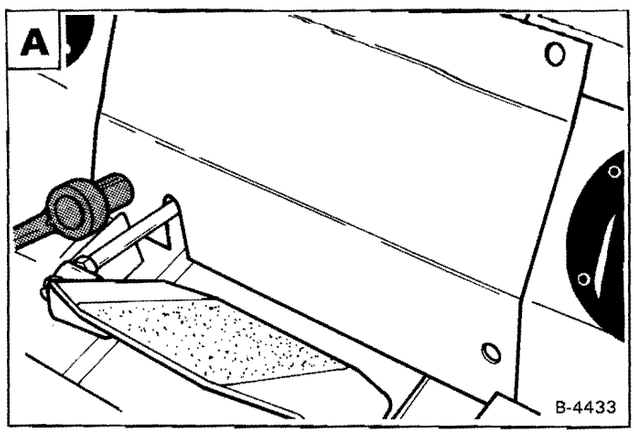
NOTE: Early production machines used 3-piece assembly. Current production machines use 1-piece shield which must be removed as a unit.

Remove the front panel [A].

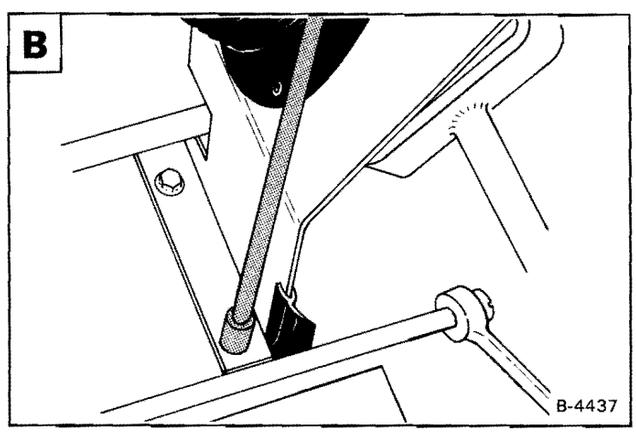
IMPORTANT

When making repairs on hydrostatic and hydraulic systems, clean the work area before disassembly and keep all parts clean. Always use caps and plugs on hoses, tubelines and ports to keep dirt out. Dirt can quickly damage the system.

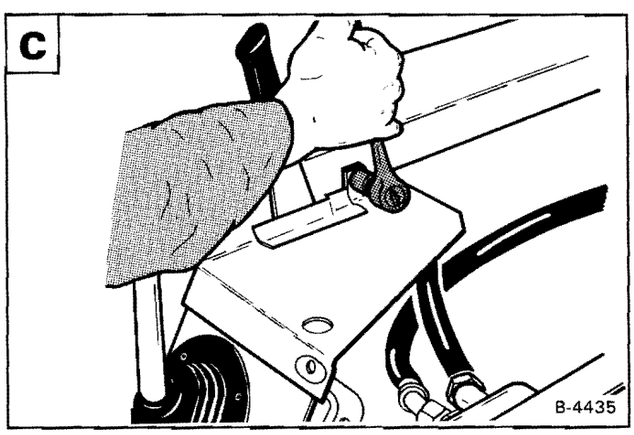
I-2003-0284

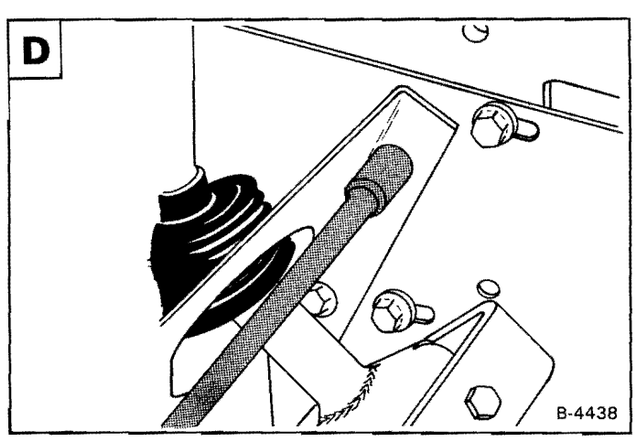


Remove the bolts and remove both side shields [B].

* 

Remove the bolts from the steering lever shield [C] & [D].

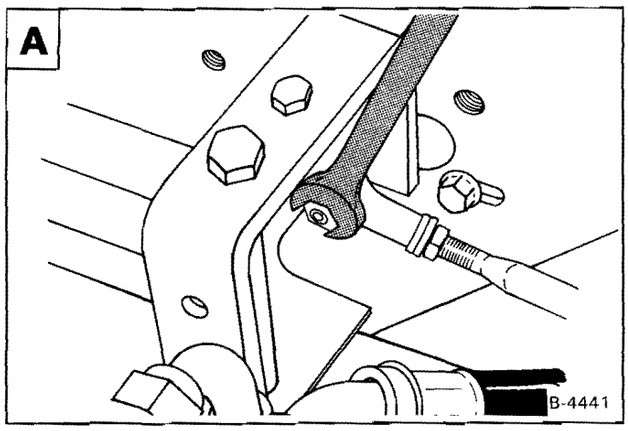




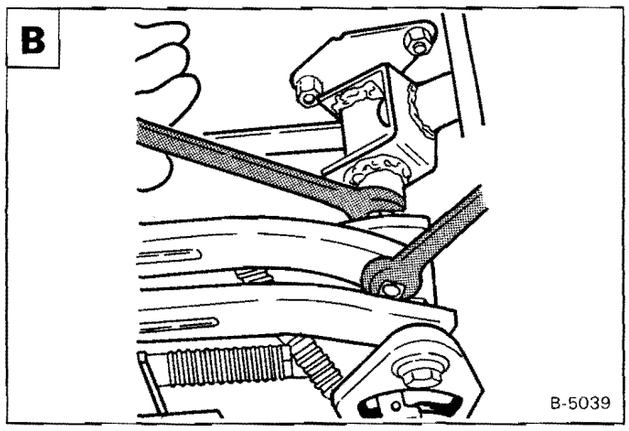
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STEERING LEVERS (Cont'd)

Remove the steering linkage at the steering levers [A].

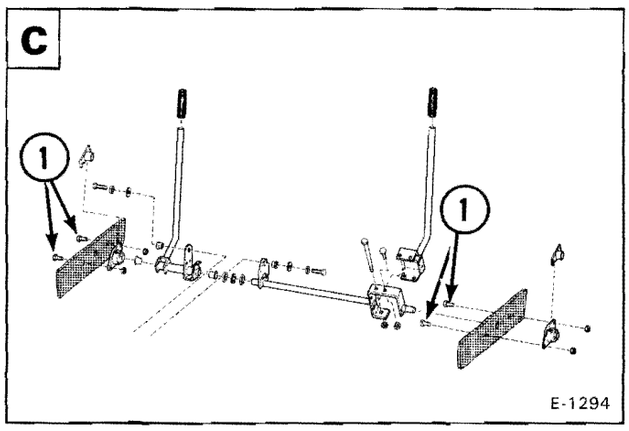


Disconnect the auxiliary linkage from the right steering lever [B].

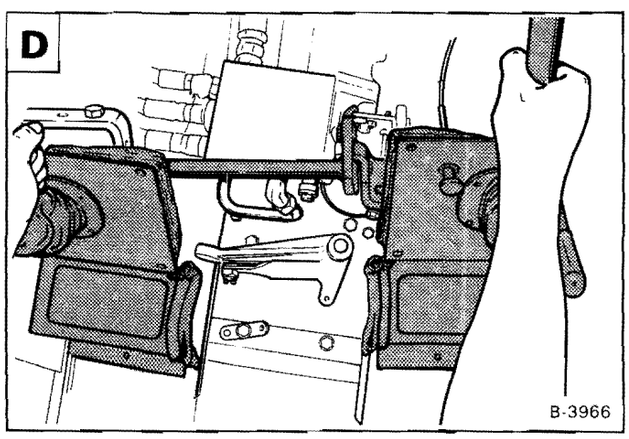


Remove the bolts (Item 1) from the pivot bearings [C].

Installation: Tighten the bolts to 25-28 ft.-lbs. (34-38 Nm) torque.



Remove the steering lever assembly [D].



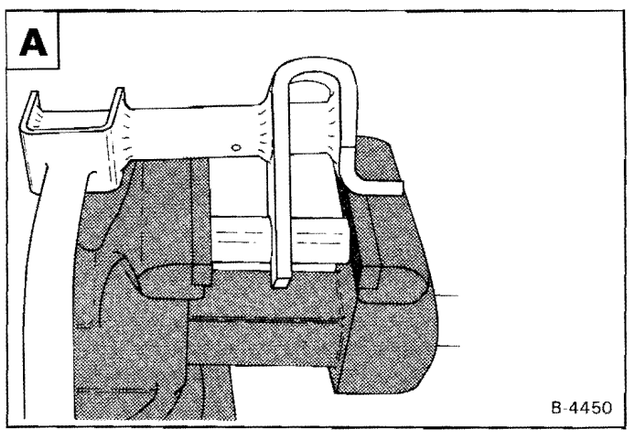
https://truckmanualshub.com/

STEERING LEVERS (Cont'd)

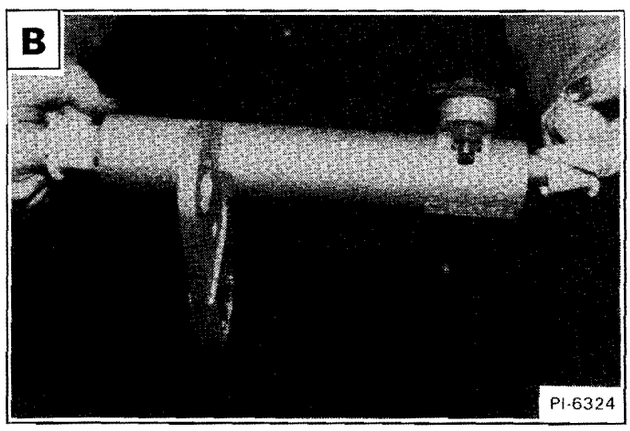
Repairing the Steering Levers

Remove the rubber bushing and the Teflon bushing from the steering levers.

Install the new rubber bushings into the steering levers using two sockets and a vise [A].

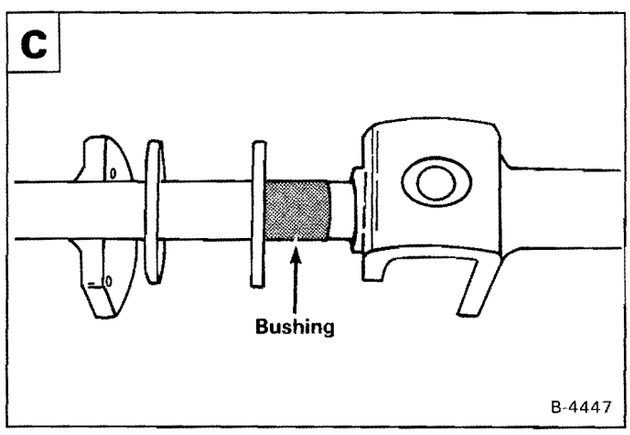


Install the Teflon bushings on the steering levers [B].



Install the two steering lever assemblies together [C].

Check the pivot bearings and replace as needed.



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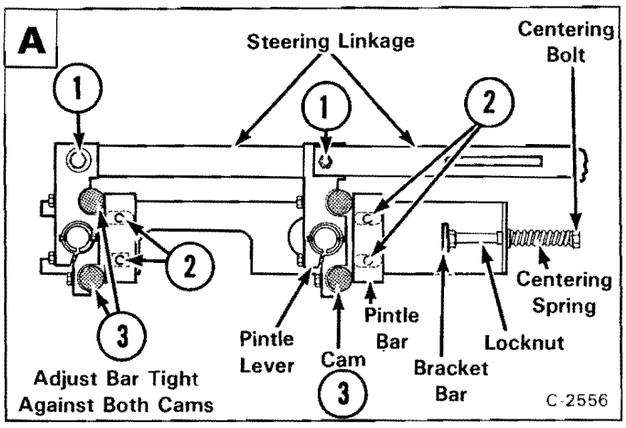
STEERING LINKAGE

Adjustment

⚠ WARNING

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

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Raise the operator cab (See Page 1—7).

Loosen the linkage (Item 1) at both pintle arms [A].

Loosen the pintle bar bolts (Item 2) [A].

Connect the remote start switch MEL-1138A (See Page 1—9).

Start the engine and run at slow RPM.

Move the left steering lever until the tires do not turn (neutral). Adjust the rear pintle bar so that the bar is tight against both cams (Item 3) of the pintle lever and the transmission is still in neutral [A].

Tighten the pintle bar bolts to 28 ft.-lbs. (38 Nm) torque.

Move the left steering lever backward and forward and let the transmission return to neutral. If the transmission does not go back to neutral, repeat the procedure.

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STEERING LINKAGE (Cont'd)

Move the right steering lever until the tires do not turn (neutral). Adjust the front pintle bar so that the bar is tight against both cams (Item 1) of the pintle lever and transmission is still in neutral [A].

Tighten the pintle bar bolts to 28 ft.-lbs. (38 Nm) torque.

Move the right steering lever backward and forward and let the transmission return to neutral. If the transmission does not go back to neutral, repeat the procedure.

Tighten the bolts holding the steering linkage to the pintle levers to 12 ft.-lbs. (16 Nm) torque.

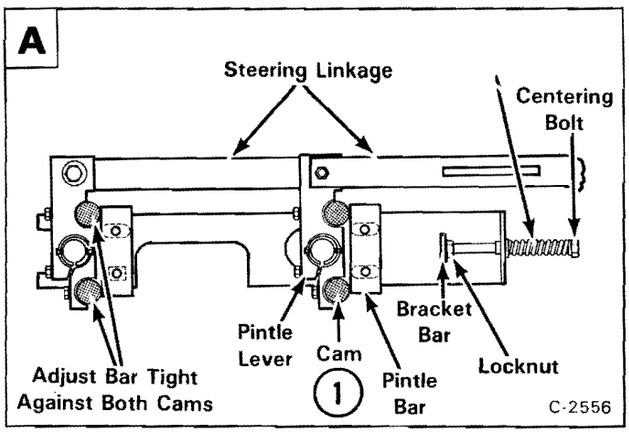
Install the locknuts on each bolt and tighten to 23 ft.-lbs. (31 Nm) torque.

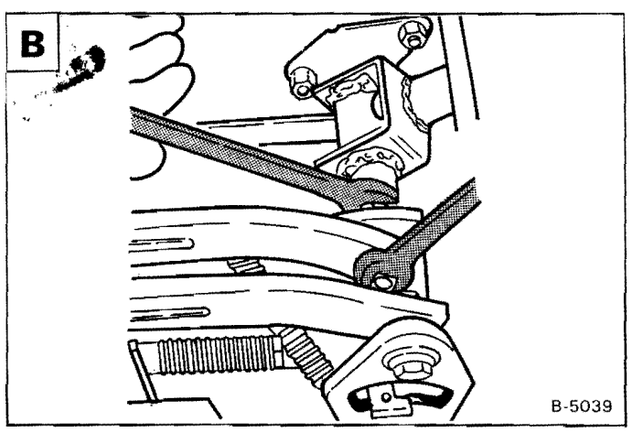
Removal and Installation

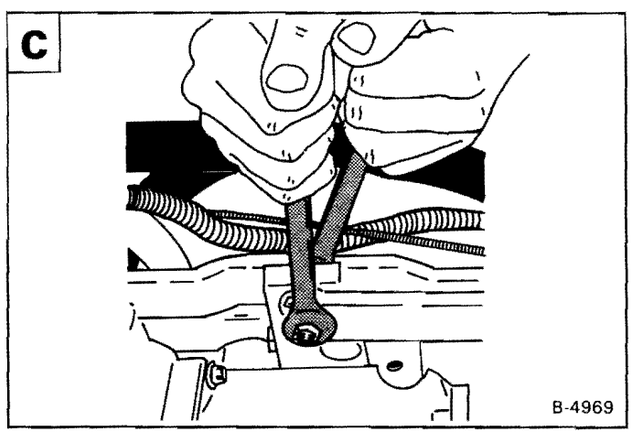
Raise the operator cab (See Page 1—7).

Remove the steering linkage bolts from the steering levers [B].

Remove the bolts from the pintle arms [C].







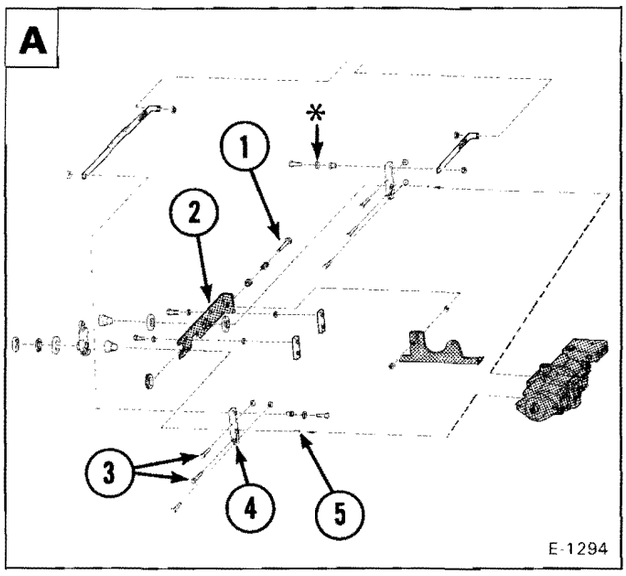
https://truckmanualshub.com/

STEERING LINKAGE (Cont'd)

Remove the centering bolts and the spring assembly (Item 1) [A].

Remove the centering bar (Item 2) [A].

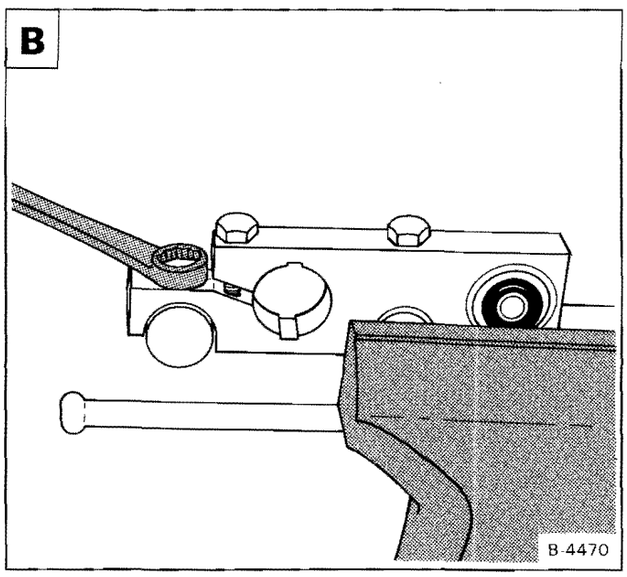
Loosen the bolts (Item 3) on the pintle levers (Item 4). Remove the pintle lever key (Item 5) [A].



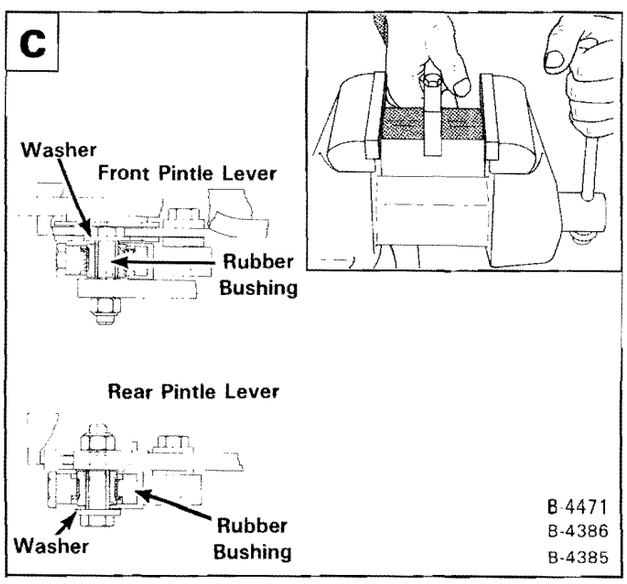
Repairing the Pintle Lever

Remove the bolt at the lobes on the pintle lever [B].

Remove the rubber bushings from the pintle levers.



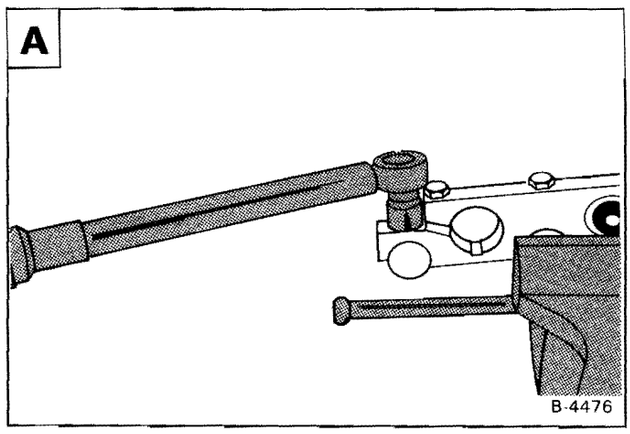
Install the new rubber bushings using two sockets and a vice [C].



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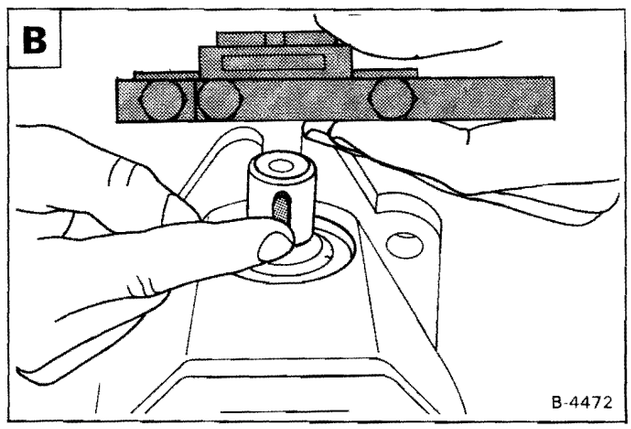
STEERING LINKAGE (Cont'd)

Install the new lobes on the pintle lever and tighten to 25-28 ft.-lbs. (34-38 Nm) torque [A].

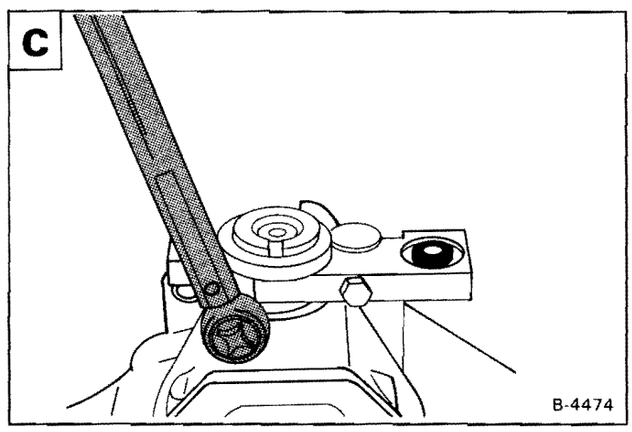


Install the bushing and the guide in the pintle lever.

Install the key on the shaft of the hydrostatic pump and install the pintle lever assembly [B].



Tighten the bolt on the pintle lever to 18-20 ft.-lbs. (24-27 Nm) torque [C].



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HYDROSTATIC MOTOR

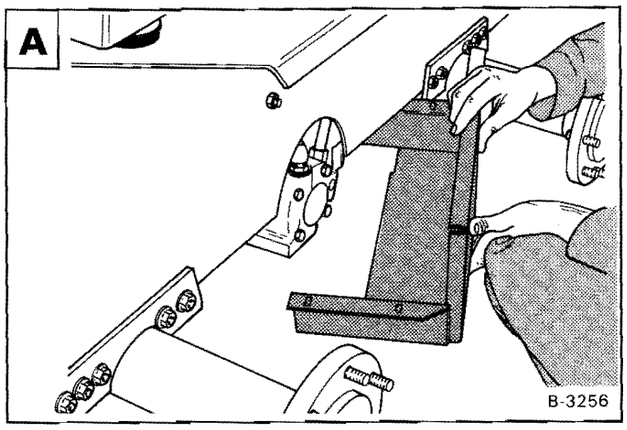
Removal

IMPORTANT

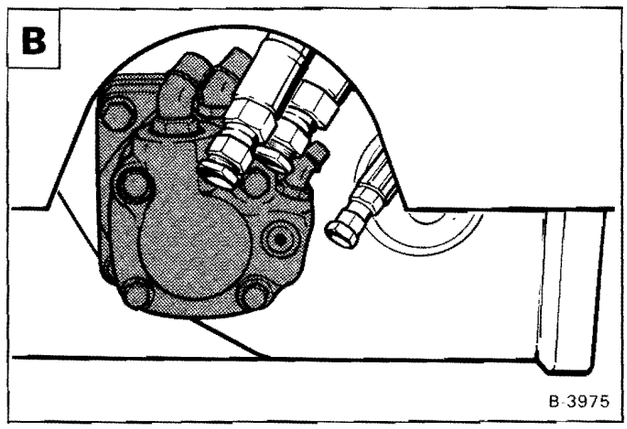
When making repairs on hydrostatic and hydraulic systems, clean the work area before disassembly and keep all parts clean. Always use caps and plugs on hoses, tubelines and ports to keep dirt out. Dirt can quickly damage the system.

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Remove the motor cover [A].



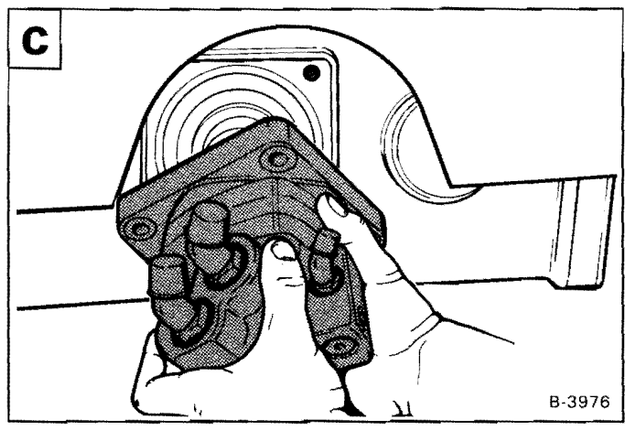
Remove the hoses from the hydrostatic motor. Note the location of the hoses for correct assembly [B].



Remove the mounting bolts and remove the motor [C].

NOTE: Refer to the Component Repair Manual for the disassembly and assembly procedure.

Installation: Tighten the mounting bolts to 65-70 ft.-lbs. (88-95 Nm) torque.



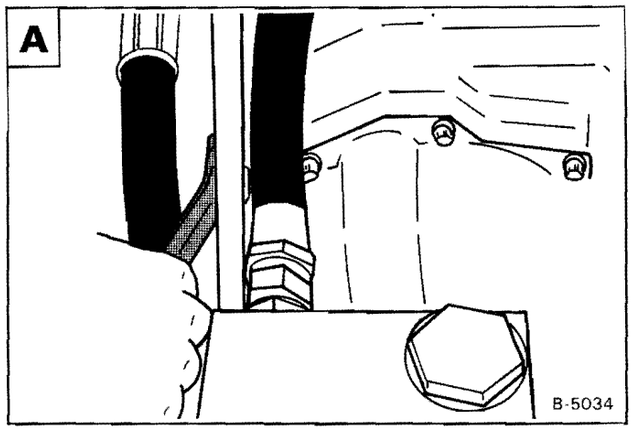
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HYDROSTATIC PUMP

IMPORTANT

When making repairs on hydrostatic and hydraulic systems, clean the work area before disassembly and keep all parts clean. Always use caps and plugs on hoses, tubelines and ports to keep dirt out. Dirt can quickly damage the system.

I-2003-0284



Checking the High Pressure Relief Replenishing Valves

The tool listed will be needed to do the following procedure:

MEL-1173 – Gauge Test Kit

Lift and block the loader (See Page 1–2 for the correct procedure).

Raise the operator cab (See Page 1–7 for the correct precedure).

If there is a loss of drive in one direction, to one side of the loader, use the following procedure to check the valves.

Remove both plugs and the replenishing valves that controls the direction of drive that was lost [A].

Switch the replenishing valves around. Install and tighten the plugs.

Connect the remote start switch MEL-1138A (See Page 1–9).

Start the engine and check the drive.

If the loss of drive goes to the other side, the valve which controls that side of the loader must be replaced.

To Use the Special Tool Kit (MEL-1173)

⚠ WARNING

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

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HYDROSTATIC PUMP (Cont'd)

Remove the high pressure hydraulic hose from the pump port. Install the 10,000 PSI gauge (from the kit) in the port.

⚠ WARNING

When an engine is running in an enclosed area, fresh air must be added to avoid concentration of exhaust fumes. If the engine is stationary, vent the exhaust outside. Exhaust fumes contain odorless, invisible gases which can kill without warning.

W-2050-1285

Connect the remote start switch MEL-1138A (See Page 1 – 9).

Run the engine at idle RPM. Engage the drive lever a small amount. The pressure must reach 3500 to 4000 PSI (24133-27580 kPa). DO NOT exceed 4000 PSI (27580 kPa).

NOTE: One port test at each pump is enough to test the condition of both valves.

Replace the valves as needed.

Checking Charge Pressure (S/N 14999 & Below)

The tools listed will be needed to do the following procedure:

MEL-1173 – Test Kit
MEL-1138A – Remote Start Switch

Raise the operator cab (See Page 1 – 7).

Remove the temperature sender from the port block [A].

Connect the gauge (from the kit) to the port block in the temperature sender port [B].

Connect the remote start switch MEL-1138A (See Page 1 – 9).

Start the engine and run at full RPM.

The pressure should read 140-170 PSI (965-1172 kPa).

NOTE: Refer to the Component Repair Manual for the disassembly and assembly procedure.

Remove the gauges. Install the switch and connect the sender wire.

Checking Charge Pressure (S/N 15001 & Above)

The tools listed will be needed to do the following procedure:

MEL-1173A – Test Kit
MEL-1138A – Remote Start Switch

Raise the operator cab (See Page 1 – 7).

Remove the switch from the elbow on top of the hydrostatic pump.

Connect the gauge (from the kit) to the fitting as shown [C].

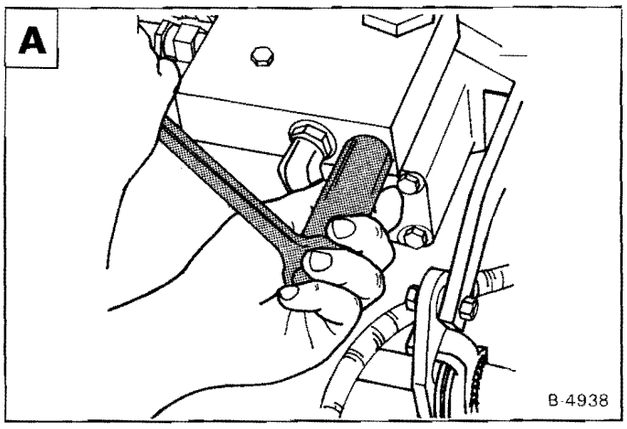
Connect the remote start switch MEL-1138A (See Page 1 – 9).

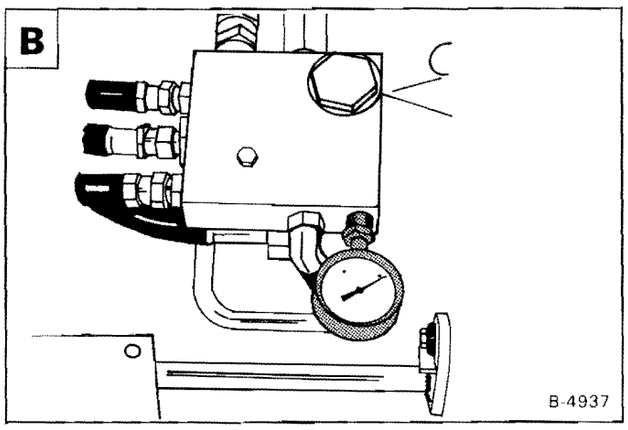
Start the engine and run at full RPM.

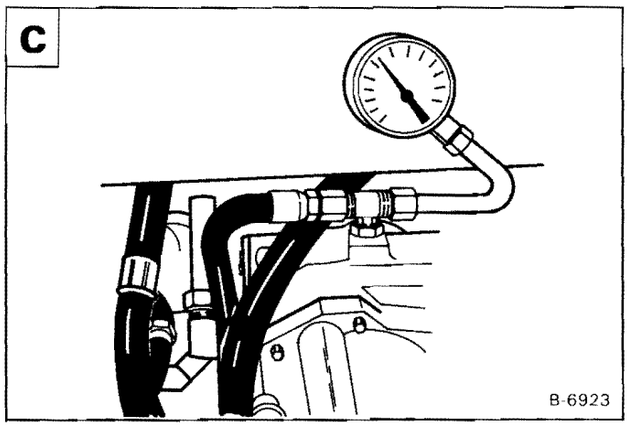
The pressure should read 95-115 PSI (655-793 kPa).

NOTE: Refer to the Component Repair Manual for the disassembly and assembly procedure.

Remove the gauges. Install the switch and connect the wire.







⚠ WARNING

Diesel fuel or hydraulic fluid under pressure can penetrate skin or eyes causing serious injury. 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.

W-2074-1285

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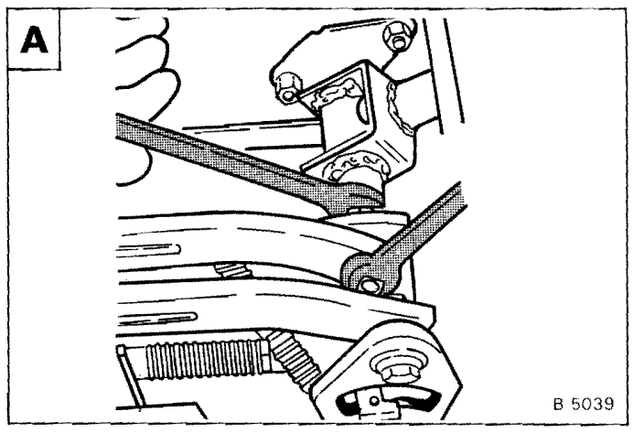
HYDROSTATIC PUMP (Cont'd)

Removal

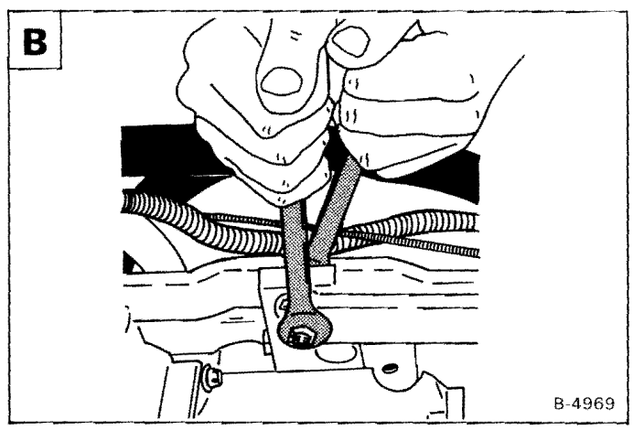
Drain the hydraulic/hydrostatic reservoir (See Page 2 - 34).

Remove the front panel and side shields (See Page 3 - 3).

Remove the detent linkage [A].



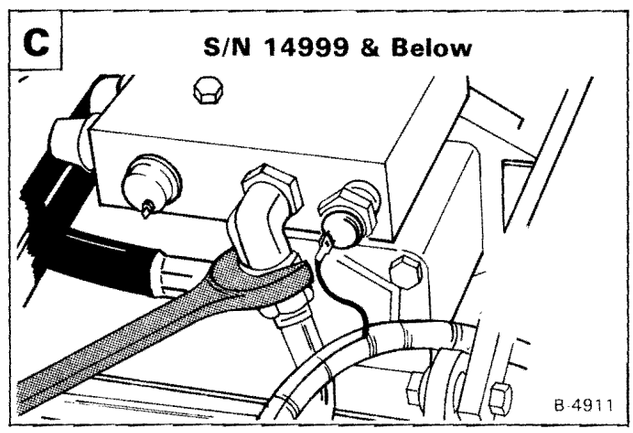
Remove the steering linkage at the steering levers [B].



S/N 14999 & Below

Remove the hoses from the port block [C].

Disconnect the hose from the port block to the hydraulic/ hydrostatic reservoir.

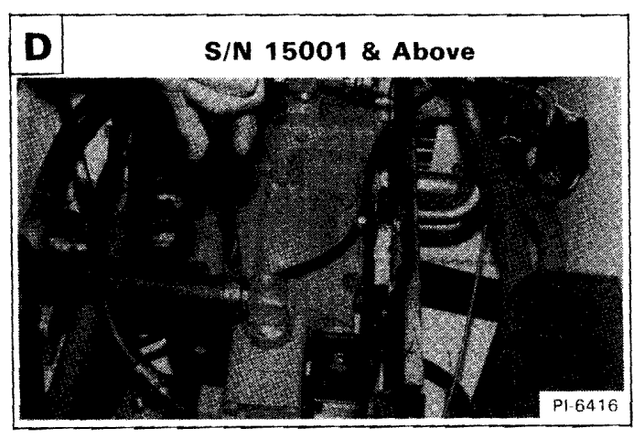


S/N 15001 & Above

Remove the suction hose from the hydraulic pump [D].

Loosen the suction hose fitting at the port block.

Move the hose for ease of pump removal and installation.

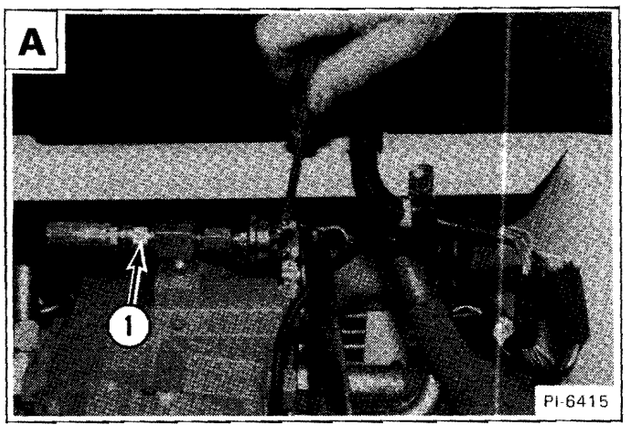


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HYDROSTATIC PUMP (Cont'd)

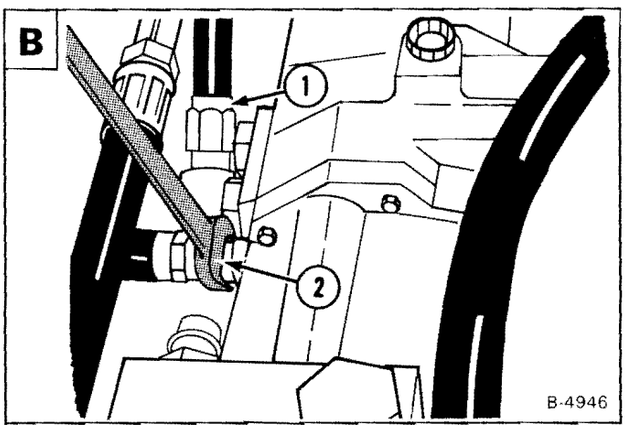
Remove the wires from the hydraulic temperature sender [A].

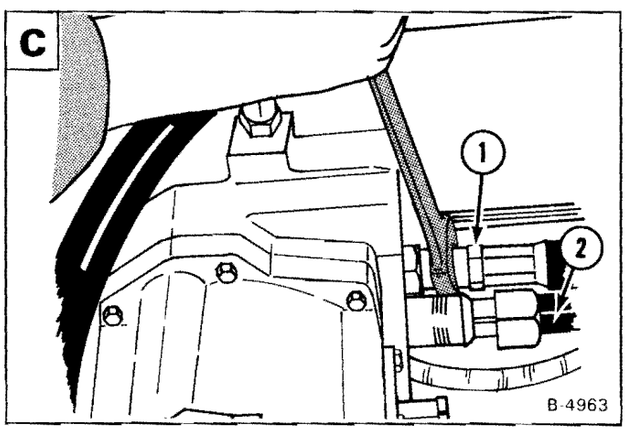
Remove the hydraulic filter hose (Item 1) [A].



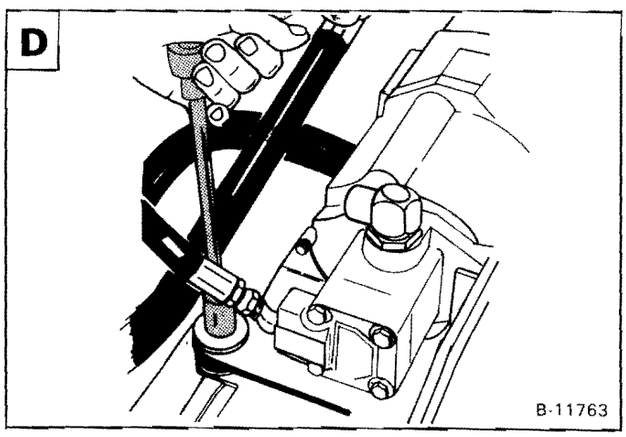
Disconnect the high pressure hoses (Item 1 & 2) from the hydrostatic pump [B] & [C].

Disconnect the wire from the temperature switch on the port block.





Remove the bolts from the front hydrostatic pump mounts [D].

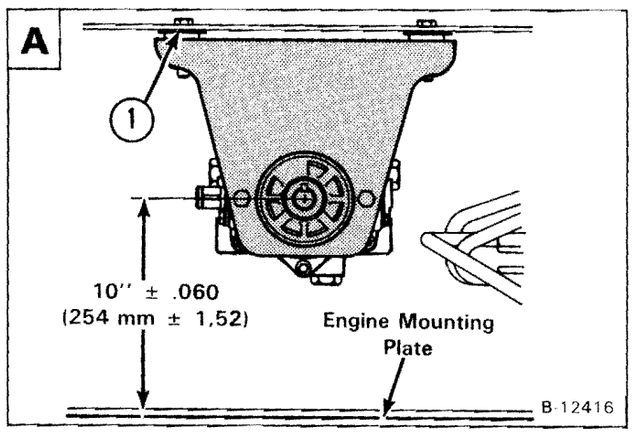


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HYDROSTATIC PUMP (Cont'd)

NOTE: If the rear pump mount is to be removed make sure to note the location of the washers between the mount and frame. These washer(s) (Item 1), must be installed at the correct location to give the pump and engine the correct alignment [A].

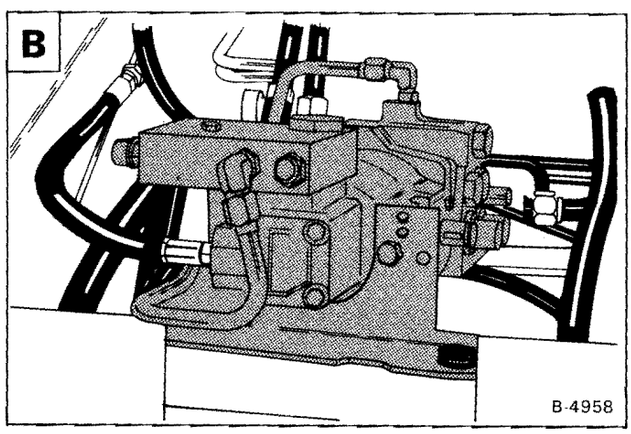
Remove the bolts from the rear hydrostatic pump mount.



Move the pump forward and lift it up to remove it from the loader [B]. (Example shown is from S/N 14999 & Below)

Remove the spline coupler from the input shaft on the rear of the pump.

NOTE: Refer to the Component Repair Manual for the Hydrostatic pump Disassemlby and Assembly.



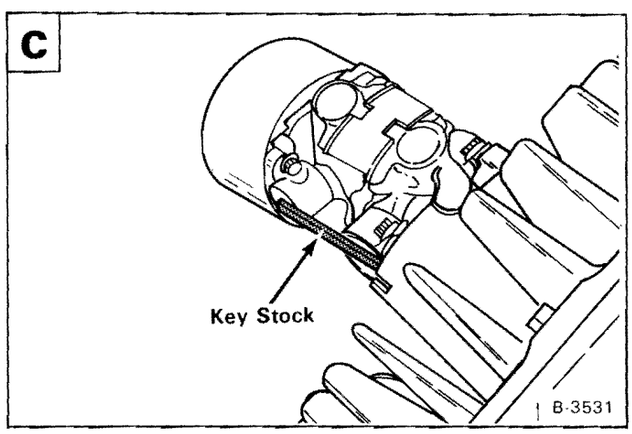
Installation

Install the front pump mount using the same number of shims removed.

Lower the pump assembly into position on the transmission case and guide the spline pump drive shaft and coupler yoke into engagement.

Install the bolts in the front and rear pump mounts. Fasten the pump assembly to the rear mount.

Use key stock against the spider on the drive coupler to check alignment [C].

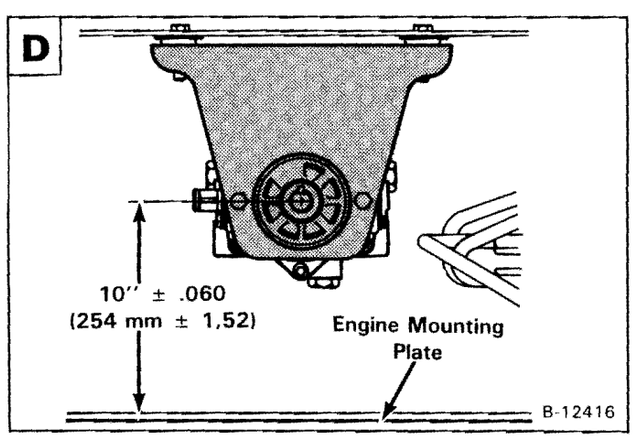


Loosen the engine mounts if necessary to align the drive coupler.

If the height alignment is not correct, add or subtract half thickness washers at the rear pump mount [D].

NOTE: Measure from engine mounting plate to center of pump shaft. Also measure engine distance to center of the flywheel, the two dimensions must be as close as possible.

Check engagement of coupling onto spline. Maximum clearance between pump drive flange and yoke is 1/4'' (6,35 mm).



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TOW VALVES

The tool listed will be needed before attempting to tow the loader.

MEL-1179-2 – Towing Tool

The loader can be moved (towed) for a short distance (at a slow speed) if it is unable to do so under its own power.

IMPORTANT

When making repairs on hydrostatic and hydraulic systems, clean the work area before disassembly and keep all parts clean. Always use caps and plugs on hoses, tubelines and ports to keep dirt out. Dirt can quickly damage the system.

1-2003-0284

Remove the high pressure relief plug.

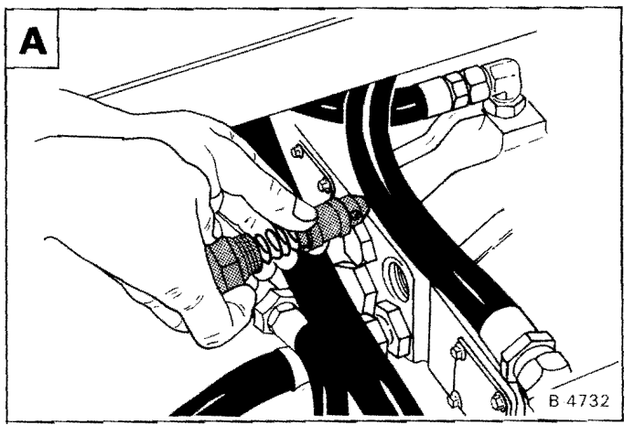
Remove the spring and the high pressure relief valve [A].

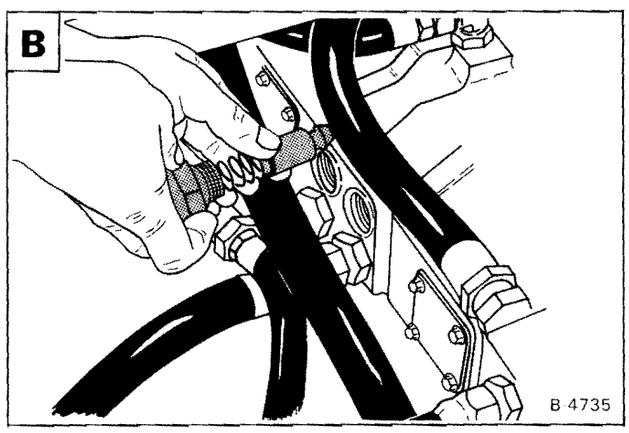
Remove the other plug.

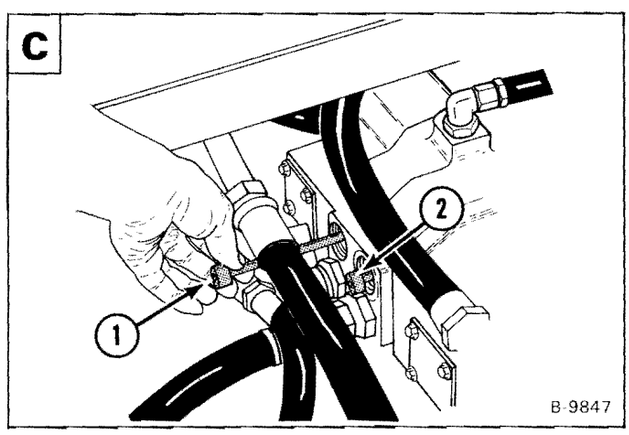
Remove the other spring and the high pressure relief valve [B].

Install the towing tools (Item 1 & 2) and then the plugs only [C].

NOTE: Make sure to remove the tow tools before trying to operate the loader.







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DRIVE SYSTEM

	Page Number
AXLE, SEALS AND BEARINGS	
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Removal	4–5
CHAINCASE FLUID	
Replacing Chaincase Fluid	4–20
FINAL DRIVE CHAIN	
Removal and Installation	4–10
PARKING BRAKE	
Adjustment	4–1
Block and Pucks	4–3
Removal and Installation	4–2
REDUCTION GEARCASE	
Checking Reduction Gearcase	4–13
Disassembly and Assembly	4–13
Installation	4–19
Reduction Gearcase Seal	4–18
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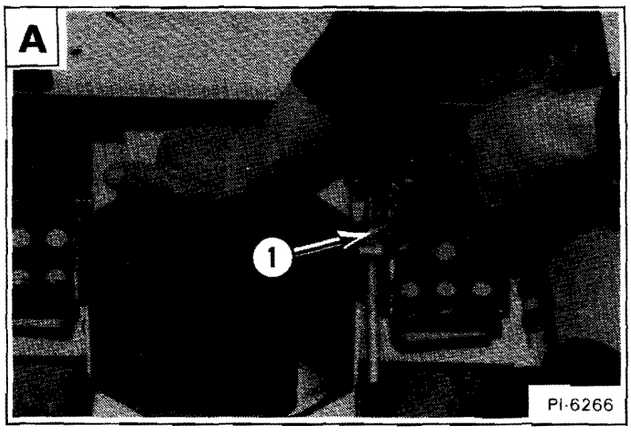
PARKING BRAKE

Adjustment

When the brake is in good condition and adjusted correctly, it will keep the loader from moving when in the engaged position.

Loosen the nut (Item 1) and turn the linkage rod to adjust the brake. There must be 1/4'' (6,35 mm) free play under the rear edge of the pedal [A].

NOTE: **If the correct adjustment cannot be reached by turning the linkage rod, the brake lever must be adjusted.**



Remove the brake lever (Item 1) [B].

Turn the cam pin (Item 2) counter clockwise until the brake pucks (Item 3) make contact with the brake discs (Item 4) [B].

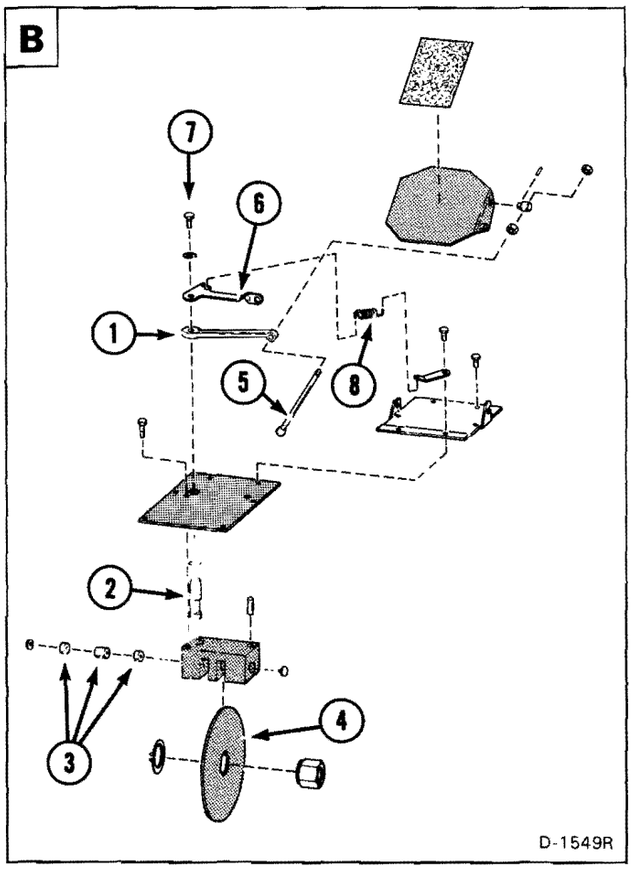
Put the brake linkage rod (Item 5) into the brake lever. Install the linkage rod into the brake pedal [B].

When there is 1'' (25.4 mm) of threads through the brake pedal install the brake lever on the cam pin. The brake pucks must still be making contact with the brake discs.

Install the lever (Item 6) and bolt (Item 7) on the cam pin and tighten to 65-70 ft.-lbs. (88-95 Nm) torque.

Install the spring (Item 8) [B].

Adjust the brake as described above.



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PARKING BRAKE (Cont'd)

Removal and Installation

Raise the operator's cab (See Page 1 – 7).

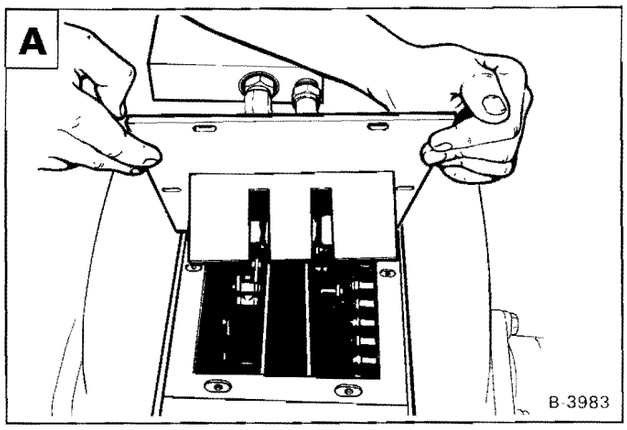
743 Only: Disconnect the fuel shut off cable from the engine.

742 Only: Remove the choke cable from the engine.

Remove the control shields, steering levers and linkage.

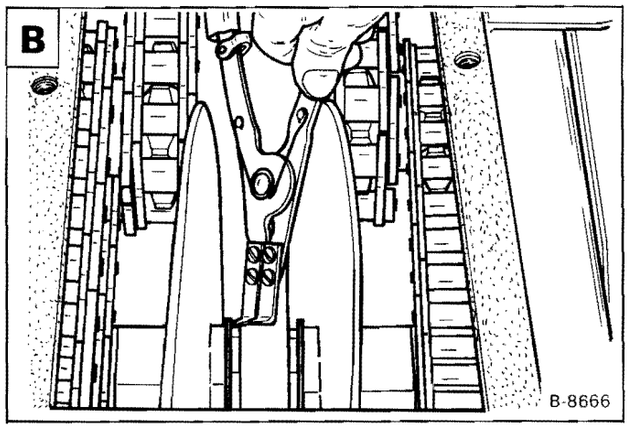
Remove the transmission covers and the brake block [A].

Installation: Align the brake discs so they are centered between the brake pucks.



IMPORTANT

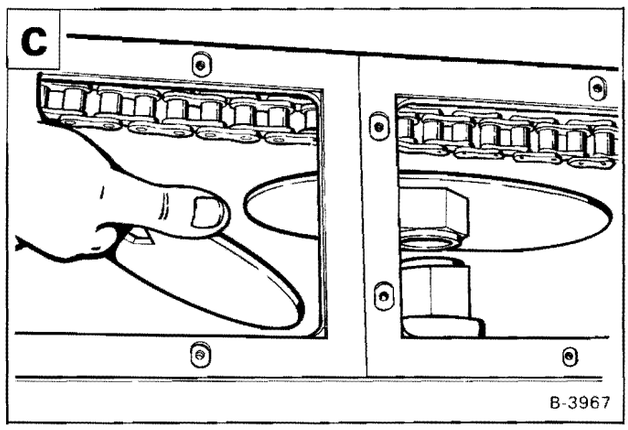
Be careful not to damage the gasket when removing the transmission covers.



Remove the snap ring at the discs [B].

Remove the brake discs [C].

Check the brake discs for damage. Replace the discs as needed. Do not grind the discs.



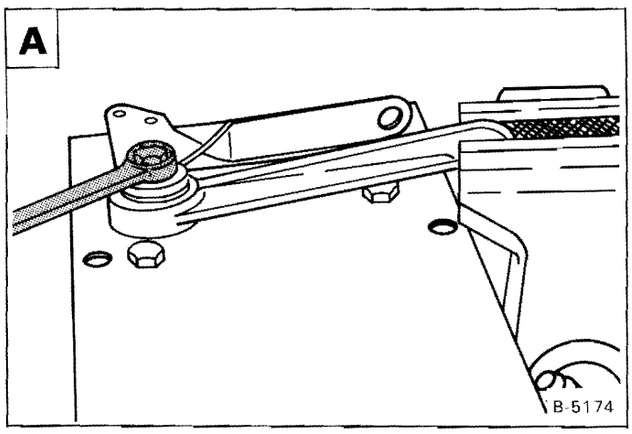
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PARKING BRAKE (Cont'd)

Block and Pucks

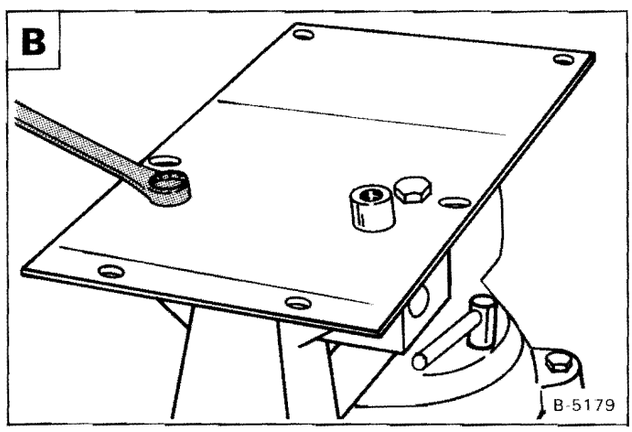
Remove the brake lever [A].

Installation: Tighten the bolt to 65-70 ft.-lbs. (88-95 Nm) torque.



Remove the bolts which fasten the brake block to the transmission cover [B].

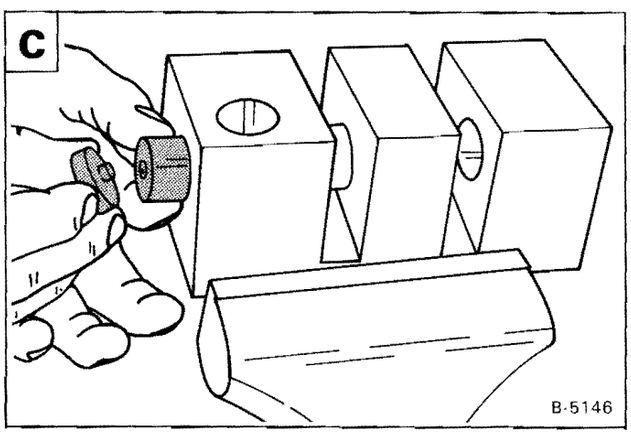
Installation: Put thread sealant on the bolts and tighten to 65-70 ft.-lbs. (88-95 Nm) torque.



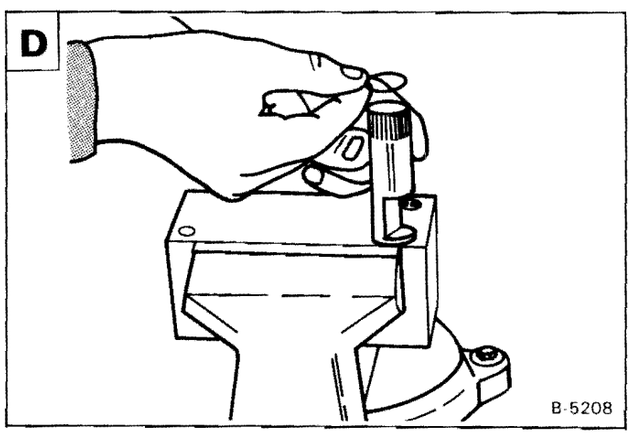
Remove the pucks from the block [C].

Check the pucks for wear or damage. The pucks can be turned 180° and used again.

Check for a good fit between the pucks and the block bore. They must slide in and out freely.



Install the new o-ring on the cam pin [D].

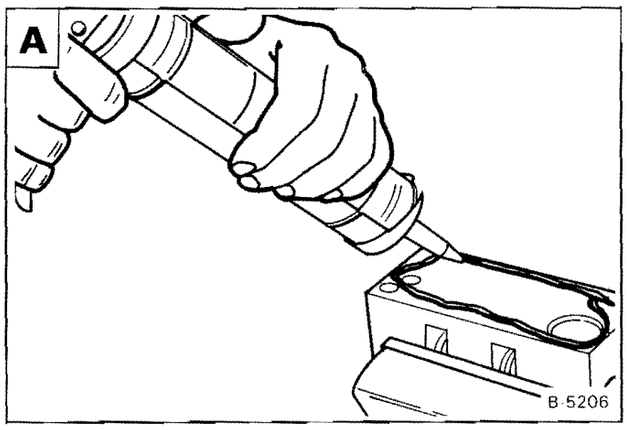


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PARKING BRAKE (Cont'd)

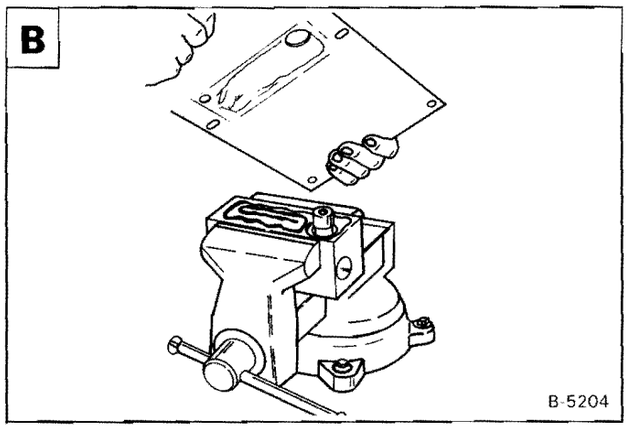
Clean and dry the block and put a bead of R.T.V. sealant on the brake block [A].

Install the cam pin in the brake block.



Install the center cover on the brake block [B].

Install the bolts and tighten.



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AXLES, SEALS AND BEARINGS

Removal

The tools listed will be needed to do the following procedure:

MEL-1202B – Axle Bearing Service Set

Slide Hammer (Fabricate locally)

Lift and block the loader (See Page 1–2).

Raise the operator's cab (See Page 1–7).

Remove the wheel and tire assembly.

Remove the steering levers.

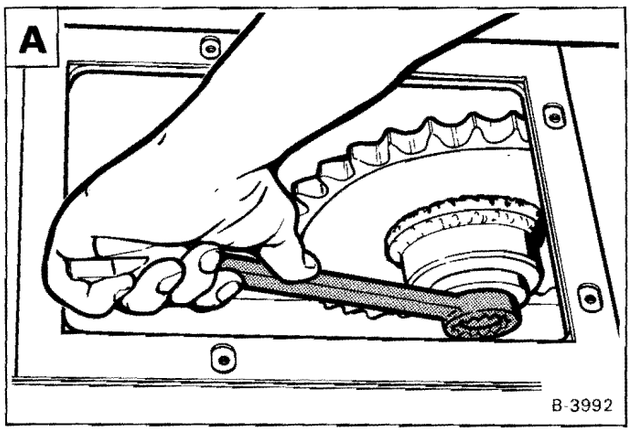
Remove the chaincase covers and brake assembly (See Page 4–2).

Loosen the gearcase mounting bolts to allow clearance to remove the sprocket.

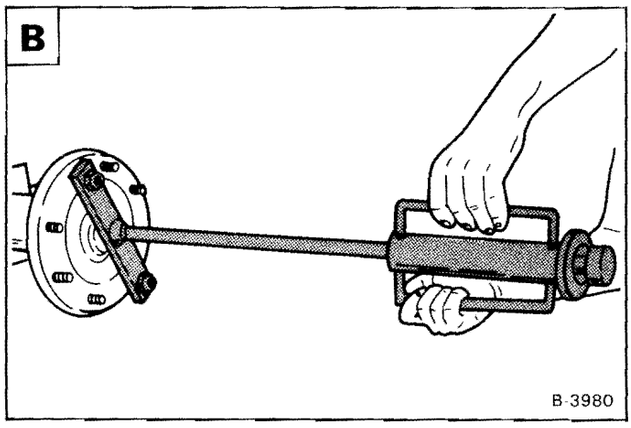
Installation: Tighten the bolts to 220-245 ft.-lbs. (300-330 Nm) torque.

Loosen the bolt in the end of the axle by turning the axle hub [A].

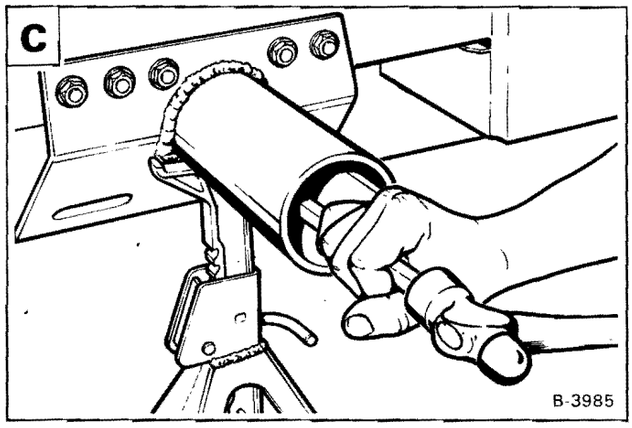
Installation: Put loctite on the bolt threads and tighten to 475-525 ft.-lbs. (644-712 Nm) torque.



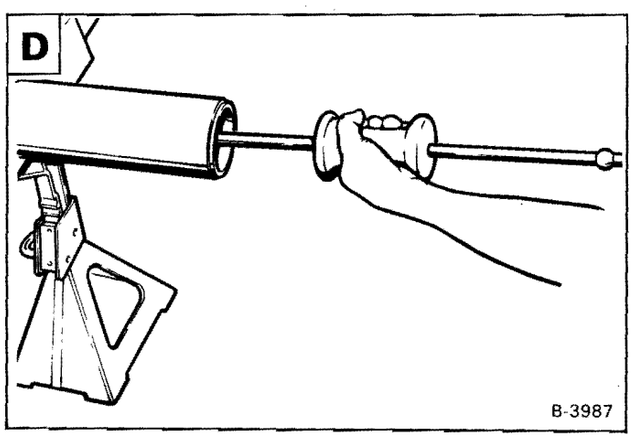
Use a slide hammer to remove the axle from the inner bearing [B].



Move the sprocket away from the inner axle bearing and remove the inside bearing cup using a long punch [C].



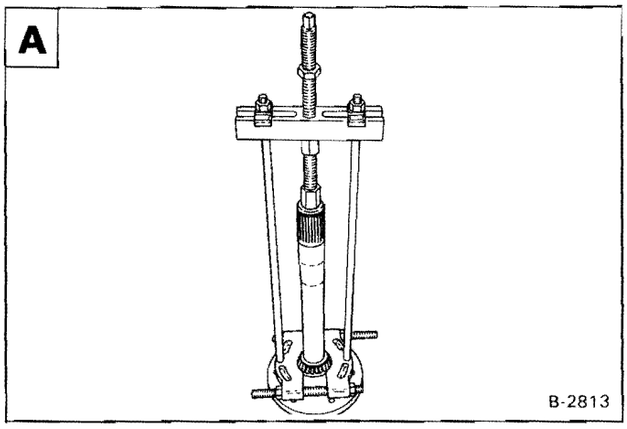
Use a bearing puller tool and a slide hammer to remove the outer bearing cup [D].



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AXLE, SEALS AND BEARINGS (Cont'd)

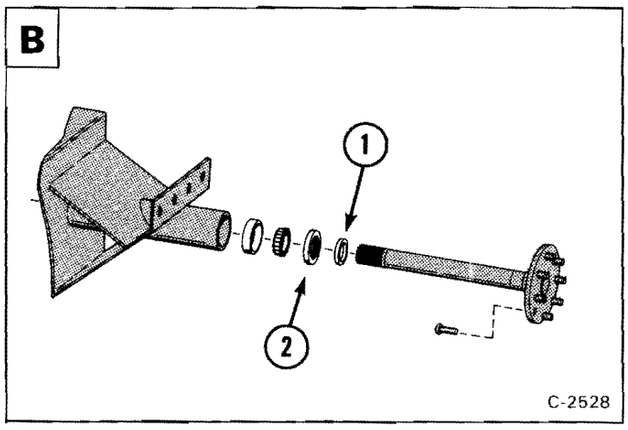
Use a puller to remove the outer bearing from the axle [A].



Using a hammer and chisel, remove the wear sleeve (Item 1) from the axle [B].

Do not damage the axle bearing surface.

Clean and check all the parts for wear and damage. Replace the parts as needed.



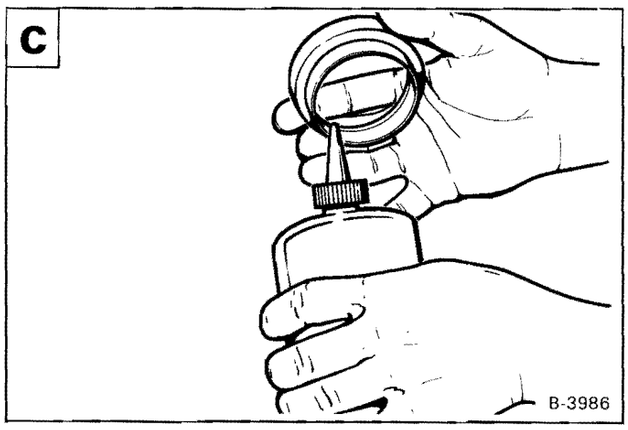
Installation

The tools listed will be needed to do the following procedure:

MEL-1202B – Axle Bearing Service Set
MEL-1052 – Seal Installation Tool

Put loctite on the inside of the wear sleeve [C]. Install the wear sleeve (Item 1) on the axle [B].

Lubricate the axle seal (Item 2) and install the seal on the axle with the open side toward the chain case [B].

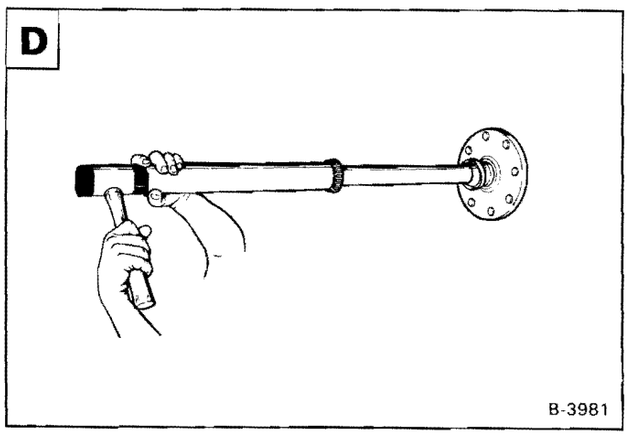


Using an arbor, install the outer bearing on the axle [D].

Make sure the bearing seats correctly on the axle [D].

Press only on the inner race of the bearing.

NOTE: When the bearing is installed, it will also position the wear ring in its correct position.



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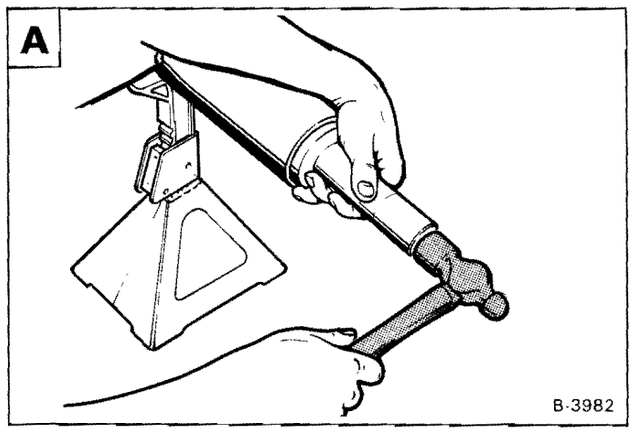
AXLES, SEALS AND BEARINGS (Cont'd)

Install the outer bearing cup using the correct size bushing driver [A].

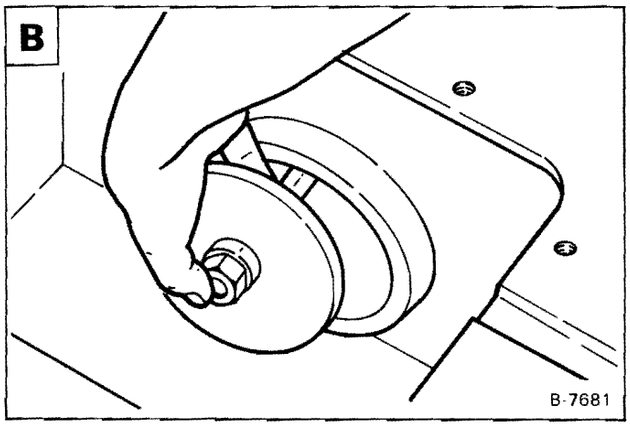
Install a long threaded bolt into the axle tube.

Install the correct size cup driver.

Install a washer and nut.



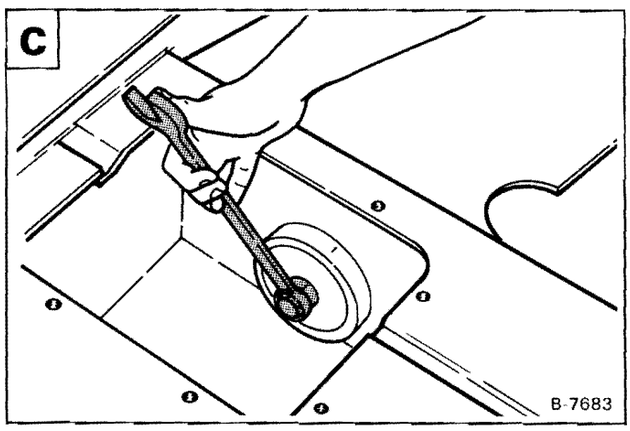
Inside the chaincase, install the new bearing cups, the bearing cup driver tool, washer and nut [B].



Have a second person hold the wrench on the nut in the chaincase [C].

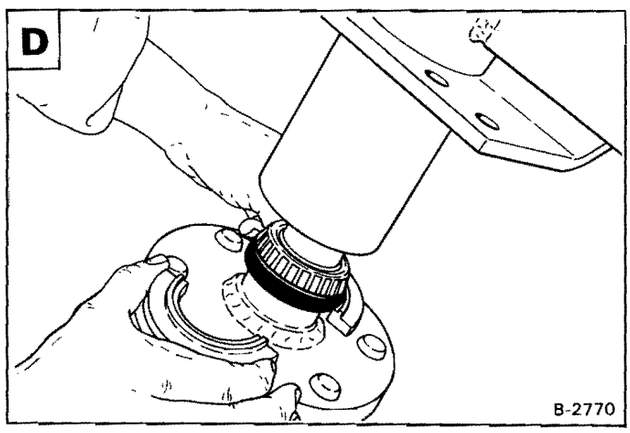
Turn the nut on the outside of the axle tube until the inner bearing cup is on its seat.

NOTE: **Pack the inner and outer axle bearing with grease before installing the axle assembly.**



Install the inner halves of the installation tool behind the axle seal [D].

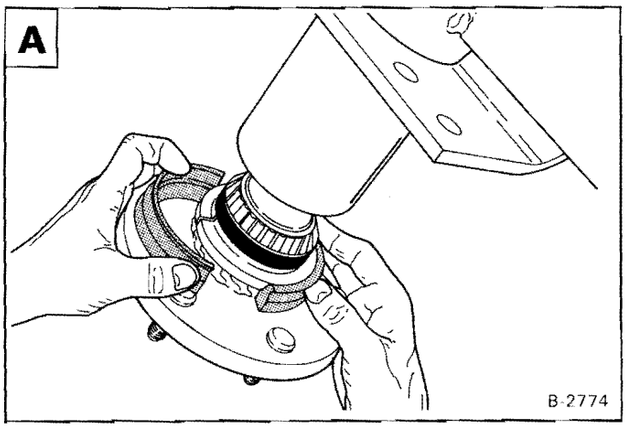
MEL-1052 – Seal Installation Tool



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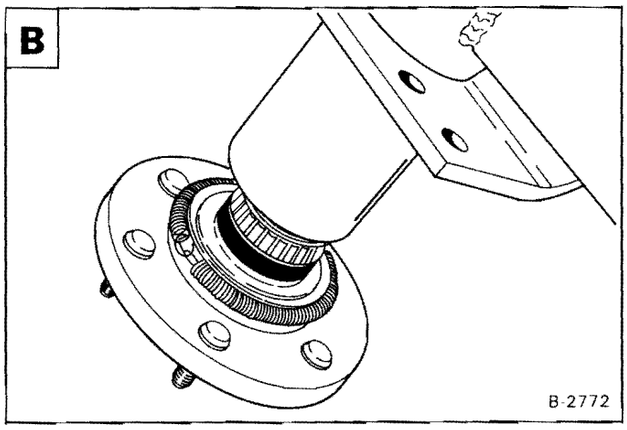
AXLES, SEALS AND BEARINGS (Cont'd)

Install the outer halves of the tool on the inner halves [A].



Install the spring on the tool halves [B].

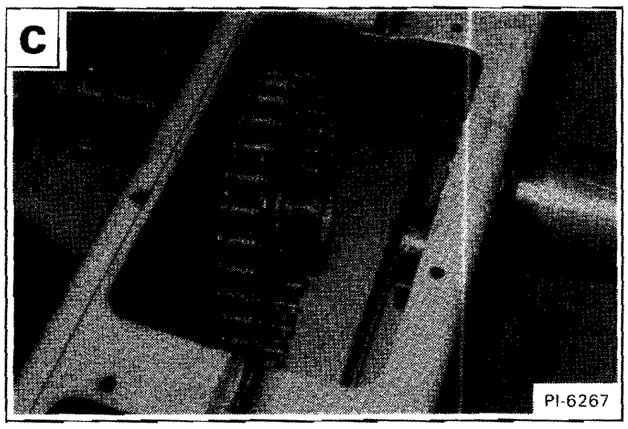
Put the drive chain on the reduction gear case sprocket.



Put the rear sprockets in the rear drive chain with the wide part of the hub toward the outside of the chaincase [C].

Slide the axle into the chaincase, move the sprocket and chain to the rear of the chaincase and align it with the splines on the axle.

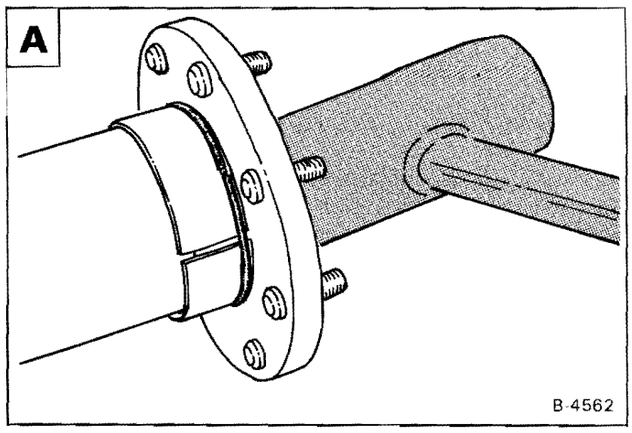
Slide the sprocket on the axle.



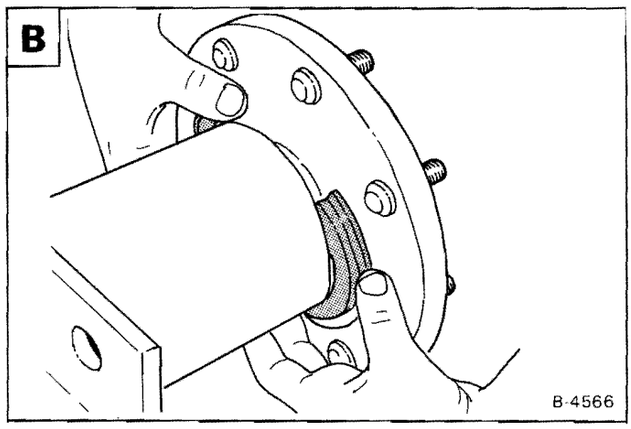
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AXLES, SEALS AND BEARINGS (Cont'd)

Using a large hammer, hit the axle hub until it is in the correct position. The tool will control the position of the axle and the seal will be in the correct location in the housing [A].



Remove the spring from the tool. Remove the outer halves of the tool. Remove the inner halves from the axle [B].

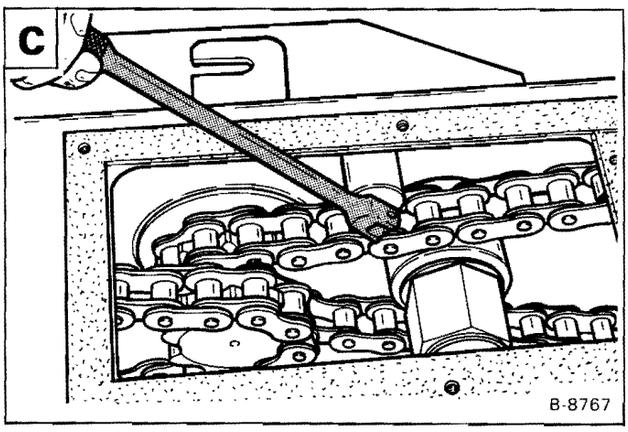


Use the same procedure to install the front axle.

Install the washer and bolt (inside the chaincase) on the axle.

Tighten the sprocket bolt to 300 ft.-lbs. (409 Nm) torque.

Center the reduction gearcase between the front and rear drive chains. Tighten the bolts to 220-245 ft.-lbs. (300-330 Nm) torque [C].



Check the axle end play. It must not exceed 0.013" (0.33 mm).

If end play is not correct replace the washer at the sprocket bolt to get the correct end play.

Install the transmission covers (See Page 4–2).

Install the brake linkage.

Install the center steering controls and linkages.

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FINAL DRIVE CHAIN

Removal and Installation

The tools listed will be needed to do the following procedure:

MEL-1046 – Chain Breaker
MEL-1037 – Chain Link Tool
MEL-1049 – Chain Puller Tool

Lift and block the loader (See Page 1–2).

Raise the operator's cab (See Page 1–7).

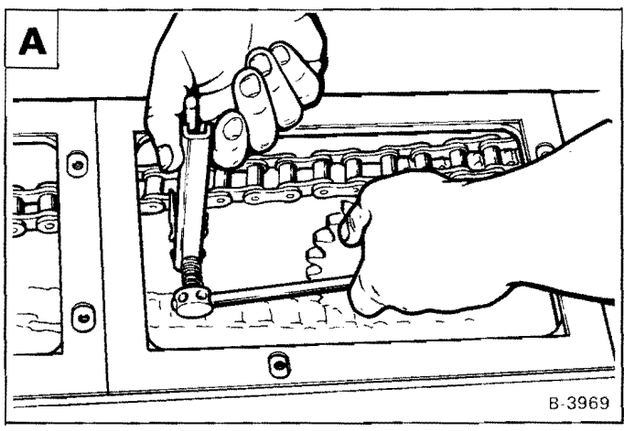
Remove the center transmission shields.

Remove the chain case covers (See Page 4–2).

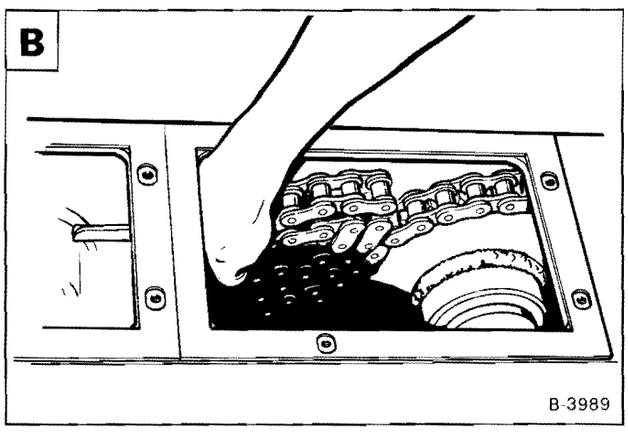
Remove the fluid from the chain case using a transfer pump.

Break the front chain [A].

MEL-1046 – Chain Breaker



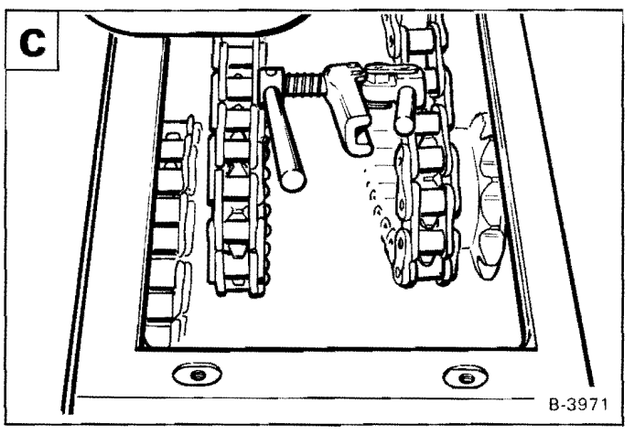
Remove the chain [B].



Break the rear drive chain [C].

MEL-1046 – Chain Breaker

Remove the chain.



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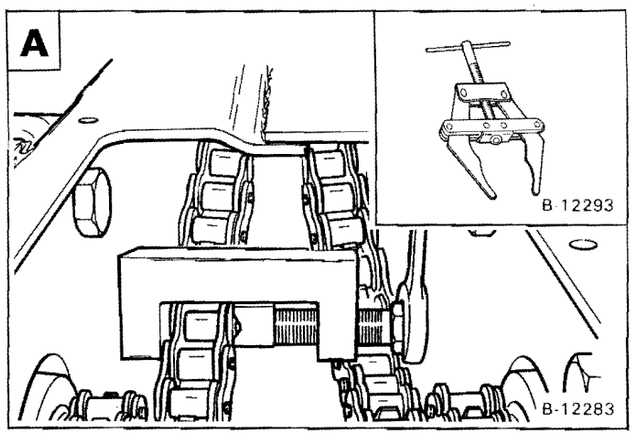
FINAL DRIVE CHAIN (Cont'd)

⚠ 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



Install the replacement chain over the rear sprocket.

Use the chain puller tool (Inset) to install the connector link in the chain [A].

MEL-1049 – Chain Puller Tool

⚠ WARNING

DO NOT exceed the recommended torque of 130 ft.-lbs. (176 Nm). The tool may fail under too much torque. Put cloth around the tool to protect yourself from flying debris.

Use the chain link press to crimp the connector link into position [A].

MEL-1037 – Chain Link Tool

Be sure to use the adapter for #80 chain.

Use a large wrench to hold the tool while pressing the chain link.

Use the same procedure to install the front drive chain.

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REDUCTION GEARCASE

Removal and Installation

Lift and block the loader (Page 1—2).

Remove the hydrostatic motor (Page 3—10). Raise the operator cab (Page 1—7).

Remove the front panel and steering levers (Page 3—3).

Remove the chaincase covers and brake assembly (Page 4—2).

Drain the fluid from the chaincase and remove the front chain (Page 4—10).

Support the reduction gearcase with a floor jack [A].

Remove the gearcase mounting bolts [B].

Installation: Tighten the bolts to 220-245 ft.-lbs. (300-330 Nm) torque.

Remove the bolt (Item 1) and washer (Item 2). Drive the sprocket (Item 3) through the gearcase into the chaincase so it clears the bearing (Item 4) [C].

Remove the rear chain from the sprocket and lower the gearcase to the floor.

Installation: When reassembly of the gearcase is complete, replace the bolt (Item 1) with a 1" (25,4 mm) longer bolt [C].

Install the longer bolt and washer (Item 2) in the gearcase [C].

Lift the gearcase into position, angle the sprocket and install the rear drive chain on the sprocket.

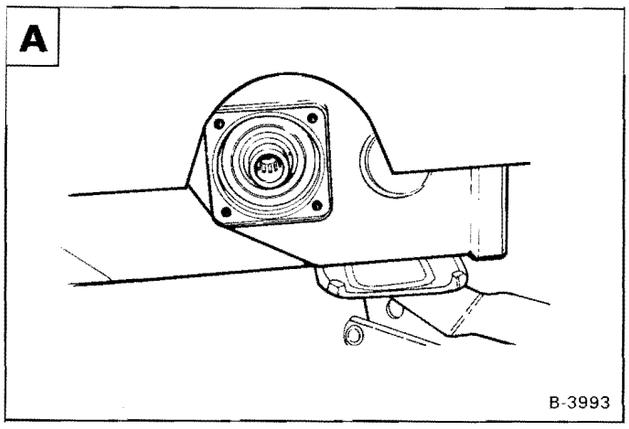
Drive the sprocket inward until it clears the bearing (Item 4) [C]. Do not damage the 1" longer bolt.

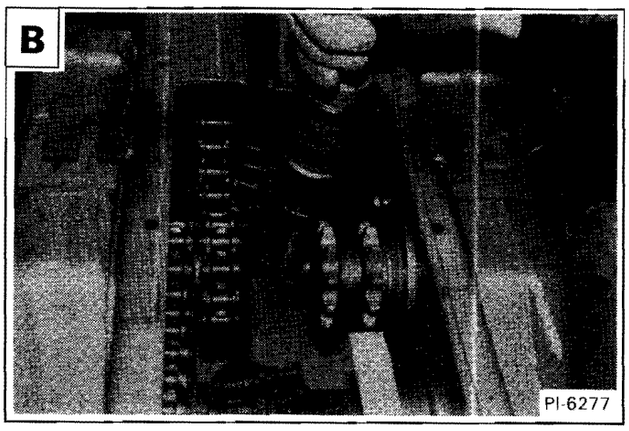
Pull the gearcase sprocket into position with the longer bolt and remove the bolt.

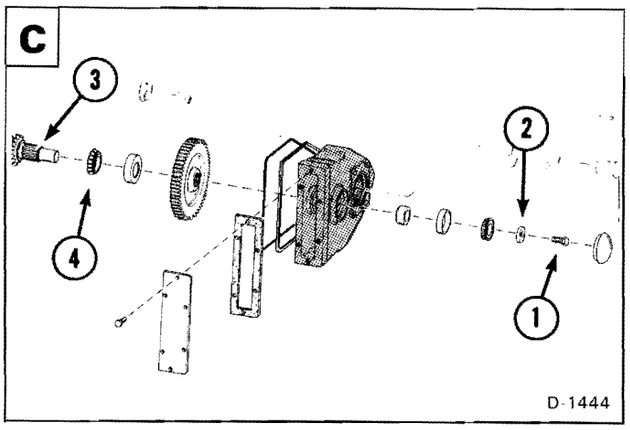
Put thread sealant on the original bolt (Item 1) and install as shown [C].

Tighten the bolt to 210-235 ft.-lbs. (285-305 Nm) torque.

Install the front chain (See Page 4—11).







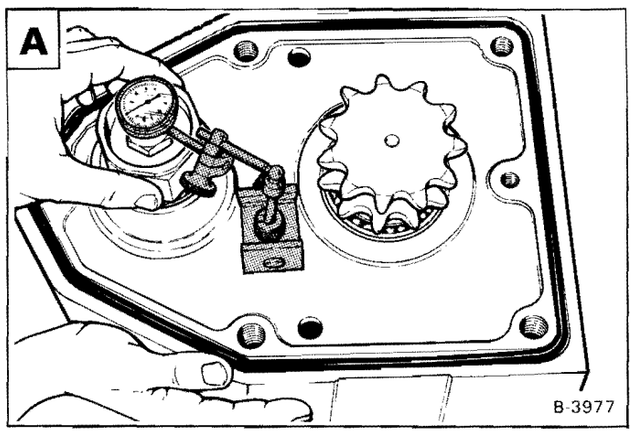
https://truckmanualshub.com/

REDUCTION GEARCASE (Cont'd)

Checking Reduction Gearcase

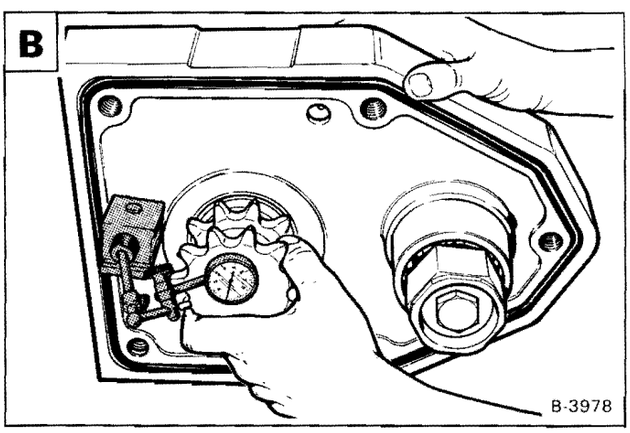
Before disassembly of the gearcase do the following checks:

Install a dial indicator on the input shaft [A]. The end play must be between 0.00 - 0.010" (0,0254 mm). If not, the following parts may need replacing: Bearing, bearing cups, gear or gearcase housing.



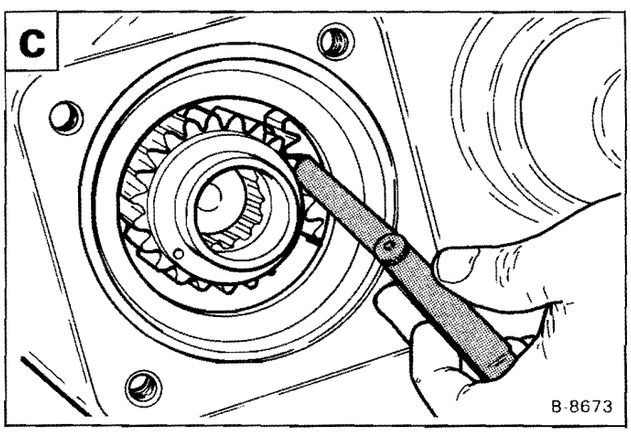
Install the dial indicator on the output shaft [B]. The end play must be between 0.00 - 0.010" (0,0254 mm). If not, the following parts may need replacing: Bearing, bearing cups, gear or gearcase housing.

Remove the seal.



Install a feeler gauge between the teeth of the gears [C].

The back lash must be between 0.003-0.009" (0,076-0,228 mm). If not, the following parts may need replacing: Large gear or the shaft.



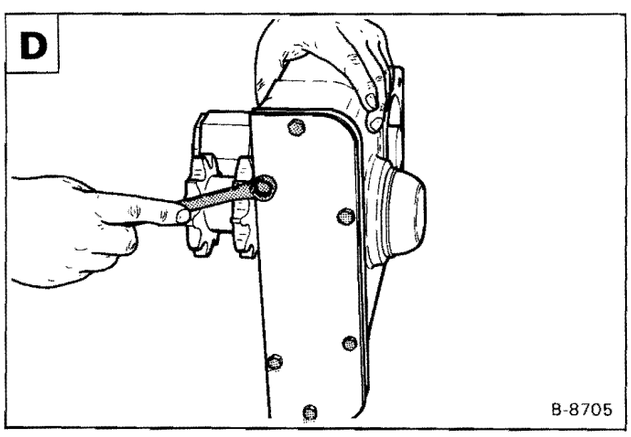
Disassembly and Assembly

The tool listed will be needed to do the following procedure:

MEL-1047 — Seal Installation Tool

Remove the bolts from the end plate [D].

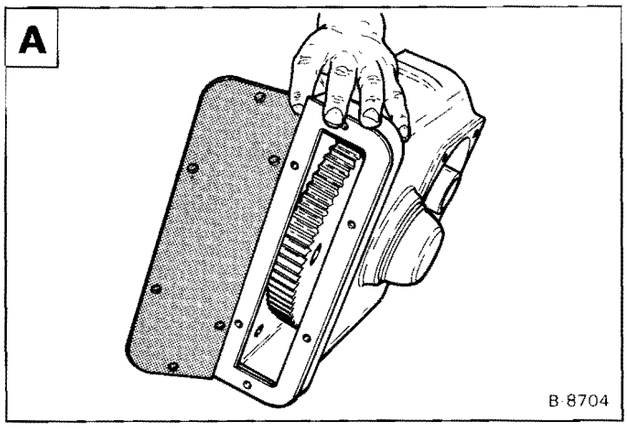
Installation: Tighten the bolts to 13-14 ft.-lbs. (16-18 Nm) torque.



https://truckmanualshub.com/

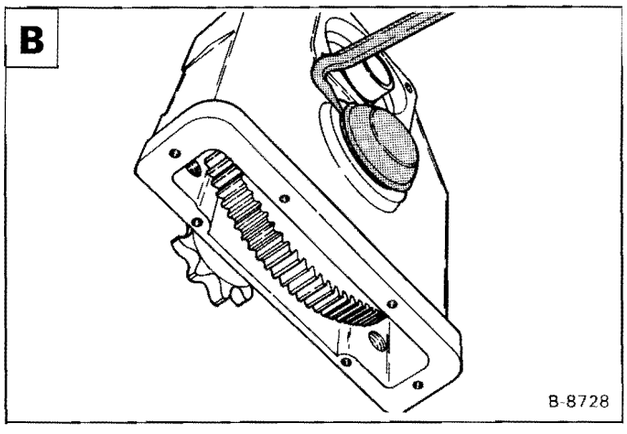
REDUCTION GEARCASE (Cont'd)

Remove the end plate [A].



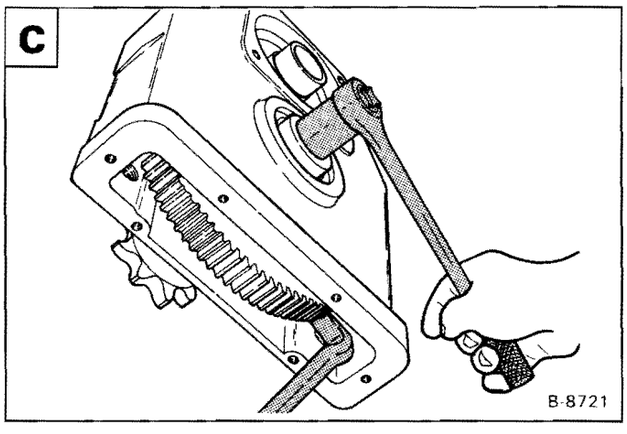
Remove the dust cap [B].

Installation: Put "Boretite" sealant on the edge of the dust cap before installing it.

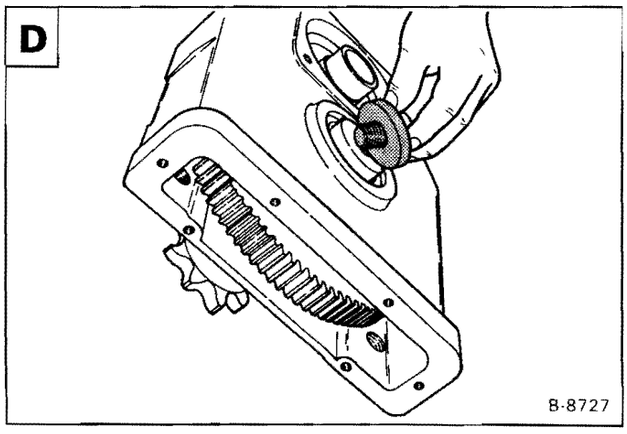


Remove the bolt from the output shaft [C].

Installation: Put Loctite on the bolt and tighten to 210-235 ft.-lbs. (285-305 Nm) torque.



Remove the bolt and washer [D].

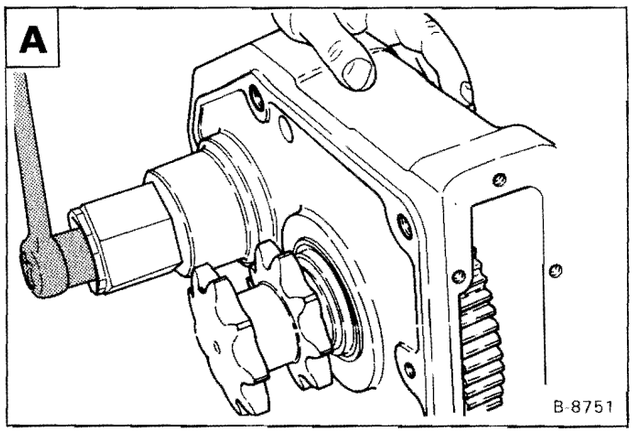


https://truckmanualshub.com/

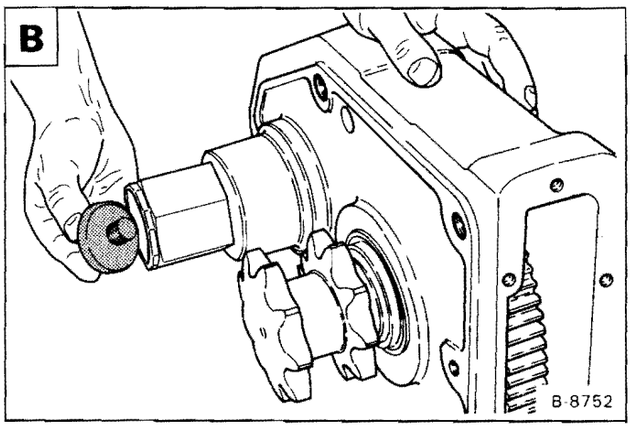
REDUCTION GEARCASE (Cont'd)

Remove the bolt at the disc hub [A].

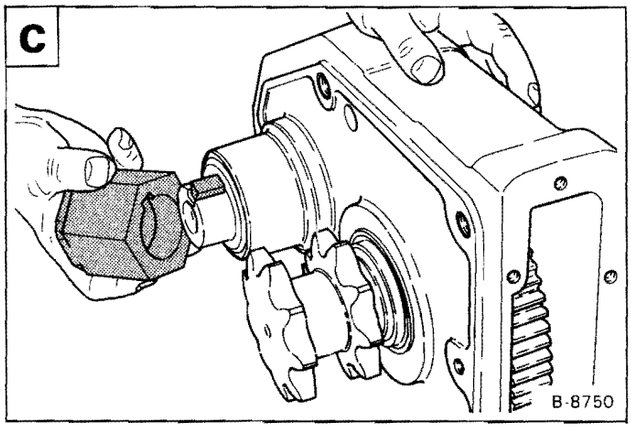
Installation: Put Loctite on the bolt and tighten to 210-235 ft.-lbs. (285-305 Nm) torque.



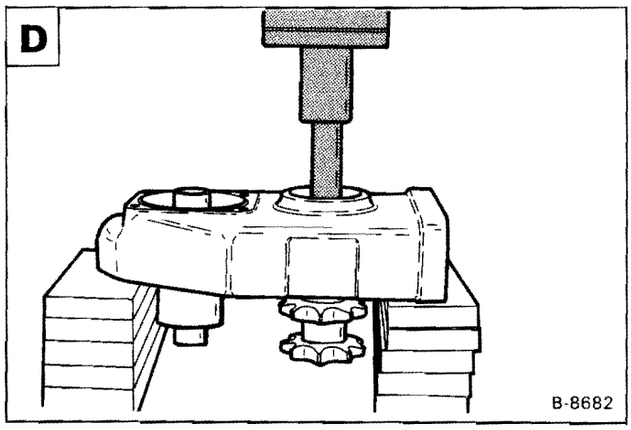
Remove the bolt and washer [B].



Remove the disc hub and key [C].



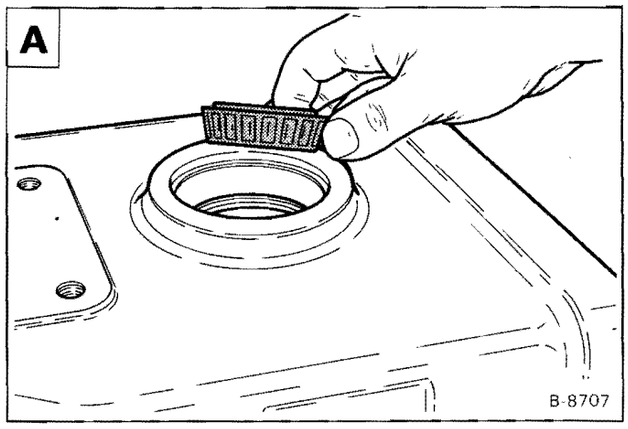
Put the gearcase housing in the press and remove the output shaft [D].



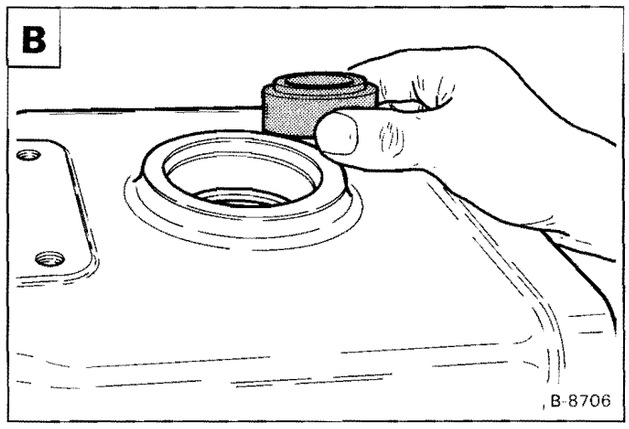
https://truckmanualshub.com/

REDUCTION GEARCASE (Cont'd)

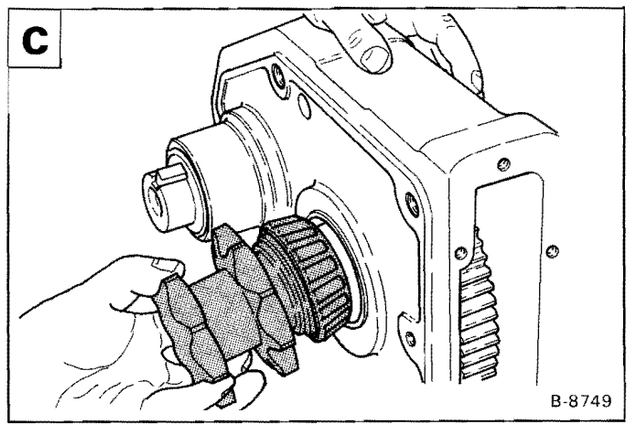
Remove the bearing [A].



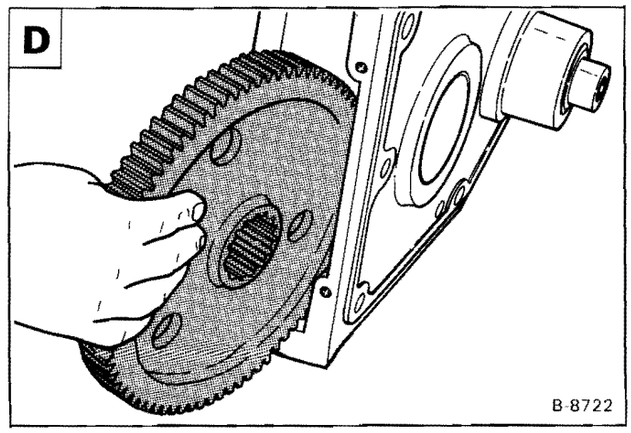
Remove the spacer [B].



Remove the output shaft [C].



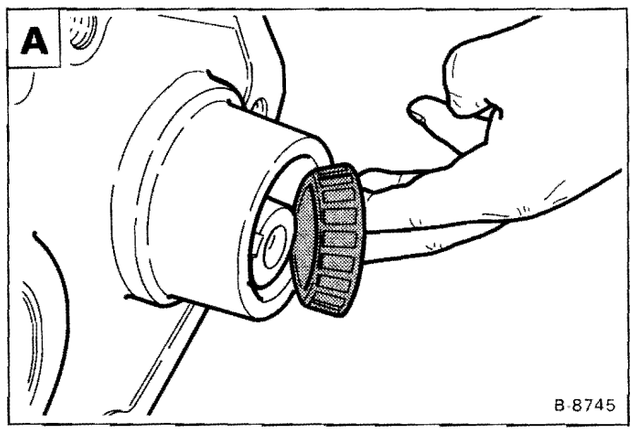
Remove the large gear [D].



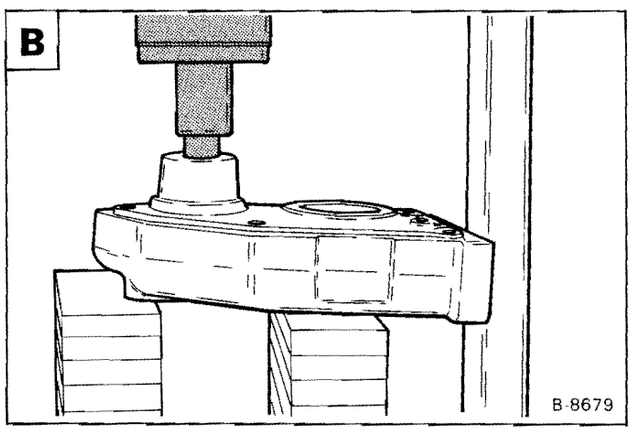
https://truckmanualshub.com/

REDUCTION GEARCASE (Cont'd)

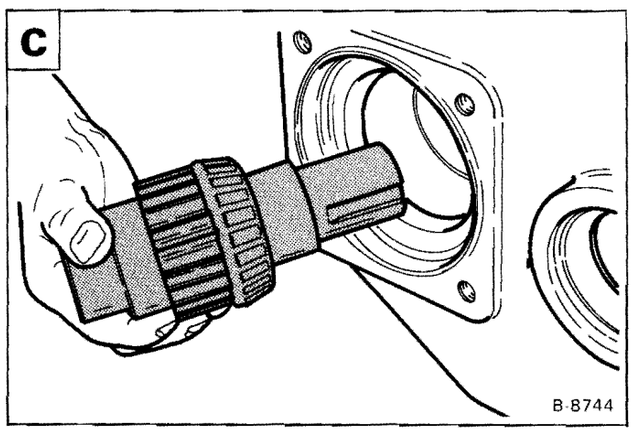
Remove the bearing at the input shaft [A].



Use a press and remove the input shaft [B].

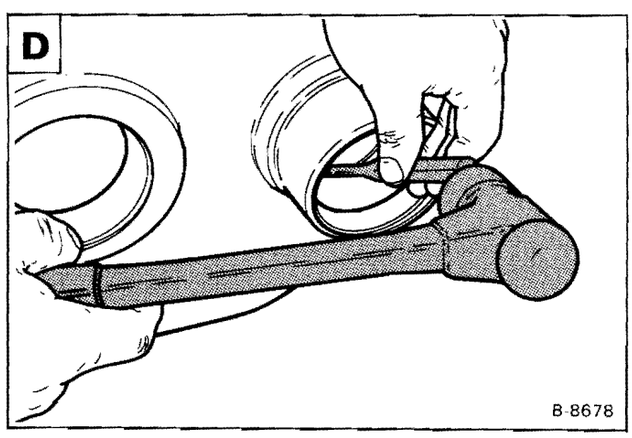


Remove the input shaft assembly from the housing [C].



Use a punch and hammer and remove the bearing cups as needed [D].

Installation: Use a press and bearing cup driver to install the bearing cup.



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REDUCTION GEARCASE (Cont'd)

Reduction Gearcase Seal

The tool listed will be needed to do the following procedure:

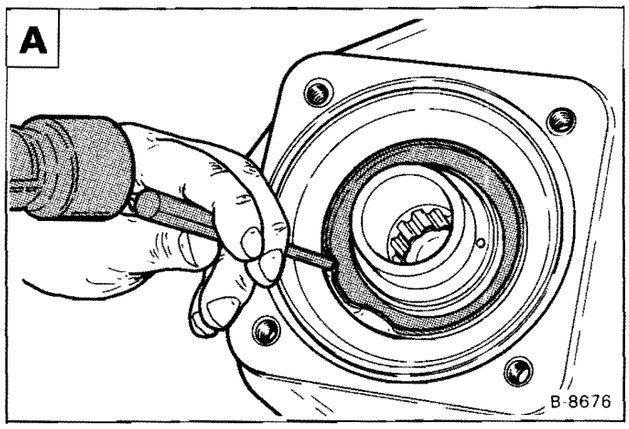
MEL-1047 – Seal Installation Tool

It is not necessary to remove the reduction gearcase. To replace the seal on the input shaft, use the following procedure.

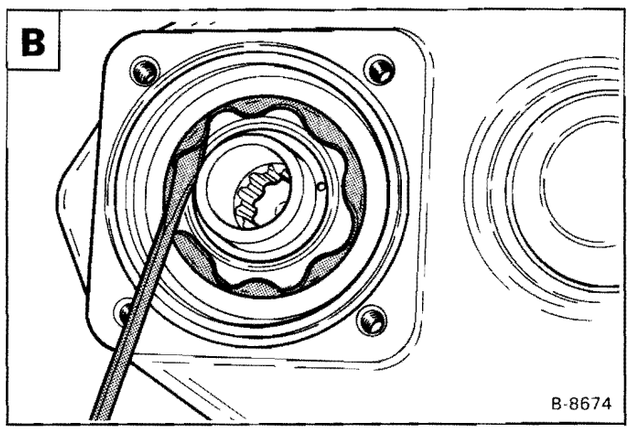
Lift and block the loader (See Page 1–2 for the correct procedure).

Remove the hydrostatic motor (See Page 3–10 for the correct procedure).

Use a punch and hammer to bend the edge of the seal inward [A].

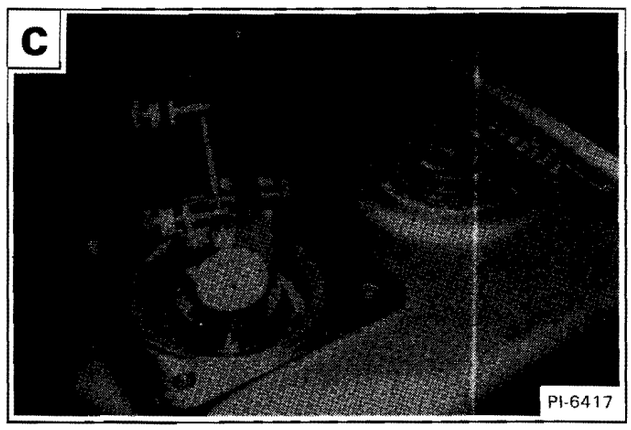


Use a screwdriver, pry the seal from the housing [B].



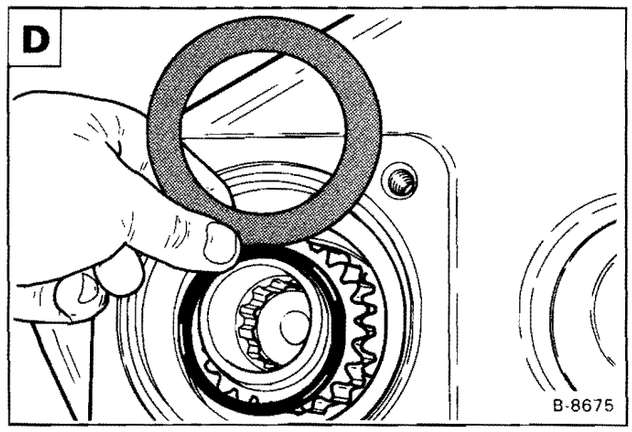
Remove the washer.

Put a magnetic base dial indicator on the input shaft and check the seal diameter for concentricity [C]. Normal dimensions are 0-.003" (0.0-0.076 mm).



Replace the Quad-ring [D].

Installation: Install a new Quad-ring. Install the back-up washer.



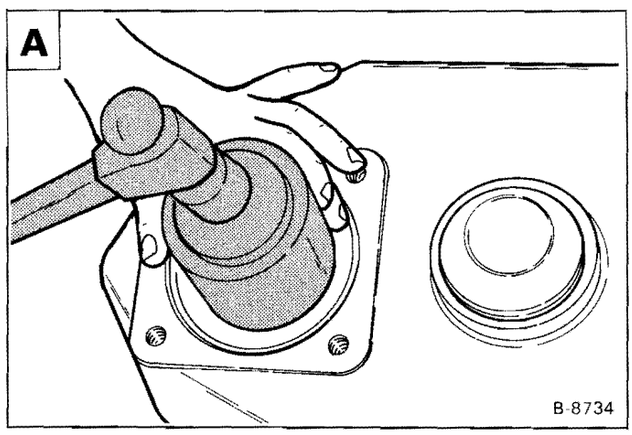
https://truckmanualshub.com/

REDUCTION GEARCASE (Cont'd)

Installation

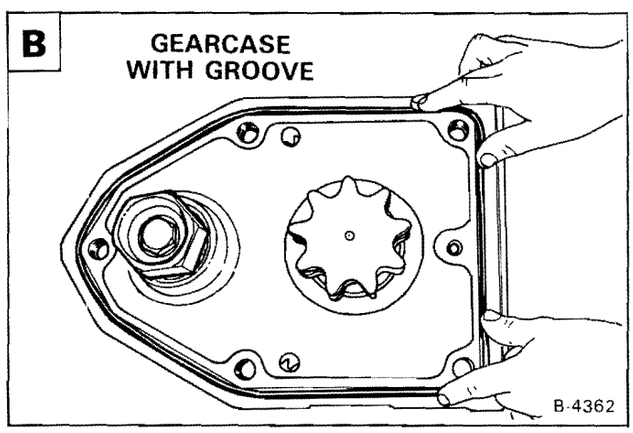
Put "Boretite" sealant around the new seal.

Install the new seal using the seal installation tool [A].



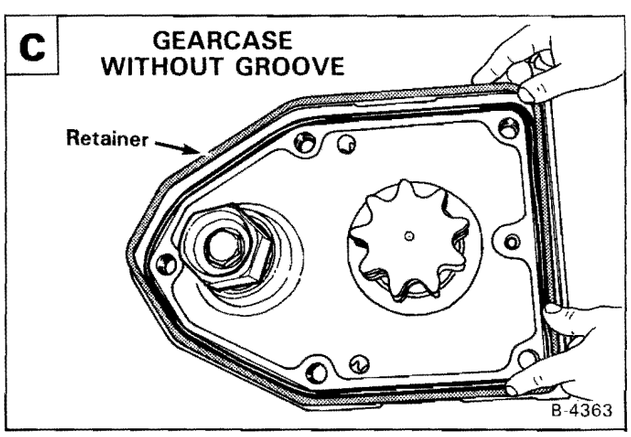
NOTE: **Always use new O-rings when installing the reduction gearcase.**

Put grease on the O-ring and install it on the outside of the gearcase [B] & [C].



NOTE: **There are two different types of gearcase housings used, some later units used a retaining ring instead of a groove [C].**

Install the retainer. Some later type uses sealant to hold the retainer ring.

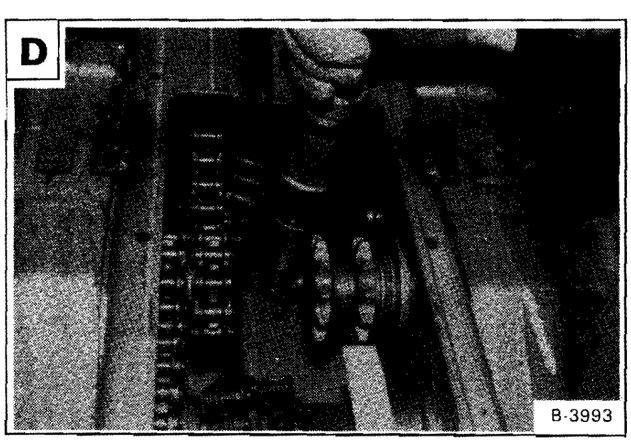


Put the reduction gearcase on a jack and lift it into position [D].

Install the five bolts inside the chaincase. Do not tighten.

Install the final drive chains (See Page 4—9).

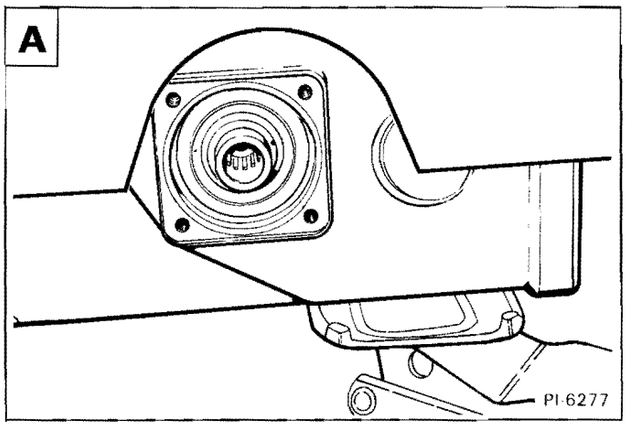
Move the reduction gearcase backward or forward to get the same amount of chain play and equal tension on both chains.



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REDUCTION GEARCASE (Cont'd)

Tighten the five bolts to 220-245 ft.-lbs. (300-330 Nm) torque [A].



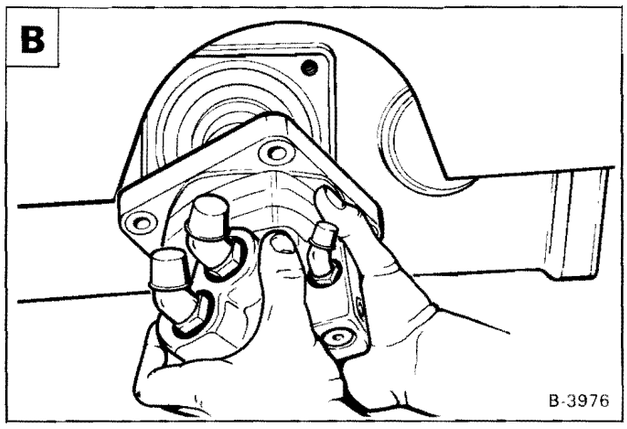
Install the hydrostatic motor [B].

Install the bolts and tighten to 65-70 ft.-lbs. (88-95 Nm) torque.

Connect the hoses to the motor and tighten.

Install the motor cover.

Install the transmission covers and the brake assembly (See Page 4—12).



CHAINCASE FLUID

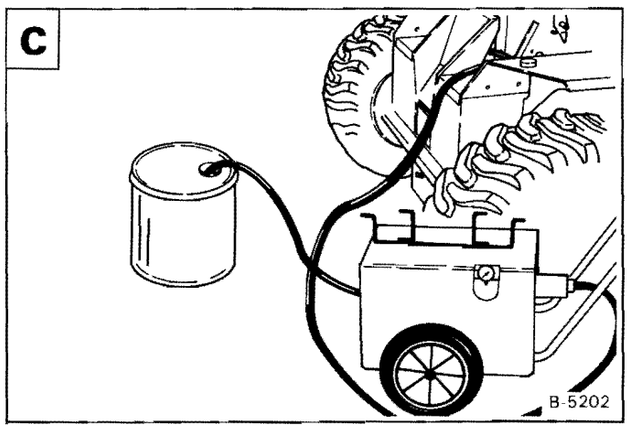
Replacing Chaincase Fluid

Raise the operator's cab (See Page 1—7).

Remove the front transmission cover (See page 4—2).

Use a pump to remove all the fluid from the chaincase [C].

MEL-10628 — Hydraulic Transfer Pump

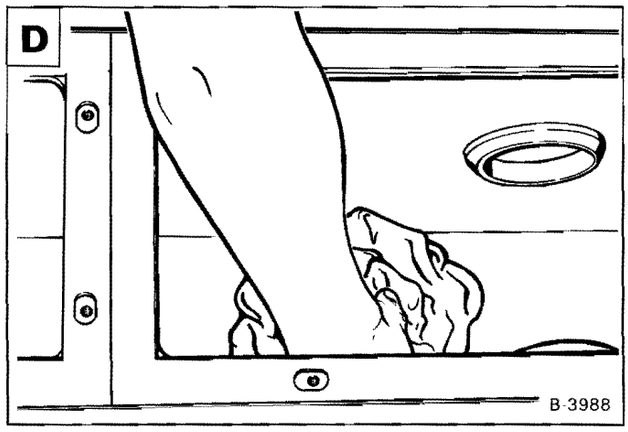


Use clean rags to remove any fluid that the pump did not remove and to clean the chaincase [D].

Use only recommended replacement fluid. Clark Bobcat Fluid (P/N 6563328) or 10W-30 or 10W-40 Class SE Motor Oil to fill the chaincase with 9 gals. (34 L) of fluid.

Install the front transmission cover (See Page 4—2).

Lower the operator's cab (See Page 1—7).



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MAIN FRAME

	Page Number
BOB-TACH	
Disassembly and Assembly	5–12
Removal and Installation	5–10
Tilt Cylinder Rod End Seal	5–11
FUEL TANK (S/N 19999 & Below)	
Removal and Installation	5–14
FUEL TANK (S/N 20001 & Above)	
Fuel Sender Switch	5–16
Removal and Installation	5–15
LIFT ARMS	
Removal and Installation	5–8
OPERATOR CAB (S/N 19999 & Below)	
Removal and Installation	5–1
OPERATOR CAB (S/N 20001 & Above)	
Removal and Installation	5–3
REAR DOOR	
Door Latch Adjustment	5–7
Removal and Installation	5–6

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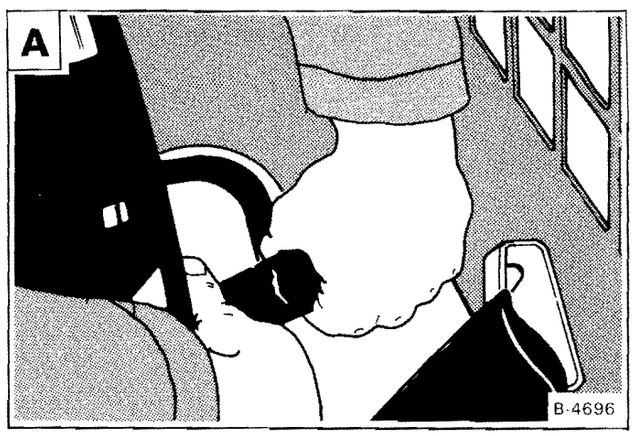
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OPERATOR CAB (S/N 19999 & Below)

Removal and Installation

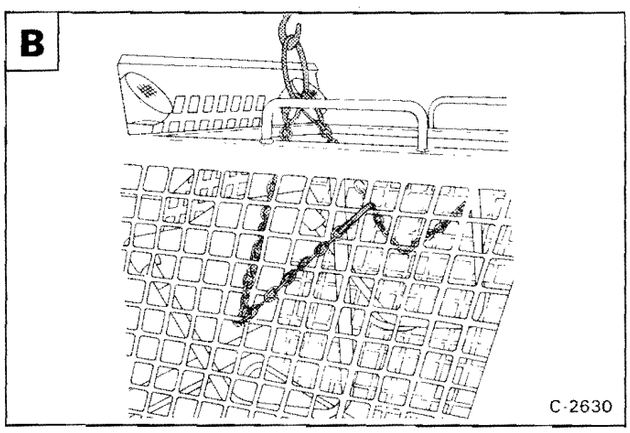
Lift and block the loader (See Page 1–2 for the correct procedure).

Disconnect the electrical harness [A].



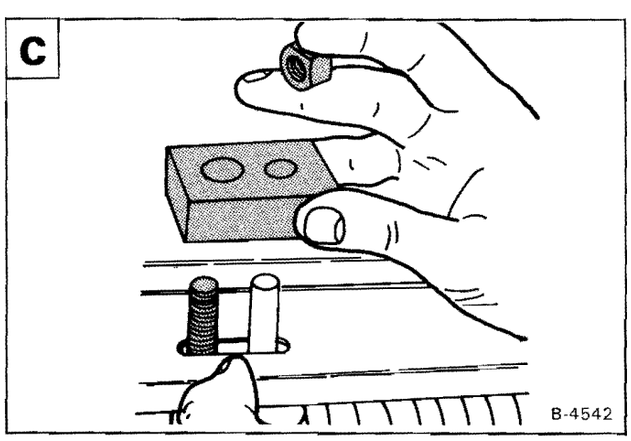
Raise the operator cab.

Fasten a chain and chain hoist to the operator cab [B].



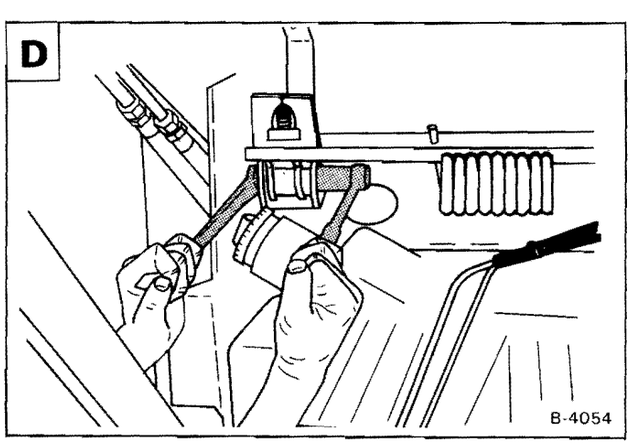
Remove the bolt and nut at the spring block. Remove the spring block (both sides) [C].

Installation: Tighten the bolt and nut to 65-70 ft.-lbs. (88-95 Nm) torque.



Remove the nuts at the pivot bolt for the operator cab (both sides) [D].

Installation: Tighten the bolt and nut to 25-35 ft.-lbs. (34-47 Nm) torque.

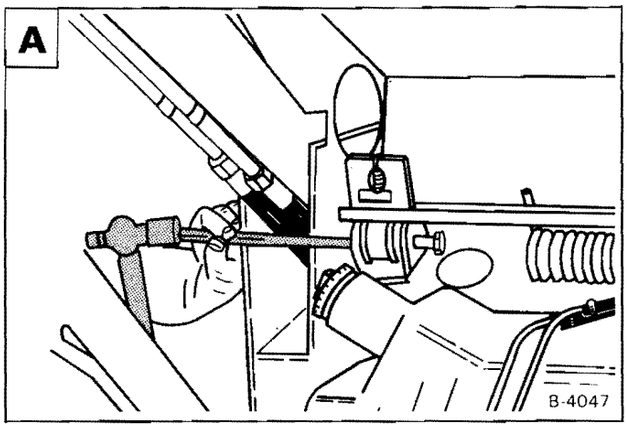


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OPERATOR CAB (S/N 19999 & Below) (Cont'd)

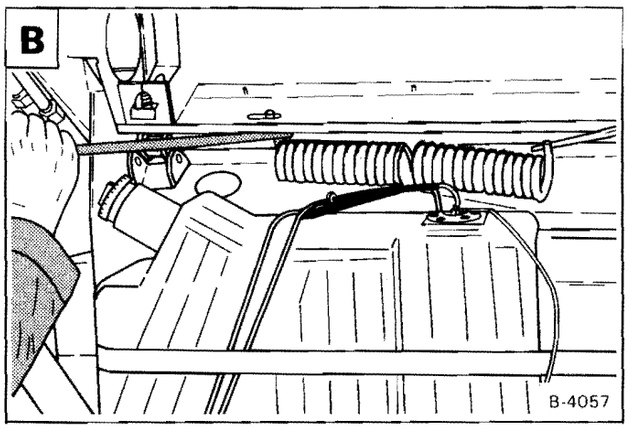
With the chain hoist tight.

Use a punch and hammer and remove the bolts (both sides) at the pivot bracket [A].



Use a pry bar, pry the springs out of the operator cab [B].

Lift the operator cab with the chain hoist and remove it from the loader.



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OPERATOR CAB (S/N 20001 & Above)

Removal and Installation

Remove the stop blocks at the rear of the operator cab [A].

IMPORTANT

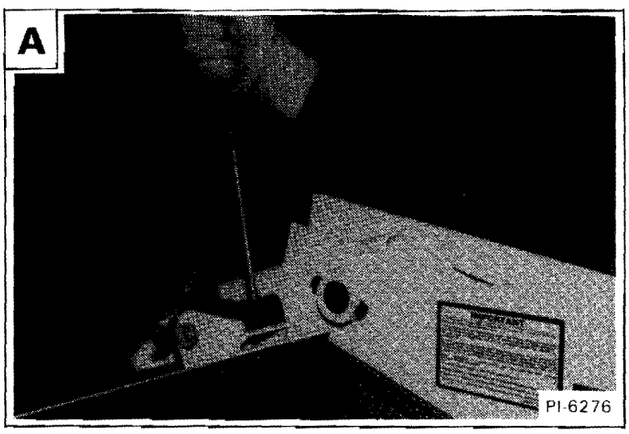
After the stop blocks are removed and the operator cab has a rear window, REMOVE THE REAR WINDOW to prevent damage to the rear window.

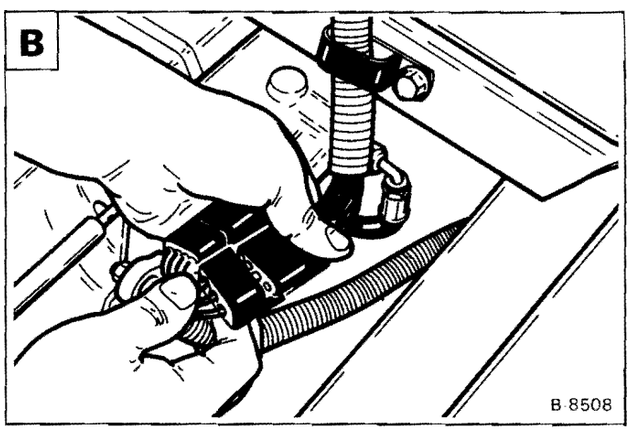
Raise the operator cab (See Page 1–7 for the correct procedure).

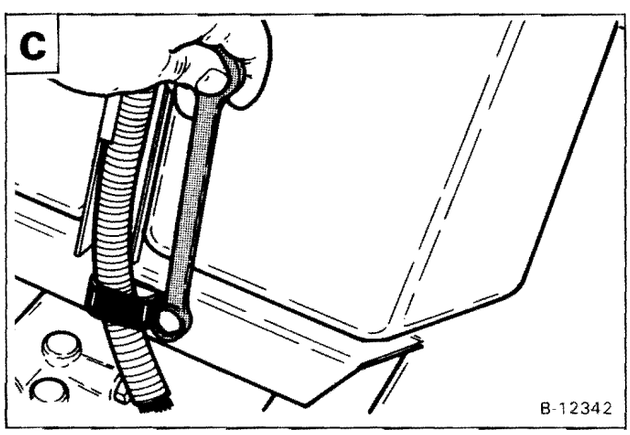
Disconnect the electrical harness [B].

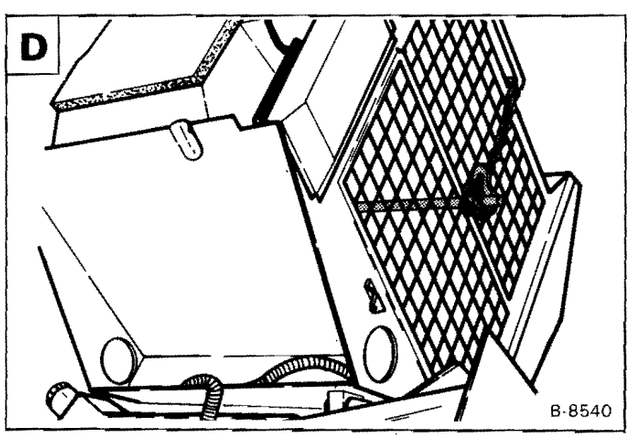
Remove the electrical harness clamp [C].

Install a bar through the operator cab balance point. Install a chain and chain hoist [D].





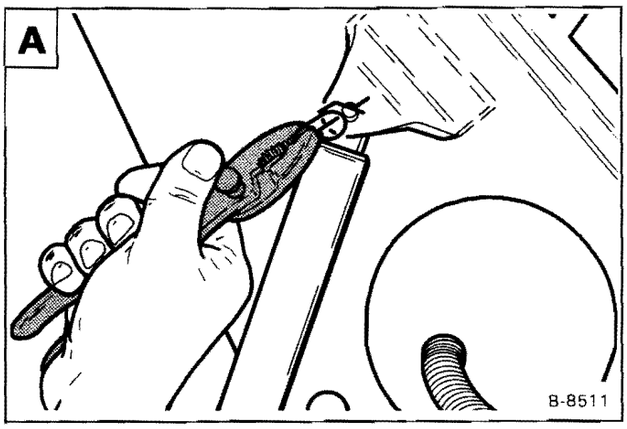




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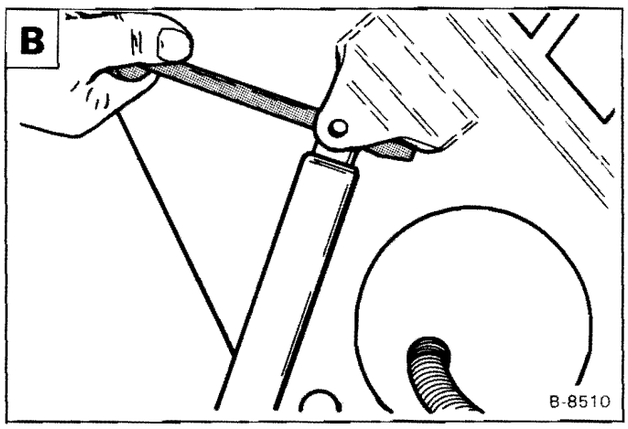
OPERATOR CAB (S/N 20001 & Above) (Cont'd)

Remove the clip at the upper pivot pin for the gas cylinder [A].



Remove the upper pivot pin for the gas cylinder (both sides) [B].

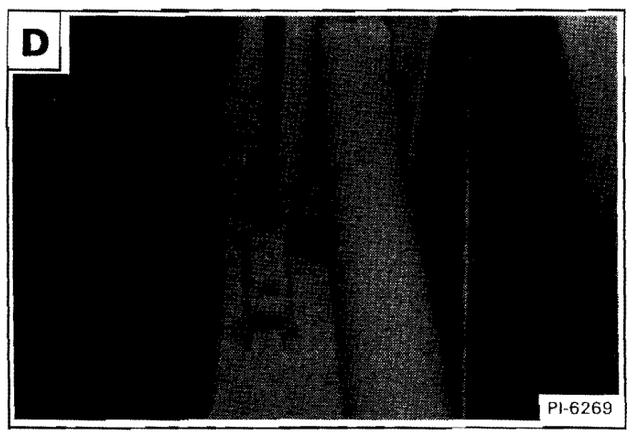
Installation: Install the lower pivot pin first, use a screwdriver to hold the gas cylinder and install the top pivot pin.



Remove the clip at the lower pivot pin [C].



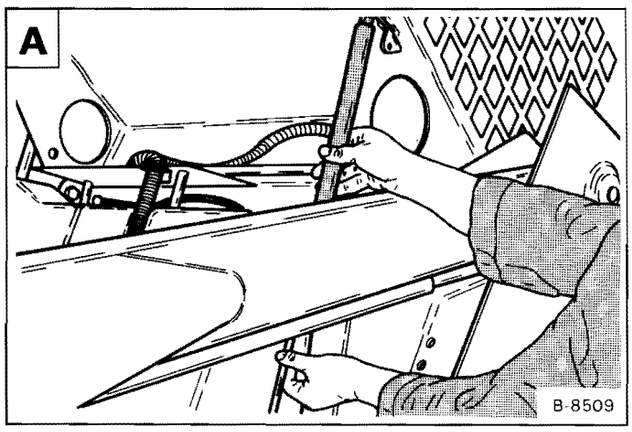
Remove the lower pivot pin (both sides) [D].



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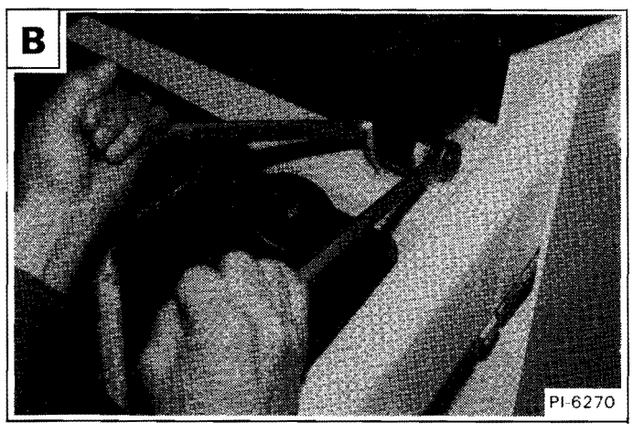
OPERATOR CAB (S/N 20001 & Above) (Cont'd)

Remove the gas cylinder (both sides) [A].



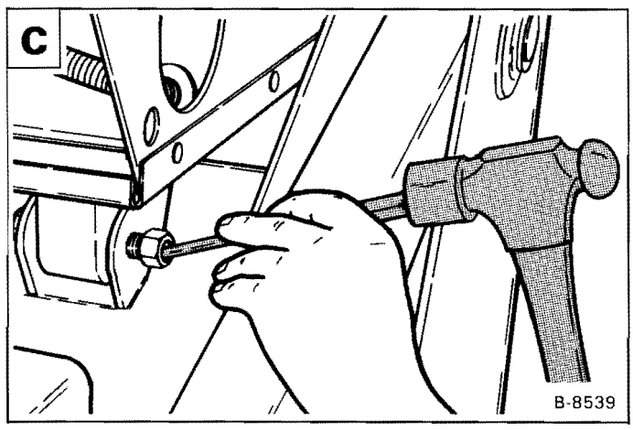
Remove the nuts from the pivot bolts [B].

Installation: Tighten the pivot bolts to 25-35 ft.-lbs. (34-47 Nm) torque.



Use a punch to remove the pivot bolt (both sides) [C].

Lift the operator cab from the loader using the chain hoist.

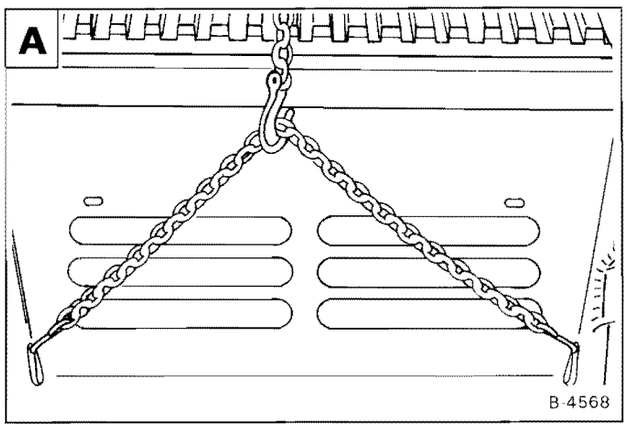


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REAR DOOR

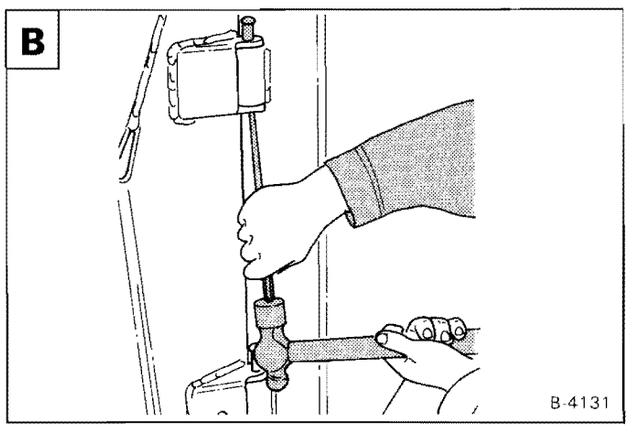
Removal and Installation

Install a chain hoist on the rear door [A].



Use a punch and remove both hinge pins [B].

Lift the rear door from the loader.

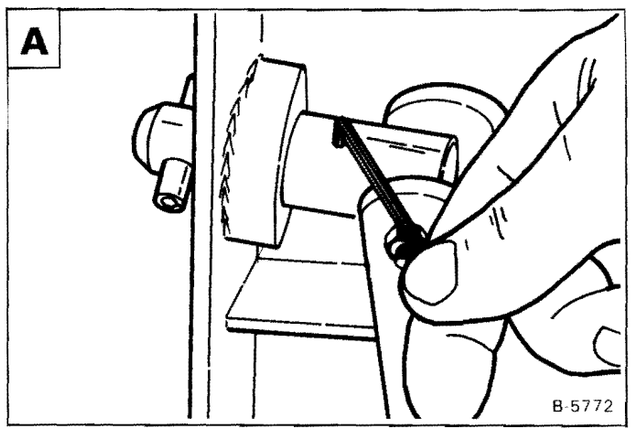


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REAR DOOR (Cont'd)

Door Latch Adjustment

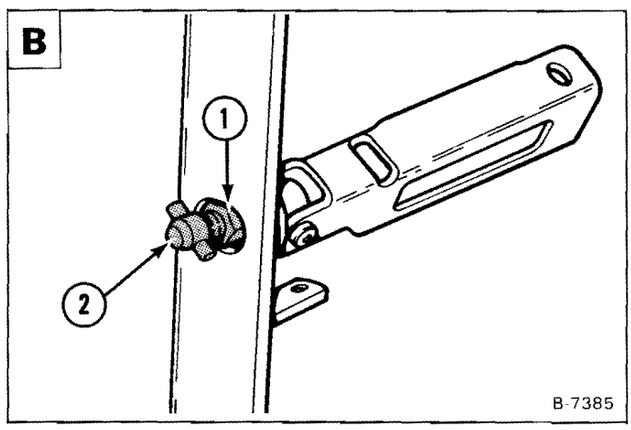
Loosen the set screw [A].



Loosen the nut (Item 1) [B].

Turn the bolt (Item 2) in or out [B], until the door contacts both the top and the bottom of the loader frame (Item 1) with the lever in the latched position [C].

NOTE: It takes approximately 50 lbs. of force to push the lever down when the latch is correctly adjusted.

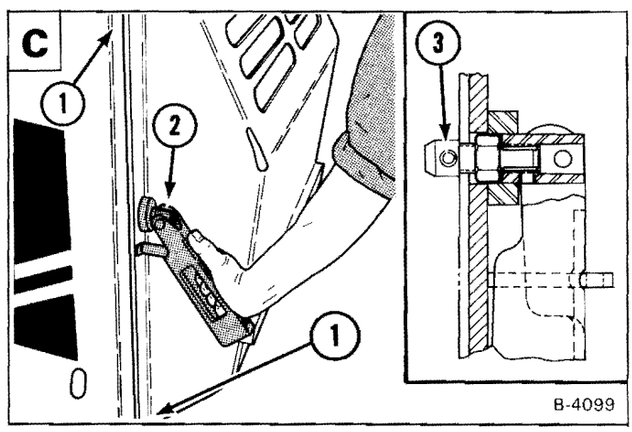


Lubricate the wear surface (Item 2) [C].

NOTE: With the set screw up, the flanges at the bolt (Item 3) must be to the side so that the set screw aligns with the flat surface at the end of the bolt [C].

Tighten the set screw [A].

Tighten the nut (Item 1) to 65-70 ft.-lbs. (88-95 Nm) torque [B].



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LIFT ARMS

Removal and Installation

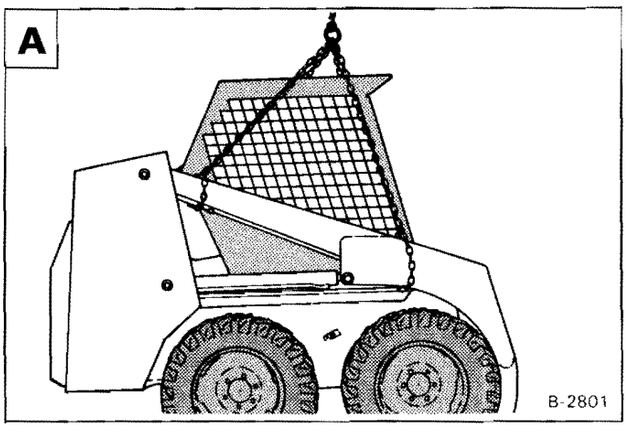
Lift and block the loader (See Page 1—2 for the correct procedure).

Roll the Bob-Tach fully forward.

Stop the engine. Move the hydraulic controls to release the hydraulic pressure.

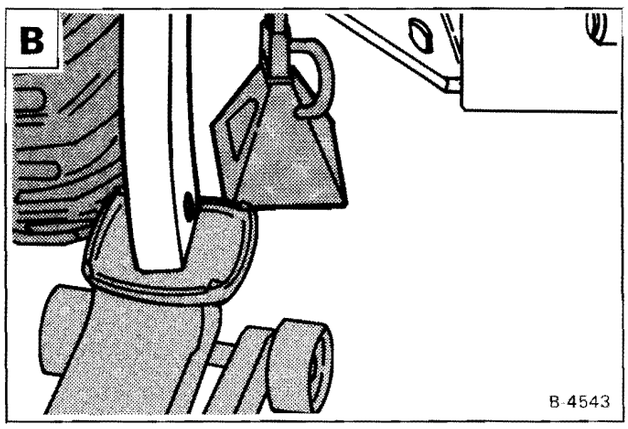
Remove the Bob-Tach from the lift arms (See Page 5—11).

Fasten chains and a chain hoist to the lift arms [A].



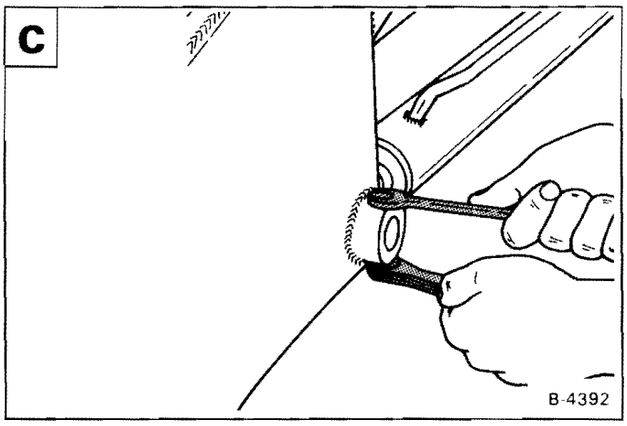
Put a floor jack under the lift arms [B].

Raise the lift arms, with the floor jack, until the pivot pin at the rod end of the lift cylinders can be removed.



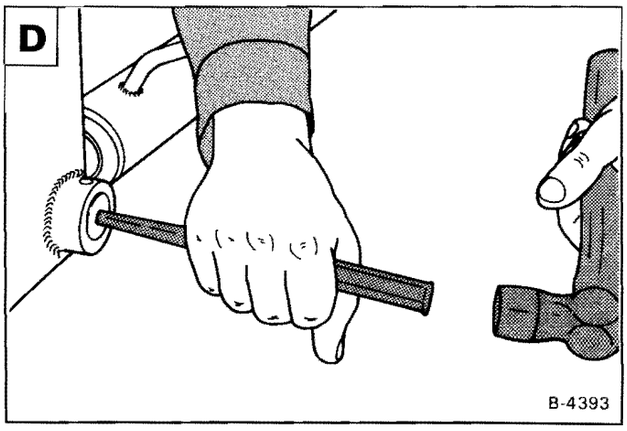
Remove the lock nut and bolt [C].

Installation: Tighten the bolt and nut to 18-20 ft.-lbs. (24-27 Nm) torque.



Remove the pins at the rod end of the lift cylinders (both sides) [D].

Lower the lift arms. Remove the floor jack.



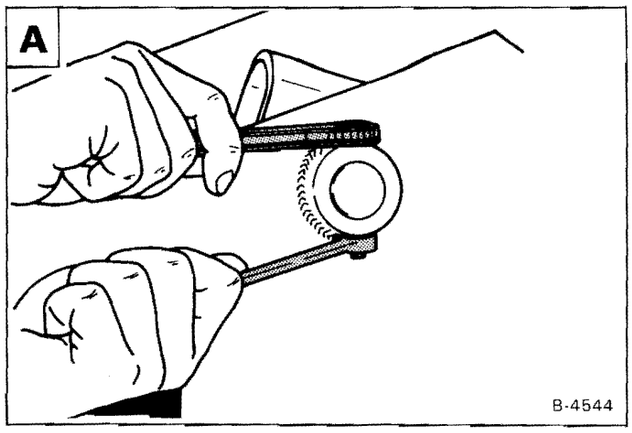
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LIFT ARMS (Cont'd)

Remove the lock nut and bolt at the pivot pins for the lift arms (both sides) [A].

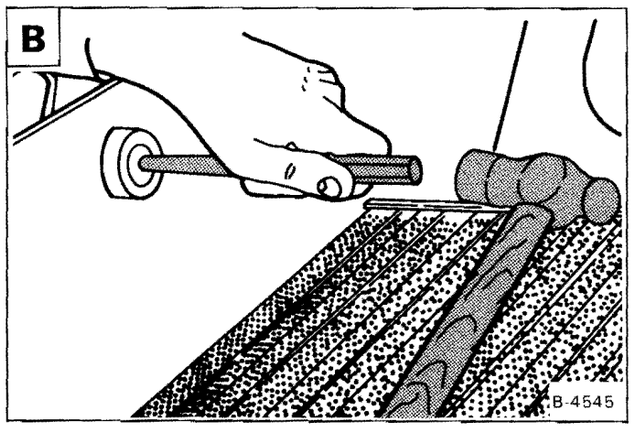
Installation: Tighten the bolt and nut to 18-20 ft.-lbs. (24-27 Nm) torque.

Tighten the chain hoist.



Use a punch and hammer and remove the pivot pins at the lift arms (both sides) [B].

Raise the lift arms, with chain hoist and remove them from the loader frame.



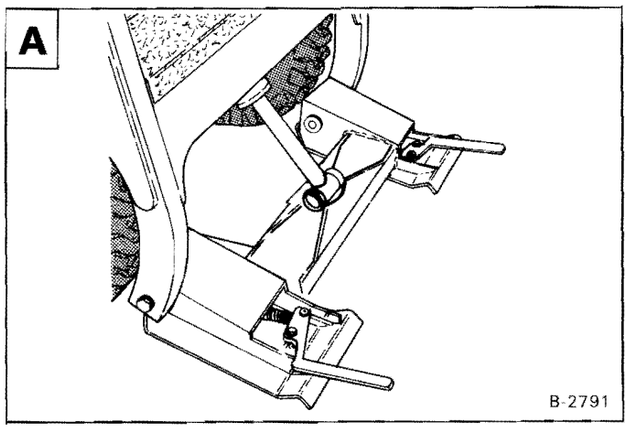
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BOB-TACH

Removal and Installation

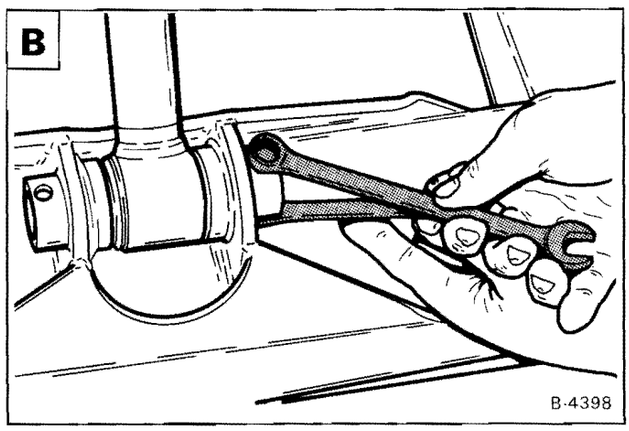
Tilt the Bob-Tach fully forward until the front edge is on the floor [A].

Stop the engine. Move the hydraulic controls to release the hydraulic pressure.

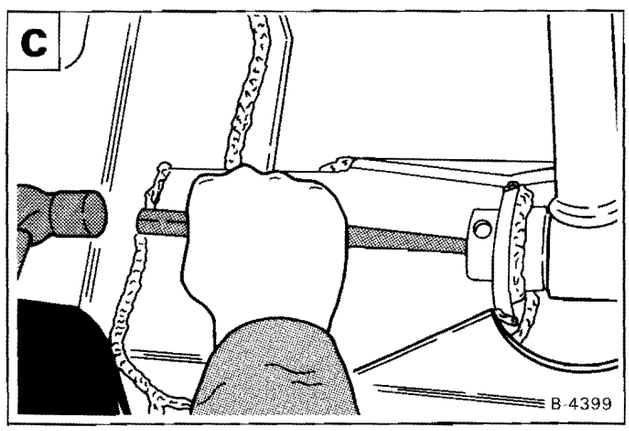


Remove the lock nut and bolt at the rod end of the tilt cylinder [B].

Installation: Tighten the bolt and nut to 18-20 ft.-lbs. (24-27 Nm) torque.

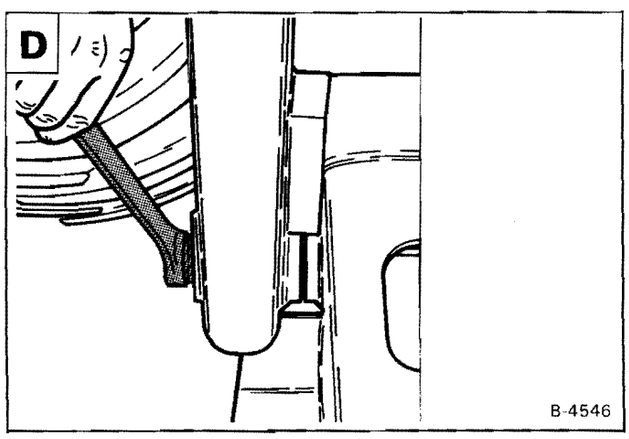


Remove the pivot pin at the rod end of the tilt cylinder [C].



Loosen the bolt at the Bob-Tach pivot pin [D]. DO NOT remove the bolt.

Installation: Tighten the bolt at the pivot pin to 125-140 ft.-lbs. (170-190 Nm) torque.



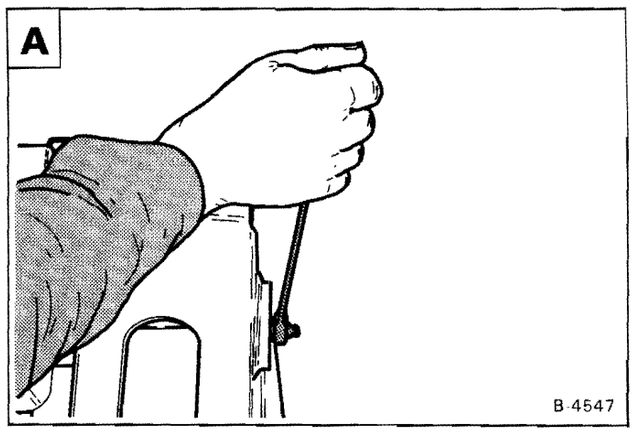
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BOB-TACH (Cont'd)

Remove the grease fitting at the pivot pins [A].

NOTE: The grease fitting at the pivot pin must be removed, because the grease can cause a lock and the pivot pin can not be removed form the Bob-Tach frame.

Put a rag over the grease fitting hole.



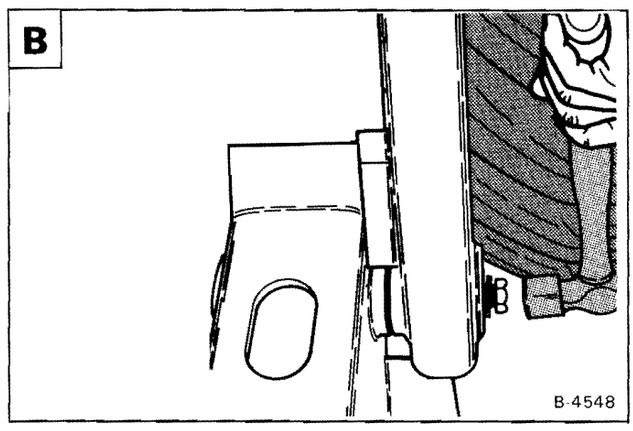
Hit the bolt to start the pivot pin into the Bob-Tach frame [B].

Remove the bolt and use a punch to push the pivot pin into the Bob-Tach frame.

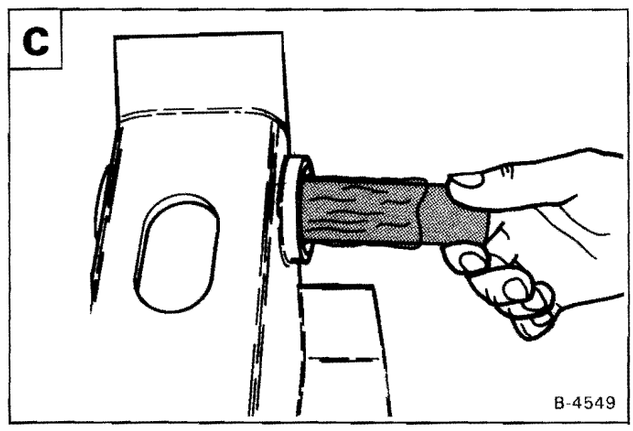
Repeat the above procedure for the other side.

Installation: Use a small diameter punch through the grease fitting hole to push the pivot pin into the lift arms.

Remove the Bob-Tach from the lift arms.



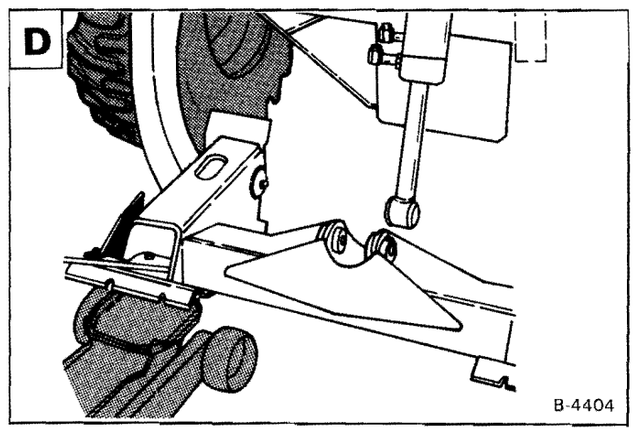
Remove the Bob-Tach pivot pins [C].



Tilt Cylinder Rod End Seal

After the Bob-Tach is installed on the lift arms, use this procedure to install the rod end seals.

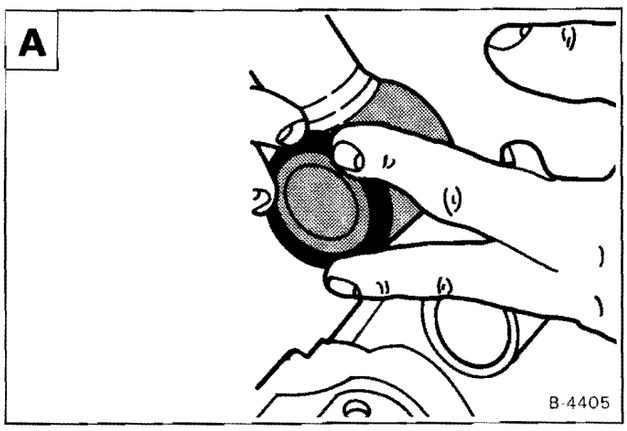
Lift the Bob-Tach with a floor jack [D].



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BOB-TACH (Cont'd)

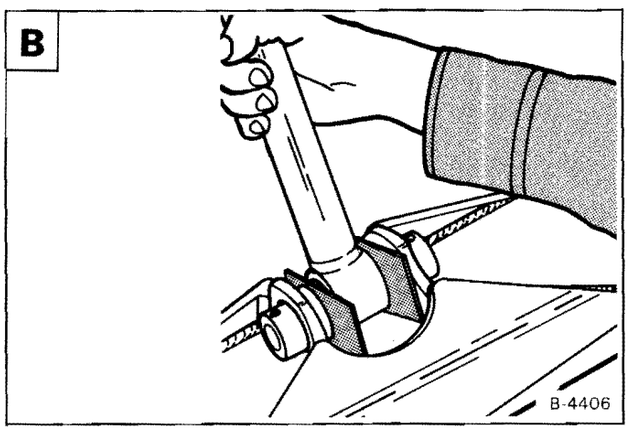
Install the new seals at the rod end [A].



Put a piece of shim stock on each side of the seals [B].

Lift the Bob-Tach with the floor jack and install the rod end into the Bob-Tach frame [B].

Remove the shim stock and finish installing the Bob-Tach.

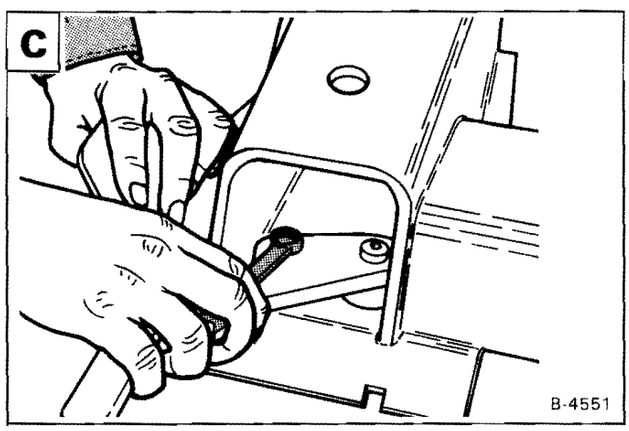


Disassembly and Assembly

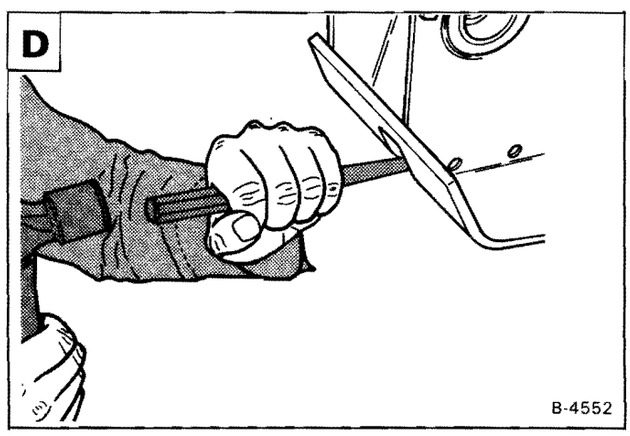
Put the Bob-Tach on a work bench.

Remove the bolt at the Bob-Tach lever [C].

Installation: Tighten the bolt to 25-28 ft.-lbs. (34-38 Nm) torque.



Using a punch and hammer, remove the Bob-Tach wedge and spring assembly from the frame [D].



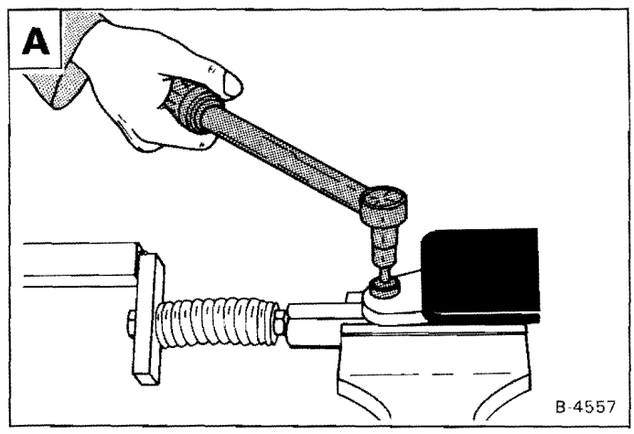
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BOB-TACH (Cont'd)

Put the wedge and lever assembly in the vise.

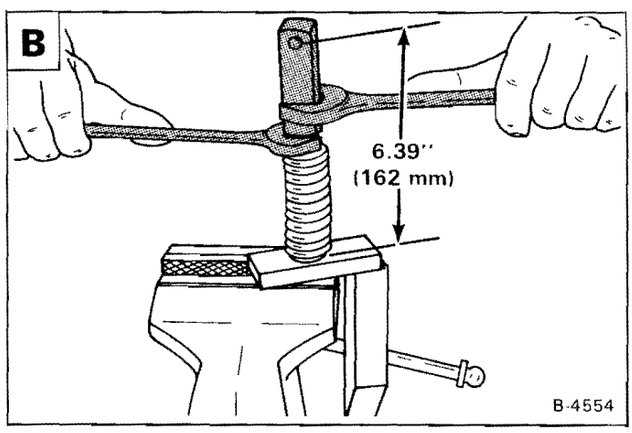
Remove the bolt at the lever [A].

Assemble: Tighten the bolt to 25-28 ft.-lbs. (34-38 Nm) torque.

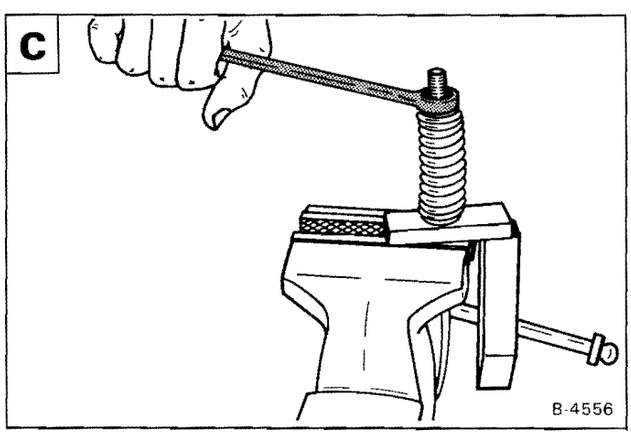


Remove the block from the wedge bolt [B].

* Assemble: Turn the block down until there is 6.39" (162 mm) from the center of the hole to the top of the wedge spring seat [B].

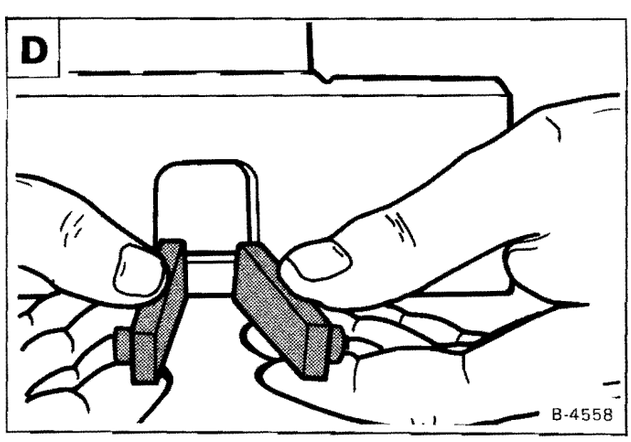


Remove the nut and the spring from the bolt [C].



Remove the plastic guides from the Bob-Tach frame [D].

Clean and inspect all the parts for wear and damage, replace the parts as needed.



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FUEL TANK (S/N 19999 & Below)

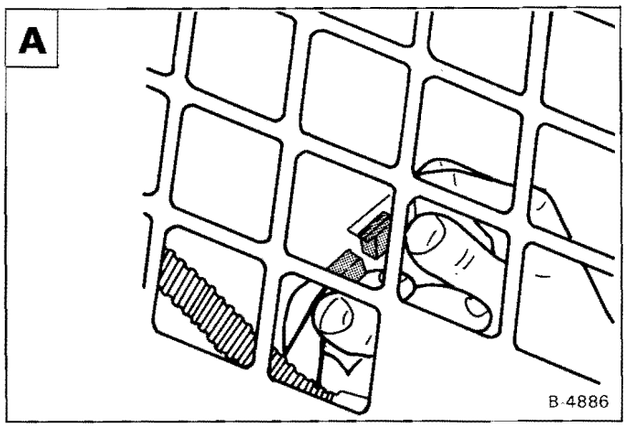
Removal and Installation

Raise the operator cab (See Page 1—7 for the correct procedure).

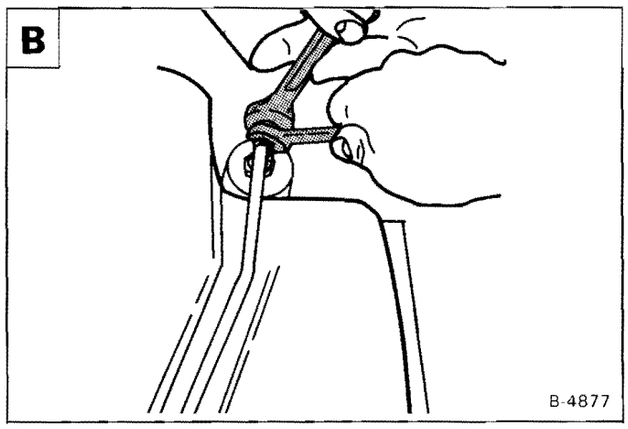
Disconnect the wire from the operator cab harness connector [A].

Turn the fuel shut off valve to the "OFF" position.

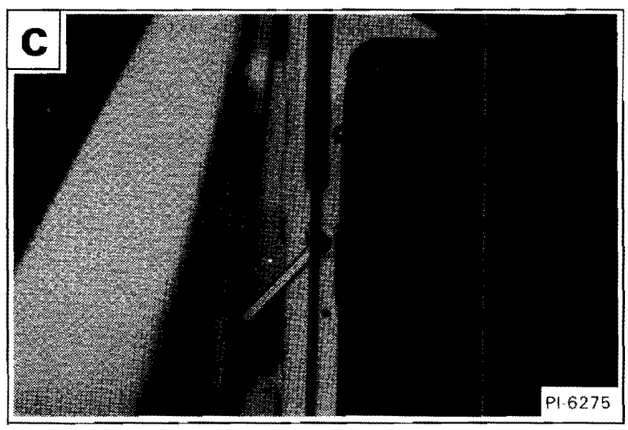
Use a transfer pump and remove all the fuel from the tank.



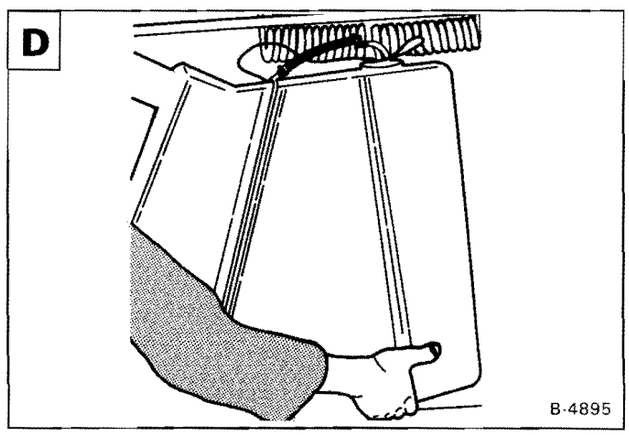
Disconnect the fuel line at the fuel filter [B].



Remove the nut holding the strap [C].



Remove the fuel tank from the loader [D].



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FUEL TANK (S/N 20001 & Above)

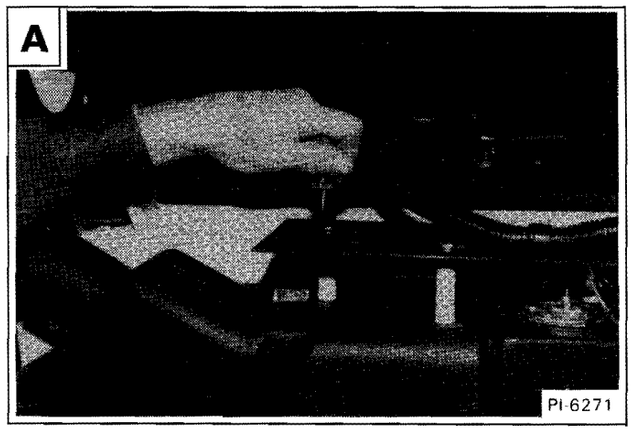
Removal and Installation

Raise the operator cab (See Page 1 – 7 for the correct procedure).

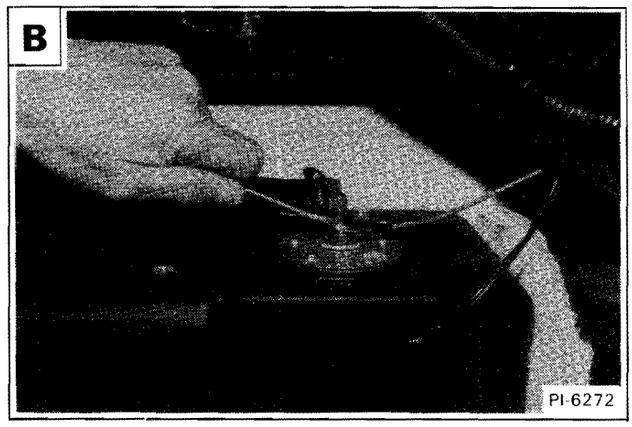
Use a transfer pump to remove the fuel from the fuel tank.

Remove the harness plate screws at the top of the fuel tank [A].

Move the harness plate over and above the hydraulic reservoir.



Disconnect the wires at the fuel sender [B].



Remove the fuel hoses from the tank fittings [C].



Remove the fuel hoses at the shut off valve [D].

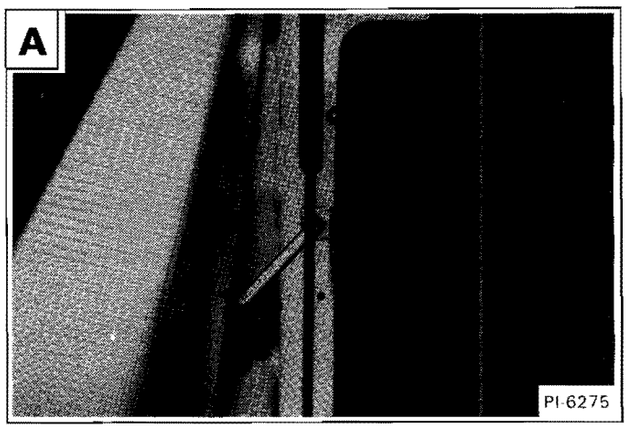


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FUEL TANK (S/N 20001 & Above) (Cont'd)

Remove the fuel tank holding strap bolt [A].

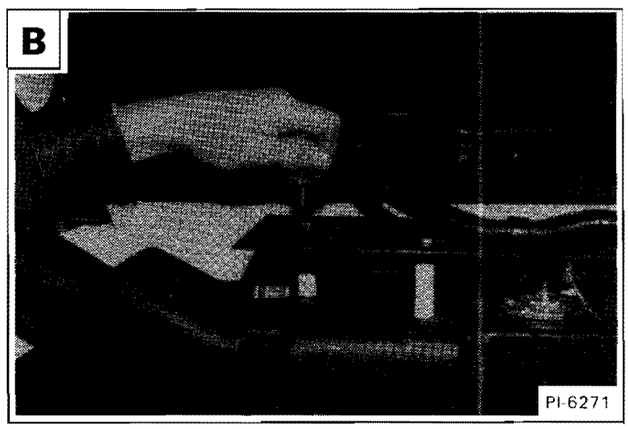
Remove the fuel tank from the loader.



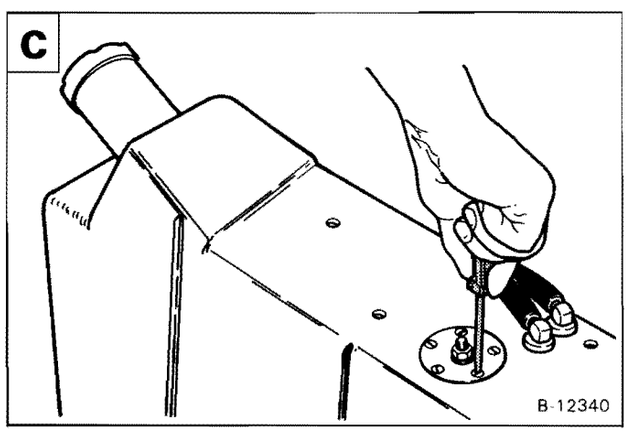
Fuel Tank Sender Switch

Remove the harness plate from the top of the fuel tank [B].

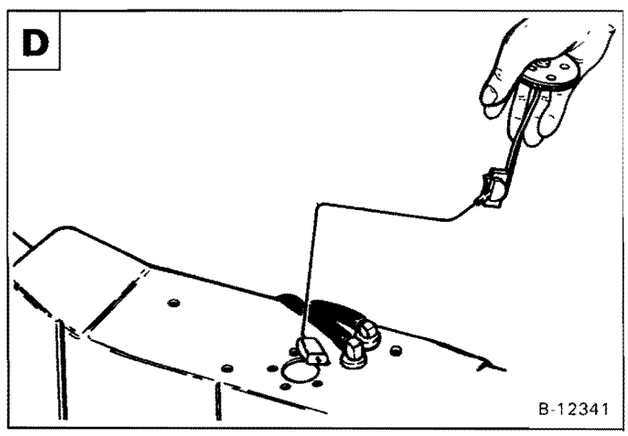
Remove the wires from the sender.



Remove the screws from the sender [C].



Remove the sender switch from the fuel tank [D].



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ELECTRICAL SYSTEM

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6 ELECTRICAL SYSTEM

ELECTRICAL SYSTEM INFORMATION

DESCRIPTION

The loader has a 12 volt, negative ground electrical alternator charging system. There are two main circuits.

1. The charging circuit has an alternator (with built-in regulator), a voltmeter and a battery.

2. The starting circuit has a starter motor, solenoids and other components for starting the engine.

The loader also has front and rear lights. Optional windshield wiper, horn and back-up alarm.

The electrical system is protected by two fuses installed in the instrument panel. Fuses protect the electrical system from an overload.

⚠ WARNING

Instructions are necessary before operating or servicing machine. Read Operator's 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. Failure to follow instructions can cause injury or death.

W-2003-1285

TROUBLESHOOTING

The following troubleshooting chart is provided as an assistance in locating and correcting problems which are most common. Many of the recommended procedures must be done by authorized Bobcat Service Personnel only.

PROBLEM	CAUSE
Battery does not charge.	1, 2, 3, 4, 5
Alternator will not charge.	1, 2, 5
Starter will not turn the engine.	2, 3, 4, 6, 7, 8, 9

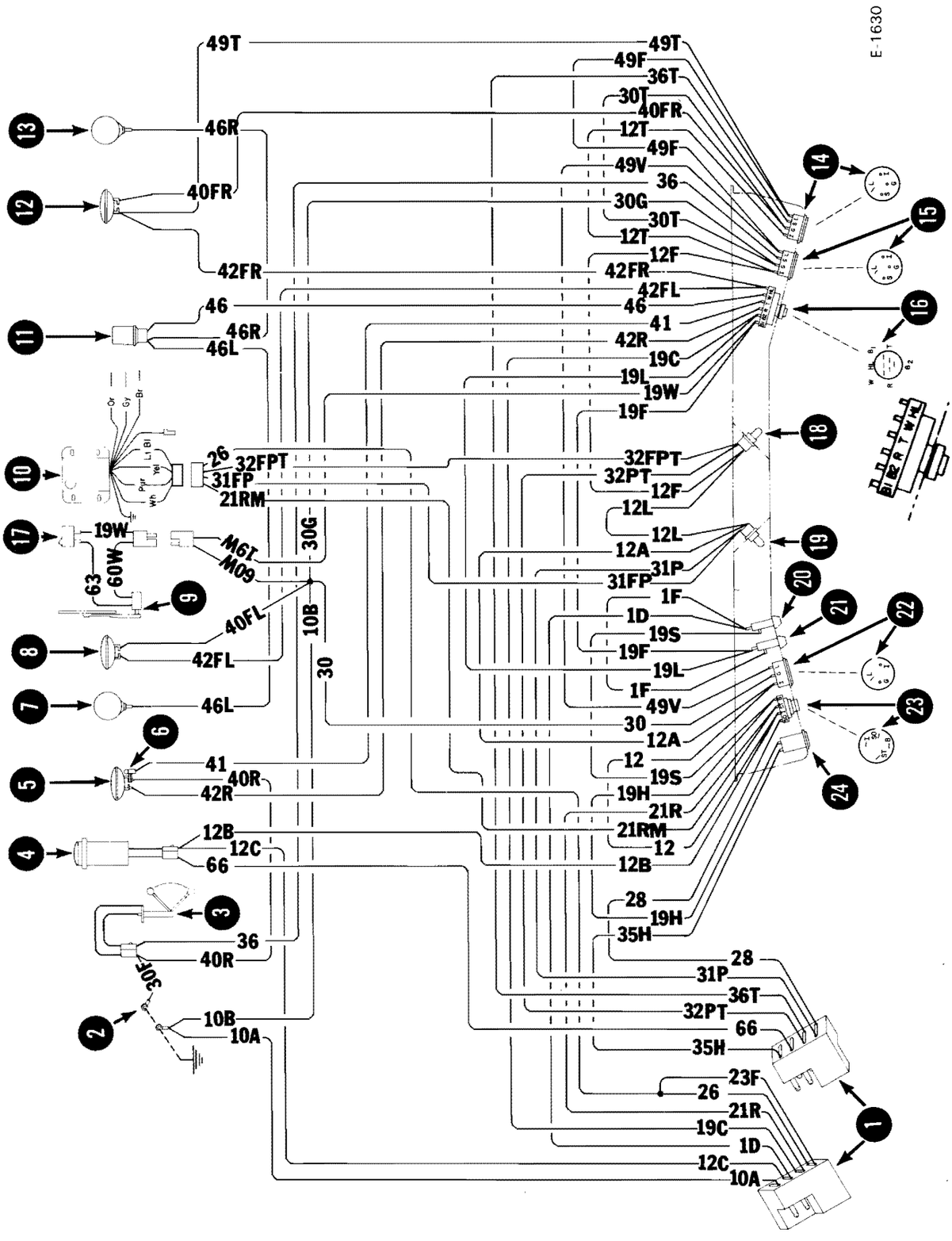
KEY TO CORRECT THE CAUSE
1. Alternator belt is loose or damaged.
2. Battery connections are dirty or loose.
3. Battery is damaged.
4. The ground connection is not making a good contact.
5. The alternator is damaged.
6. The engine is locked.
7. The starter is damaged.
8. The wiring or the solenoid is damaged.
9. Check the fuses.

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CAB WIRING DIAGRAM (P/N 6566807)

640, 740 Series

(Printed April 1988)



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CAB HARNESS

641 (S/N 20001 & Above)
642 (S/N 20001 & Above)
642B (S/N 11001 & Above)
643 (S/N 20001 & Above)
741 (S/N 20001 & Above)
742 (S/N 20001 & Above)
743 (S/N 20001 & Above)
743DS (S/N 51001 & Above)

WIRE LEGEND

NO.'s	COLOR	GAUGE
1D	Red	12
1F	Red	16
10A	Black	12
10B	Black	12
12	Orange	16
12A	Orange	18
12B	Orange	16
12C	Orange	16
12F	Orange	18
12L	Orange	18
12T	Orange	18
19C	Red/White	16
19F	Red/White	16
19H	Red/White	18
19L	Red/White	16
19S	Red/White	16
19W	Red/White	16
21R	White	16
21RM	White	16
23F	White/Black	16
26	Lt. Blue	16
28	Lt. Blue/Black	16
30	Black	16
30F	Black	16
30G	Black	16
30T	Black	16
31FP	Yellow/Green	18
32FPT	Yellow	18
32PT	Yellow	18
35H	Yellow/Brown	18
36	Purple	16
36T	Purple/White	18
40FL	Black	16
40FR	Black	16
40R	Black	16
41	Pink	16
42FL	Dk. Blue	16
42FR	Dk. Blue	16
42R	Dk. Blue/White	16
46	Brown	16
46L	Brown	16
46R	Brown	16
49F	Gray	16
49T	Gray	16
49V	Gray	16
60W	Black	16
66	Orange/Green	16

PARTS LEGEND

1. Harness Connector
2. Operator Cab Ground
3. * Fuel Sender
4. * Back-Up Alarm (Optional)
5. * Rear Lamp
6. * Tail Lamp
7. * Left Flasher Lamp (Optional)
8. * Left Front Lamp
9. * Wiper (Optional)
10. * Shut Down Module (Optional)
11. * Flasher (Optional)
12. * Right Front Lamp
13. * Right Flasher Lamp (Optional)
14. * Engine Temp. Gauge
15. * Fuel Gauge
16. * Light Switch
17. * Wiper Switch (Optional)
18. "Trans" Warning Light
19. "Eng" Warning Light
20. Fuse-Ignition
21. Fuse-Accessory
22. * Voltmeter
23. Ignition Switch
24. Hourmeter

* Optional for 642B Only

● Tee splice

○ Butt splice

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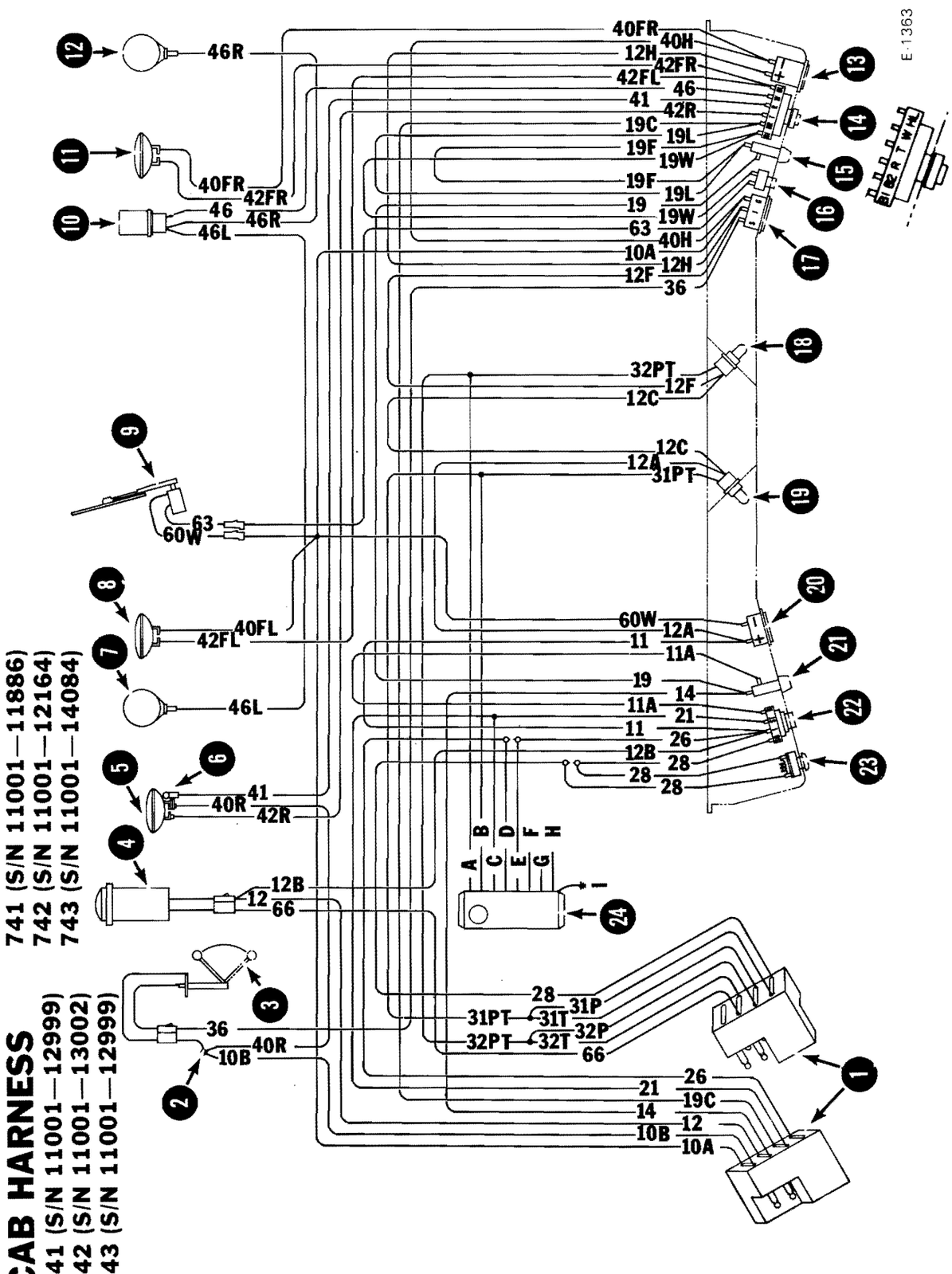


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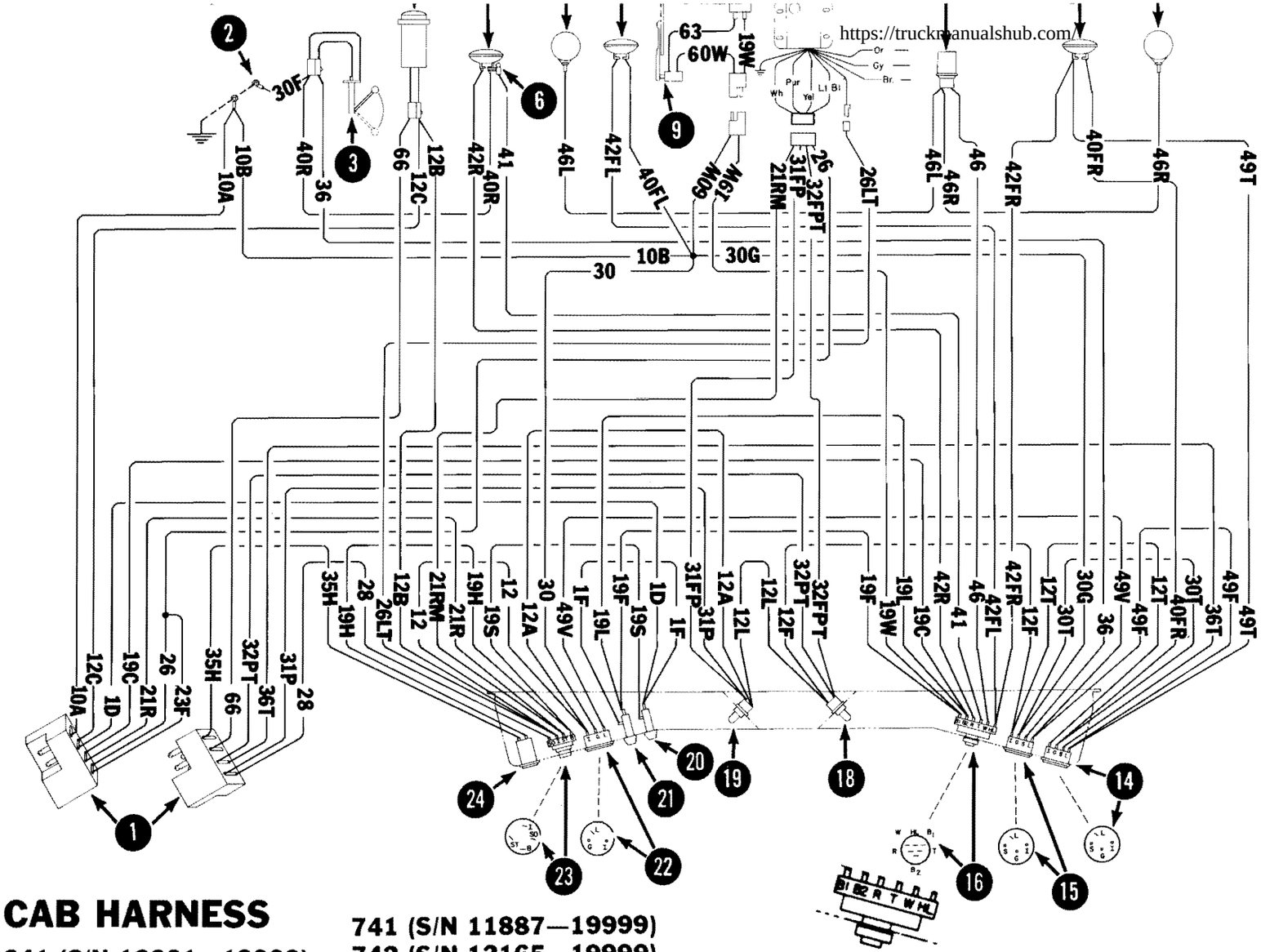
CAB WIRING DIAGRAM (P/N 6566808)

640, 740 Series

(Printed April 1988)



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CAB HARNESS

641 (S/N 13001—19999)
642 (S/N 13003—19999)
643 (S/N 13001—19999)

741 (S/N 11887—19999)
742 (S/N 12165—19999)
743 (S/N 14085—19999)
743DS (S/N 50001—50999)

E-1630

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CAB HARNESS

641 (S/N 13001—19999)
642 (S/N 13003—19999)
643 (S/N 13001—19999)
741 (S/N 11887—19999)
742 (S/N 12165—19999)
743 (S/N 14085—19999)
743DS (S/N 50001—50999)

WIRE LEGEND

NO.'s	COLOR	GAUGE
1D	Red	12
1F	Red	16
10A	Black	12
10B	Black	12
12	Orange	16
12A	Orange	18
12B	Orange	16
12C	Orange	16
12F	Orange	18
12L	Orange	18
12T	Orange	18
19C	Red/White	16
19F	Red/White	16
19H	Red/White	18
19L	Red/White	16
19S	Red/White	16
19W	Red/White	16
21RM	White	16
23F	White/Black	16
26	Lt. Blue	16
28	Lt. Blue/Black	16
30	Black	16
30F	Black	16
30G	Black	16
30T	Black	16
31FR	Yellow/Green	18
32FPT	Yellow	18
35H	Yellow/Brown	18
36	Purple	16
36T	Purple/White	18
40FL	Black	16
40FR	Black	16
40R	Black	16
41	Pink	16
42FL	Dk. Blue	16
42FR	Dk. Blue	16
42R	Dk. Blue/White	16
46	Brown	16
46L	Brown	16
46R	Brown	16
49F	Gray	16
49T	Gray	16
49V	Gray	16
60W	Black	16
63	Orange/Black	16
66	Orange/Black	16

PARTS LEGEND

1. Harness Connector
2. Operator Cab Ground
3. Fuel Sender
4. Back-Up Alarm (Optional)
5. Rear Lamp
6. Tail Lamp
7. Left Flasher Lamp (Optional)
8. Left Front Lamp
9. Wiper (Optional)
10. Shut Down Module (Optional)
11. Flasher (Optional)
12. Right Front Lamp
13. Right Flasher Lamp (Optional)
14. Engine Temp. Gauge
15. Fuel Gauge
16. Light Switch
17. Wiper Switch (Optional)
18. "Trans" Warning Light
19. "Eng" Warning Light
20. Fuse-Ignition
21. Fuse-Accessory
22. Voltmeter
23. Ignition Switch
24. Hourmeter

● Tee splice

○ Butt splice

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CAB HARNESS

641 (S/N 11001—12999)
642 (S/N 11001—13002)
643 (S/N 11001—12999)

741 (S/N 11001—11886)
742 (S/N 11001—12164)
743 (S/N 11001—14084)

WIRE LEGEND

NO.'s	COLOR	GAUGE
10A	Black	16
10B	Black	16
11	Orange	16
11A	White/Orange	16
12	Orange	16
12A	Orange	18
12B	Orange	16
12C	Orange	18
12F	Orange	18
12H	Orange	18
14	Orange	12
19	Orange/Dk. Blue	16
19C	Orange/Yellow	16
19F	Orange/Dk. Blue	16
19L	Orange/Dk. Blue	16
19W	Orange/Black	16
21	White	16
26	Lt. Blue	16
28	Lt. Blue/Black	18
31P	Purple	18
31PT	Purple	18
31T	White/Purple	18
32P	Yellow	18
32PT	Yellow	18
32T	Yellow/Black	18
36	Dk. Green/Yellow	16
40FL	Black	16
40FR	Dk. Blue	16
40H	Black	16
40R	Black	16
41	Pink	16
42FL	Dk. Blue	16
42FR	Dk. Blue	16
42R	Dk. Blue/White	16
46	Brown	16
46L	Brown	16
46R	Brown	16
60W	Black	16
63	Orange/Black	16
66	Orange/Green	16
A	Yellow	16
B	Purple	16
C	White	16
D	Lt. Blue	16
E	Red	16
F	Orange (Not Used)	16
G	Grey (Not Used)	16
H	Brown (Not Used)	16
I	Black	16

PARTS LEGEND

1. Operator Cab Harness Connector
2. Operator Cab Ground
3. Fuel Sender
4. Back-Up Alarm (Optional)
5. Rear Lamp
6. Tail Lamp
7. Left Flasher Lamp (Optional)
8. Left Front Lamp
9. Wiper Motor (Optional)
10. Flasher (Optional)
11. Right Front Lamp
12. Right Flasher Lamp (Optional)
13. Hourmeter
14. Light Switch
15. Accessory Fuse
16. Wiper Switch (Optional)
17. Fuel Gauge
18. "Trans" Warning Lamp
19. "Eng" Warning Lamp
20. Voltmeter
21. Ignition Fuse
22. Ignition Switch
23. Glow Plug Indicator (543 Only)
24. Shut-Down Module (Optional)

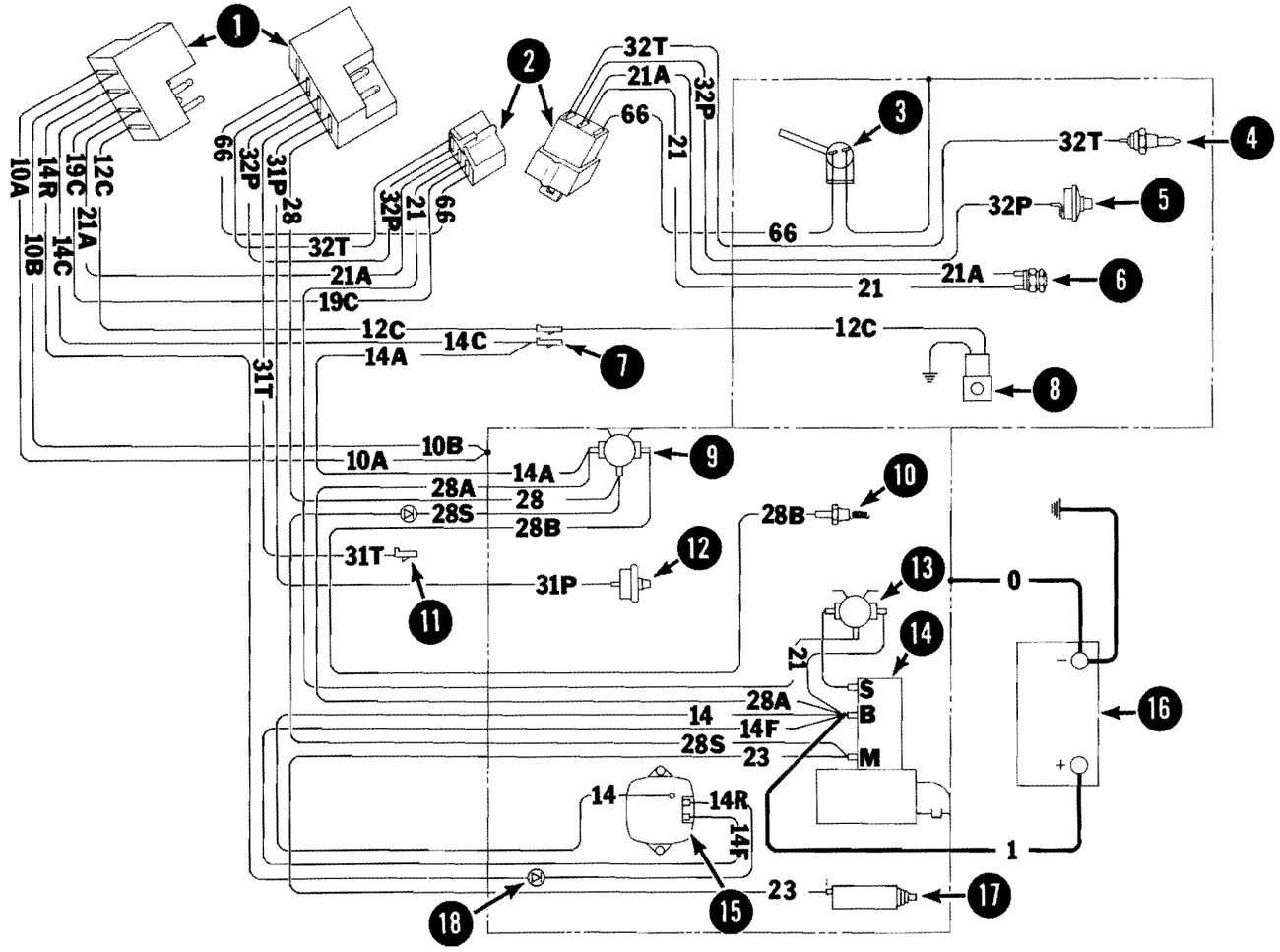
● Tee splice

○ Butt splice

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ENGINE HARNESS

641 (S/N 11001—12999)
741 (S/N 11001—11885)





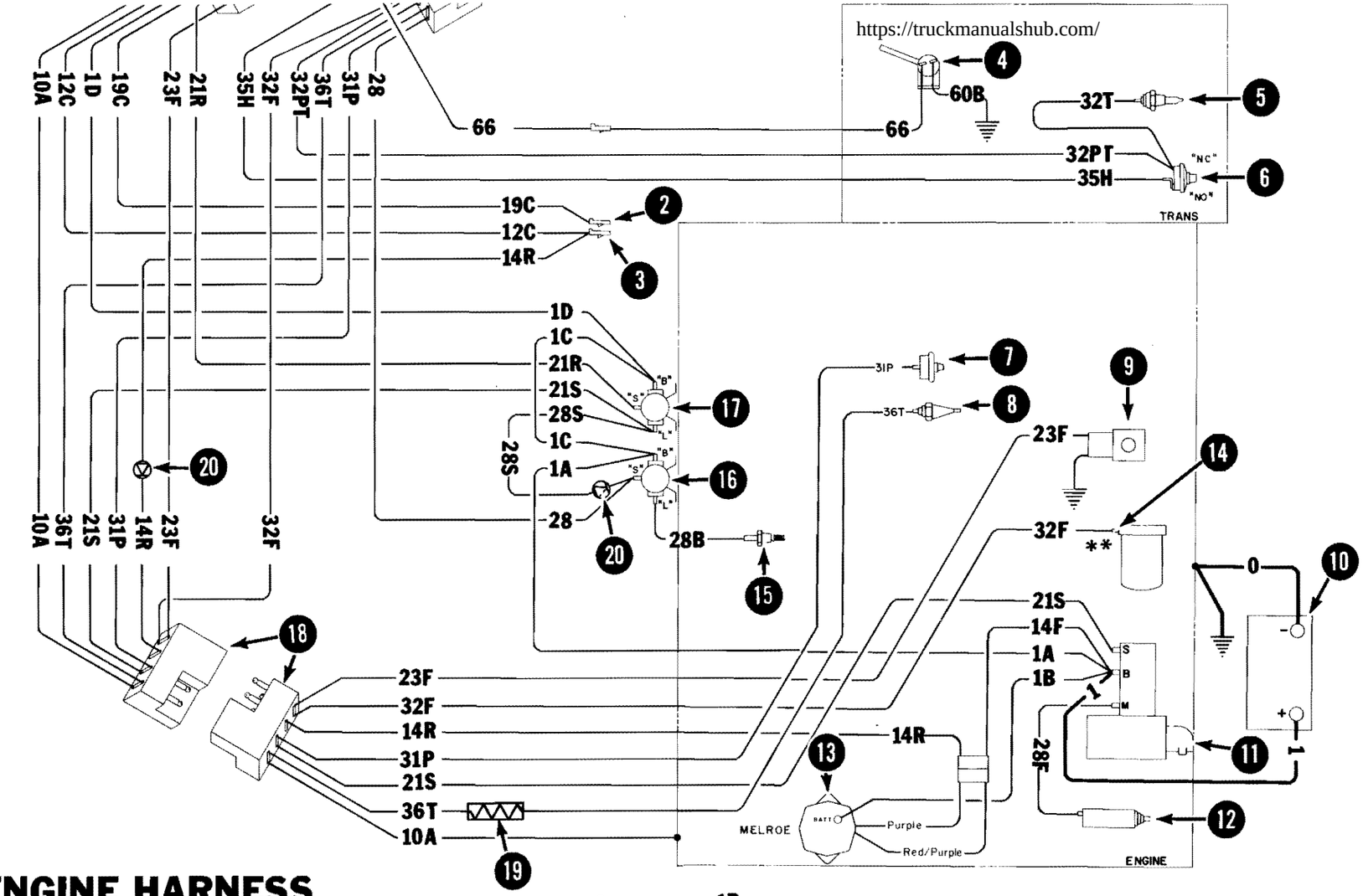
ENGINE WIRING DIAGRAM (P/N 6566809)

Model 641, 741

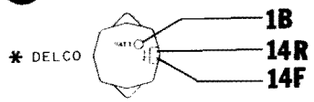
(Printed April 1988)

E-1357

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ENGINE HARNESS



* 641 (S/N 13001 — 20408) Delco
* 741 (S/N 11886 — 20320) Delco
641 (S/N 20409 & Above) Melroe
741 (S/N 20321 & Above) Melroe

* * Hydraulic Fluid Filter Pressure Switch (Item 14, Wire #32F) was added at S/N 15001 for Model 741 and S/N 13209 for Model 641.

E-1517

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ENGINE HARNESS

* 641 (S/N 13001 — 20408) Delco
* 741 (S/N 11886 — 20320) Delco
641 (S/N 20409 & Above) Melroe
741 (S/N 20321 & Above) Melroe

WIRE LEGEND

NO.'s	COLOR	GAUGE
0	Black	Cable
1	Red	Cable
1A	Red	8
1B	Red	10
1C	Red	12
1D	Red	12
10A	Black	12
12C	Orange	16
14F	Light Green	16
14R	Lt. Green/White	16
19C	Red/White	12
21R	White	16
21S	White/Lt. Green	12
23F	White/Blue	16
28	Lt. Blue/Black	16
28B	Lt. Blue/Orange	10
28F	Lt. Blue/Dk. Blue	16
28S	Lt. Blue/Yellow	16
31P	Yellow/Lt. Green	16
32F	Yellow/Dk. Blue	16
32PT	Yellow	16
32T	Yellow/Black	16
35H	Yellow/Brown	16
36T	Purple/White	16
60B	Black	16
66	Orange/Green	16

PARTS LEGEND

1. Operator Cab Harness Connector
2. Fused & Live Accessories
3. Fuse & Switched Accessories
4. Back-Up Alarm Switch (Optional)
5. Trans. Fluid Temp. Switch
6. Trans. Charge Pressure Switch
7. Engine Oil Pressure Switch
8. Engine Oil Temp. Sender
9. Fuel Shut-Off Solenoid Valve (Optional)
10. Battery
11. Starter
12. Excess Fuel Solenoid
13. Alternator
** 14. Hydraulic Fluid Filter Pressure Switch
15. Pre-Heat Glow Plug
16. Pre-Heat Relay
17. Starter Relay
18. Chassis Connector
19. Resistor
20. Diode

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ENGINE HARNESS

641 (S/N 11001—12999)
741 (S/N 11001—11885)

WIRE LEGEND

NO.'s	COLOR	GAUGE
0	Black	Cable
1	Red	Cable
10A	Black	16
10B	Black	16
12C	White/Orange	16
14	Orange	12
14A	Orange	12
14C	Orange	12
14F	Light Green	16
14R	White/Lt. Green	16
19C	Orange/Yellow	16
21	White	16
21A	White	16
23	White/Black	16
28	Lt. Blue/Black	16
28A	Red	10
28B	Lt. Blue/Orange	10
28S	White/Green	16
31P	Purple	16
31T	White/Purple	16
32P	Yellow	16
32T	Yellow/Black	16
66	Orange/Green	16

PARTS LEGEND

1. Operator Cab Harness Connector
2. Engine Connector
3. Back-Up Alarm Switch (Optional)
4. Trans. Oil Temperature Sender
5. Trans. Charge Pressure Sender
6. Brake Switch (Future)
7. Unfused Live Accessory
8. Fuel Solenoid Valve (Optional)
9. Pre-Heat Relay Solenoid
10. Pre-Heat Plug
11. Future Temp. Switch
12. Engine Oil Pressure Sender
13. Starter Relay Solenoid
14. Starter
15. Alternator
16. Battery
17. Excess Fuel Solenoid
18. Diode

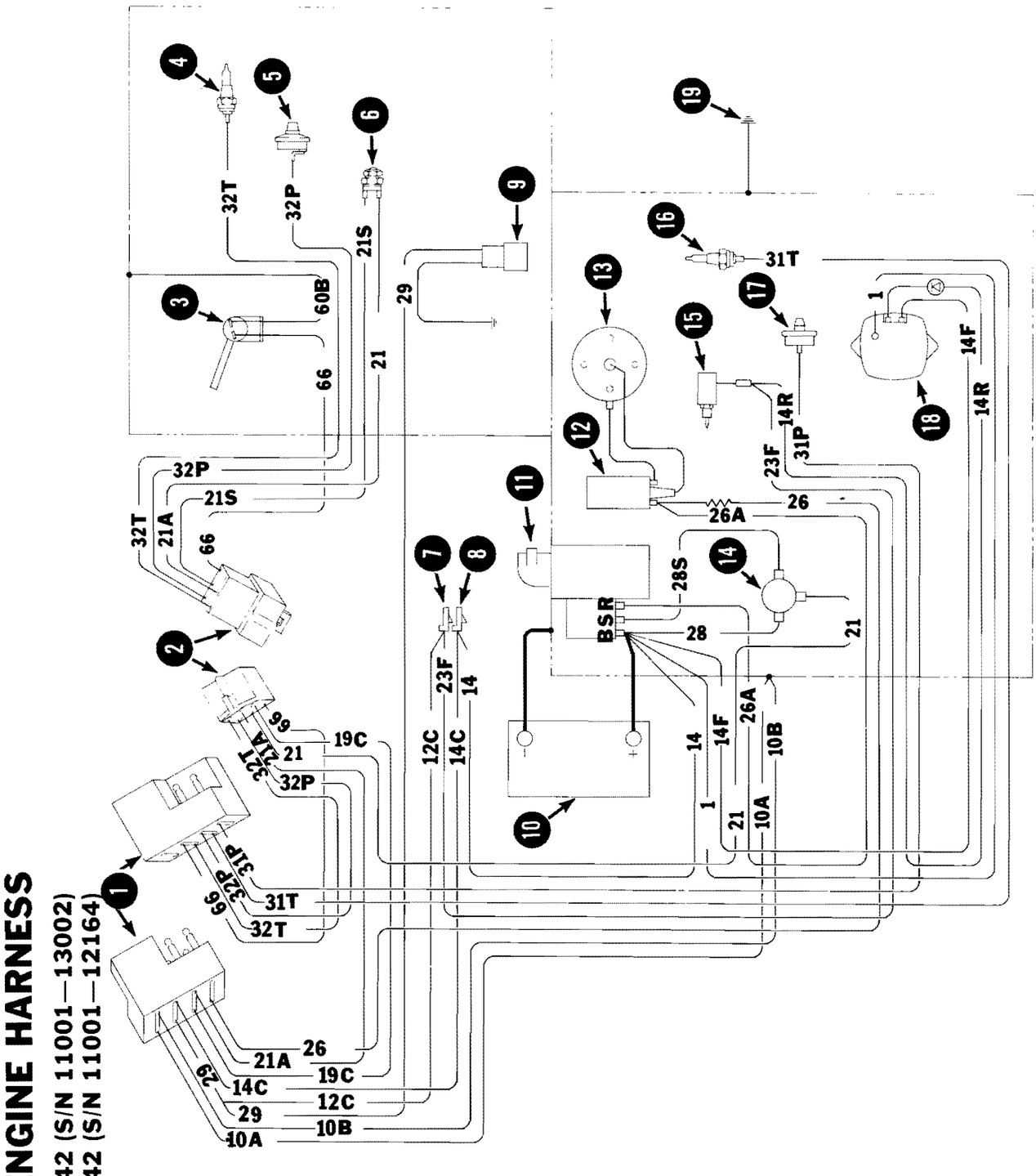
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ENGINE WIRING DIAGRAM (P/N 6566810)

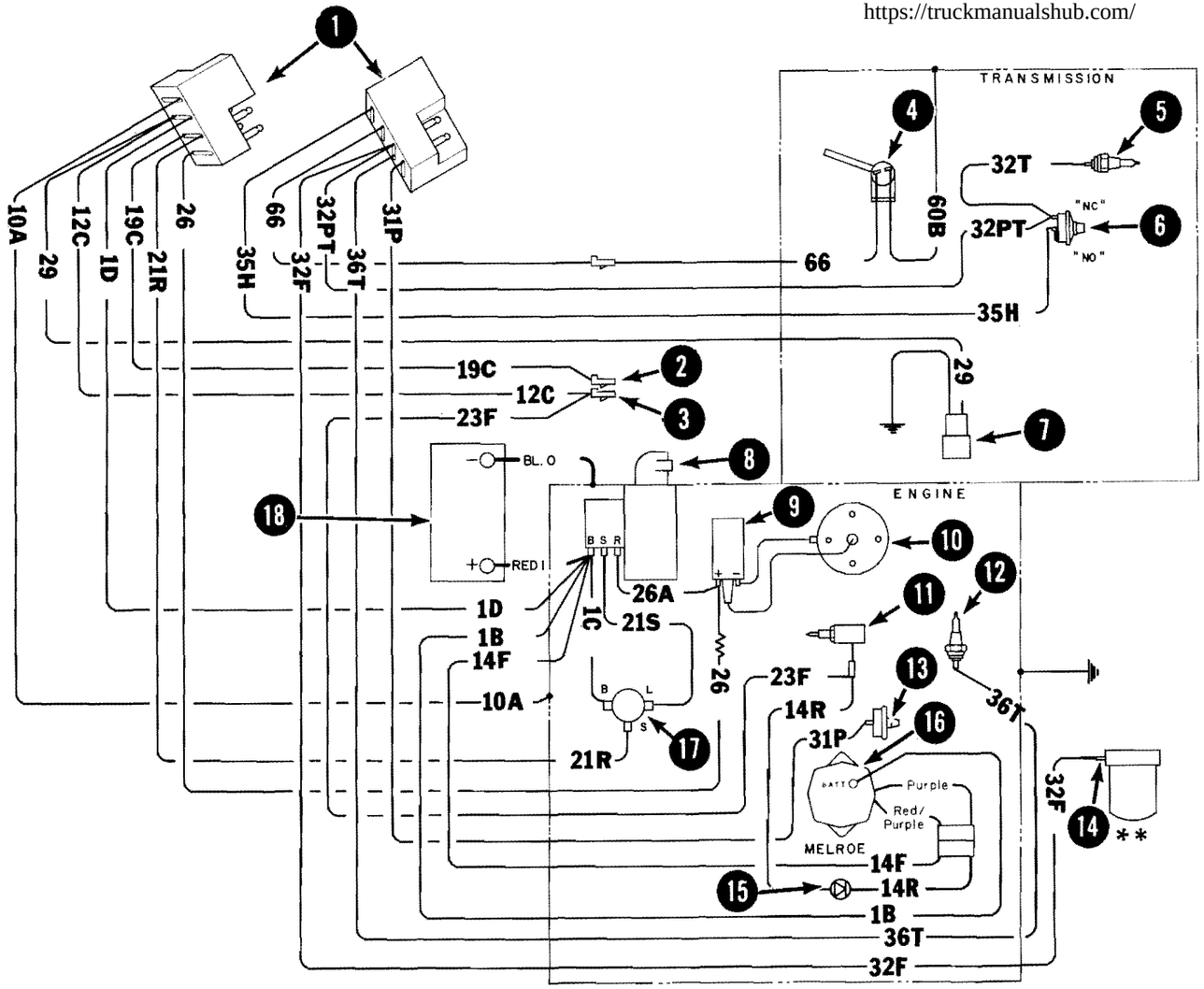
Models 642, 742

(Printed April 1988)

E-1358

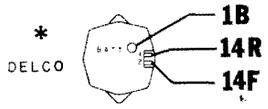


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ENGINE HARNESS

* 642 (S/N 13003 — 20840) Delco
* 742 (S/N 12165 — 20881) Delco
  742 (S/N 20882 & Above) Melroe



** Hydraulic Fluid Filter Pressure Switch (Item 14, Wire #32F) was added at S/N 15001 for Model 742 and S/N 13524 for Model 642.

E-1481

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ENGINE HARNESS

* 642 (S/N 13003 — 20840) Delco
* 742 (S/N 12165 — 20881) Delco
742 (S/N 20882 & Above) Melroe

WIRE LEGEND

NO.'s	COLOR	GAUGE
0	Black	Cable
1	Red	Cable
1B	Red	10
1C	Red	12
1D	Red	12
10A	Black	12
12C	Orange	16
14F	Light Green	16
14R	Lt. Green/White	16
19C	Red/White	16
21R	White	16
21S	White/Green	12
23F	White/Black	16
26	Color Optional (1.3-1.4 OHMS Resistance)	
26A	Lt. Blue/Green	16
29	White/Red	18
31P	Yellow/Lt. Green	16
* 32F	Yellow/Dk. Blue	16
32PT	Yellow	16
32T	Yellow/Black	16
35H	Yellow/Brown	16
36T	Purple/White	16
60B	Black	16
66	Orange/Green	16

PARTS LEGEND

1. Operator Cab Harness Connector
2. Fused & Live Accessories
3. Fuse & Switched Accessories
4. Back-Up Alarm Switch (Optional)
5. Trans. Fluid Temp. Switch
6. Trans. Charge Pressure Switch
7. Fuel Tank Solenoid
8. Starter
9. Coil
10. Distributor
11. Carburetor Fuel Solenoid
12. Engine Water Temp. Sender
13. Engine Oil Pressure Switch
** 14. Hydraulic Fluid Filter Pressure Switch
15. Diode
16. Alternator
17. Starter Relay
18. Battery

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ENGINE HARNESS

642 (S/N 11001—13002)
741 (S/N 11001—12164)

WIRE LEGEND

NO.'s	COLOR	GAUGE
1	Red	12
10A	Black	16
10B	Black	16
12C	White/Orange	16
14	Orange	12
14C	Orange	12
14F	Light Green	16
14R	White/Lt. Green	16
19C	Orange/Yellow	16
21	White	16
21A	White	16
21S	White/Green	16
23F	White/Black	16
26	Optional (1.3-1.4 OHMS Resistance)	
26A	Light Blue	16
28	Lt. Blue/Black	16
28S	White/Green	16
29	White/Red	18
31P	Purple	16
31T	White/Purple	16
32P	Yellow	16
32T	Yellow/Black	16
60B	Black	16
66	Orange/Green	16

PARTS LEGEND

1. Operator Cab Harness Connector
2. Chassis Harness Connector
3. Back-Up Alarm Switch (Optional)
4. Trans. Oil Temperature
5. Trans. Charge Pressure
6. Brake Switch (Future Switch)
7. Fused & Switched Feed
8. Unfused Feed
9. Fuel Tank Solenoid
10. Battery
11. Starter
12. Coil
13. Distributor
14. Power Relay
15. Carburetor Fuel Solenoid
16. Engine Water Temp.
17. Engine Oil Pressure
18. Alternator
19. Engine to Frame Ground

Diode (Keeps engine from running after ignition is turned off)

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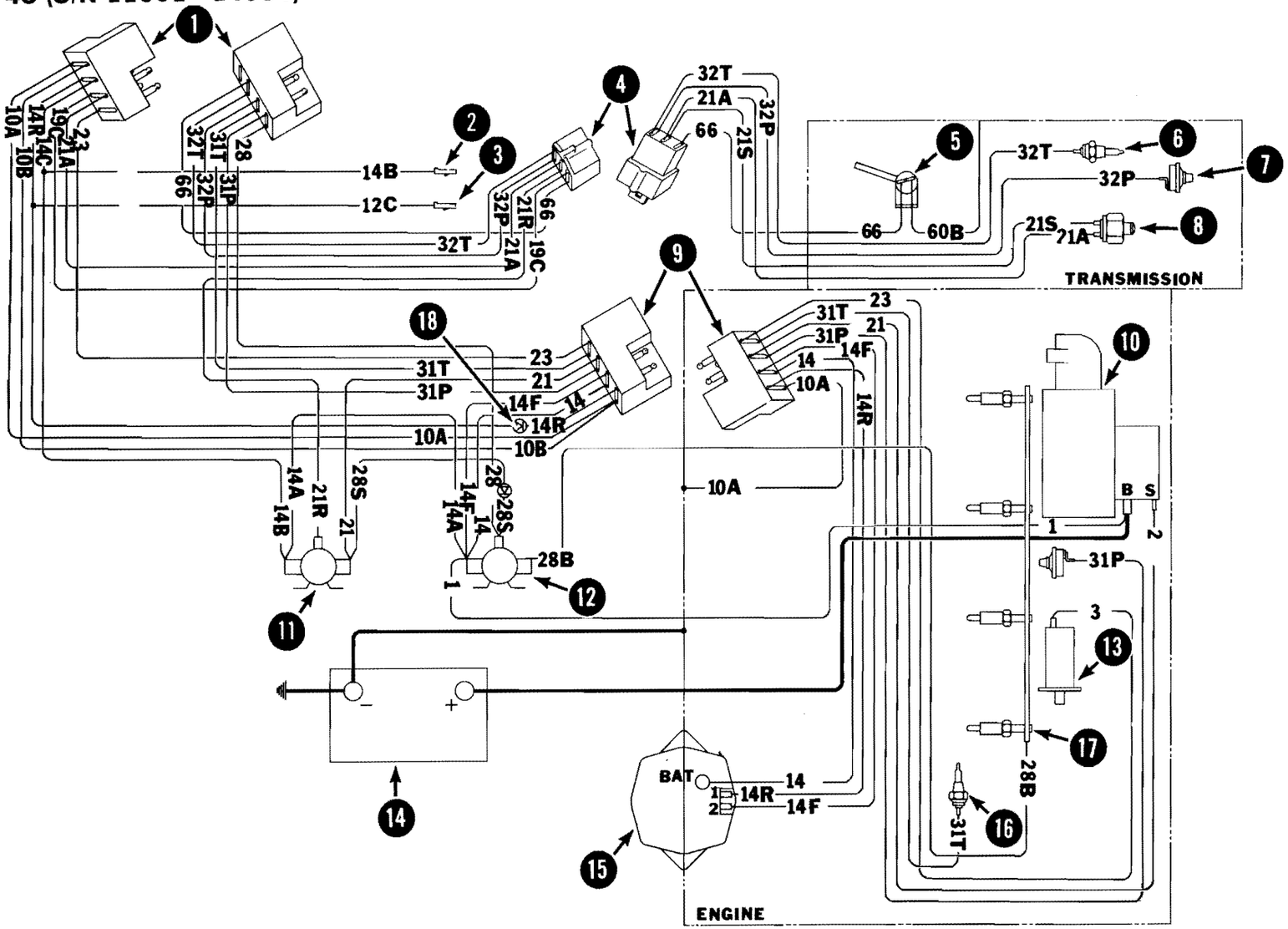
ENGINE WIRING DIAGRAM (P/N 6566811)

Models 643, 743

(Printed April 1988)

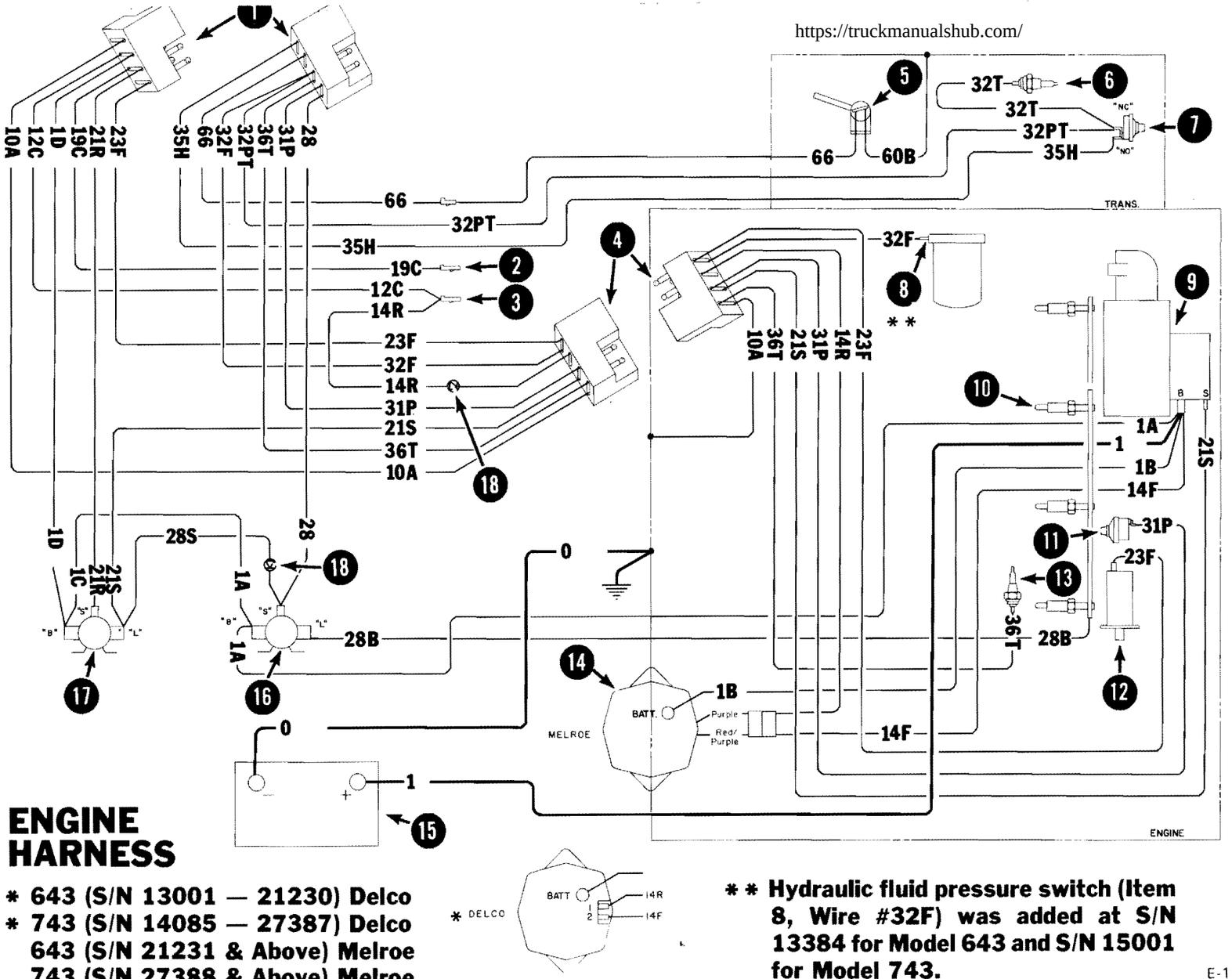
ENGINE HARNESS

643 (S/N 11001—12999)
743 (S/N 11001—14084)



E-1356

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ENGINE HARNESS

* 643 (S/N 13001 — 21230) Delco
* 743 (S/N 14085 — 27387) Delco
643 (S/N 21231 & Above) Melroe
743 (S/N 27388 & Above) Melroe

* * Hydraulic fluid pressure switch (Item 8, Wire #32F) was added at S/N 13384 for Model 643 and S/N 15001 for Model 743.

E-1513

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ENGINE HARNESS

* 643 (S/N 13001 — 21230) Delco
* 743 (S/N 14085 — 27387) Delco
643 (S/N 21231 & Above) Melroe
743 (S/N 27388 & Above) Melroe

WIRE LEGEND

NO.'s	COLOR	GAUGE
0	Black	Cable
1	Red	Cable
1A	Red	8
1B	Red	10**
1C	Red	12
1D	Red	12
10A	Black	12
12C	Orange	16
14F	Light Green	16
14R	Lt. Green/White	16
19C	Red/White	16
21R	White	16
21S	White/Green	12***
23F	White/Black	16
28	Lt. Blue/Black	16
28B	Lt. Blue/Orange	10
28S	Lt. Blue/Yellow	16
31P	Yellow/Lt. Green	16
32F3	Yellow/Dk. Blue	16
32PT	Yellow	16
32T	Yellow/Black	16
35H	Yellow/Brown	16
36T	Purple/White	16
60B	Black	16
66	Orange/Green	16

** 12 gauge on S/N 13001—21230 for Model 643 and S/N 14085—27387 for Model 743

PARTS LEGEND

1. Operator Cab Harness Connector
2. Fused & Live Accessories
3. Fuse & Switched Accessories
4. Chassis Connector
5. Back-Up Alarm Switch (Optional)
6. Trans. Fluid Temp. Switch
7. Trans. Charge Pressure Switch
** 8. Hyd. Fluid Filter Pressure Switch
9. Starter
10. Engine Glow Plugs
11. Engine Oil Pressure Switch
12. Fuel Shut-Off Solenoid (Optional)
13. Engine Coolant Temp. Sender
14. Alternator
15. Battery
16. Pre-Heat Relay
17. Start Relay
18. Diode

*** 16 gauge on S/N 13001—13383 for Model 643 and S/N 14085—14999 for Model 743.

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ENGINE HARNESS

643 (S/N 11001—12999)
743 (S/N 11001—14084)

WIRE LEGEND

NO.'s	COLOR	GAUGE
1	Red	8
10A	Black	16
10B	Black	16
12C	White/Orange	16
14	Orange	12
14A	Orange	12
14B	Orange	12
14C	Orange	12
14F	Light Green	16
14R	White/Lt. Green	16
19C	Orange/Yellow	16
21	White	16
21A	White	16
21R	White/Orange	16
21S	White/Green	16
23	White/Black	16
28	Lt. Blue/Black	16
28B	Lt. Blue/Orange	10
28S	White/Green	16
31P	Purple	16
31T	White/Purple	16
32P	Yellow	16
32T	Yellow/Black	16
60B	Black	16
66	Orange/Green	16

PARTS LEGEND

1. Operator Cab Harness Connector
2. Unfuse & Live Accessory
3. Fused & Switch Accessory
4. Chassis Connector
5. Back-Up Alarm Switch (Optional)
6. Trans. Oil Temp. Sender
7. Trans. Charge Pressure Sender
8. Brake Start Switch (Future)
9. Engine Connector
10. Starter
11. Start Relay
12. Pre-Heat Relay
13. Fuel Shut-Off Solenoid (Optional)
14. Battery
15. Alternator
16. Engine Coolant Temp.
17. Engine Glow Plugs
18. Diode

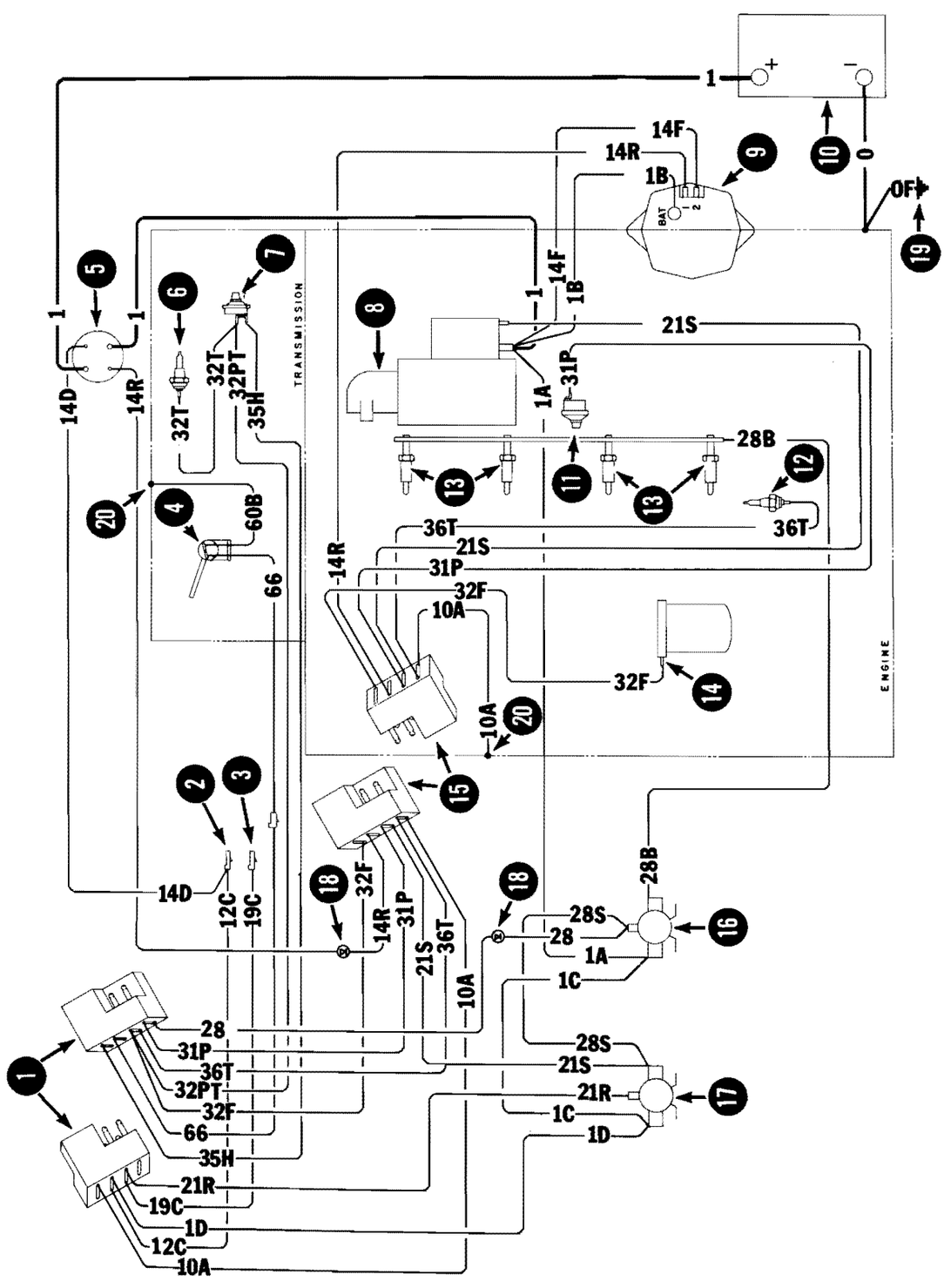
https://truckmanualshub.com/

ENGINE WIRING DIAGRAM (P/N 6570758)

Model 743DS

(Printed September 1990)

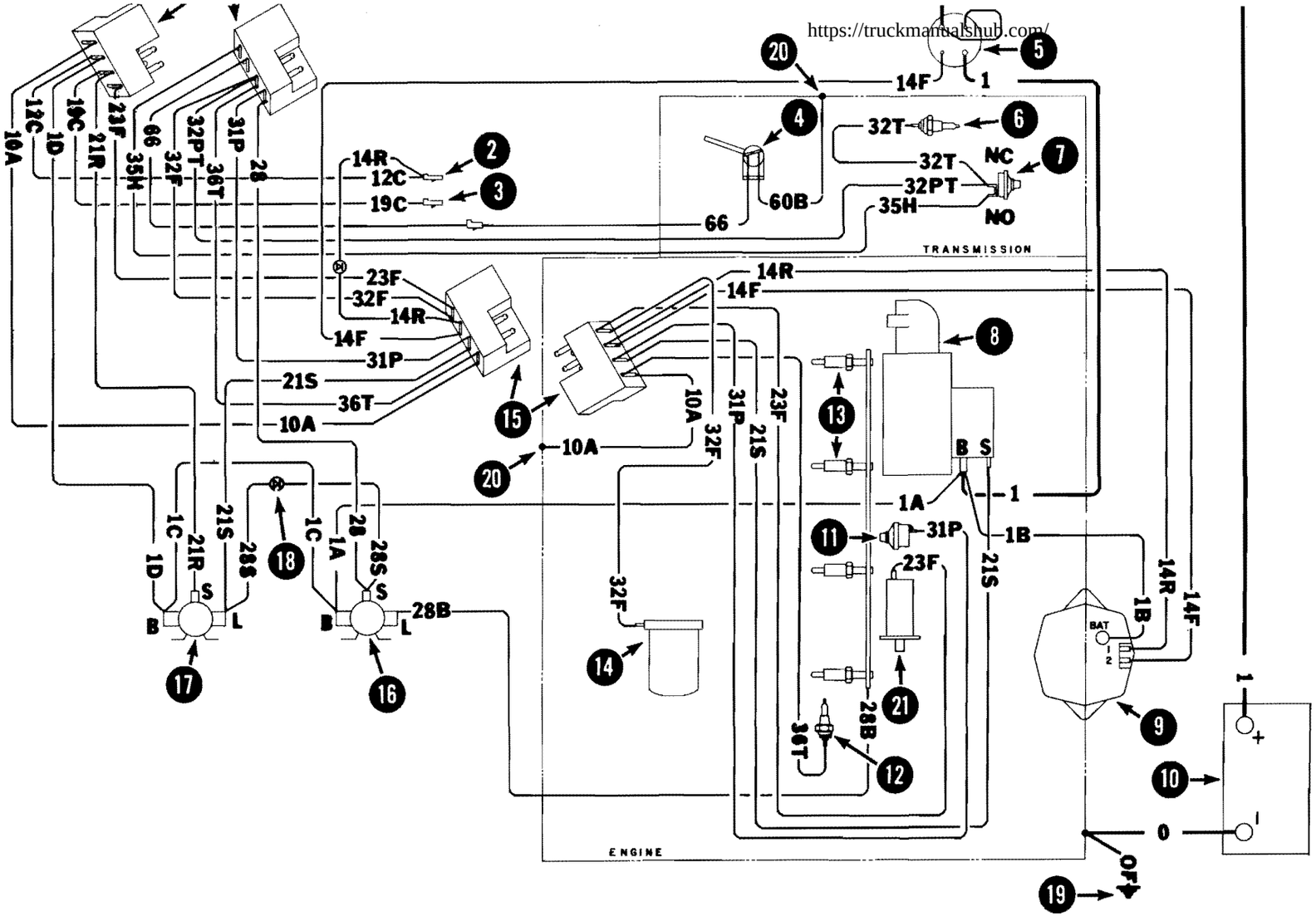
E-1495



ENGINE HARNESS

743DS (S/N 50001—50156)

https://truckmanualshub.com/



ENGINE HARNESS

743DS (S/N 50157 thru 51377)

E-1516

https://truckmanualshub.com/

ENGINE HARNESS

743DS (S/N 50157 thru 51377)

WIRE LEGEND

NO.'s	COLOR	GAUGE
0	Black	Cable
1	Red	Cable
1A	Red	8
1B	Red	12
1C	Red	12
1D	Red	12
10A	Black	12
12C	Orange	16
14F	Lt. Green	16
14R	Lt. Green/White	16
19C	Red/White	12
21R	White	16
21S	White/Lt. Green	12
23F	White/Black	16
28	Lt. Blue/Black	16
28B	Lt. Blue/Orange	10
28S	Lt. Blue/Yellow	16
31P	Yellow/Lt. Green	16
32F	Yellow/Dk. Blue	16
32PT	Yellow	16
32T	Yellow/Black	16
35H	Yellow/Brown	16
36T	Purple/White	16

NO.'s	COLOR	GAUGE
60B	Black	16
66	Orange/Green	16

PARTS LEGEND

1. Operator Cab Harness Connector
2. Fused & Switch Accessory
3. Open, Fused & Live Accessory
4. Back-Up Alarm Switch (Optional)
5. Battery Disconnect Switch
6. Trans. Oil Temperature Switch
7. Trans. Charge Pressure Switch
8. Starter
9. Alternator
10. Battery
11. Engine Oil Pressure Switch
12. Engine Coolant Temp. Sender
13. Engine Glow Plugs
14. Hyd. Fluid Filter Condition Switch
15. Engine Connector
16. Pre-Heat Relay
17. Starter Relay
18. Diode
19. Frame Ground
20. Engine Ground
21. Fuel Shut-Off Solenoid (Optional)

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ENGINE HARNESS

743 (S/N 50001—50156)

WIRE LEGEND

NO.'s	COLOR	GAUGE
0	Black	Cable
0F	Black	Cable
1	Red	Cable
1A	Red	8
1B	Red	12
1C	Red	12
1D	Red	12
10A	Black	16
12C	Orange	16
14D	Lt. Green/White	16
14F	Lt. Green	16
14R	Lt. Green/White	16
19C	Red/White	12
21R	White	16
21S	White/Lt. Green	12
28	Lt. Blue/Black	16
28B	Lt. Blue/Orange	10
28S	Lt. Blue/Yellow	16
31P	Yellow/Lt. Green	16
32F	Yellow/Dk. Blue	16
32PT	Yellow	16
32T	Yellow/Black	16
35H	Yellow/Brown	16
36T	Purple/White	16
60B	Black	16
66	Orange/Green	16

PARTS LEGEND

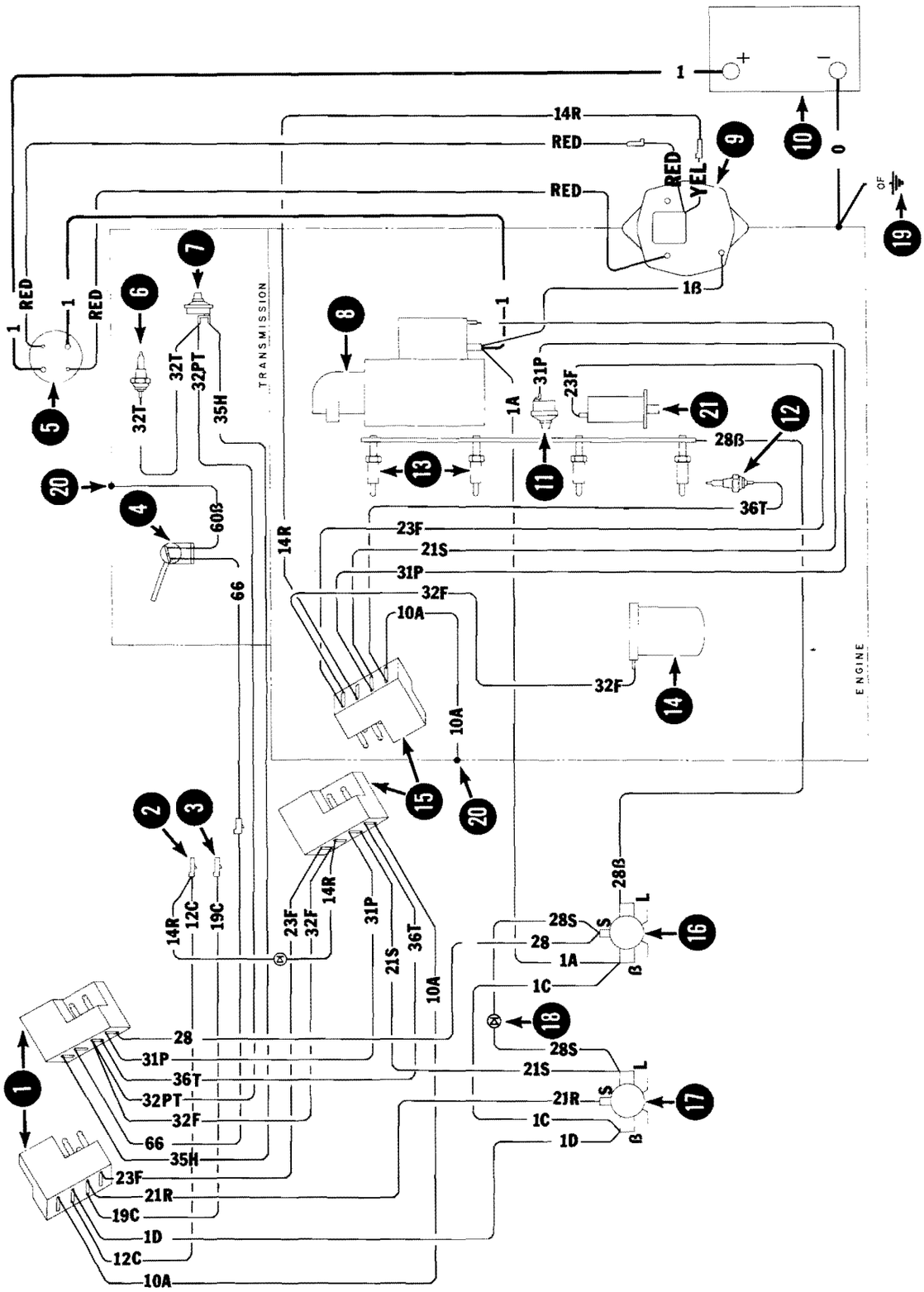
1. Operator Cab Harness Connector
2. Fused & Switch Accessory
3. Open, Fused & Live Accessory
4. Back-Up Alarm Switch (Optional)
5. Battery Disconnect Switch
6. Trans. Oil Temperature Switch
7. Trans. Charge Pressure Switch
8. Starter
9. Alternator
10. Battery
11. Engine Oil Pressure Switch
12. Engine Coolant Temp. Sender
13. Engine Glow Plugs
14. Hyd. Fluid Filter Condition Switch
15. Engine Connector
16. Pre-Heat Relay
17. Starter Relay
18. Diode
19. Frame Ground
20. Engine Ground

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ENGINE WIRING DIAGRAM (P/N 6720564)

Model 743DS

(Printed September 1990)



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ENGINE HARNESS

743DS (S/N 51378 & Above)

WIRE LEGEND

NO.'s	COLOR	GAUGE
0	Black	Cable
1	Red	Cable
1A	Red	8
1B	Red	12
1C	Red	12
1D	Red	12
10A	Black	12
12C	Orange	16
14F	Lt. Green	16
14R	Lt. Green/White	16
19C	Red/White	12
21R	White	16
21S	White/Lt. Green	12
23F	White/Black	16
28	Lt. Blue/Black	16
28B	Lt. Blue/Orange	10
28S	Lt. Blue/Yellow	16
31P	Yellow/Lt. Green	16
32F	Yellow/Dk. Blue	16
32PT	Yellow	16
32T	Yellow/Black	16
35H	Yellow/Brown	16
36T	Purple/White	16
60B	Black	16
66	Orange/Green	16

PARTS LEGEND

1. Operator Cab Harness Connector
2. Fused & Switch Accessory
3. Open, Fused & Live Accessory
4. Back-Up Alarm Switch (Optional)
5. Battery Disconnect Switch
6. Trans. Oil Temperature Switch
7. Trans. Charge Pressure Switch
8. Starter
9. Alternator
10. Battery
11. Engine Oil Pressure Switch
12. Engine Coolant Temp. Sender
13. Engine Glow Plugs
14. Hyd. Fluid Filter Condition Switch
15. Engine Connector
16. Pre-Heat Relay
17. Starter Relay
18. Diode
19. Frame Ground
20. Engine Ground
21. Fuel Shut-Off Solenoid (Optional)

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BATTERY

Checking the Battery

The tool listed will be needed to do the following procedure:

MEL-10004 – Battery Tester

To make a safe and complete check of the battery see the Clark Battery Manual (P/N 6566047).

The Battery Manual has all the information and specifications needed for checking and servicing the battery. Replace the battery as needed.

⚠ WARNING

Batteries contain acid which burns eyes and skin on contact. Wear goggles, protective clothing and rubber gloves to keep acid off body.

In case of acid contact, wash immediately with water for several minutes and get medical attention in case of eye contact.

W-2065-1286

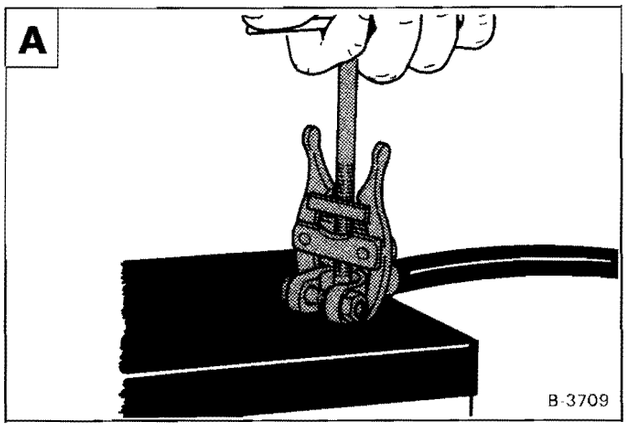
DO NOT remove the vent caps from the battery while charging the battery. The battery has vent caps which will decrease the possibility of the battery being exploded by an external spark.

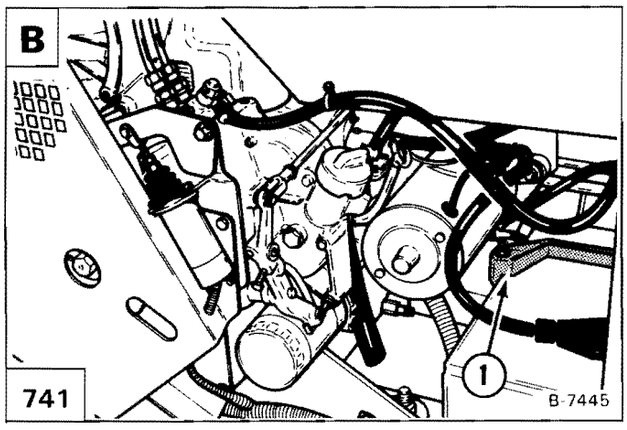
Removal and Installation

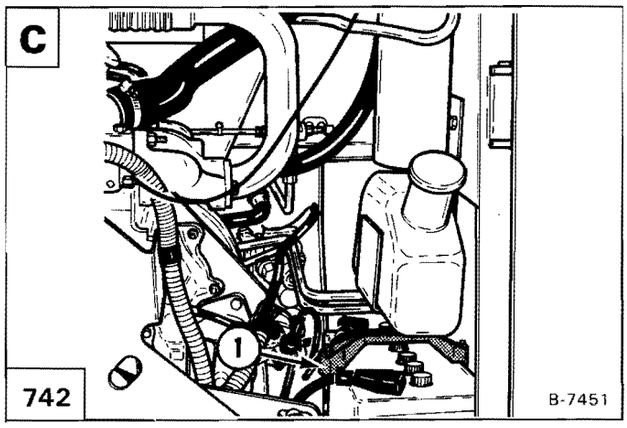
Disconnect the battery cables. Always remove the negative (–) cable first to prevent sparks [A].

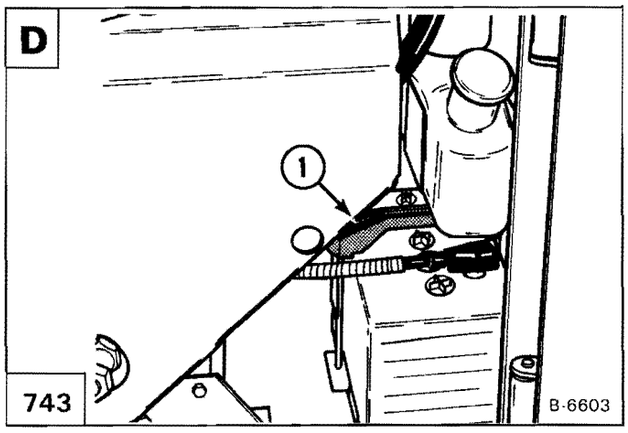
Remove the battery holddown clamps (Item 1) [B], [C] and [D].

Remove the battery from the loader.









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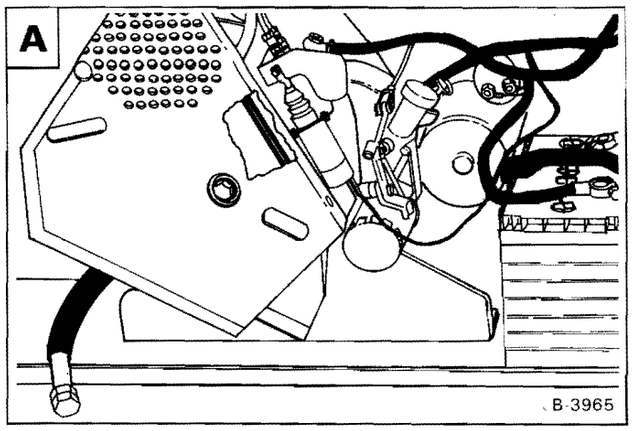
ALTERNATOR

Alternator Belt Adjustment (741)

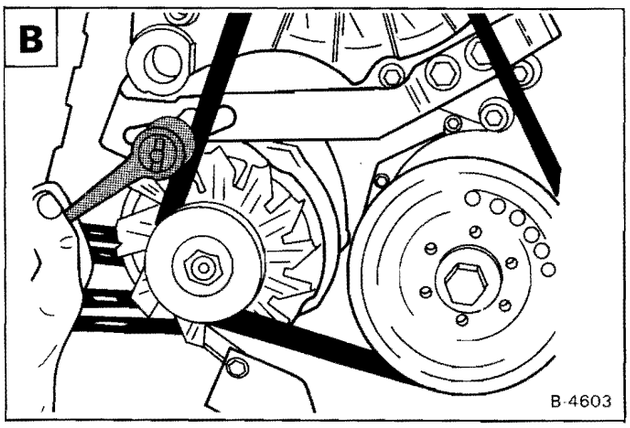
Open the rear door.

Remove the belt shield bolts.

Remove the belt shield from the engine [A].



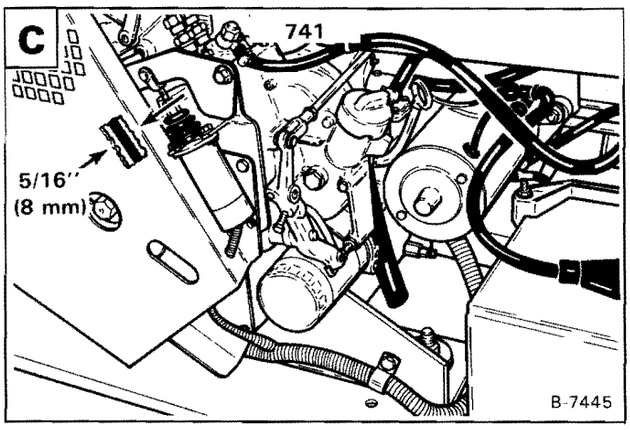
Loosen the adjustment bolt [B].



Move the alternator to set the belt tension at 5/16" (8 mm) deflection with 15 pounds of force [C].

Tighten the adjustment bolt [B].

Install the belt shield.



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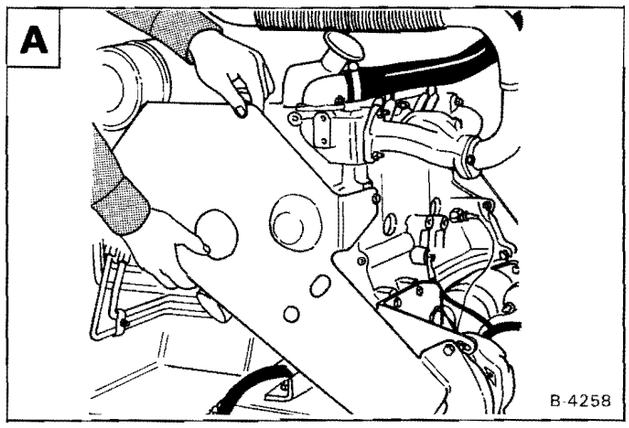
ALTERNATOR (Cont'd)

Alternator Belt Adjustment (742)

Open the rear door.

Remove the belt shield bolts.

Remove the belt shield from the engine [A].

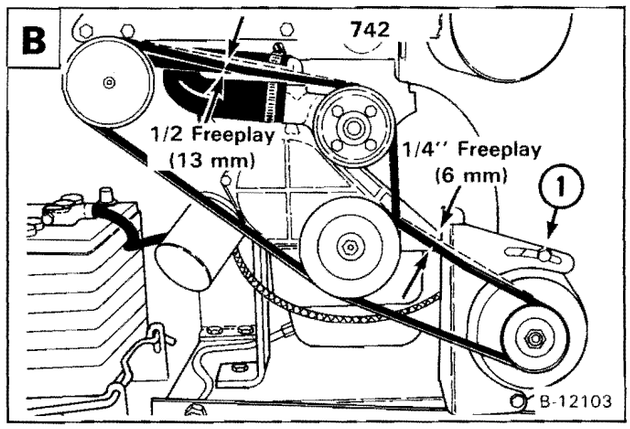


Loosen the adjustment bolt (Item 1) [B].

Move the alternator to set the belt tension at 1/4'' (6 mm) deflection with 20 lbs. (9 kg) pressure [B].

Tighten the adjustment bolt.

Install the belt shield.



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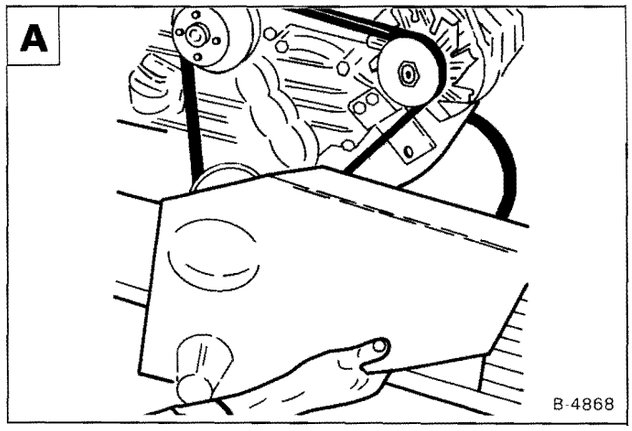
ALTERNATOR (Cont'd)

Alternator Belt Adjustment (743)

Open the rear door.

Remove the belt shield bolts.

Remove the belt shield from the engine [A].

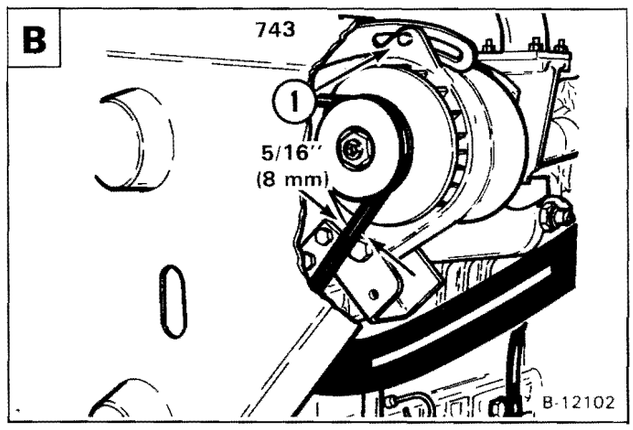


Loosen the adjustment bolt (Item 1) [B].

Move the alternator to set the belt tension at 5/16'' (8 mm) deflection with 15 lbs. (7 kg) pressure [B].

Tighten the adjustment bolt.

Install the belt shield.



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ALTERNATOR (Cont'd)

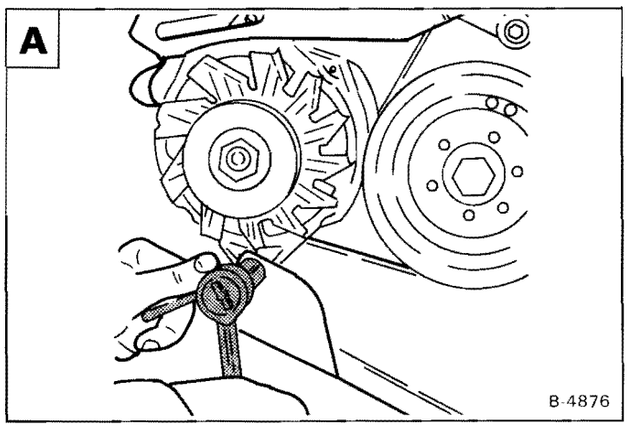
Removal and Installation

Stop the engine.

741: Remove the belt shield (See Page 6—3 for the correct procedure).

Remove the alternator mounting bolts [A].

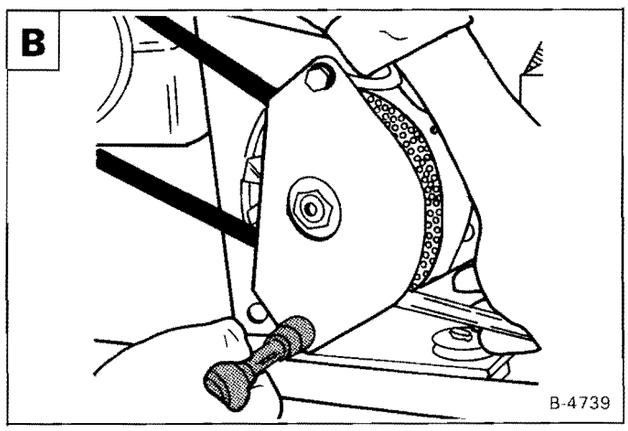
Remove the alternator.



742: Remove the belt shield (See Page 6—4 for the correct procedure).

Remove the alternator mounting bolts [B].

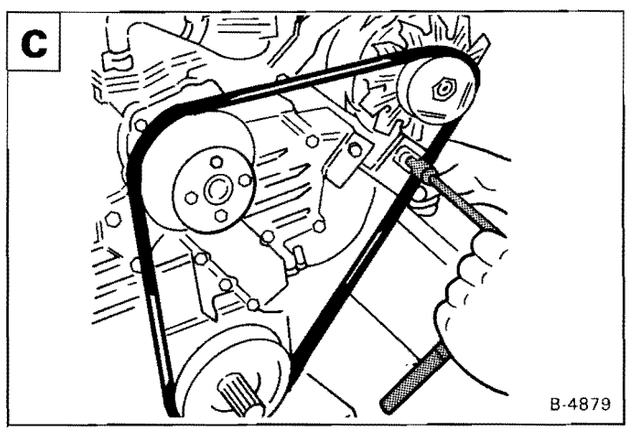
Remove the alternator.



743: Remove the belt shield (See Page 6—5 for the correct procedure).

Remove the alternator mounting bolts [C].

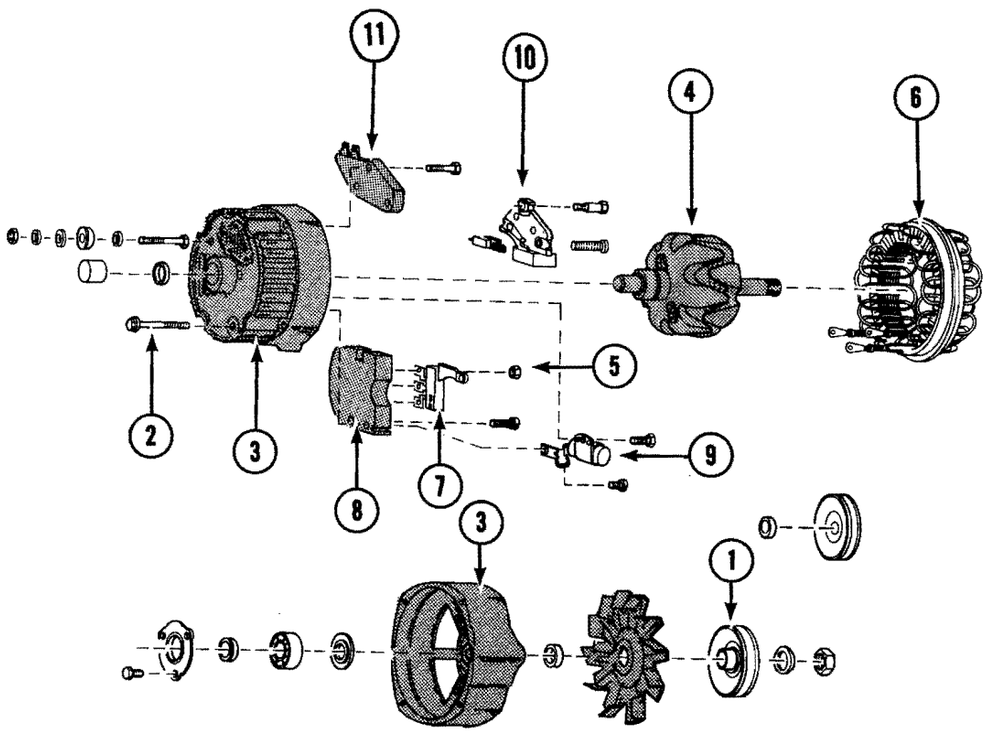
Remove the alternator.



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A

1. Pulley
2. Bolts
3. Case Halves
4. Rotor
5. Nuts
6. Stator
7. Diode Trio
8. Rectifier
9. Capacitator
10. Brush Holder
11. Regulator



C-1802

ALTERNATOR (Cont'd)

Disassembly and Assembly

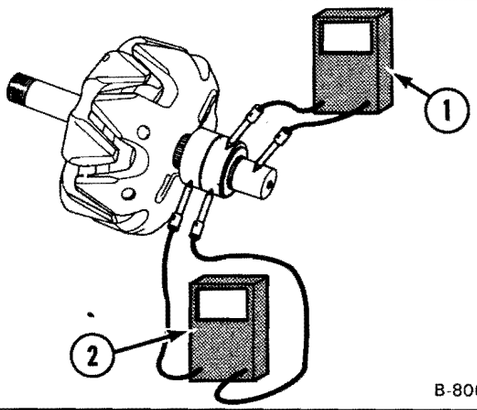
Disassemble the alternator as shown [A].

Connect an ohmmeter as follows to check the rotor [B].

Between one slip ring and the shaft (Item 1). Check the other slip ring. There must be maximum resistance.

Between both slip rings (Item 2). There must be 2.4 to 3.0 ohms. resistance.

B



B-8068

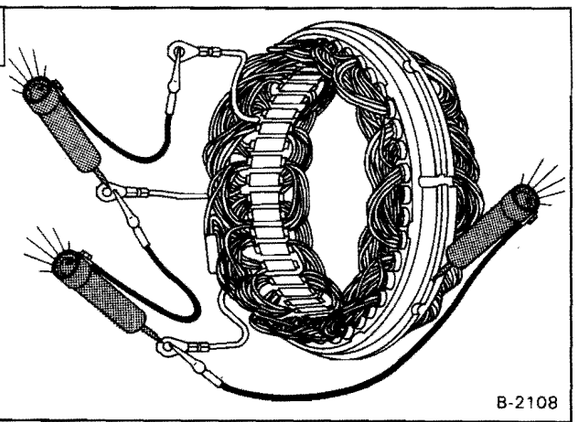
Connect a battery powered test light as follows to check the stator [C].

Between the center wire and an outside wire. Light must come "ON".

Between center wire and the other outside wire. Light must come "ON".

Between one of the wires and frame. Light must NOT come "ON".

C



B-2108

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ALTERNATOR (Cont'd)

Connect a D.C. test light as follows to check the diode trio [A].

IMPORTANT

Do not use voltage which is more than circuit voltage to check the diode trio or the rectifier on the alternator.

I-2026-0284

Between a single connection and one of the three connections. Connect the tester in the opposite direction. The light must come "ON" in one direction, but not in the other direction.

Check each diode with the same procedure.

Connect a test light as follows to check the rectifier [B].

Between one connection and insulated heat sink. Connect the test light in opposite direction. The light must come "ON" in one direction, but not in the other direction.

Between one connection and the grounded heat sink. Connect test light in opposite direction. The light must come "ON" in one direction, but not in the other direction.

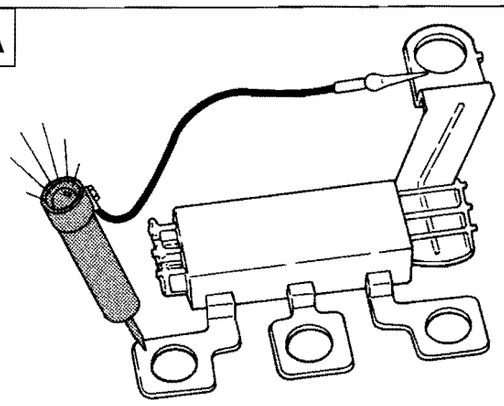
Assembly: Reverse the order of disassembly.

Also if regulator was removed, install new insulated washers and spacers [C].

When installing the brushes, put a piece of straight wire through the housing to hold the brushes in the up position [D].

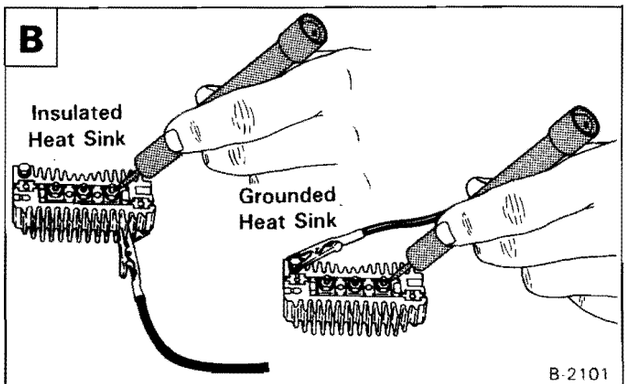
Then install the rotor, when in position pull the wire out to seat the brushes.

A



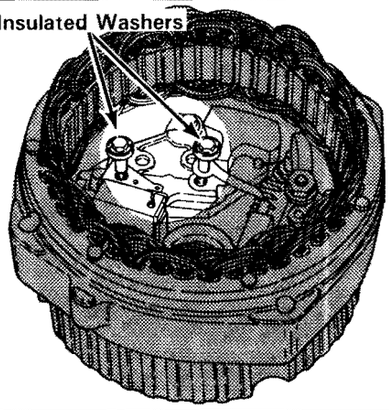
A-2382

B



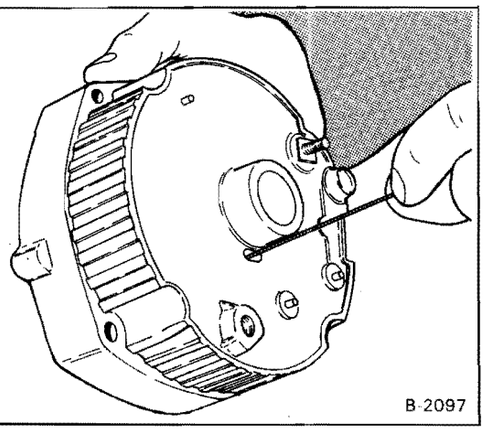
B-2101
B-2102

C



B-2128

D



B-2097

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MELROE ALTERNATOR

Checking the Alternator Output

NOTE: Checking procedure and connections are the same for 741, 742 and 743. The example shown is 743.

⚠ WARNING

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

W-2017-0286

Lift and block the loader (Refer to Page 1—2 for the correct procedure).

Disconnect the negative (—) cable from the battery.

Remove the belt shield.

Disconnect the orange wire (Item 1) from the alternator. Connect that wire to the negative (—) side of the ammeter [A].

Connect the positive (+) side of the ammeter to the output terminal on the alternator (Item 2) [A].

Close the fuel shut-off valve.

Connect the negative (—) cable to the battery.

Turn on the lights and crank the engine for 30 seconds to discharge the battery.

Open the fuel shut-off valve.

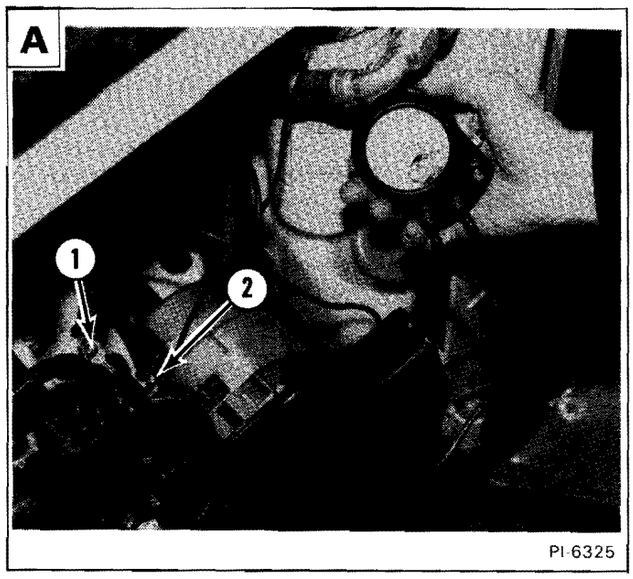
Start the engine and run at 2600 RPM

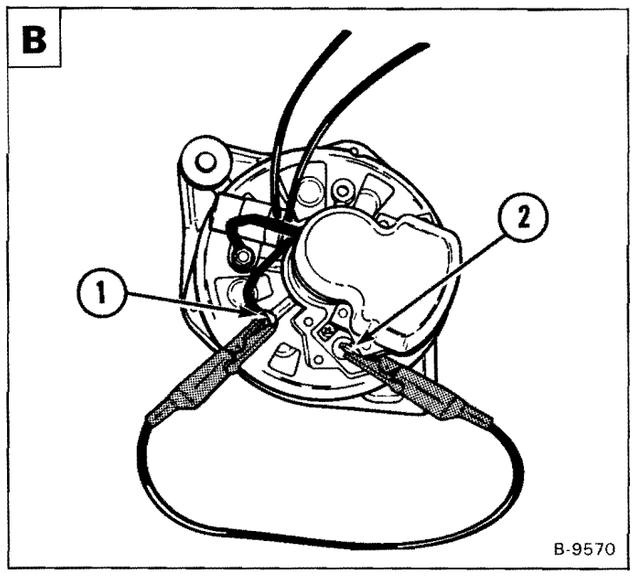
The ammeter reading should be between 45 & 55 amps. @ 2600 RPM.

If the reading is low, remove the screws and pull the regulator cover away from the alternator.

Disconnect the battery and connect a jumper wire from the alternator output terminal (Item 1) [B] to the regulator terminal (Item 2).

Connect the battery cable, start the engine and check the ammeter. If the reading is within the rated amperage (45-55 amps. @ 2600 RPM) replace the diode trio.





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MELROE ALTERNATOR (Cont'd)

Checking the Alternator Regulator

Connect the positive (+) voltmeter lead to the positive (+) battery terminal and connect the negative (−) voltmeter lead to the negative (−) battery terminal [A].

⚠ WARNING

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

W-2017-0286

⚠ WARNING

When an engine is running in an enclosed area, fresh air must be added to avoid concentration of exhaust fumes. If the engine is stationary, vent the exhaust outside. Exhaust fumes contain odorless, invisible gases which can kill without warning.

W-2050-1285

Start and run the engine at 1500-2000 RPM. The voltmeter reading should be between 13.9-14.7 volts [A].

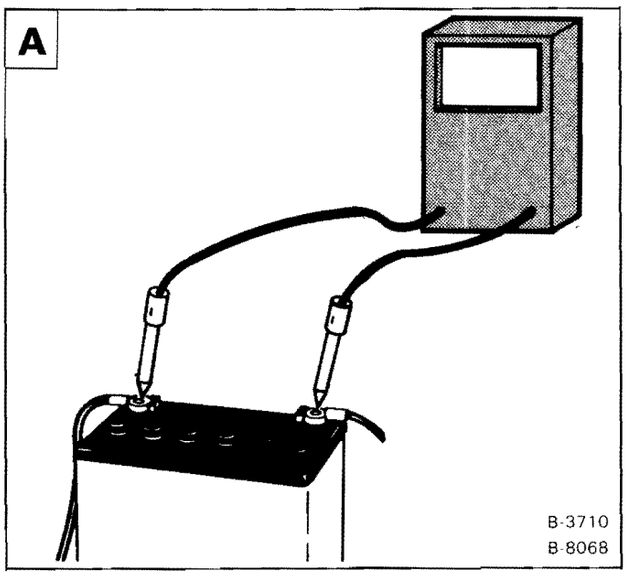
If the reading is low, stop the engine and disconnect the battery.

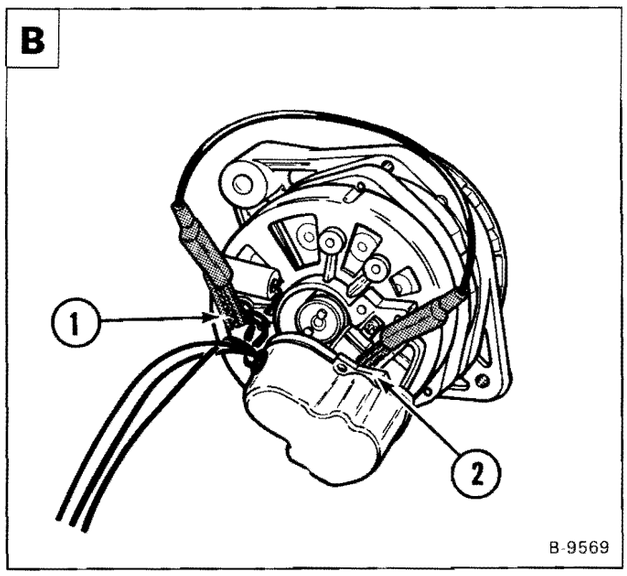
Remove the screws and pull the regulator cover away from the alternator. Connect the jumper wire from the ground stud (Item 1) to the brush terminal (Item 2) (the tan wire) [B].

Connect the battery and start the engine. Run at 1500 RPM. DO NOT allow the meter to exceed 16 volts.

If the reading is 14.5 or above, replace the regulator.

If the reading is 14.5 or below, repair or replace the alternator.





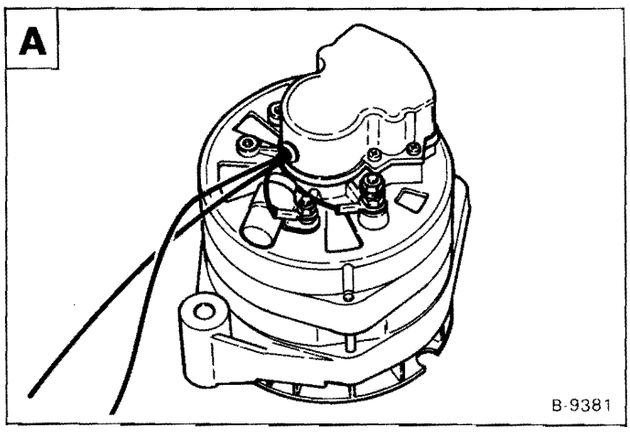
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MELROE ALTERNATOR (Cont'd)

Removal and Installation

Disconnect the negative cable from battery.

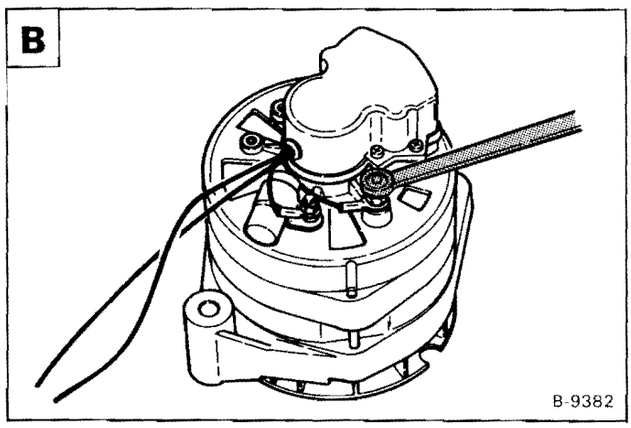
Disconnect the wire terminals from the back of the alternator [A].



Disconnect the battery wire [B].

Remove the adjustment bolt and the mounting bracket bolt.

Remove the alternator.



⚠ WARNING

AVOID INJURY

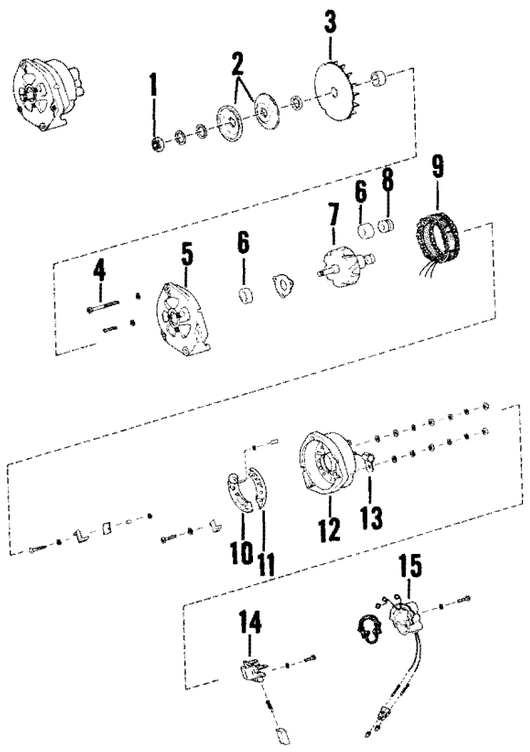
Never service or adjust the machine when the engine is running unless instructed to do so in the manual.

W-2012-1285

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A

1. Nut
2. Pulley
3. Fan
4. Bolt
5. Case Half (Front)
6. Bearing
7. Rotor
8. Slip Ring
9. Stator
10. Heat Sink (+)
11. Heat Sink (−)
12. Case Half (Rear)
13. Condenser Assy.
14. Brush Holder Kit
15. Regulator Kit



D-1760

MELROE ALTERNATOR (Cont'd)

Disassembly and Assembly

Disassemble the alternator as shown [A].

Remove three (3) bolts (Item 4) holding halves together.

Pry halves apart.

Use a soft jaw vise to hold rotor while removing pulley nut (Item 1).

Remove front case half (Item 5) from the rotor using a plastic hammer or press.

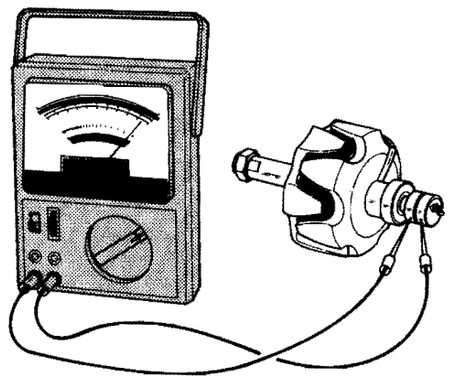
Unsolder the stator wires from the rectifier to test the stator and rectifier. Use a needle nose plier to aid in removal of the wires.

Use the following procedure with an ohmmeter to test the rotor:

Touch both probes on the slip rings. There must be a 3 to 5 ohm reading [B].

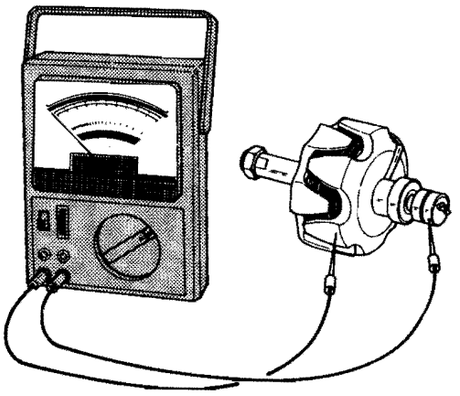
Touch one probe to the shaft and one probe to a slip ring, then to the other. There must be maximum resistance [C].

B



B-9375

C



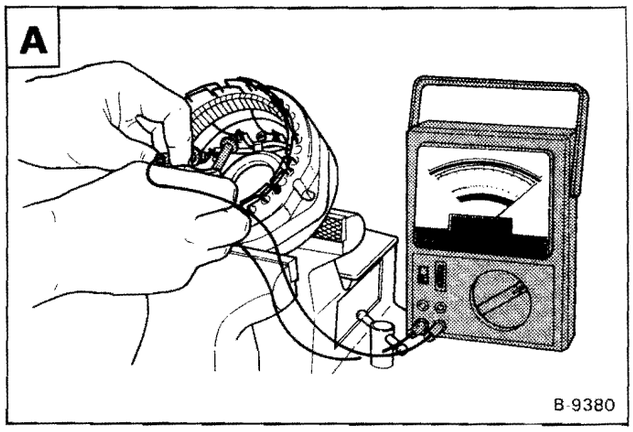
B-9376

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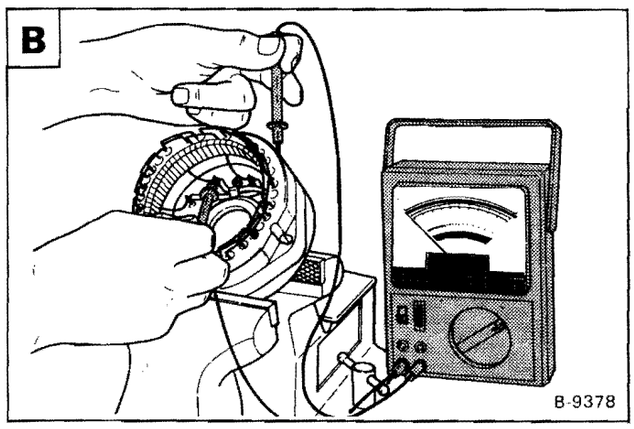
MELROE ALTERNATOR (Cont'd)

Use the following procedure with an ohmmeter to test the stator:

Touch two (2) bare wires of the stator with the probes, take a reading. Move one probe to the other wire. The readings should be the same [A].

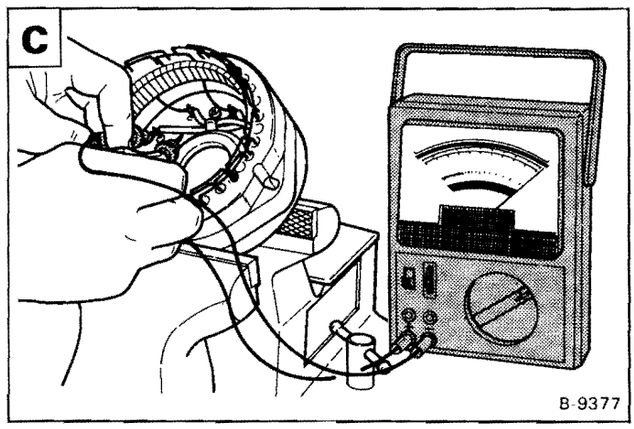


Test for ground by touching one probe on the metal surface of the stator and the other probe on the bare wire. There must be no needle movement [B].

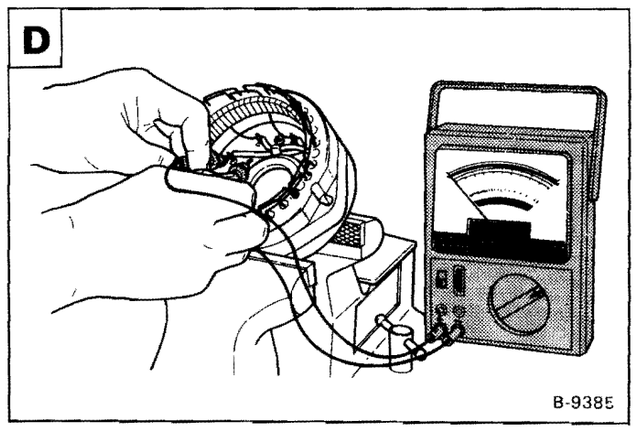


Use the following procedure with a circuit tester to test the rectifier:

Touch the positive probe to the positive diode holder and the negative probe to each diode terminal. There must be continuity [C].



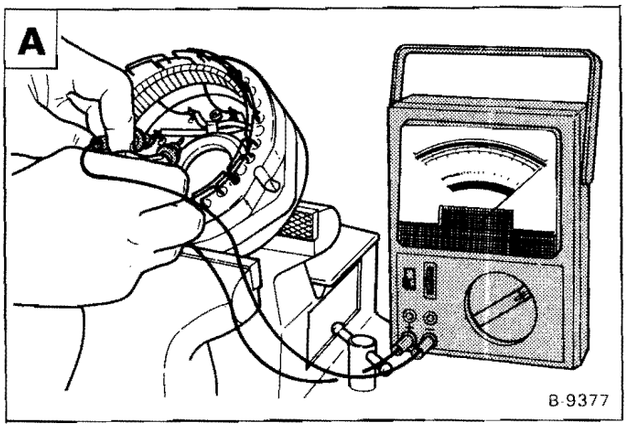
Reverse the probes and check the other direction. There must be no continuity [D].



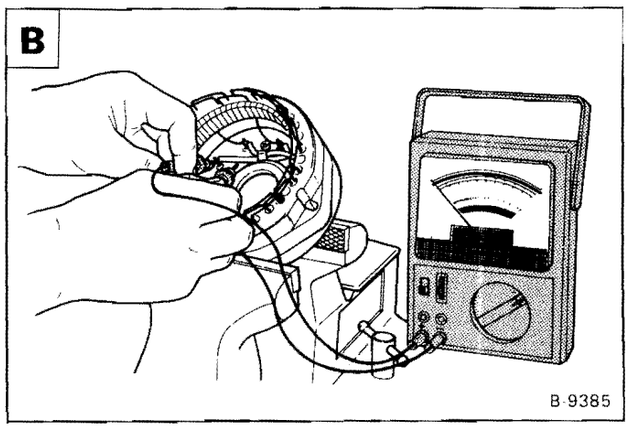
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MELROE ALTERNATOR (Cont'd)

Touch the negative probe to the negative diode holder and the positive probe to each diode terminal. There must be continuity [A].



Reverse the probe and check the other direction. There must be no continuity [B].

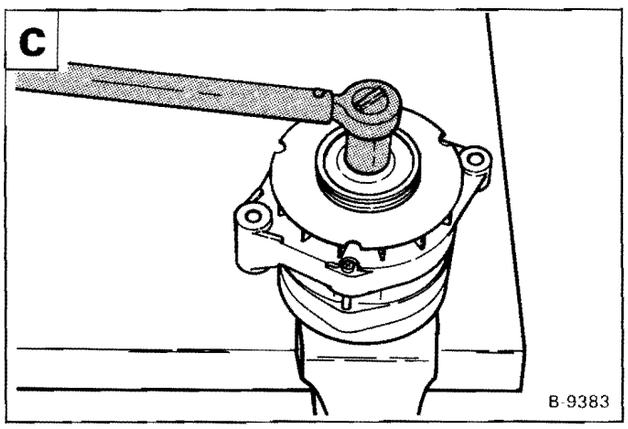


Check the brushes for wear. The maximum length of exposed brushes should be .125" (3 mm).

Replace broken or rusted brush springs.

Reverse the order of disassembly.

Place the rotor in soft jaws when tightening the shaft nut. Tighten to 50 ft.-lbs. (70 Nm) torque [C].



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STARTER

Checking the Starter

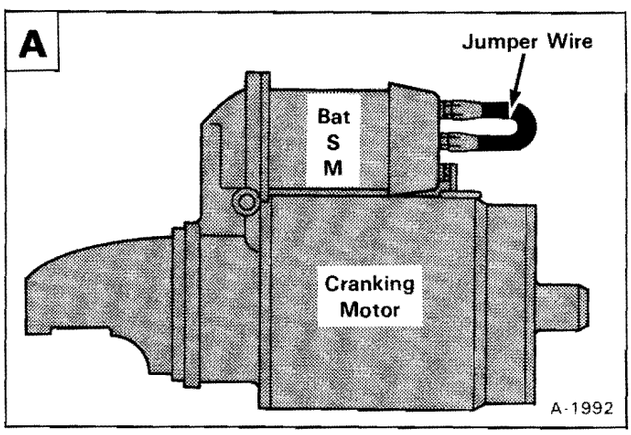
The key switch must be in the "OFF" position.

The battery must be at full charge.

The cable connections must be clean and tight.

Connect a jumper wire between "S" terminal and "BAT" terminal [A].

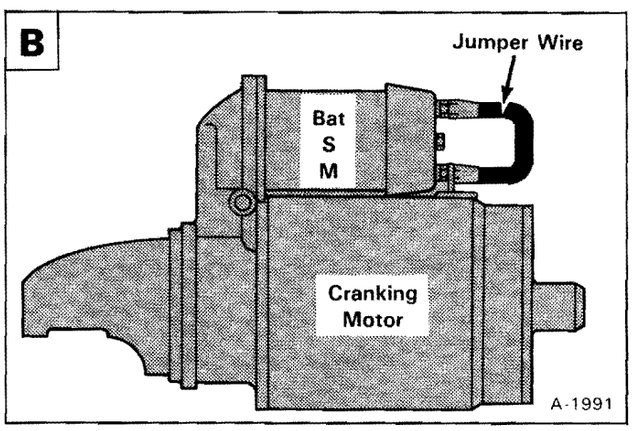
If the starter turns but does not turn the engine, the starter drive has a defect.



Connect a jumper wire between the "M" terminal and the "BAT" terminal [B].

If the starter turns, the defect is in the solenoid.

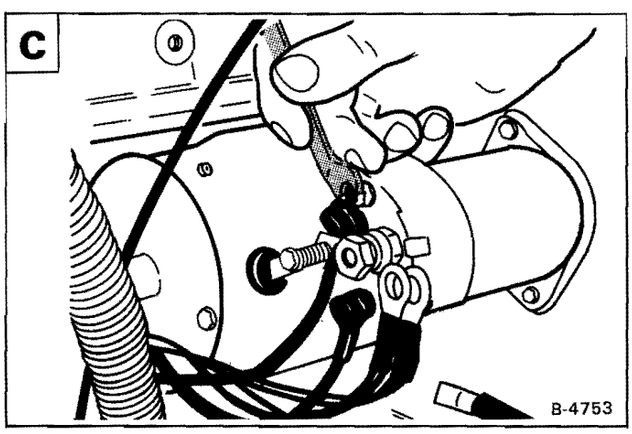
If the starter does not turn, the starter is defective.



Removal and Installation

Disconnect the negative (—) cable from the battery.

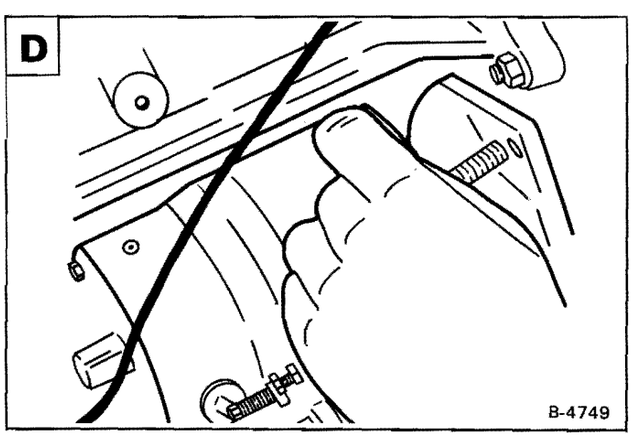
Mark the wires on the starter and solenoid. Remove the wires [C].

* 

Remove the starter mounting bolts [D].

Installation: Tighten the bolts to 25-28 ft.-lbs. (34-38 Nm) torque.

Remove the starter.

* 

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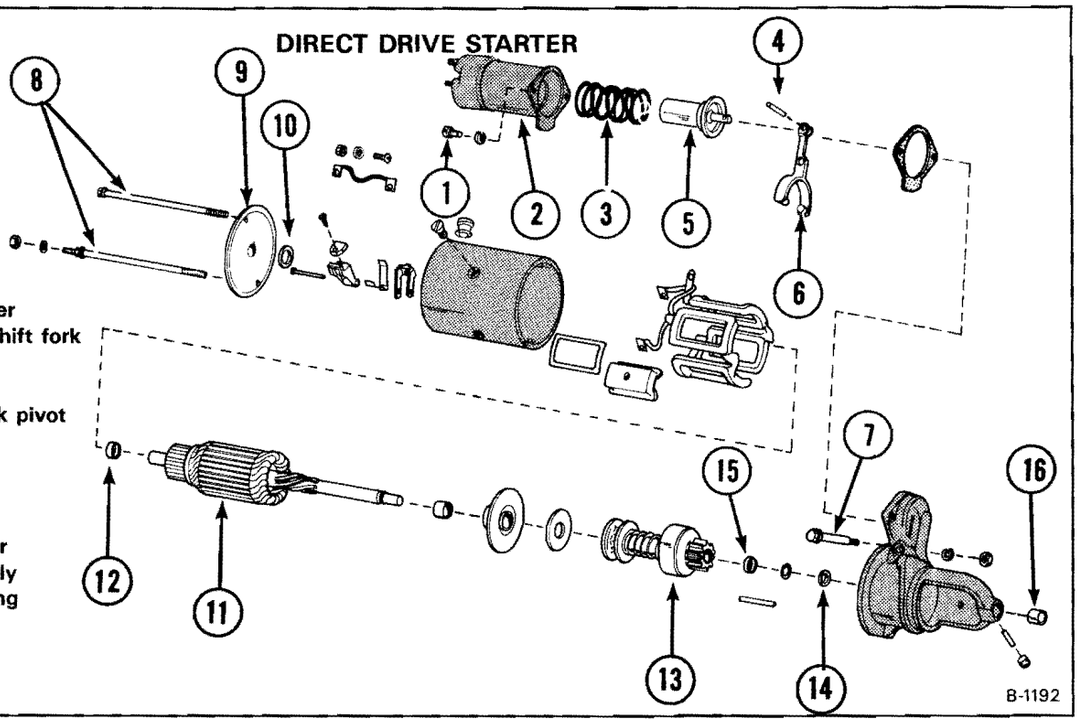
STARTER (Cont'd)

Disassembly and Assembly

Disassemble the starter as shown in figure [A].

A

DIRECT DRIVE STARTER



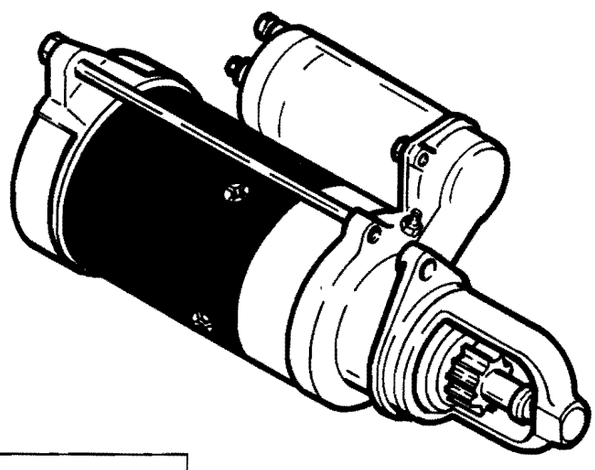
1. Bolt, solenoid
2. Solenoid
3. Spring, plunger
4. Pin, plunger/shift fork
5. Plunger
6. Shift Fork
7. Bolt, shift fork pivot
8. Bolt, end cap
9. End Cap
10. Shim Washer
11. Armature
12. Thrust Washer
13. Drive Assembly
14. Drive Stop Ring
15. Thrust Collar
16. Bushing

Disassembly and Assembly

Disassemble the starter as shown in figure [B].

B

GEAR REDUCTION STARTER



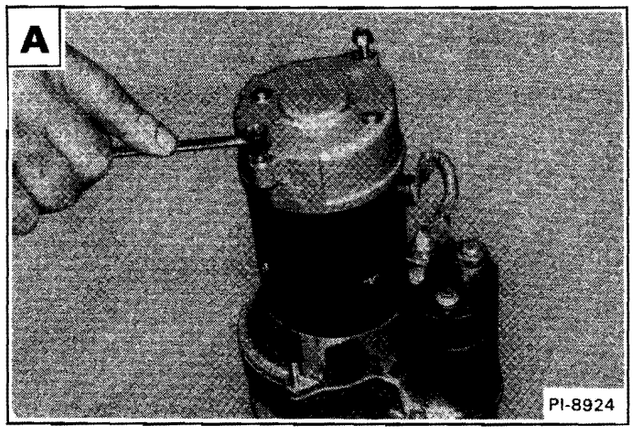
NOTE: Component break down information for the gear reduction starter was unavailable at print date.

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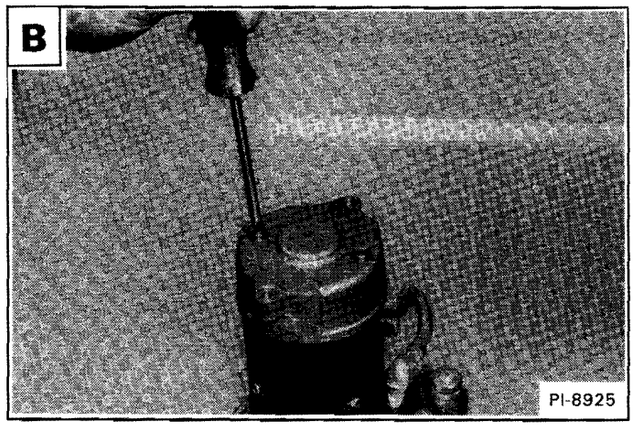
STARTER (Cont'd)

Disassembly and Assembly (Gear Reduction)

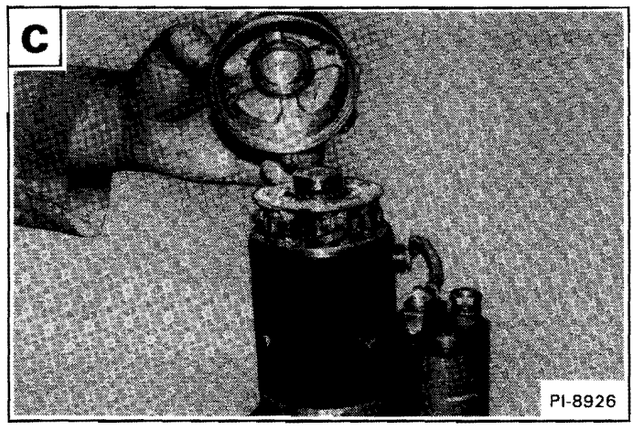
Remove the starter thru-bolts [A].

* 

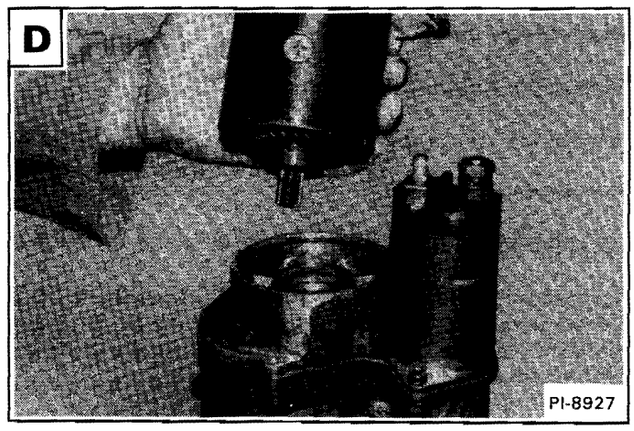
Remove the screws for the brush holders [B].

* 

Remove the starter end cap [C].

* 

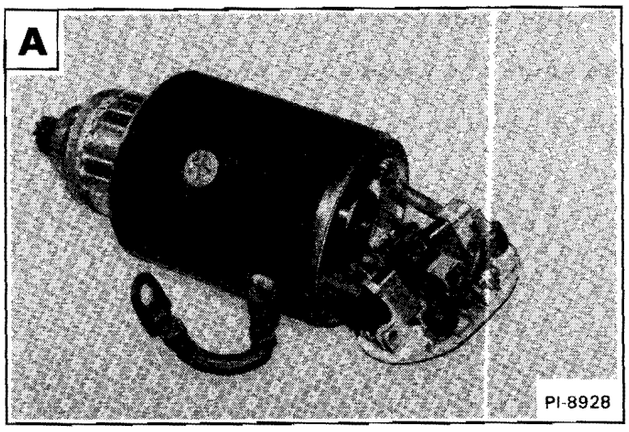
Remove the starter housing/armature assembly from the reduction gear drive [D].

* 

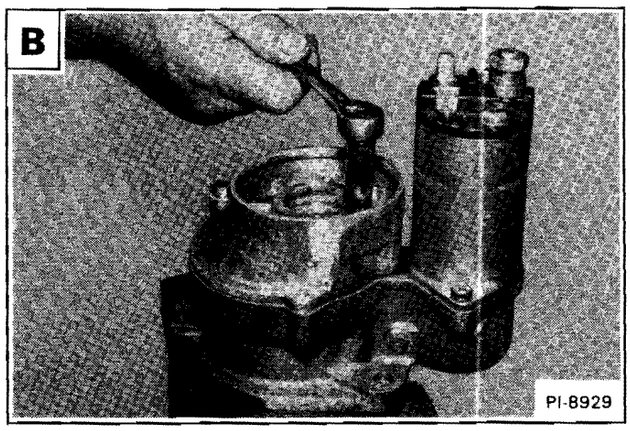
https://truckmanualshub.com/

STARTER (Cont'd)

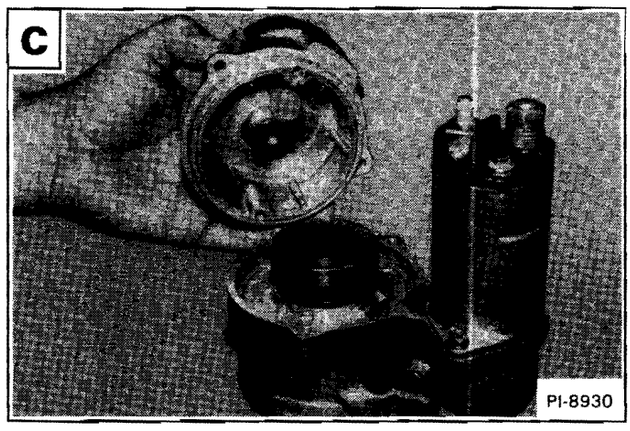
Remove the armature and brushes from the starter housing [A].



Remove the bolts from the reduction gear housing [B].



Remove the reduction gear housing [C].



Replacing the Brushes

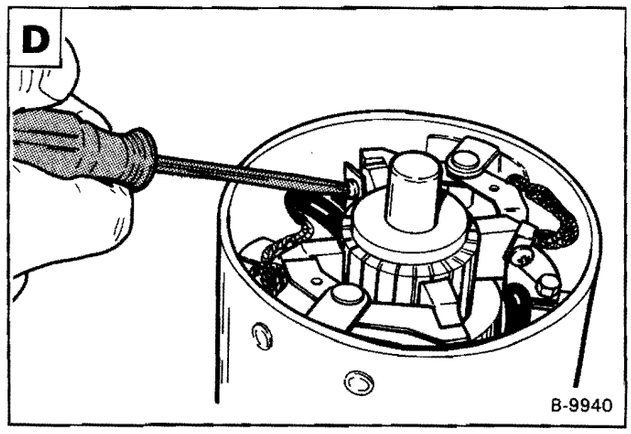
Remove the screws at the brushes [D].

Remove the screws at the brush leads.

Remove the old brushes.

Install the new brushes and make sure to tighten the screws.

Assembly of the starter: Reverse the order of disassembly. Put a small amount of grease on the splines of the armature and the bushings. Add or remove shims at the drive end of the armature to adjust the end play.



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STARTER (Cont'd)

Cleaning and Inspection

Use a brush and air pressure to clean the drive, field coils, armature and starter housing.

NOTE: Do not use solvent to clean the drive assembly. The solvent will remove the lubricant and the drive will slip.

Check the following items:

Armature
- Broken or burned insulation
- Loose connections at commutator
- Open or grounded circuits [A] & [B]
- Worn shaft or bearings
- Rough commutator

Brush Holders
- Broken springs
- Broken insulation
- Spring tension

Field Coils
- Broken or burned insulation
- Electrical continuity
- Brush connections

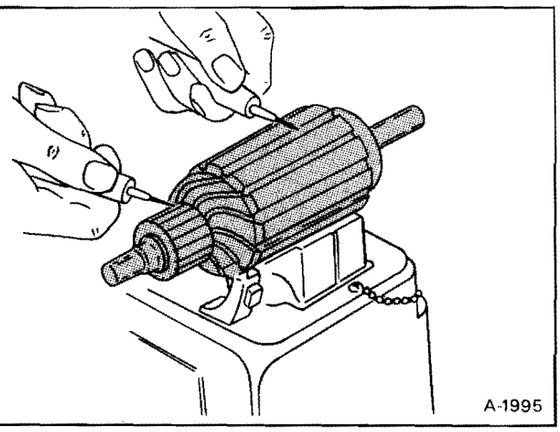
Drive Gears
- Worn teeth
- Tooth engagement

Field Coils
- Broken or burned insulation
- Electrical continuity [C]
- Brush connections

Drive Gear
- Worn teeth
- Tooth engagement (drive gear must engage ring gear by 1/2 the depth of the ring gear tooth)

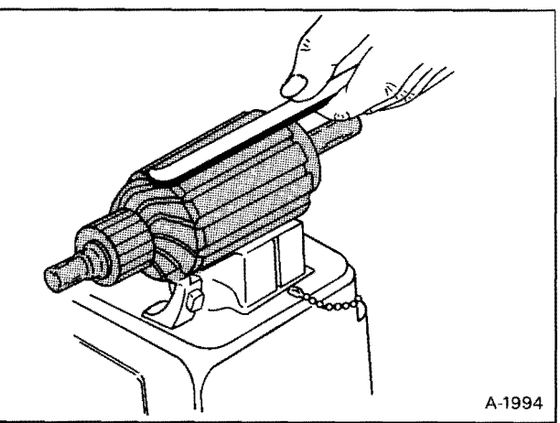
To test for ground, use a test light and touch one probe to the body and the other probe to the field winding end of the brush. The lamp should not light [D].

* A



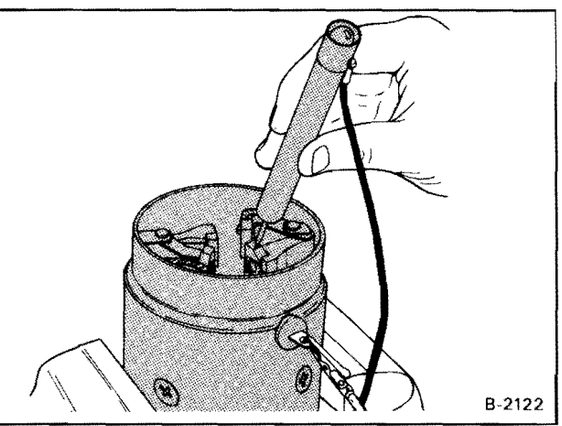
A-1995

* B



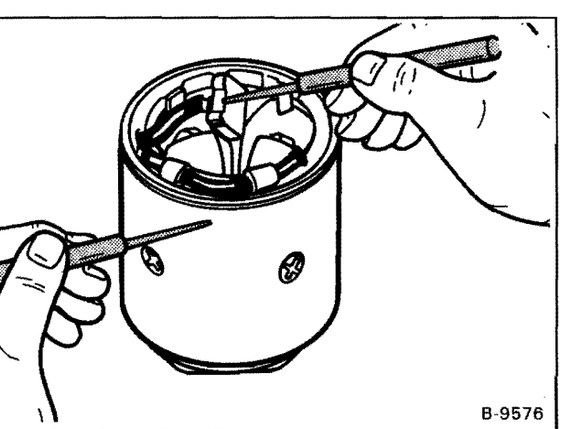
A-1994

* C



B-2122

* D



B-9576

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MITSUBISHI ENGINE (742)	7D—1

⚠ WARNING

Instructions are necessary before operating or servicing machine. Read 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. Failure to follow instructions can cause injury or death.

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(Deutz 741)

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ENGINE SERVICE (Deutz 741)

TROUBLESHOOTING

The following troubleshooting chart is provided as an assistance in locating and correcting problems which are most common. Many of the recommended procedures must be done by trained service personnel only.

PROBLEM	CAUSE
Engine will not turn over with the starter.	1, 2, 3, 4, 5, 6
Engine will not start or is difficult to start.	7, 8, 9, 10, 11, 12, 13, 14, 15
Engine will not run correctly (misses) or stops.	16, 17, 18, 19
Engine overheats.	16, 20, 21, 22, 23, 24
Too much engine vibration.	25, 26

KEY TO CORRECT THE CAUSE

1. Battery has lost its charge.
2. Loose battery connections.
3. Loose starter connections.
4. Damaged starter switch.
5. Broken or disconnected wire harness.
6. Damaged starter or solenoid.
7. Wrong starting procedure.
8. No fuel in tank.
9. Dirty air cleaner.
10. Fuel tank vent cap is restricted.
11. Damaged fuel lift pump.
12. Hydraulic/Hydrostatic load on engine.
13. Fuel injection system damaged.
14. Excess fuel function not working.
15. Incorrect crankcase oil.
16. Fuel injection set wrong.
17. Dirty fuel or restricted fuel filter or vent.
18. Poor compression.
19. Water in the fuel.
20. Engine is overloaded.
21. Dirty engine cooling fins.
22. Engine has been operated with covers removed.
23. Dirty engine oil.
24. Restricted exhaust system.
25. Loose engine mounts.
26. Worn rubber mounts.

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FUEL SYSTEM

Fuel System Service

Engage the parking brake and start the engine.

Push the throttle forward until it is against the stop.

If it is not against the stop loosen the nut (Item 1), remove the pin (Item 2) and turn the clevis to adjust throttle aginst the stop [A]. High idle must be 2950-3000 RPM. If not correct, turn the adjustment screw.

Push down the solenoid rod (Item **1**) to check that the rod contacts fuel excess button. The lever must not hit the collar around the fuel excess button [B].

Adjust the lever until there is .0312 (0,79 mm) clearance [B].

NOTE: It is important that the linkage is adjusted so the plunger in the solenoid is in a full down position when engaged. If it is not, there will be damage to the solenoid.

Venting Air From the Fuel System

Air must be vented from the fuel system after the following conditions.

Replacement of fuel filters.

Replacement of fuel system parts.

The machine has run out of fuel.

The fuel line has been replaced or repaired.

Removing water from the water trap.

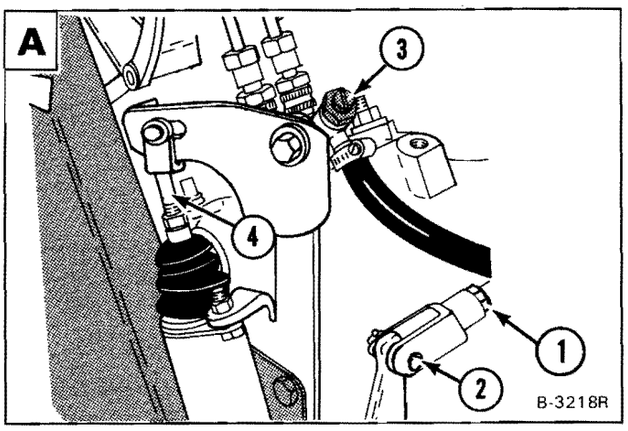
To vent air from the fuel system use the following procedure:

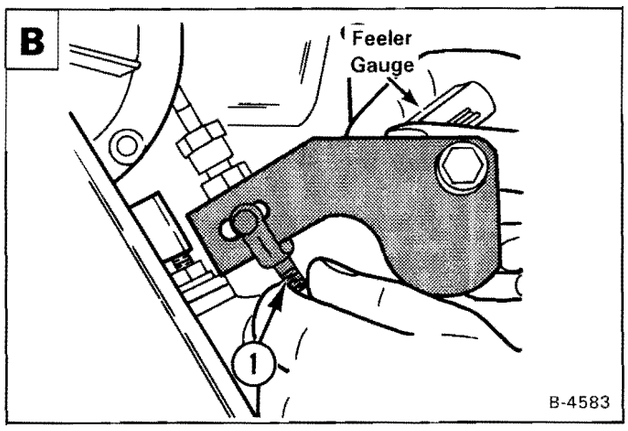
Fill the tank with clean approved fuel.

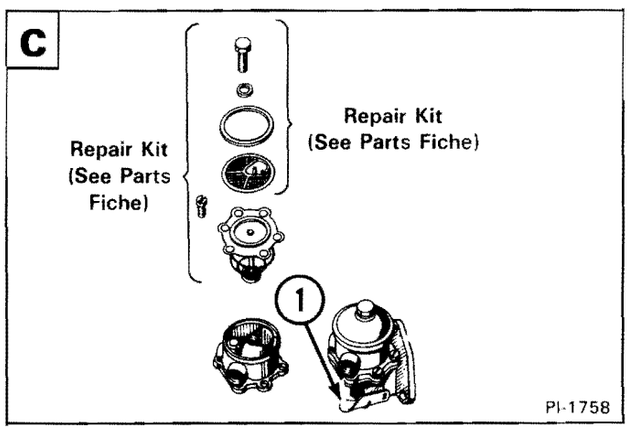
Check the in-line filter and fuel line for dirt. Both must be clean and have no restrictions.

Loosen the slotted plug (Item 3) [A].

Move priming lever (Item 1) [C] until you cannot see air coming from the slotted plug (Item 3) [A]. Tighten the fitting.







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FUEL SYSTEM (Cont'd)

Loosen the injector fittings [A].

Turn the engine with the starter until no air bubbles come from the loose fitting.

Tighten the fittings.

NOTE: **DO NOT overtighten the fittings.**

⚠ WARNING

Always clean up spilled fuel or oil. Keep heat, flames, sparks and 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.

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Fuel Filters

There are two fuel filters used in the fuel system.

1. Fuel pump strainer [B].

To clean the fuel pump strainer remove the cover on the top of the pump. Strainer and gasket can be removed and cleaned with compressed air.

IMPORTANT

Keep the fuel system clean.

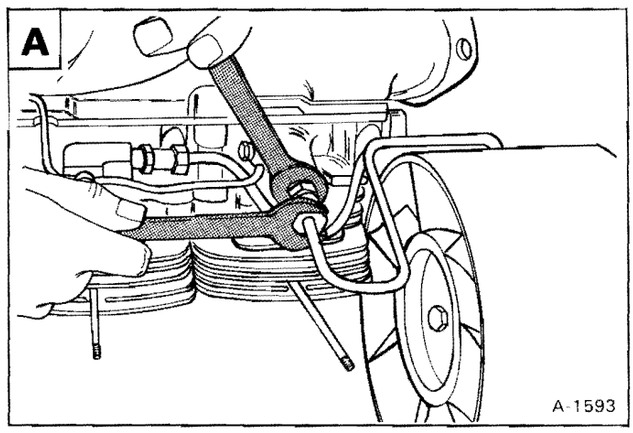
2. Filter element [C].

To install a new cartridge, loosen the bolt (Item 1) [C].

Remove the filter (Item 1) and install the new filter [D].

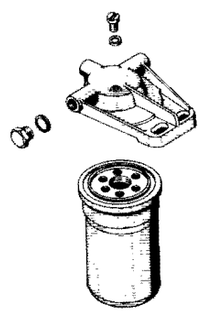
NOTE: **When the fiters are removed or if the engine runs out of fuel, air enters the fuel system and venting of the fuel system is necessary.**

A



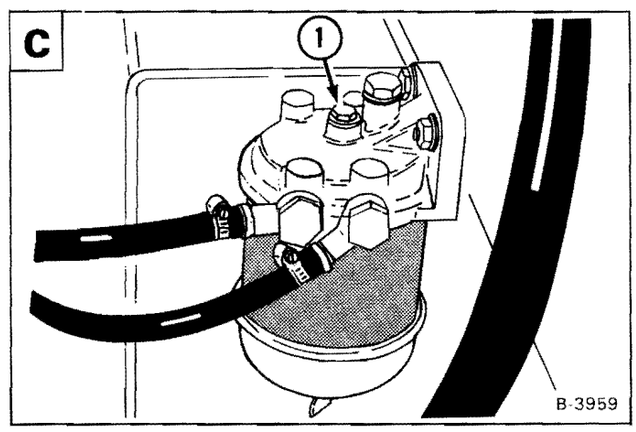
A-1593

B



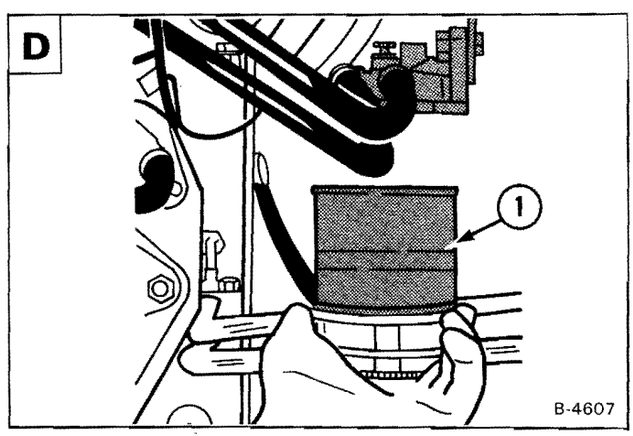
PI-1758

C



B-3959

D



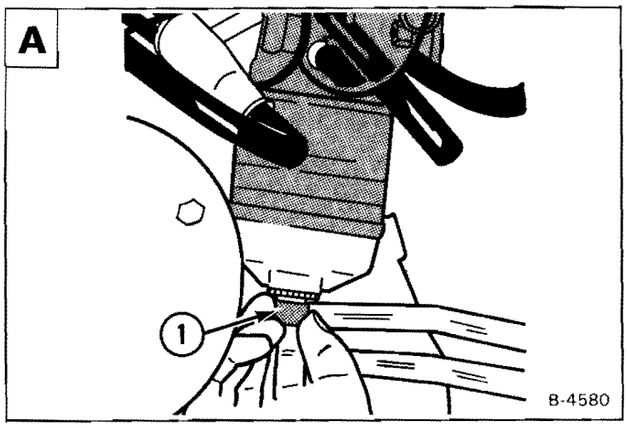
B-4607

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FUEL SYSTEM (Cont'd)

Fuel Water Trap

The water is removed by loosening the screw (Item 1) at the bottom of the fuel filter. Tighten the screw after the water has been removed [A].



Fuel Lift Pump

Repair kits are available for the lift pump. Check the lift pump pressure by turning the engine over and checking with a gauge. If the pump does not give enough pressure, install the repair kit or replace the pump. (See Section 8 for the correct pressure).

Fuel Injection Pump

To check delivery valves and pump elements do the following:

Remove the fuel injection lines from the injection pump.

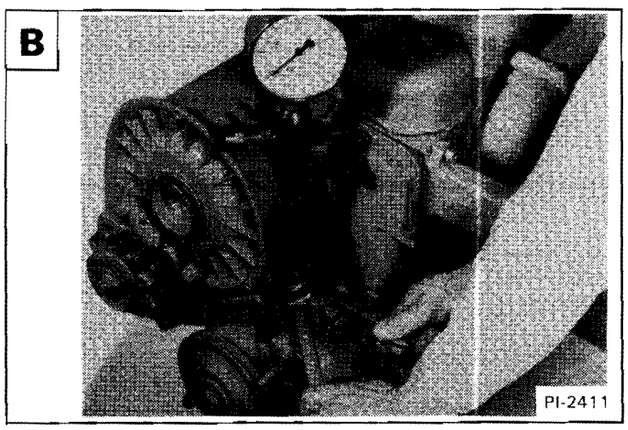
Install the pressure indicator tool loosely to one of the open connections [B]. Turn the engine over several revolutions to remove air and then tighten the nut.

Open the throttle.

Turn the engine with the starter until the pressure on the gauges is a least 1074 PSI (7909 kPa). Wait for one minute. The decrease in pressure must not be more than 145 PSI (100 kPa) on the delivery valve.

Turn the engine 5 revolutions. The pressure shown on the gauge must be at least 4347 PSI (300 bar).

If either of the two pressures are low the pump is damaged.



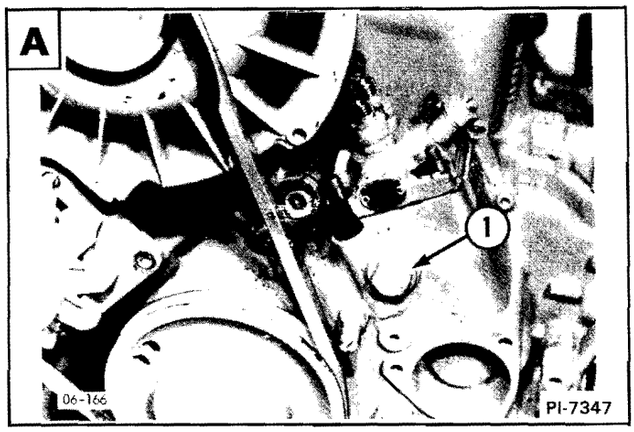
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FUEL SYSTEM (Cont'd)

Injection Pump Removal and Installation

NOTE: The excess fuel button must not be engaged.

Disconnect the fuel injection lines and the fuel lift pump. Remove the inspection plug (Item 1) at the front cover [A].



Remove the four nuts and remove the pump [B]. Note the number of shims (Item 1) used under the pump [B].

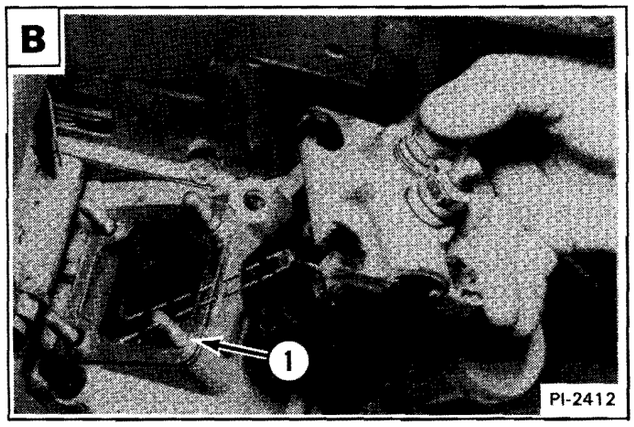
Remove the screw and sleeve from the pump.

Installation: Tighten the screw to 2 ft.-lbs. (2,5 Nm) torque.

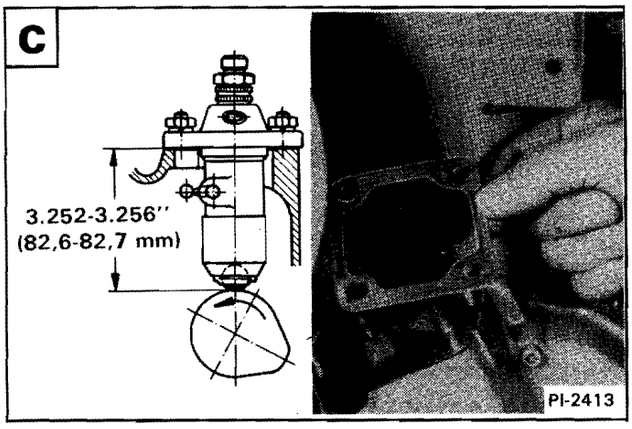
Replace the injection pump if it is damaged or worn.

Put a new gasket on the pump fastening surface.

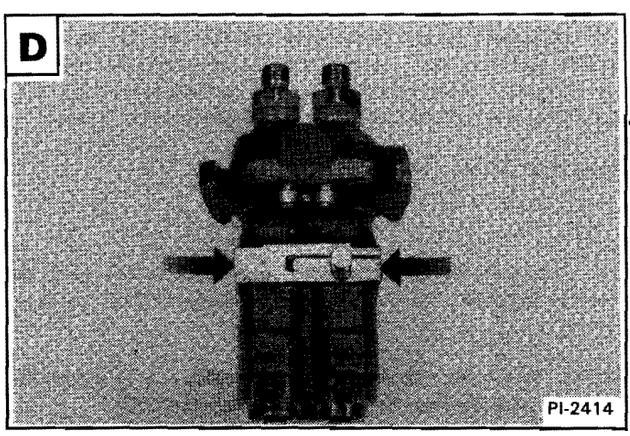
Turn the camshaft so the cam lobes cannot be seen.



Measure the distance from the top of the gasket to the camshaft [C]. Add shims on the top of the gasket until the distance is 3.252-3.256" (82,6-82,7 mm) [C].



Move the rack of the injection pump lever with the recess in the engine housing [D].



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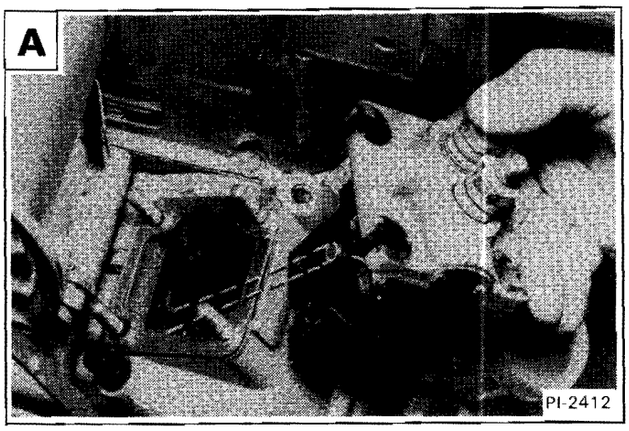
FUEL SYSTEM (Cont'd)

Align the ball on the pump rack [A].

Install the injection pump and connect the fuel line using new gaskets on both sides of the banjo fitting.

Install the screw and sleeve.

Install the plug in the front cover.



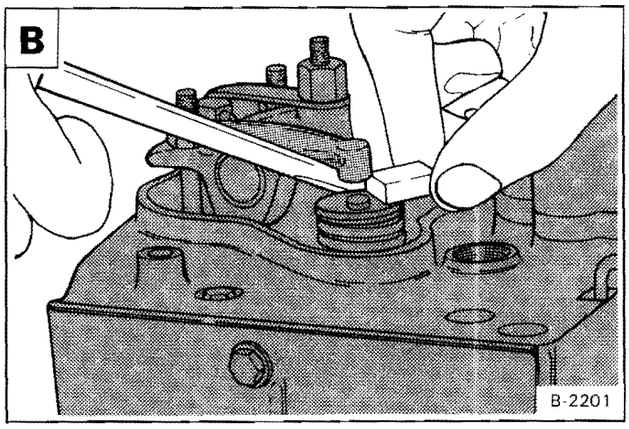
Use the following procedure to find top dead center (TDC):

Check the valve clearance and adjust as needed. Both intake and exhaust valves. Clearance must be .006'' (9,15 mm) cold.

Turn the pulley counterclockwise by hand so that the piston closest to the pulley, #2 cylinder, is at the point of maximum compression (TDC).

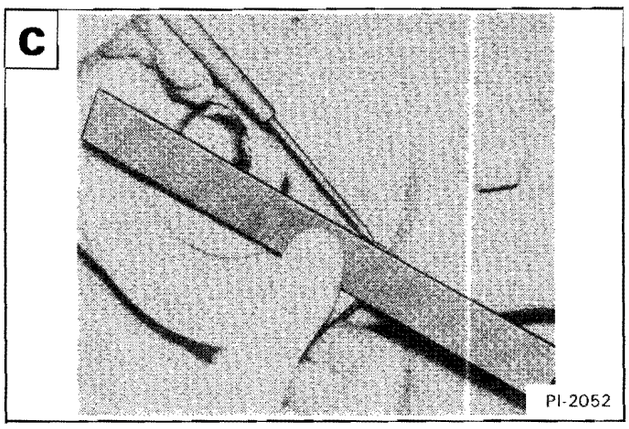
Turn the pulley clockwise 45°. Push down one of the valves on the #2 cylinder (closest to the pulley) with a screwdriver. Put a piece of 1/4'' (5,6 mm) spacer between the valve stem and the rocker arm [B].

Carefully turn the pulley by hand, counterclockwise until the piston hits the valve.



IMPORTANT

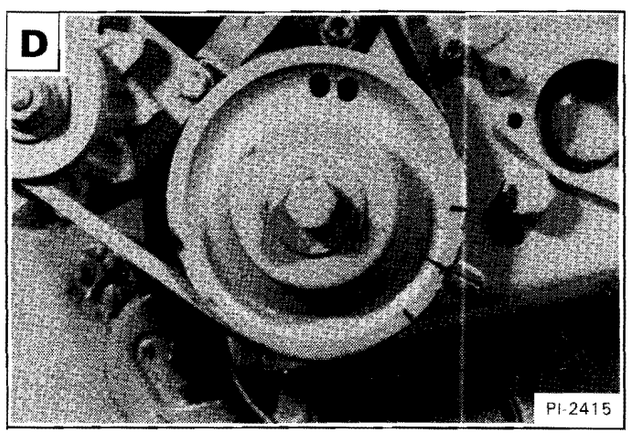
Turn the pulley by hand at a slow rate. Be careful not to damage the valve or the piston.



Put a mark on the pulley in line with the mark on the engine cover [C]. Turn the pulley clockwise about 45° and remove the spacer.

Turn the front pulley past (TDC) 90° counterclockwise. Put the 1/4'' (5,5 mm) spacer in between the same valve stem and rocker. Carefully turn the pulley by hand, clockwise until the piston again hits the valve. Put a mark at this position [C]. Turn the pulley counterclockwise 45° and remove the spacer.

Install the cylinder head valve covers.



Use a steel flexible rule to mark and measure the half-way position between the two marks [D]. This is (TDC), top dead center.

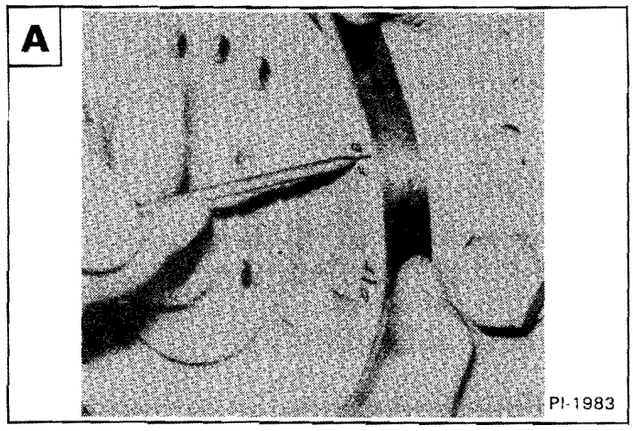
NOTE: When the center mark on the pulley is in line with the mark on the housing #2 cylinder is (TDC).

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IMPORTANT

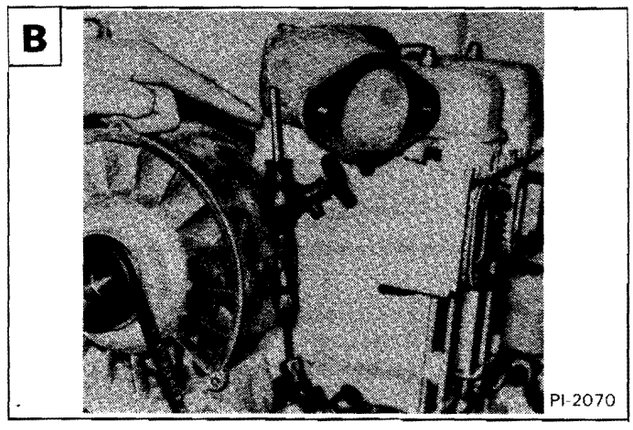
The excess fuel button must be in the "UP" position.

Make a mark 25° before TDC. This mark is 1.4" (35,6 mm) counterclockwise of the TDC mark [A].



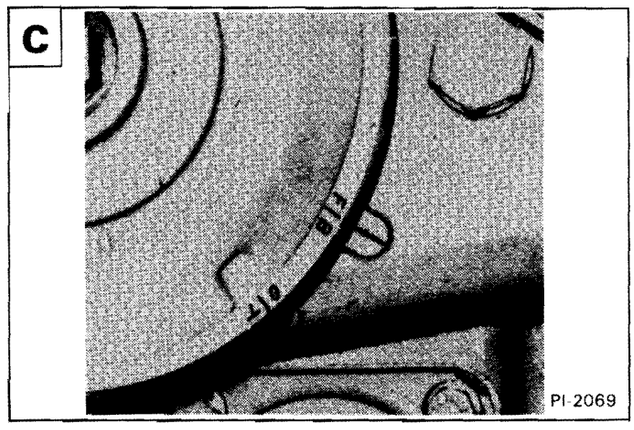
Install the capillary tube (tool P/N 003-1085) in the injection pump fitting for the #2 cylinder [B].

NOTE: If the capillary tube is not available the clear plastic cartridge from a ball point pen can be installed in the hole of the pump connection.



Vent the air from the fuel system by turning the engine several revolutions with the starter until there is no air coming up with the fuel.

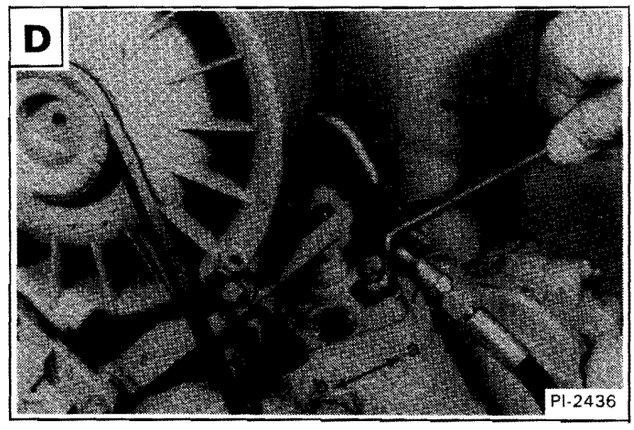
Turn the engine by hand in the direction of normal rotation at a slow rate until fuel begins to show in the clear tube. When this happens the 25° mark on the housing is in alignment [C].



If it is not in alignment, loosen the injection pump and move it in or out for adjustment of the injection timing [D].

Direction "A" – Advanced Timing.

Direction "B" – Retarded Timing.



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FUEL SYSTEM (Cont'd)

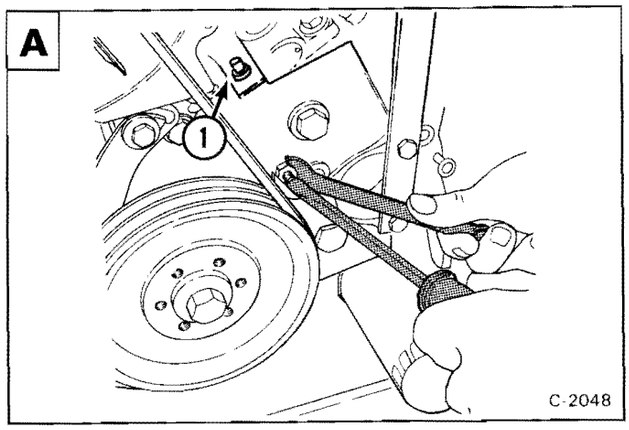
Fuel Delivery Adjustment

Engage the parking brake.

Start the engine and run at full RPM.

Push the levers forward at a slow rate until the engine begins to stall. There must very little black smoke coming from the muffler.

NOTE: Be sure button (Item 1) is up.



IMPORTANT

Incorrect adjustment of the fuel delivery will shorten the life of the engine. At high altitudes, the engine will have a rich mixture if the fuel delivery adjustment is not correct. This will damage the engine.

If there is excessive black smoke put the levers in neutral position. Remove the cap and copper washer from the fuel adjustment screw. Turn the screw in or out until there is a small amount of black smoke coming from the muffler. Tighten the lock nut on the screw [A].

Install the washer and the cap.

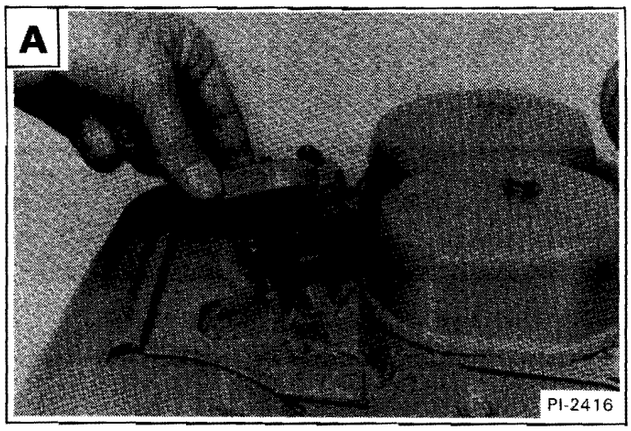
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FUEL INJECTION NOZZLES

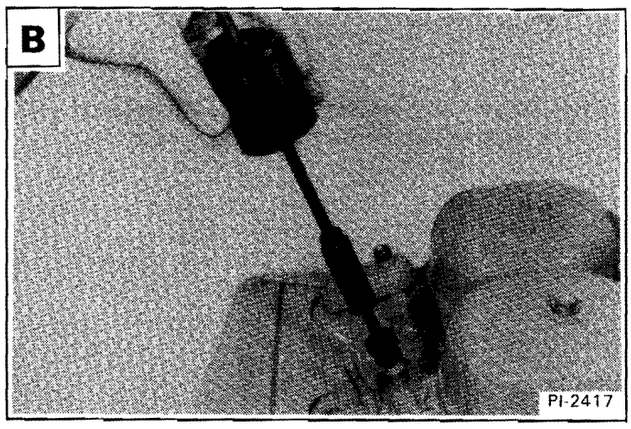
Removal and Installation

Disconnect the fuel lines.

Remove the nut and the yoke [A].



Remove the nozzle. Use a nozzle puller if necessary (P/N 003-0463 extractor and 003-0536 slide hammer) [B].



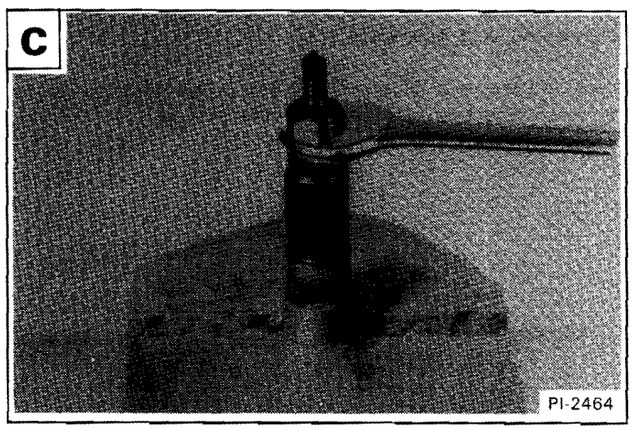
Injection Disassembly and Repair (In The Shop)

The tools listed will be needed to do the following procedure:

OEM-1064 — Diesel Fuel Injection Nozzle Tester
OEM-1065 — Accessory Kit

Special equipment is needed for service of injection nozzles. The following procedures are given only for cleaning and inspection.

Clamp the body of the injector valve in a vise. Remove the lower parts and the internal parts very carefully [C].



Wash them in clean diesel fuel.

Use a stiff bristle brush (brass) to clean the injector tips.

IMPORTANT

DO NOT use a steel brush to clean the injector tips.

Check the needle valve and seat for wear and dirt. Replace both if either is damaged.

Assemble the injector. Check the release pressure and spray pattern with an injector tester (See Section 8A for specifications).

NOTE: A new sealing gasket MUST be installed each time an injector is replaced.

Installation is the reverse of removal.

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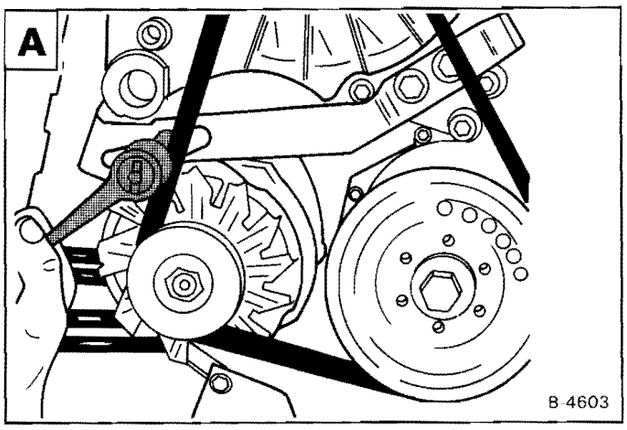
BLOWER FAN

Removal and Installation

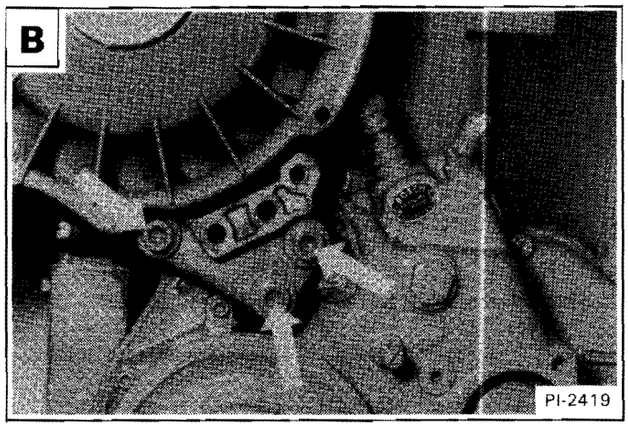
IMPORTANT

Be careful not to damage the fan blades.

Remove the belt shield and loosen the alternator to remove the v-belt [A].

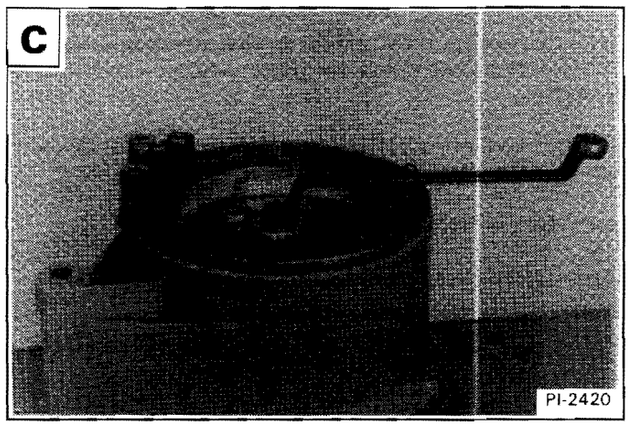


Remove the alternator bracket and the three bolts that hold the blower in position [B]. Remove the blower assembly.



Disassembly and Assembly

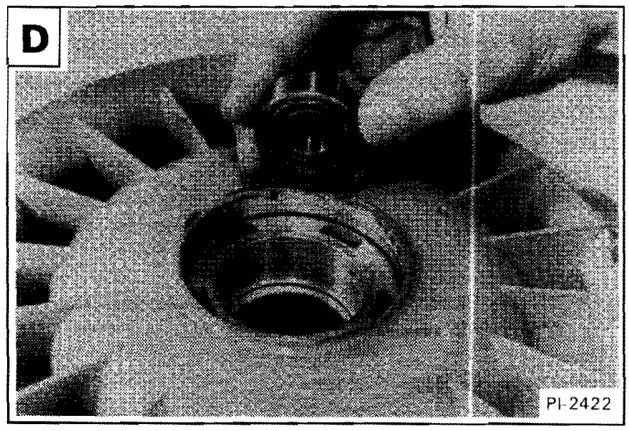
Clamp the pulley of the cooling fan in a vise with protective aluminum jaws and remove the center bolt [C].



Remove the blower fan [D].

Remove the drive shaft from the fan housing using a soft metal drift punch.

Remove the ball bearing from the drive shaft using a bearing puller.



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BLOWER FAN (Cont'd)

Remove the snap ring from the ball bearing in the housing [A]. Remove the ball bearing using a soft metal drift punch [B].

Fill the new bearing with high temperature bearing grease.

Press the small bearing into the fan housing with the closed side down.

Install the snap ring to hold the bearing in position.

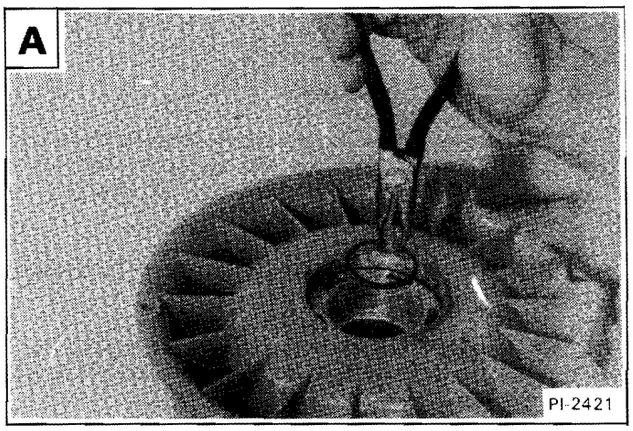
Press the large ball bearing over the drive shaft with the closed side toward the v-belt pulley.

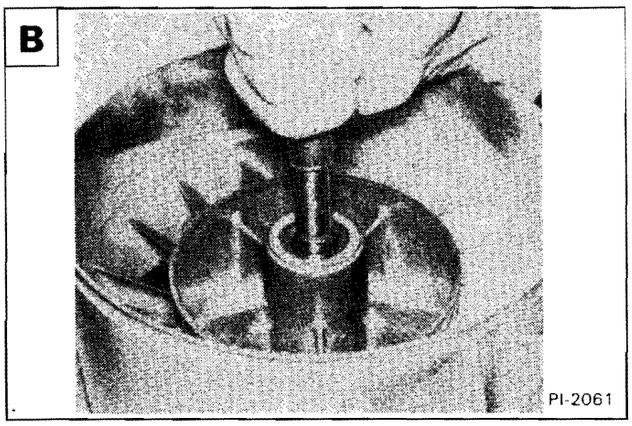
Press the fan shaft and bearing into the housing.

Clamp the cooling fan pulley in a vise.

NOTE: Do not damage the pulley.

Position the rotor wheel and tighten the bolt to 26 ft.-lbs. (35 Nm) torque.





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ENGINE SERVICE

See Page 8A - 3 for the specifications.

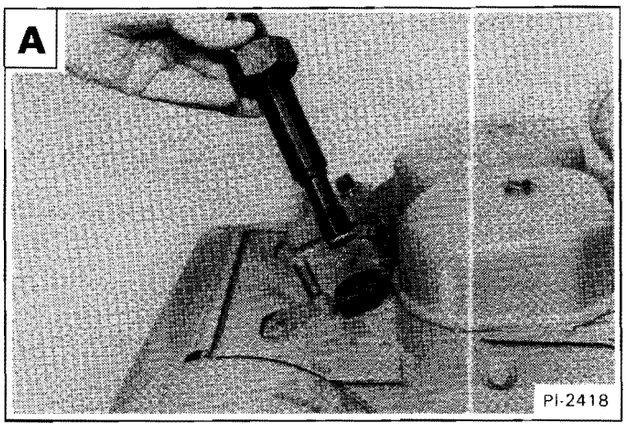
To check compression install compression tester in the injector opening [A]. Turn the engine 4 revolutions or until highest reading is obtained. Compression must be 340-412 PSI (23,5-28,5 bar).

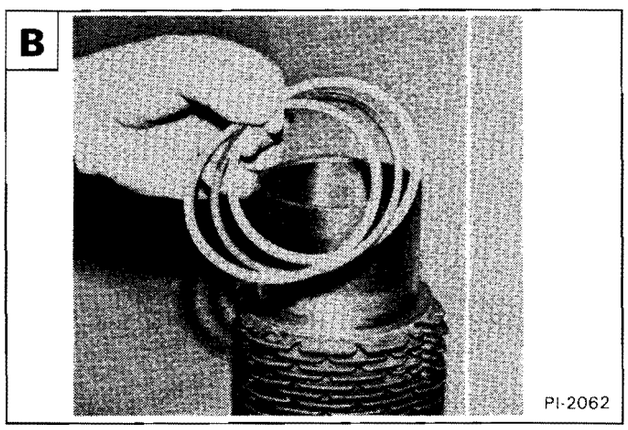
Install new bearing in the air blower each time the engine is overhauled.

Special bolts are used in many locations of the engine. These bolts are first tightened to 22 ft.-lbs. (30 Nm) torque. To correct torque. (See Specification Section).

When overhauling an engine always install new gaskets, o-rings and seals.

Install the correct number of shims on each cylinder during assembly [B].





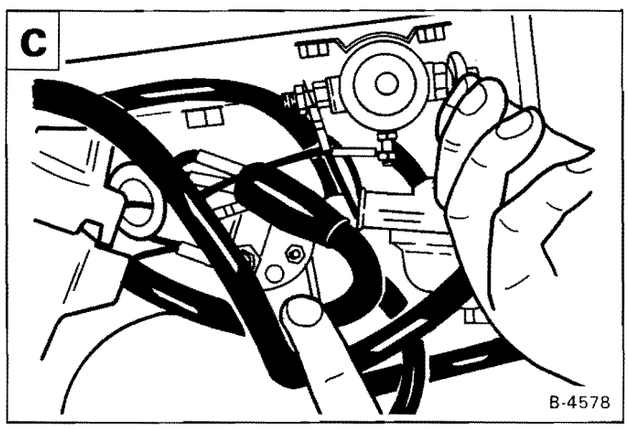
Engine Removal

To remove the engine use the following procedure:

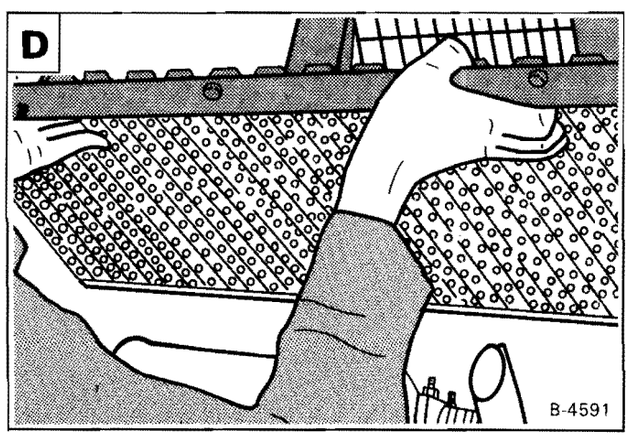
Disconnect the negative battery cable first. Then disconnect the positive battery cable.

Disconnect the ground wire from the frame.

Disconnect the wires from the solenoid [C].



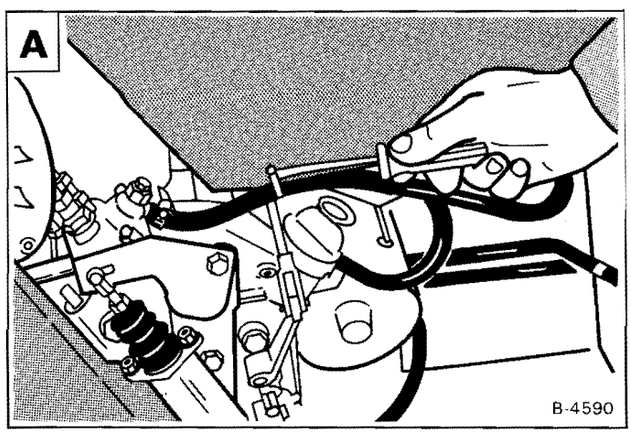
Remove the grill [D].



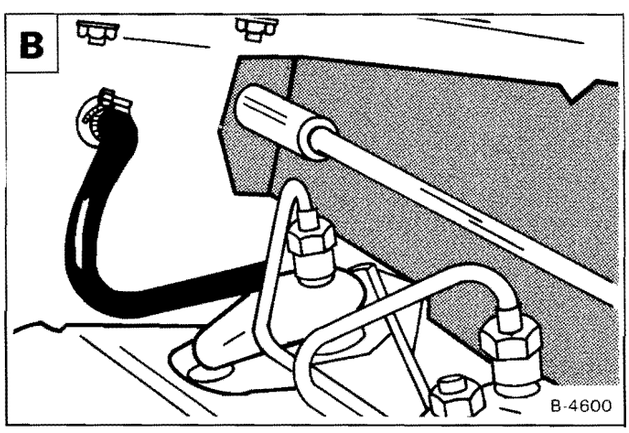
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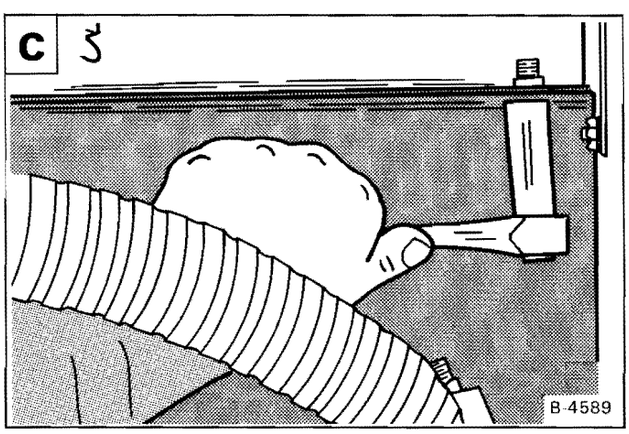
ENGINE SERVICE (Cont'd)

Release the tie clamp holding the fuel line to the shield [A].

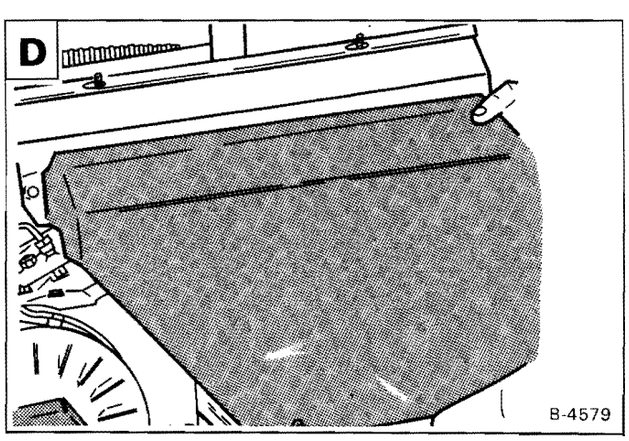


Remove the bolts holding the engine shield in position [B]& [C].





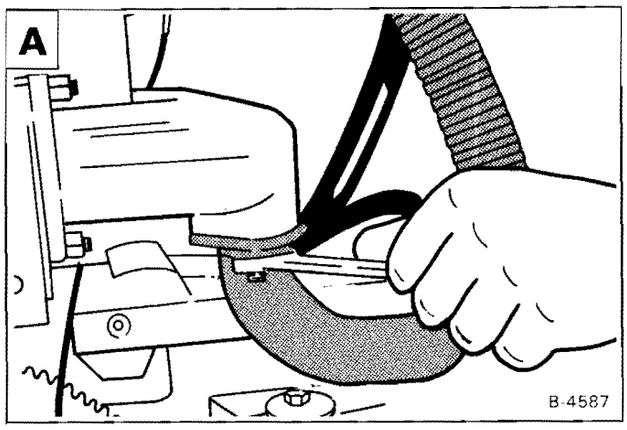
Remove the engine shield [D].



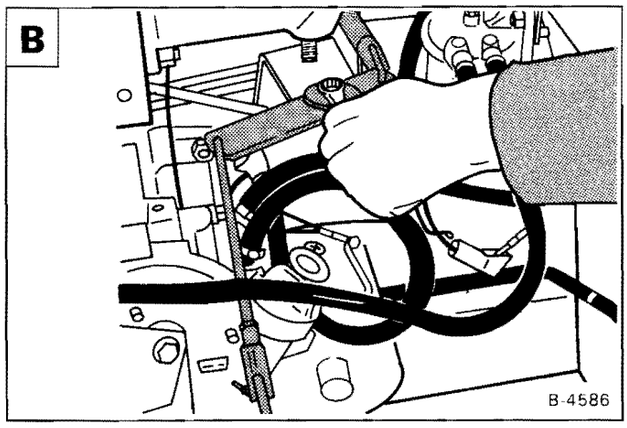
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ENGINE SERVICE (Cont'd)

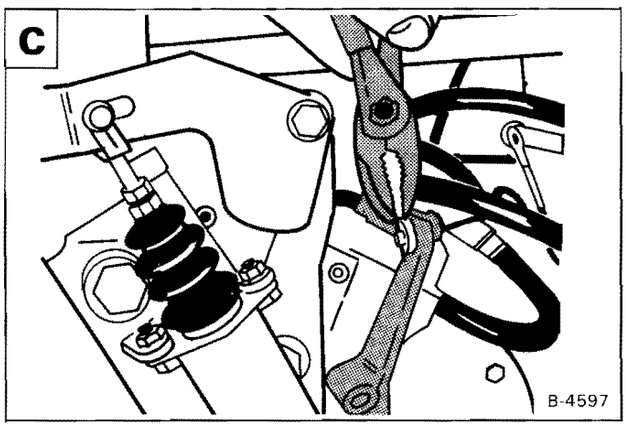
Disconnect the exhaust pipe [A].



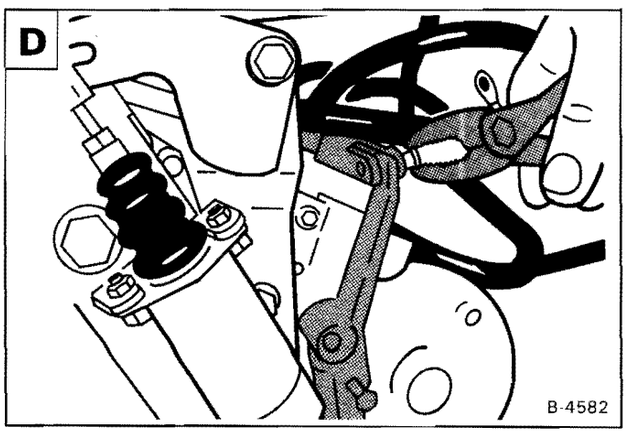
Remove the throttle linkage bolt [B].



Remove the cotter key from the throttle pin [C].



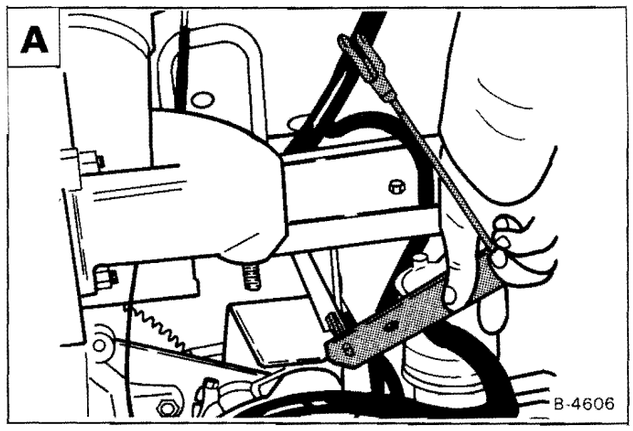
Remove the throttle pin [D].



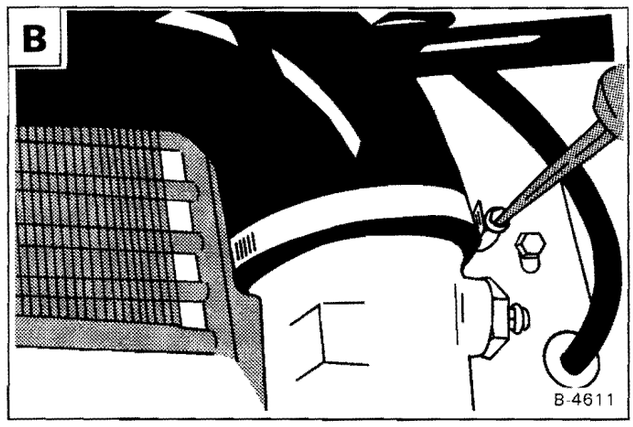
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ENGINE SERVICE (Cont'd)

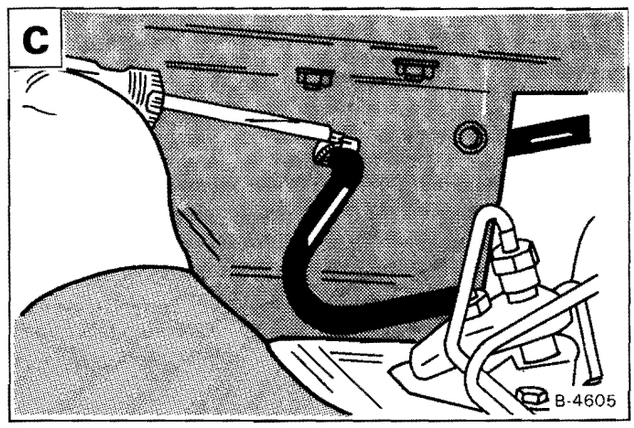
Remove the throttle linkage [A].



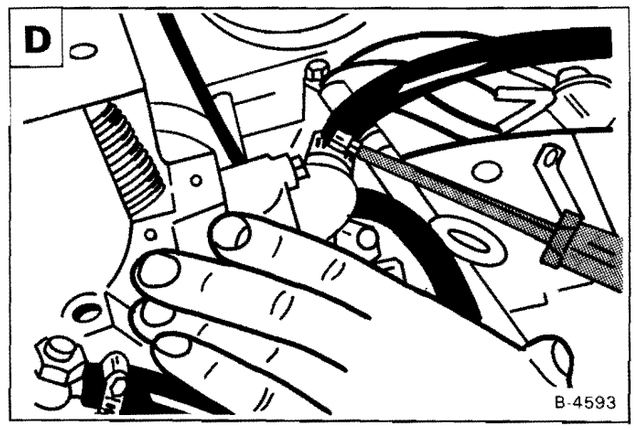
Disconnect the air cleaner hose [B].



Shut the fuel off at the fuel tank and disconnect the return fuel line [C].

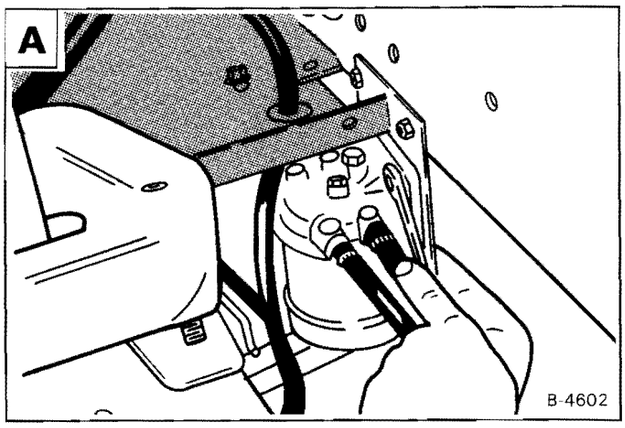


Disconnect the inlet fuel line [D].

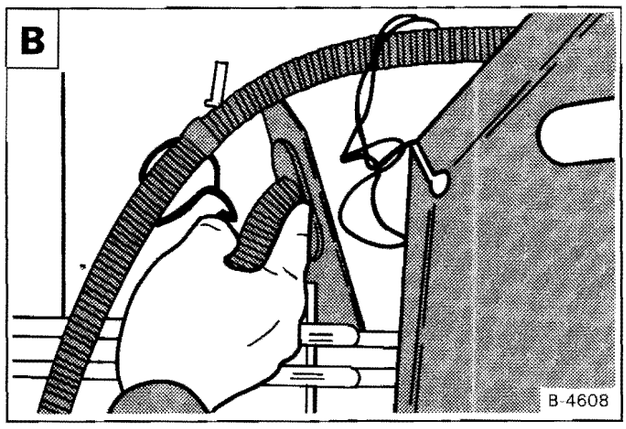


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Remove the fuel filter head assembly [A].



Remove the bracket holding the engine harness connector and move the bracket and connector into the engine compartment [B].



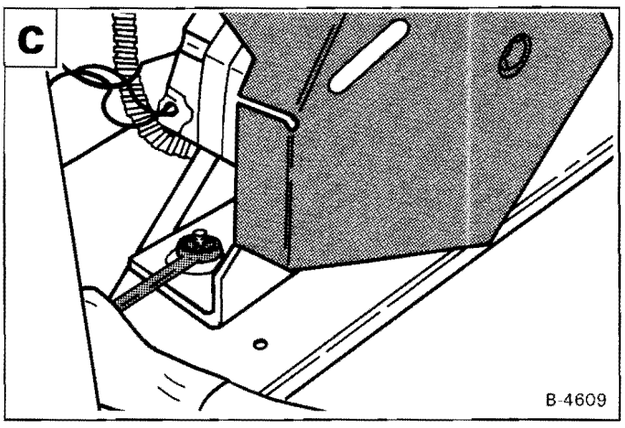
⚠ WARNING

Put jackstands under the front axles and rear corners of the frame when the engine is running for service. Failure to use jackstands can allow the machine to fall or move and cause injury or death.

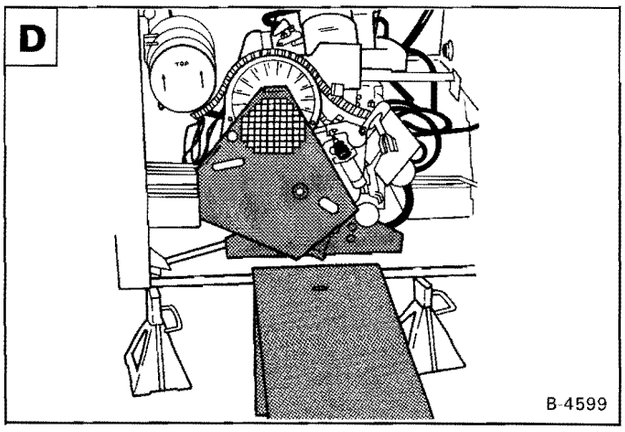
W-2017-0486

Put jackstands under the loader frame and front axles.

Remove the four bolts holding the engine mounts on the engine plate [C].



Remove the engine by lifting it a small amount and pulling carefully [D].



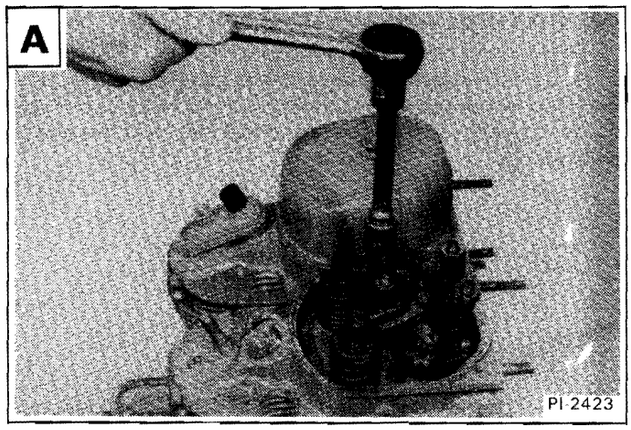
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CYLINDER HEAD AND VALVES

Removal

Remove the blower and air housing.

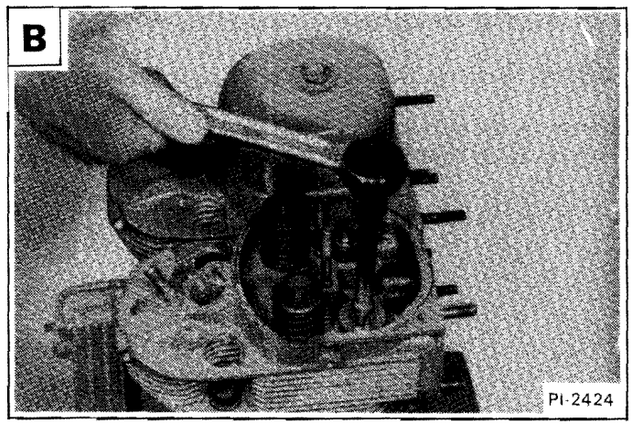
Remove the valve covers and the rocker arm brackets [A].



Remove the plugs and push rods [B].

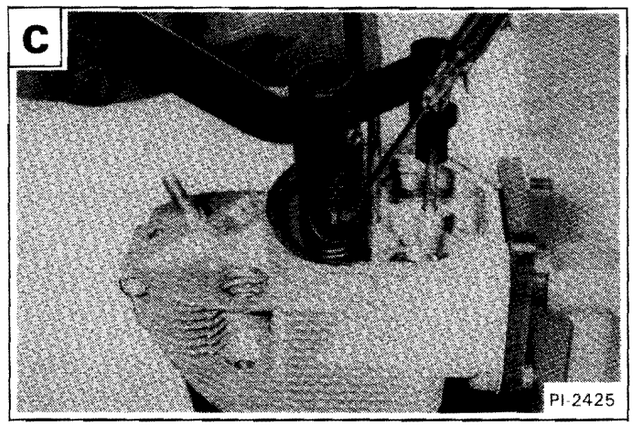
Remove the four bolts that hold the head in position with a socket wrench. Loosen the bolts evenly [B].

Lift the cylinder head off the engine and remove the push rod cover tubes.

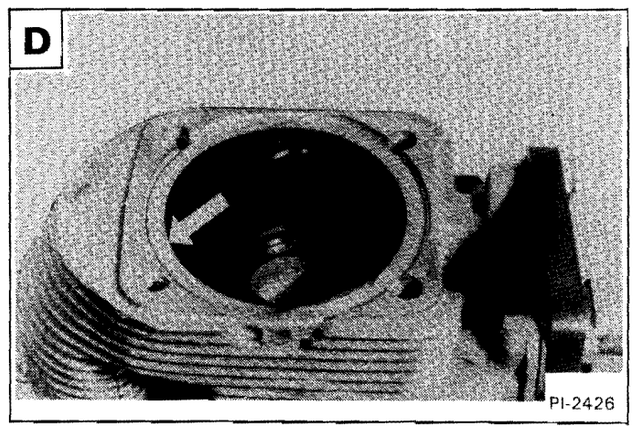


Disassembly and Assembly

Use a valve spring compressor to remove the valves and springs [C].



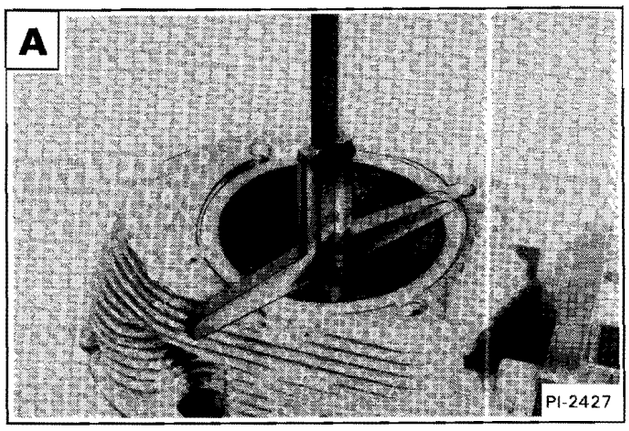
Check the head seating surface for damage.[D]. Light scratches can be removed by grinding the head and the cylinder with fine grinding compound. Use tool P/N 003-0426 when there is more damage.



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CYLINDER HEAD AND VALVES (Cont'd)

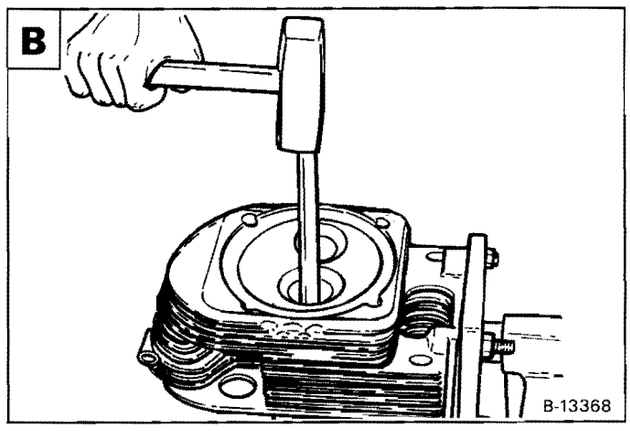
Grind the old valves if you are going to use them again. Install the valve and measure the distance to the head. If the valve depth is over the maximum the valve seat will need to be replaced [A].



Use valve seat removal tool kit P/N 003-3409.

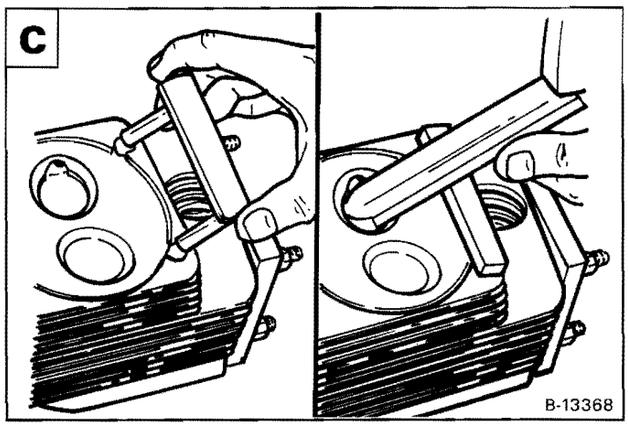
Heat the cylinder head to 450°F (250°C) in an oven.

Remove the head from the oven using insulated gloves. Tap out the valve guides from the bottom (Piston side) with a punch [B].



Install valve seat removal tool and remove the valve seat [C].

NOTE: The valve seat removal tool will need to be fabricated locally.

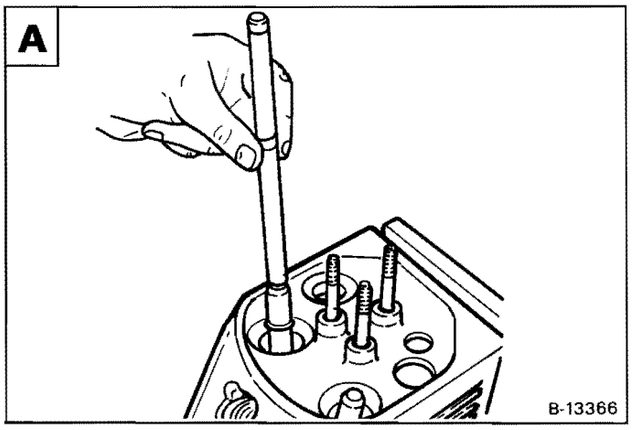


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CYLINDER HEAD AND VALVES (Cont'd)

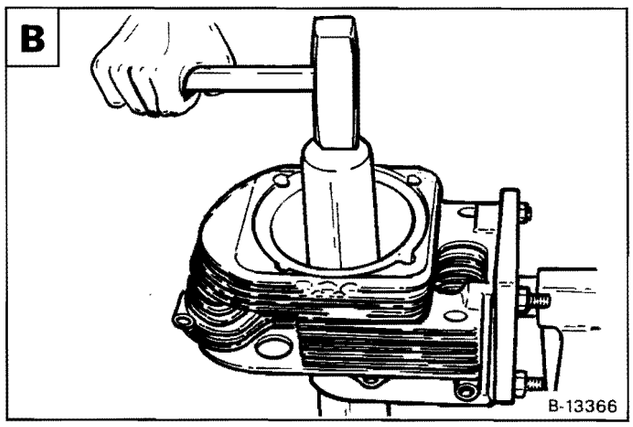
Check the cylinder head temperature. It must be 450°F (250°C). Use a punch and hammer to install new guides [A].

NOTE: The snap ring on the guide must contact the head to be installed correctly.

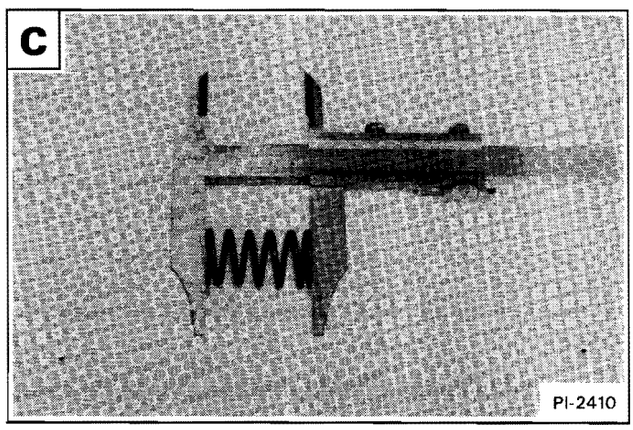
* 

Install a new valve seat in the bore and tap into position [B]. Use tool (P/N 003-3409).

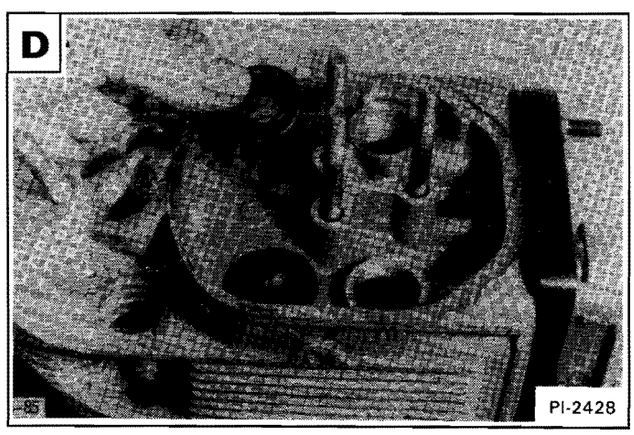
NOTE: Never use too much force when installing valve guides and valve seats. The cylinder head must be heated to the correct temperature and there must not be any debris (burrs).

* 

Measure the valve springs for correct length (See Section 8A for specifications) [C].



Apply lubricant (oil) to the valve stems and install the valve stems. Install the spring caps, springs and retainer with a spring compressor [D].

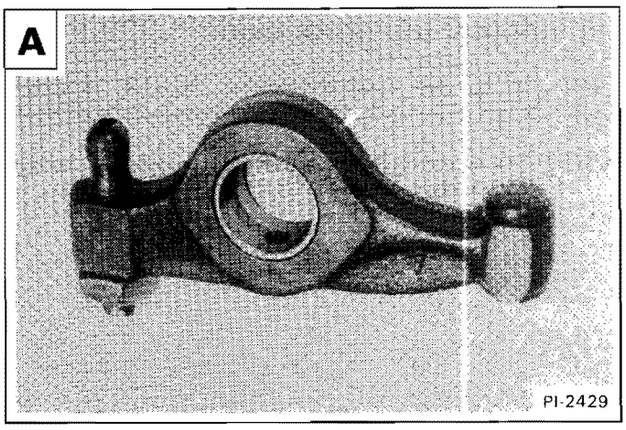


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CYLINDER HEAD AND VALVES (Cont'd)

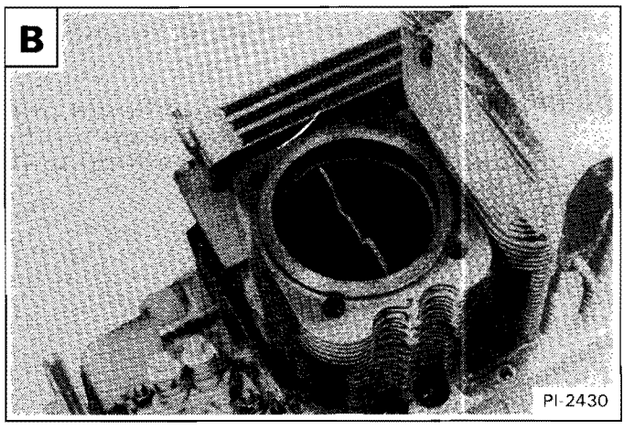
Remove the rocker arms from the bracket and check them for wear. Install new bushings if needed [A].

NOTE: The oil holes in the rocker arm and the bushing must be aligned.



Checking Piston Crown Clearance

Position lead wire to solder, approximate diameter .060'', across the piston as shown [B].



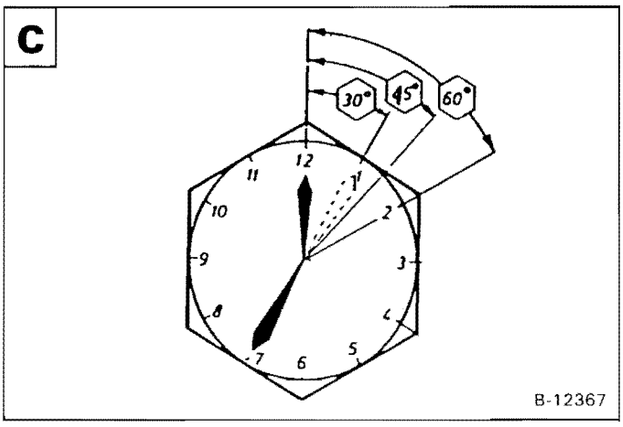
IMPORTANT

Use grease to hold the solder in position. The piston must be below TDC.

Cylinder Head Installation

Put the cylinder head on the engine cylinder and install the head bolts with the washers.

Tighten bolts to 22 ft.-lbs. (30 Nm) torque. Tighten all the head bolts to 30° with a degree scale tool (P/N 003-0500). Turn the engine one complete revolution (360°) [C].



Remove the cylinder head bolts and the cylinder head. Mark the cylinder heads to their cylinders.

Remove the lead wire and measure the thinnest points. If clearance is not within specifications add or remove shims between cylinder and crankcase (See Piston Crown Clearance Page 7A—20).

NOTE: When installing head use this method to get correct clearance.

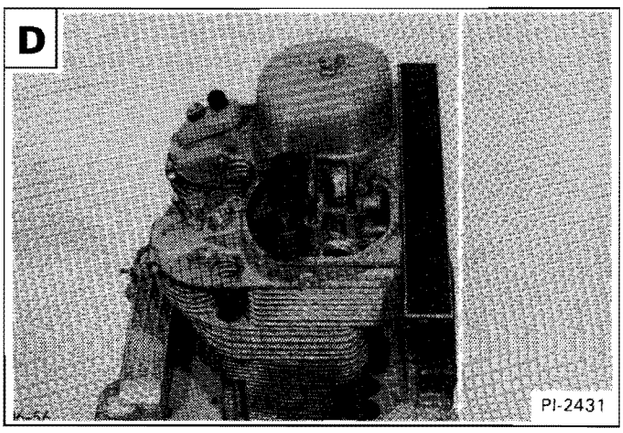
If there is not enough clearance remove the cylinder and put the needed number of shims below the liner.

If there is too much clearance remove the cylinder and remove the correct number of shims.

Use one thick shim instead of several thin ones.

Before installing the cylinder heads measure the cylinder head bolts for correct length (See Engine Specifications).

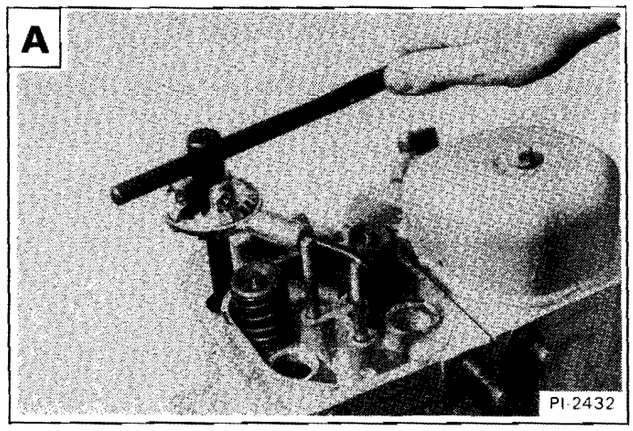
Hold a straight edge across the top of the heads [D]. Move the cylinder heads until the two cylinder heads are in alignment.



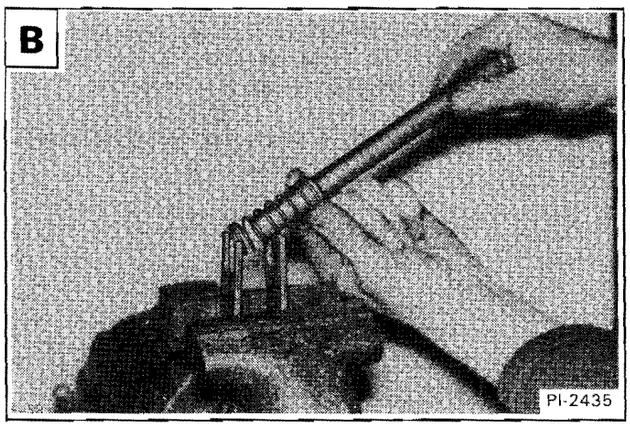
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CYLINDER HEAD AND VALVES (Cont'd)

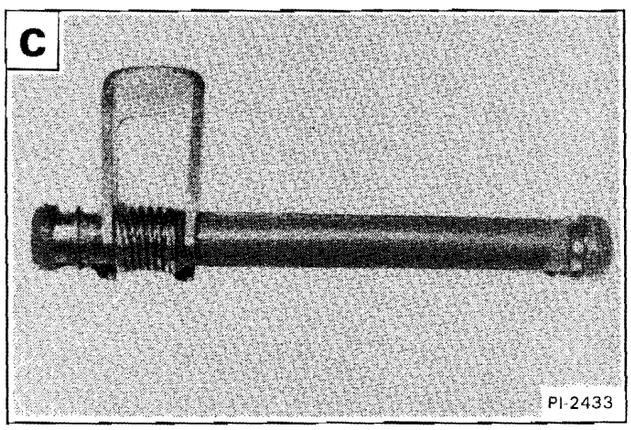
Tighten the head bolts. Use tool P/N 003-0500 to get the correct angle for tightening. (See Section 8A for Specifications) [A].



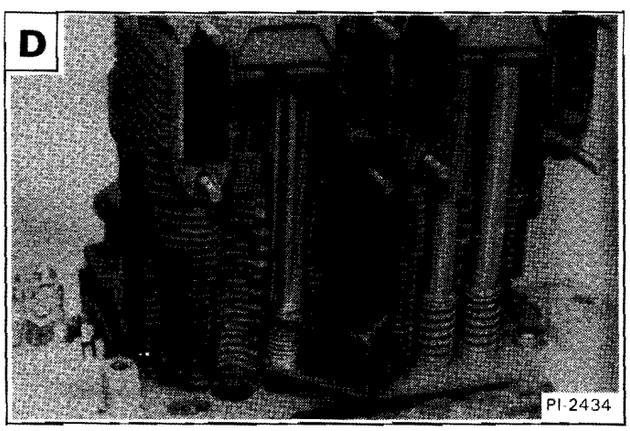
Install the spring on the push rod tube by using tool P/N 003-0501 [B].



Put the washer and seal on the bottom of the push rod tube. Put the seal at the top [C].



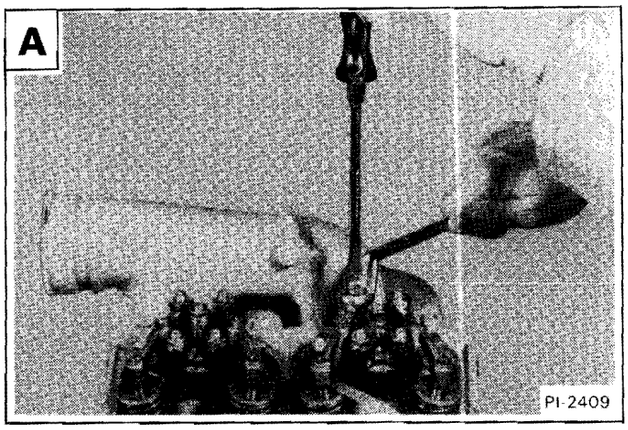
Install the push rod tubes [D].



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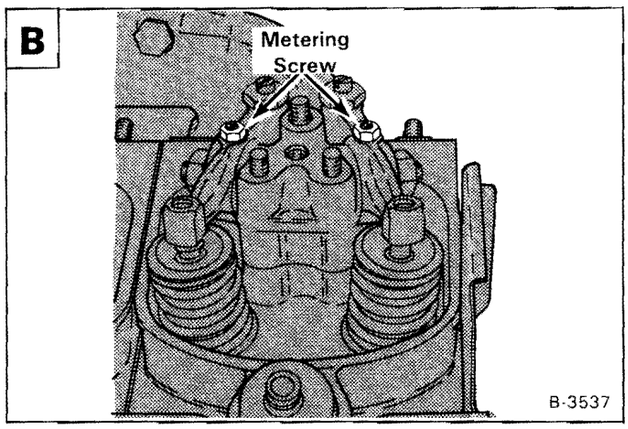
CYLINDER HEAD AND VALVES (Cont'd)

Install the push rods and the rocker arm bracket. Adjust the rocker arms as needed [A].



The rocker arms have a oil metering screw [B]. One thread must be showing over the top of the nut. Check to see that there is a small amount of oil flow toward the thrust pad.

Install all other parts removed during removal of the cylinder heads.



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CYLINDER, PISTONS AND CONNECTING RODS

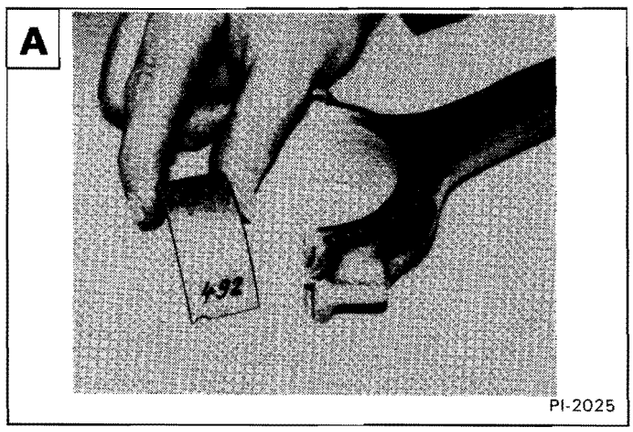
Disassembly and Assembly

NOTE: Cylinders may be removed with the piston and connecting rod in position. It is best to remove and install the piston rod and cylinder together to prevent damage to parts.

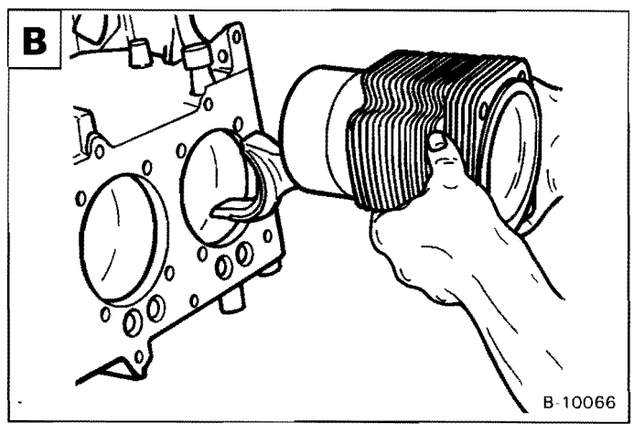
Remove the cylinder head (See Page 7A – 17).

Remove the oil pan.

Remove the bolts that hold the cap to the connecting rod. Mark the bearings to the correct connecting rod if they are to be used again [A].



Lift out the cylinder, piston and rod together [B].



NOTE: Count the number of shims under the cylinder.

Remove the piston from the cylinder and remove the snap rings holding the piston wrist pins in position.

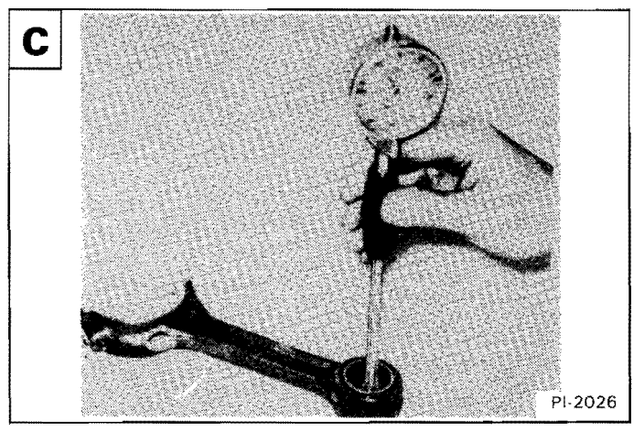
It may be necessary to heat the piston and to remove the piston wrist pin.

Remove the piston rings and clean the piston. Check the following for wear or damage:

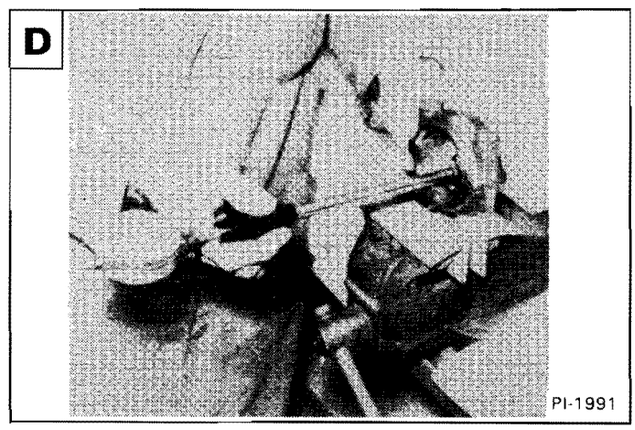
Piston and ring grooves.

Piston wrist pin.

Connecting rod wrist pin bores [C].



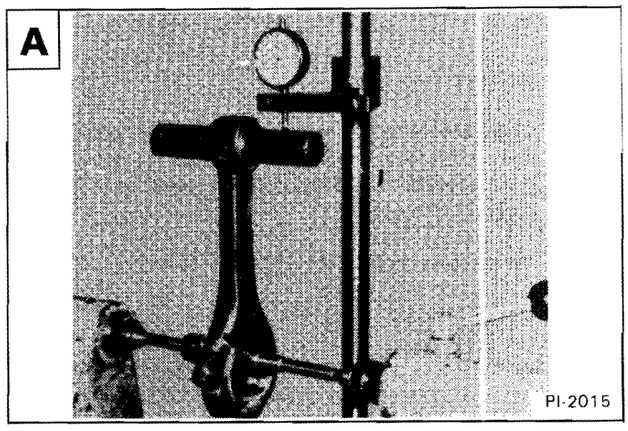
Connecting rod bearing bore [D].



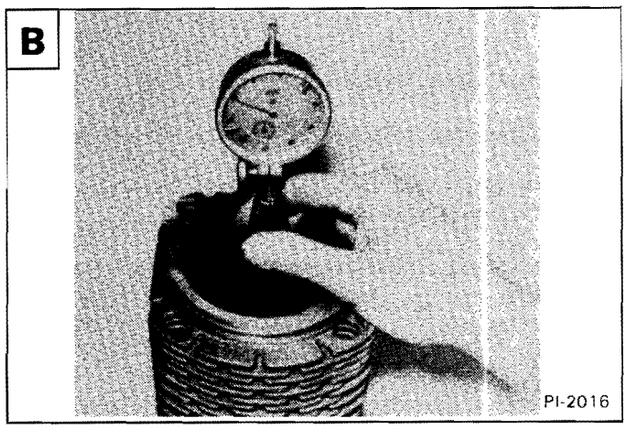
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CYLINDER, PISTON AND CONNECTING RODS (Cont'd)

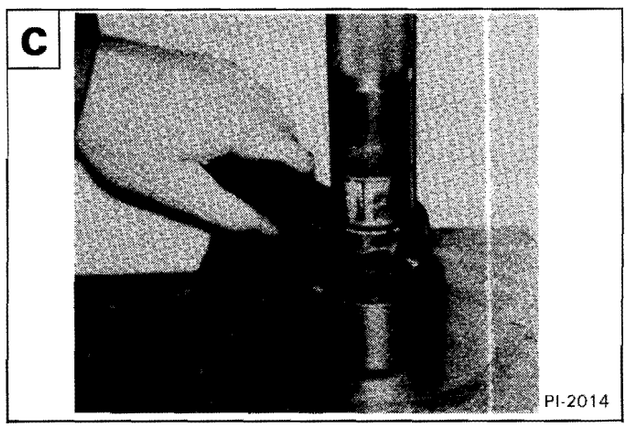
Check the rod bores for alignment [A].



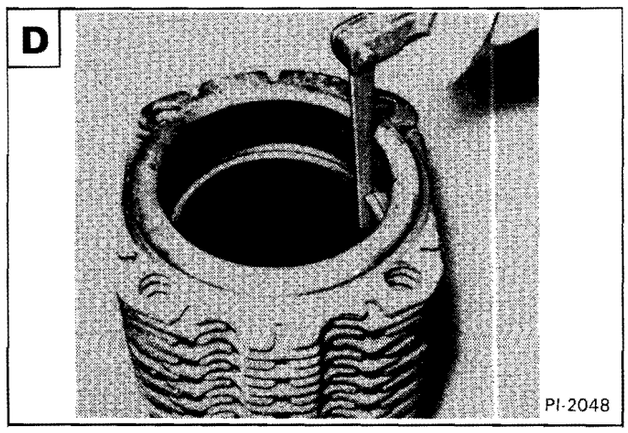
Check the cylinder bore in several locations [B].



Use a press to remove the bushing from the rod if the bearing needs replacement [C].



Hone the cylinder and check the size of the cylinder. Use a piston to push the rings into the bore. Check the end gap of the rings. (See Page 8A-4 Specifications Section) [D].



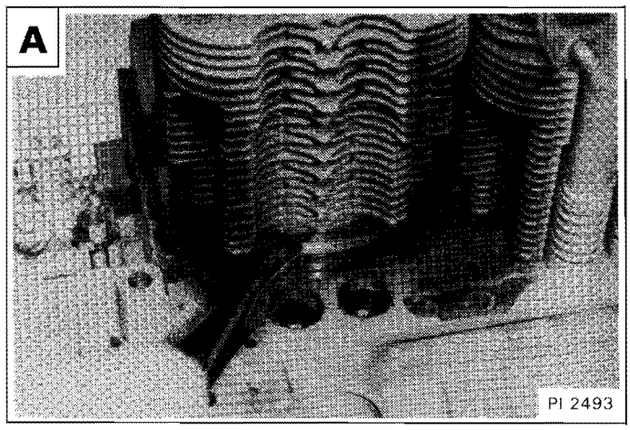
https://truckmanualshub.com/

CYLINDER, PISTON AND CONNECTING RODS (Cont'd)

The arrow at the top of the piston must be pointed toward the long side of the piston rod. [A].

Assemble the piston, install the piston wrist pin through the rod and the piston and install the snap rings.

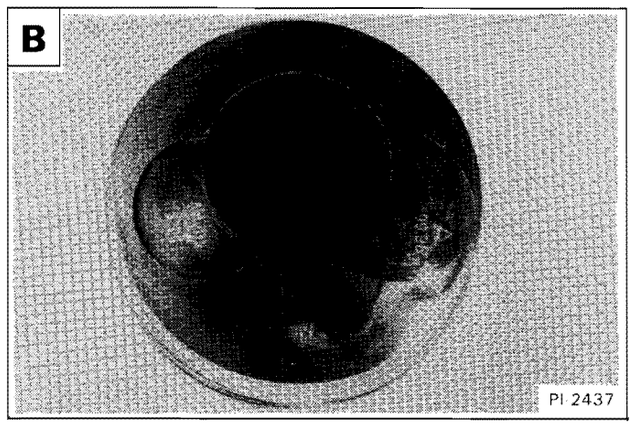
Install the piston rings on the piston with the mark on the ring toward the top. Turn the piston rings so the gaps are 120° apart.



Install the piston assembly in the cylinder with the arrow on the top of the piston, pointing toward the exhaust side of the engine [B] Use ring compressor tool P/N 003-0430.

If the old bearings are to be used again, install them as marked.

If new bearings are to be installed, use plastic gauge to check the clearance of the bearing to the crankshaft (See Page 8A-4 Specifications Section).



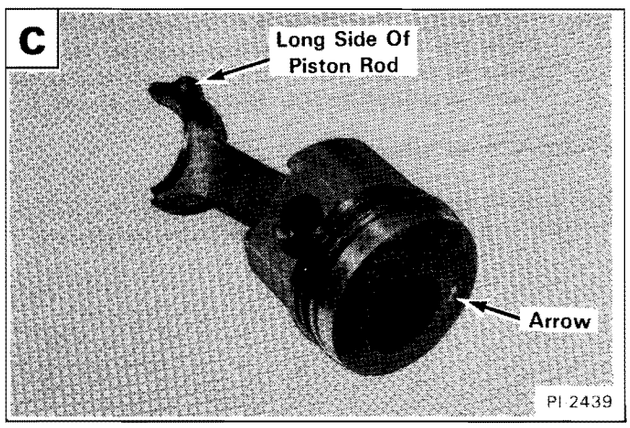
Install the shims on the cylinder as noted during disassembly [C].

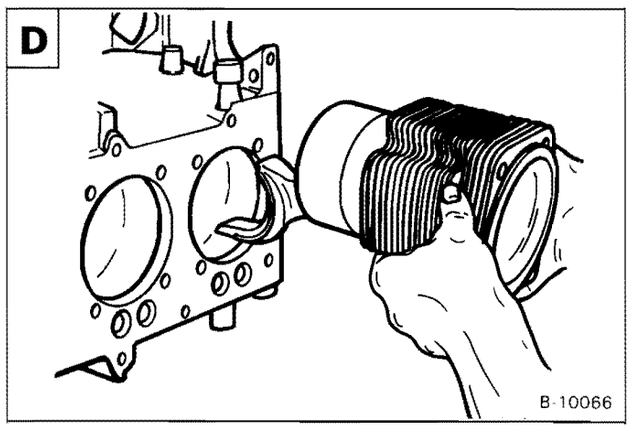
Install the piston assembly in the cylinder with the arrow on the top of the piston pointing toward the push rod (camshaft) side of the engine [D].

003-0430 - Ring Compressor

Be careful not to damage the crankshaft surface.

Install and tighten the rod caps (See Page 8A-5 Specifications Section).





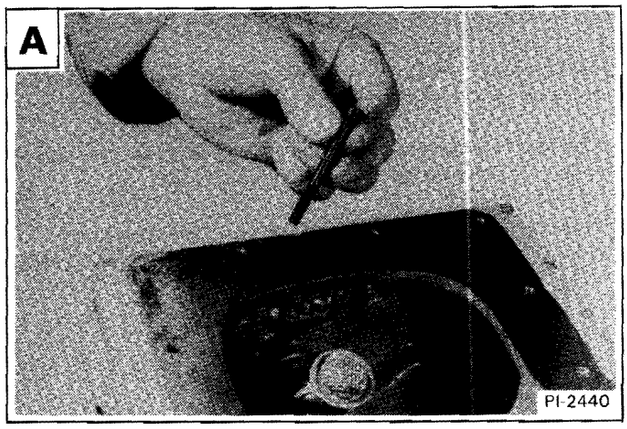
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OIL PUMP, FILTER HOUSING AND RELIEF VALVE

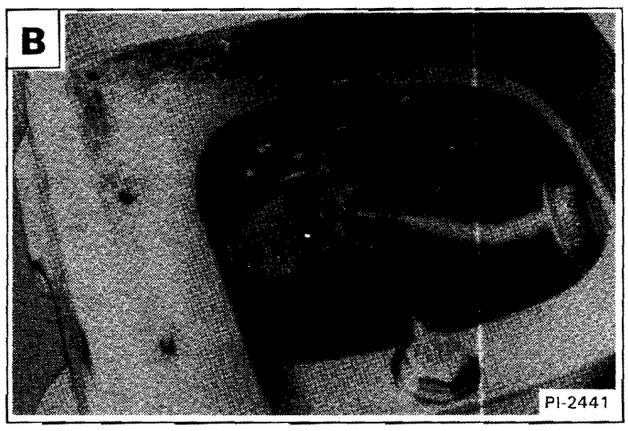
Oil Pump Removal and Installation

Remove the oil pan and the front cover.

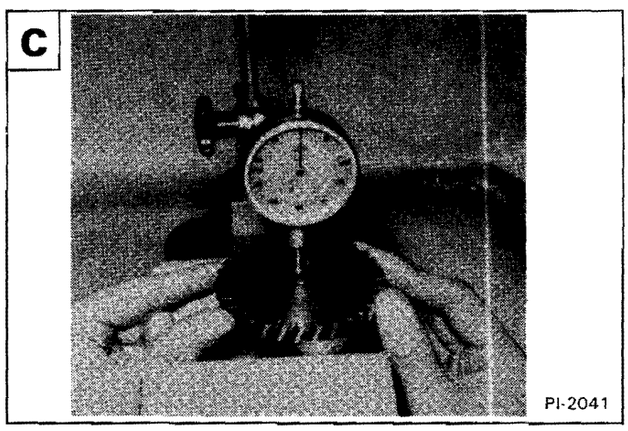
Remove the bolt that holds the oil pump in position [A].



Turn the pump and remove it from the crankcase [B].



NOTE: The oil pump cannot be serviced. A new oil pump with a new gear must be installed if any part has damage. Check the end play to find the condition of the oil pump (See Engine Specifications Section, Page 8A—4) [C].



Oil Pressure Relief Valve

The oil pressure relief valve is in the engine block. Do not change the length of the spring and do not add shims to the valve.

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ENGINE FRONT COVER

Removal

Remove the fuel injection pump (See Page 7A—5).

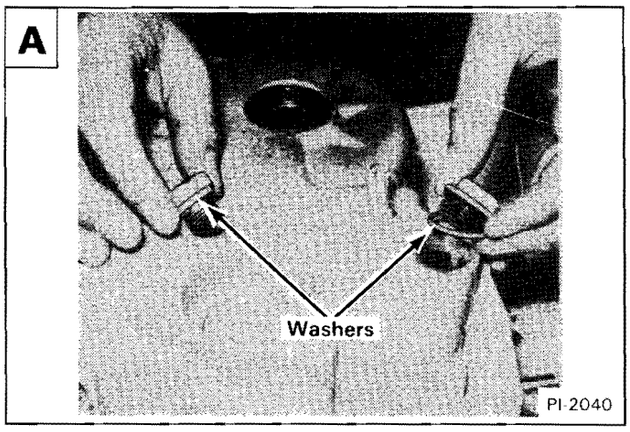
Remove the cooling blower, generator and pulley from the governor shaft.

Remove the cover bolts.

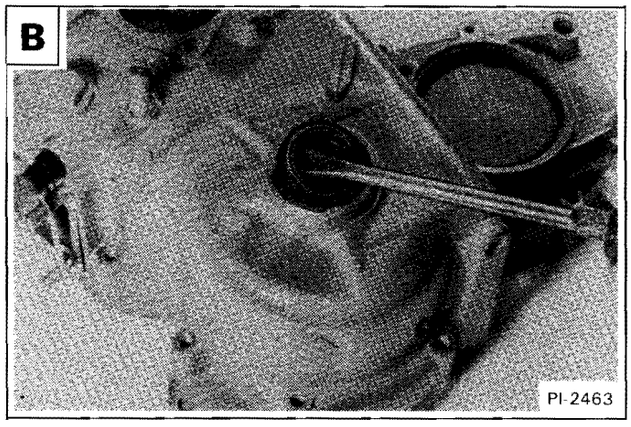
Remove the front cover. Be careful not to lose the dowel pins.

Disassembly and Assembly

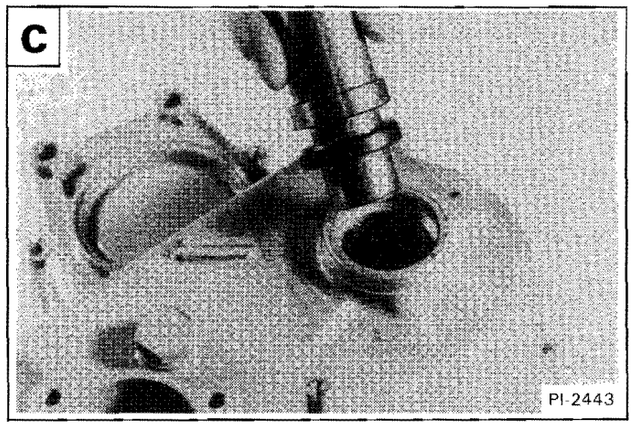
Put new sealing washers under the two plugs [A].



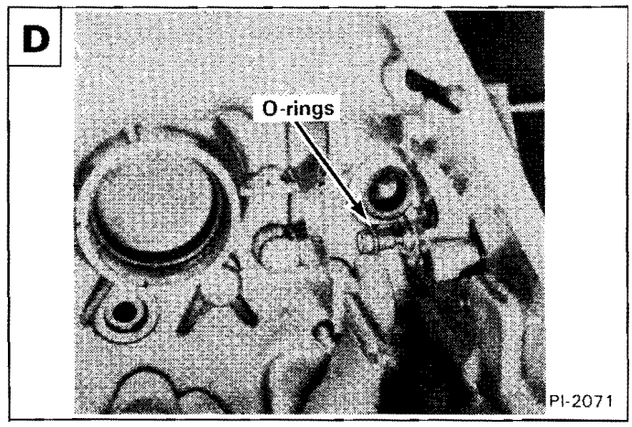
Remove the old seal from the governor shaft [B].



Install a new seal [C].



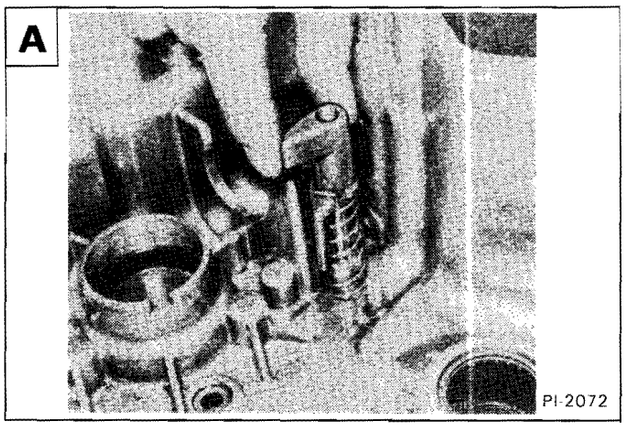
Check the exess fuel button for damage or wear. Replace the O-ring and put grease in the center groove for the O-ring [D].



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ENGINE FRONT COVER (Cont'd)

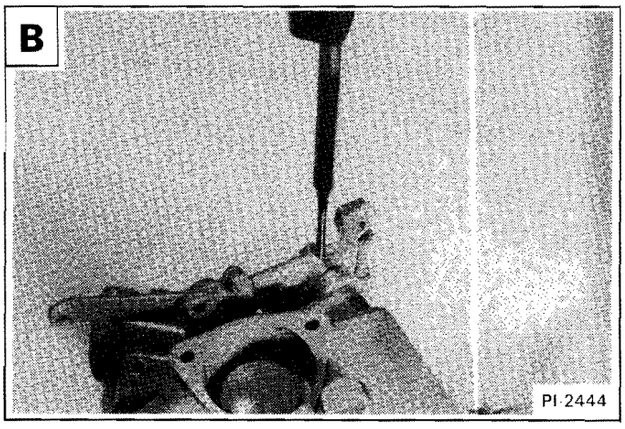
If you replace the spring on the fuel excess button, the spring must be turned 3/4 of a turn to put tension to the lever [A].



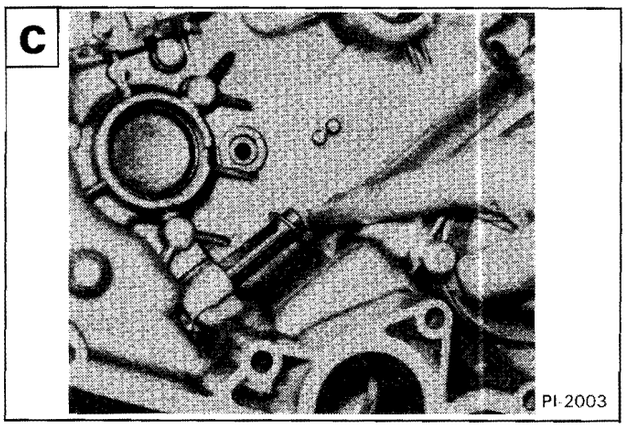
Remove the pin from the throttle control lever, and remove the lever from the shaft [B].

Remove the two bolts * which hold the governor spring in position. Remove the shaft.

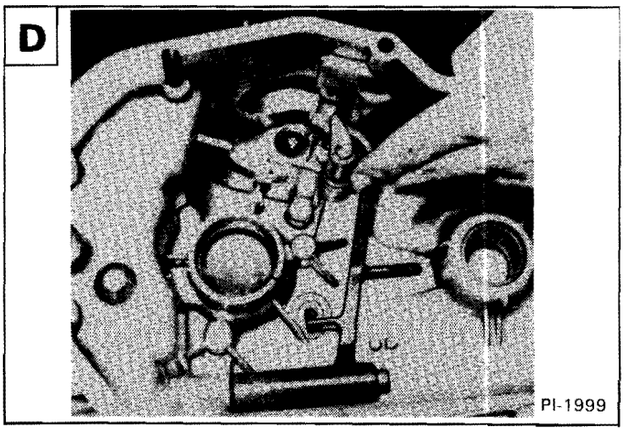
*Later model engines have a spring with four (4) bolts.



Put the shaft into the cover and install the washer [C].



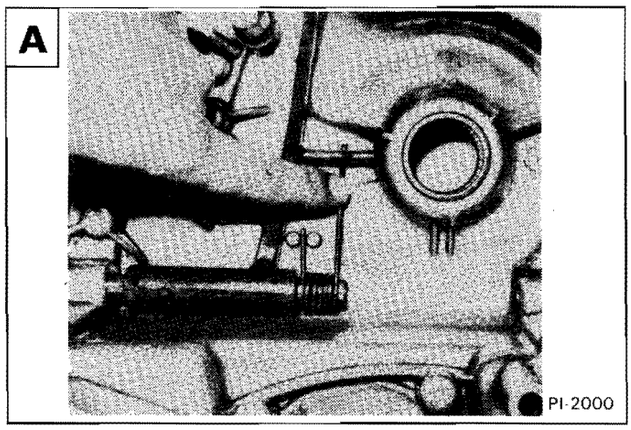
Put the shaft in position to install the control arm [D].



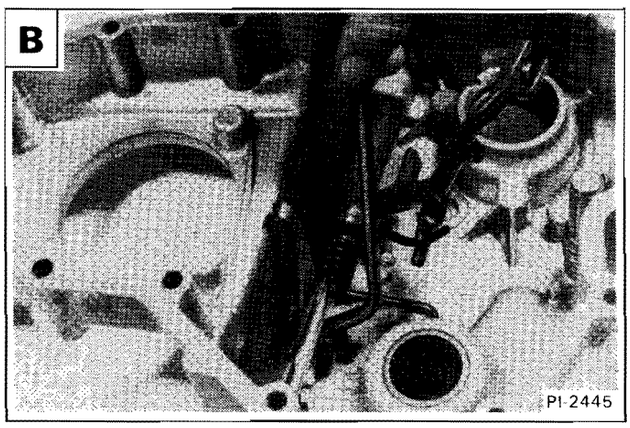
https://truckmanualshub.com/

ENGINE FRONT COVER (Cont'd)

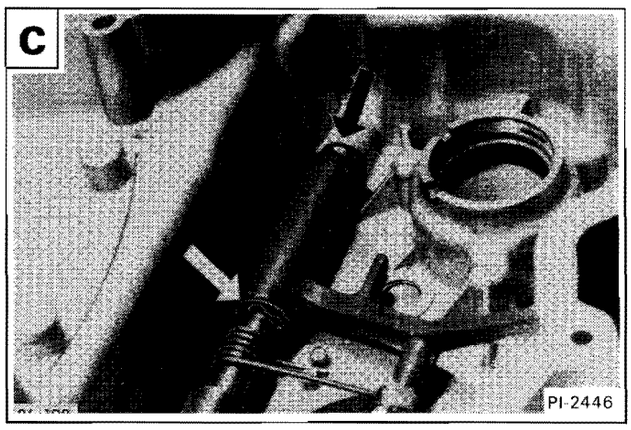
Put the spring on the control arm [A].



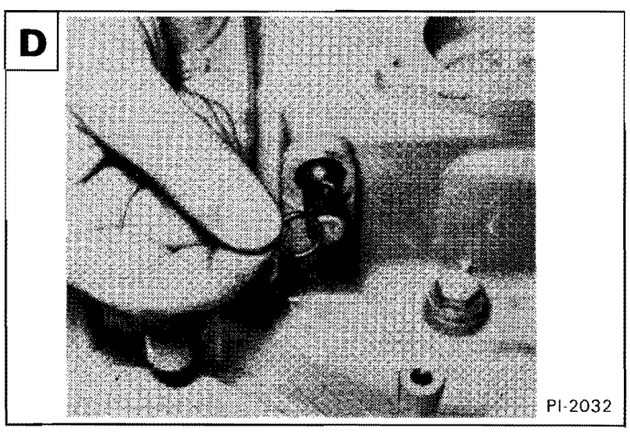
Move the shaft in more and install the governor spring. Tighten the bolts that hold the spring in position [B].



Install a snap ring on each side of the control arm [C].



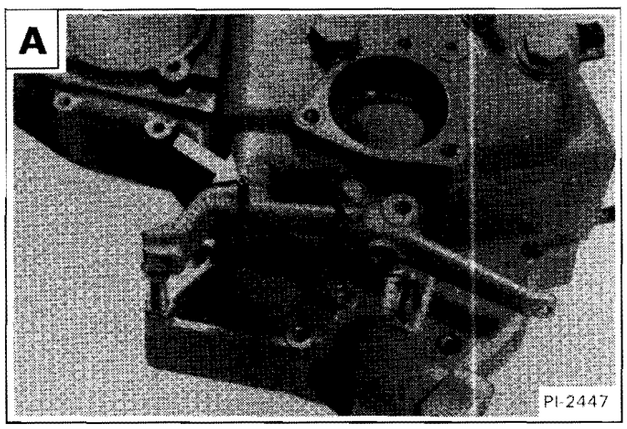
Install the O-ring on the shaft [D].



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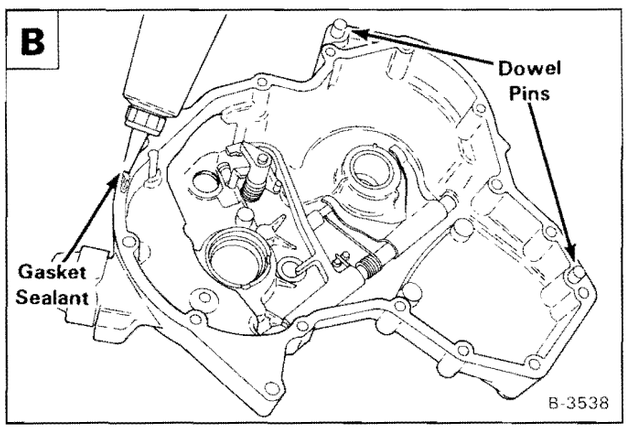
ENGINE FRONT COVER (Cont'd)

Install the throttle lever and leaf spring on the shaft and install the locking pin [A].

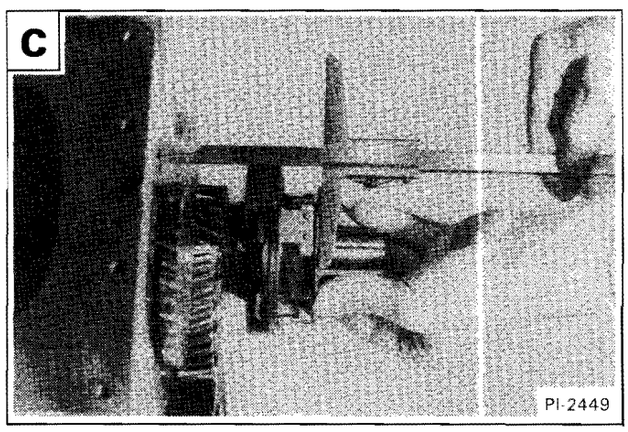


Installation

Put dowel pins in front cover and apply gasket sealant to the front cover [B].



With the camshaft pushed against its contact surface measure the distance from the front of the collar to the front of the engine housing [C].

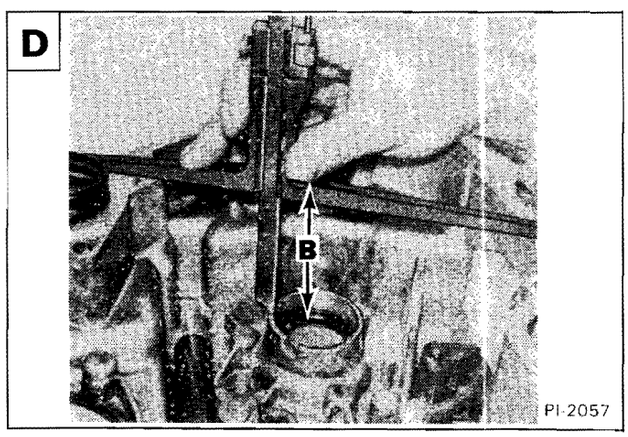


Measure the distance between the stop and the joint surface of the front cover [D].

Dimension "B" must be more than dimension "A". If the distance is more than .024" (0,6 mm). The front cover must be replaced.

Install the cover bolts and tighten them evenly.

Adjust high and low idle speeds (See Page 8A – 3 Specifications Section).



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GOVERNOR

Removal and Disassembly

Remove the injection pump (See Page 7A – 5).

Remove the blower and front cover (See Page 7A – 30). Remove the governor shaft.

Use two screwdrivers to remove the gear and shaft from the engine block.

Remove the wire retainer and disassemble the governor.

Check all parts for wear or damage.

Assembly and Installation

Put grease on the inside of the ring to hold the balls in position. Install the balls. Put the outer race over the balls (Inset) [A].

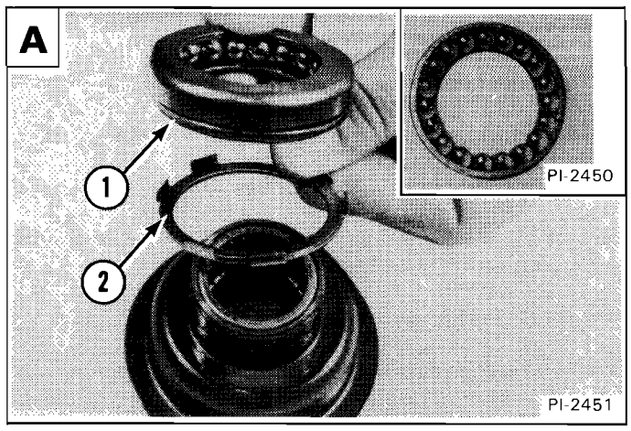
Turn the bearing cup (Item 1) face down and install the shims (Item 2) with the tabs up [A].

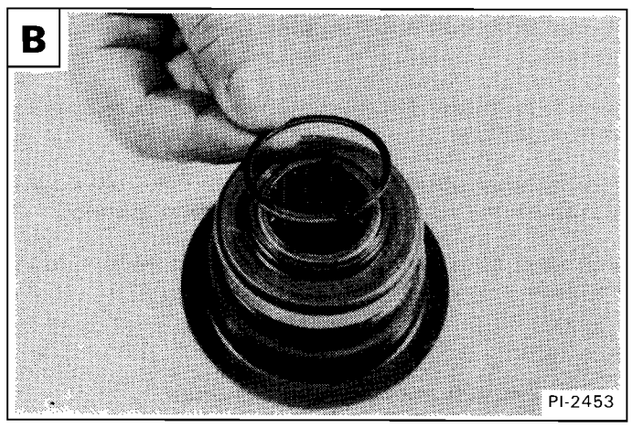
Put the bearing assembly over the cup and shims and install the snap ring [B].

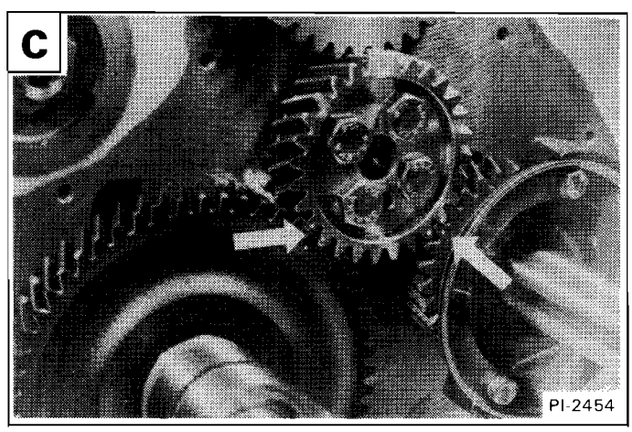
Use a soft hammer to install the shaft and gear into the engine block. The timing marks must be in alignment [C].

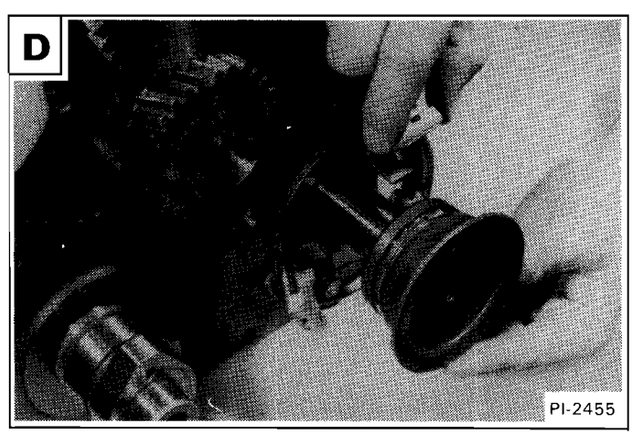
Install the governor weights and the governor [D].

Install any other parts removed.









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CAMSHAFT

Removal and Installation

NOTE: Engine must be removed from the loader.

Remove the injection pump (See Page 7A—5).

Remove the blower and air housing, the front cover and the rocker arm covers (See Page 7A—30).

Remove the rocker arms and push rods.

Position the engine so the exhaust manifold is up.

Remove the fuel lift pump.

Remove the camshaft. Be careful not to damage the camshaft bushing.

Remove the oil pan. Remove the tappets. Check all parts for wear or damage.

If the bushing is good, it can be used again. If not, use a driver to push out the old bushing and install a new bushing.

Align the oil holes in the bushing with those in the block when you install a new bushing [A].

Install the tappets from inside the crankcase.

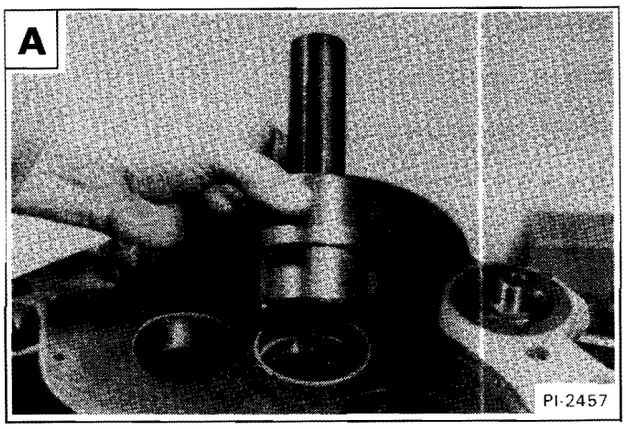
Put oil on the thrust washer and put it on the camshaft [B].

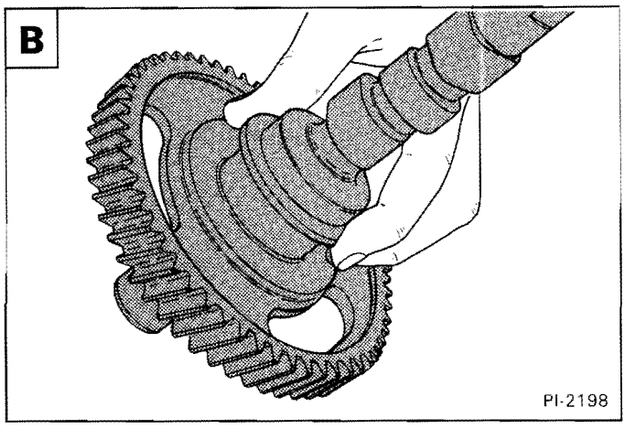
Install the oil pan and turn the engine upright.

Install the fuel lift pump, push rods and rocker arms.

Install the fuel injection pump and other parts removed.

Prime fuel injection system.





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CRANKSHAFT

Crankshaft Removal

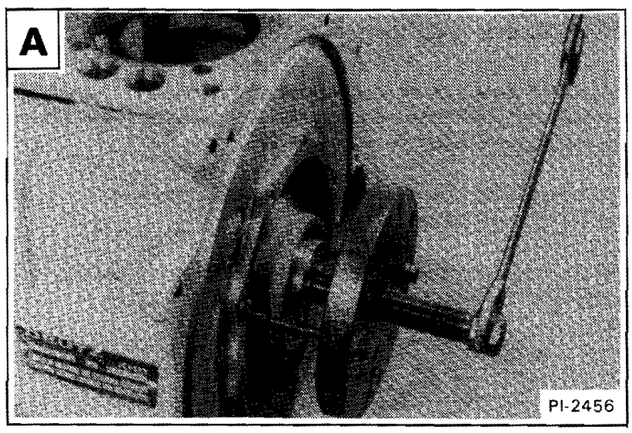
Remove the cylinder heads (See Page 7A – 17).

Remove the pistons and rods (See Page 7A – 23).

Remove the front cover (See Page 7A – 27). Remove the crankshaft gear.

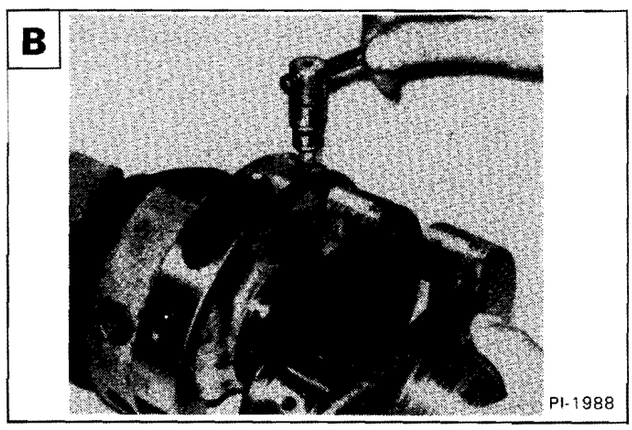
Remove the oil pan and the oil pump.

Remove the flywheel and end cover [A].



Remove the bolt from the center main bearing. Remove the crankshaft from the engine block.

Remove the center main bearing from the crankshaft [B].



Inspection

Clean all the parts and check them for wear or damage.

Replace the crankshaft or have it ground as needed (See Section 8A for specifications).

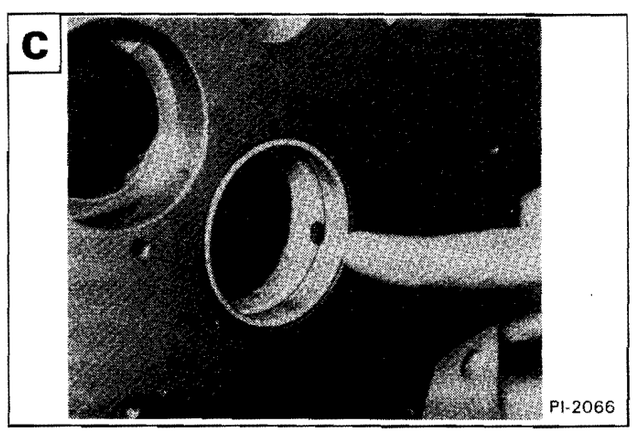
Install the correct bearing shell in the center main bearing.

Check the thrust washers for wear and damage (See Section 8A for specifications).

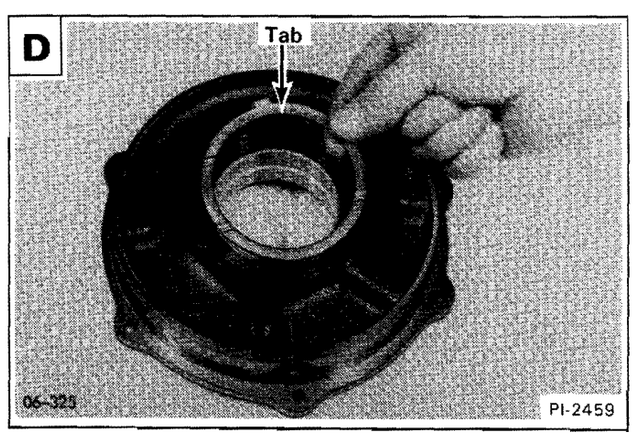
Assembly

Install the correct bushing into the block and end plate. The oil holes in the bushings must be in alignment with the holes in the block and end plate [C].

NOTE: After installation the bearing must extend 0.055-0.067" (1,4-1,7 mm) outside the front of the block.



Put grease on the thrust washer in the crankcase to hold it in position. The tab on the washer must align with the slot [D].



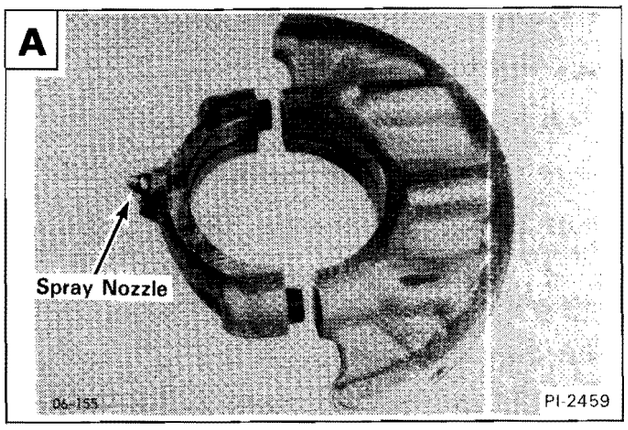
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CRANKSHAFT (Cont'd)

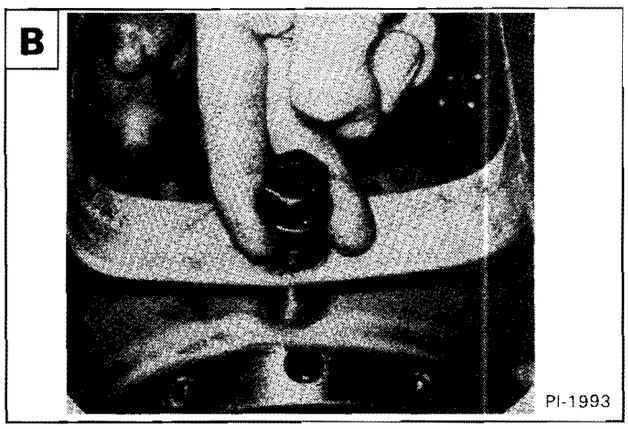
Install the bearings of the correct size in the center bearing support and install the support on the crankshaft. The numbers on the support must be matched [A].

The spray nozzle for cooling #1 piston must be turned toward the far side of the engine [A].

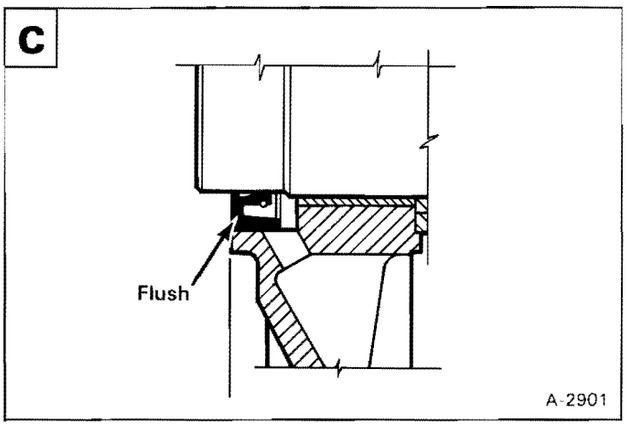
Put the crankshaft in the block. Be careful no to damage the bushing in the block during installation.



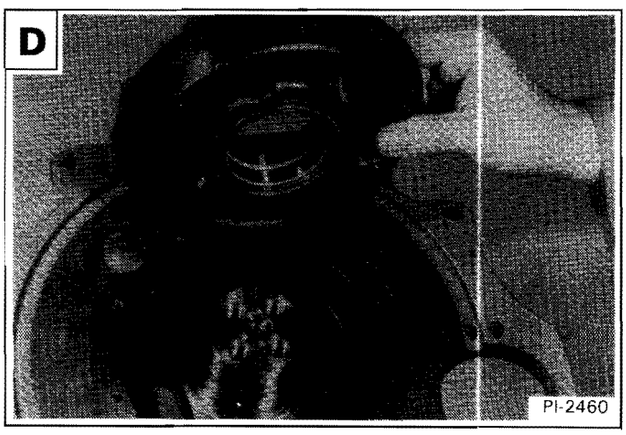
The hole in the bearing support must be in alignment with the holes in the block [B].



Install the thrust washer, seal and gasket in the end plate. When installing the shaft seal, make sure that the seal is pressed flush with the end plate edge [C].



The hole in the block must be in alignment with the hole in the plate. Put the plate in position and install the 2 bolts [D].



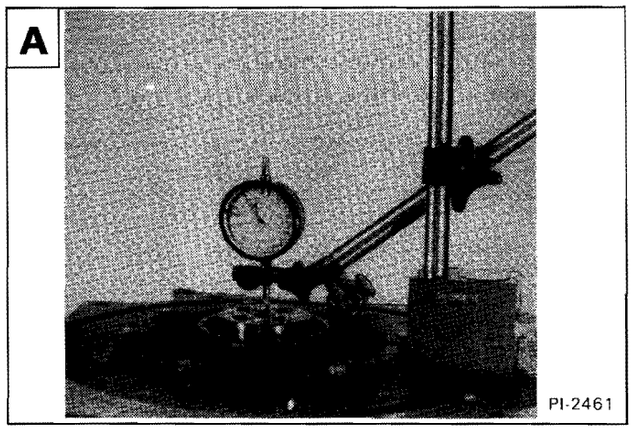
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CRANKSHAFT (Cont'd)

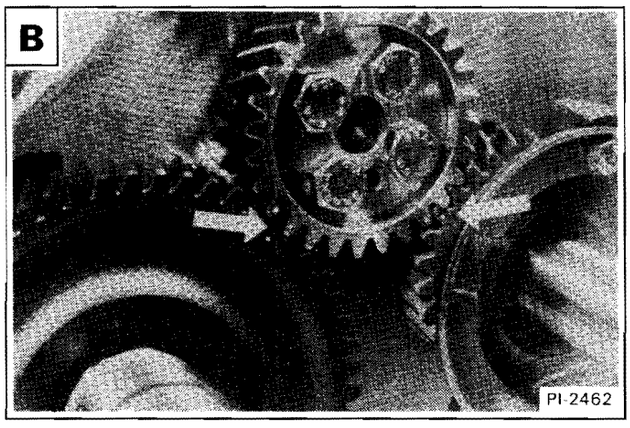
Measure the end play of the crankshaft [A].

If not in the specifications, install or remove paper gaskets as needed to get the correct clearance.

Tighten all bolts in the end plate and the bolt in the main bearing support.



Check the crankshaft. The gear must fit on the location pin in the crankshaft and the timing marks must be in alignment [B].



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UNIVERSAL JOINT

Removal and Installation

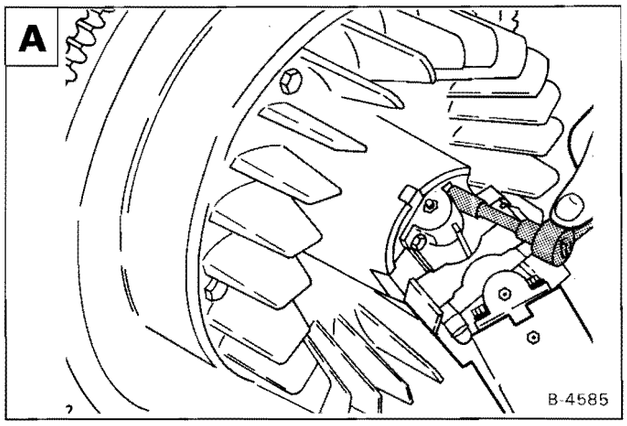
The tool listed will be needed to do the following procedure:

MEL-1187 – Socket

Remove the engine (See Page 7A – 12).

Remove the four bolts, holding the u-joint on the flywheel [A].

Installation: Tighten the bolts to 270-300 in.-lbs. (31-34 Nm) torque.



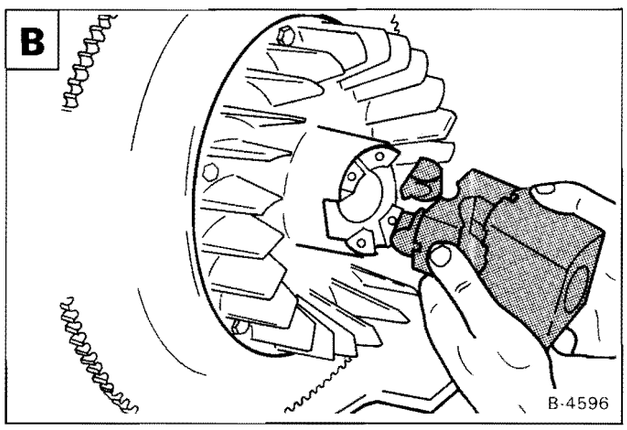
Remove the u-joint assembly [B].

Put blue loctite #242 on the 4 bolts.

Install the u-joint.

NOTE: Be sure u-joint seats completely in the bottom of the counterbore.

Put spline lube (MEL-1121) on the splines, before installation.

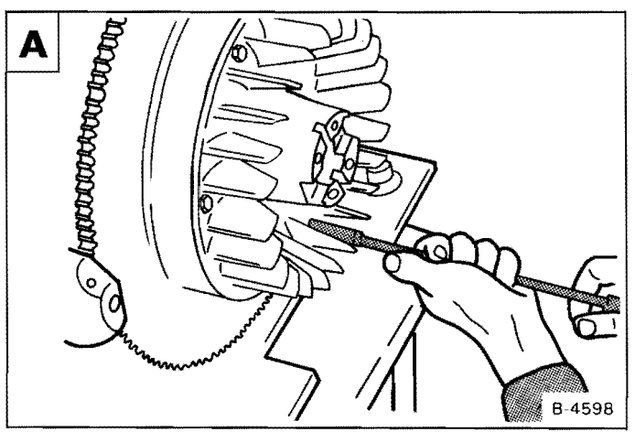


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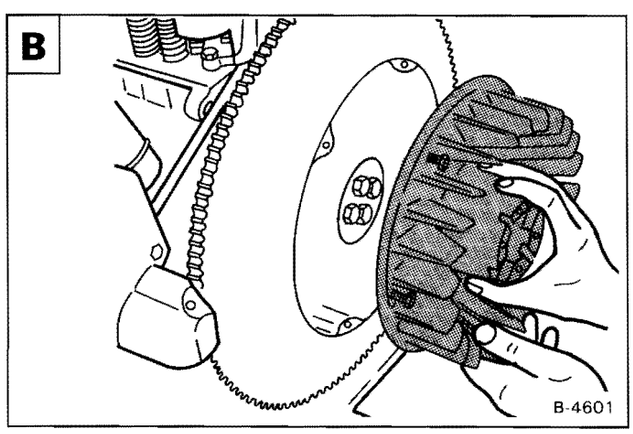
FLYWHEEL

Removal and Installation

Remove the bolts that attach the fan to the flywheel [A].



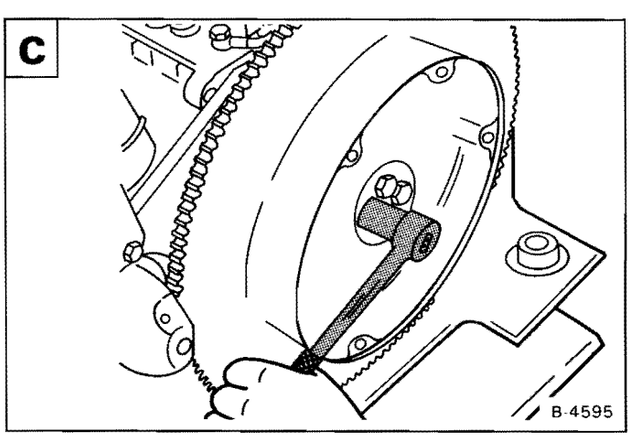
Remove the fan [B].



Remove the flywheel bolts [C].

NOTE: Do Not use the bolts again.

Remove the flywheel.



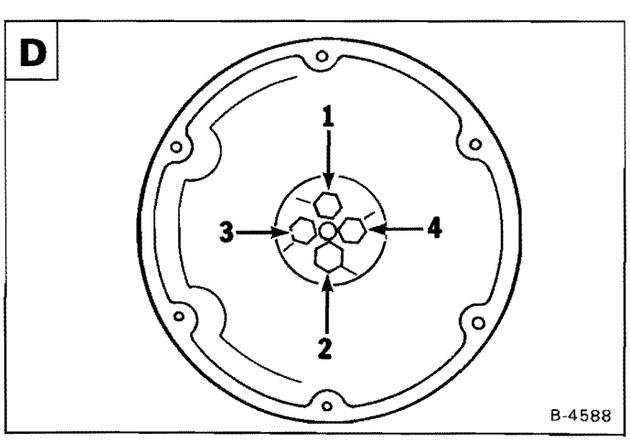
Install the flywheel.

Install the 4 new bolts. Using the sequence shown tighten the bolts with the following procedure [B].

Tighten each bolt to 20-25 ft.-lbs. (27-34 Nm) torque [D].

Then turn each bolt 60° [D].

Turn each bolt an additional 60° [D].



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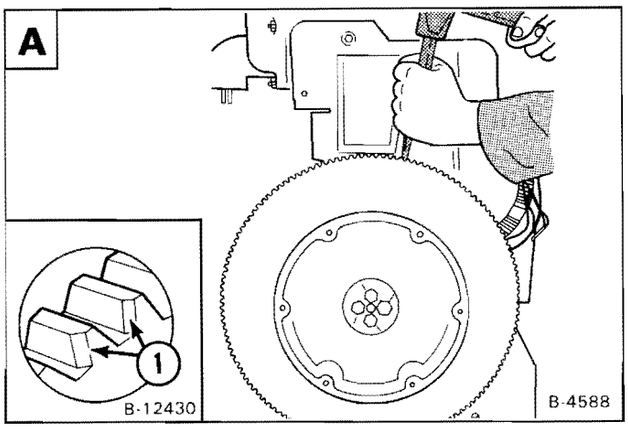
FLYWHEEL (Cont'd)

Ring Gear Removal and Installation

The ring gear for the starter is removed with a hammer and a blunt punch [A].

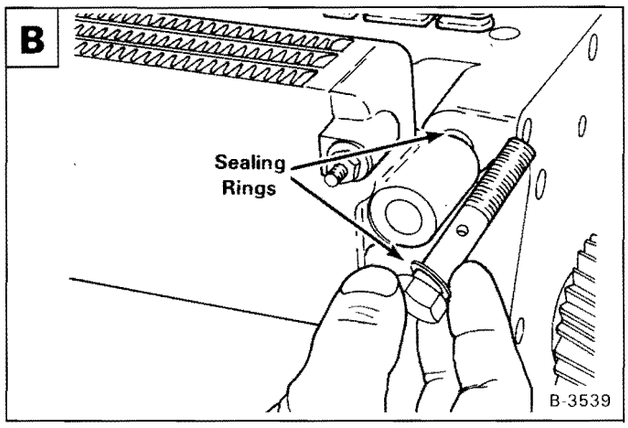
To install the new ring gear, heat the ring to 450-500°F (200°C) and install it onto a cool flywheel.

NOTE: **The champher (Item 1) on the ring gear (Inset) must be installed toward the starter [A].**



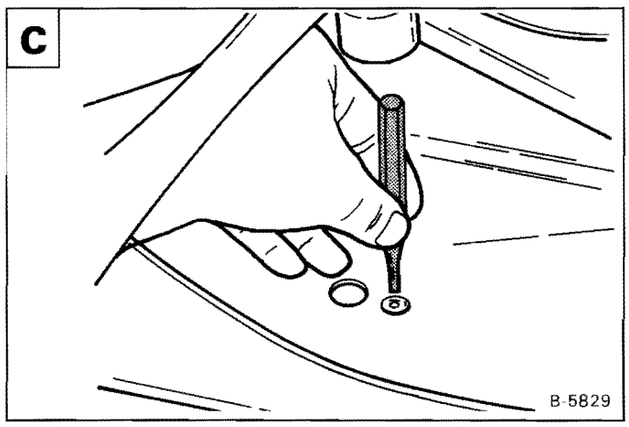
ENGINE OIL COOLER

Use new sealing rings on the banjo bolts every time they are removed [B].

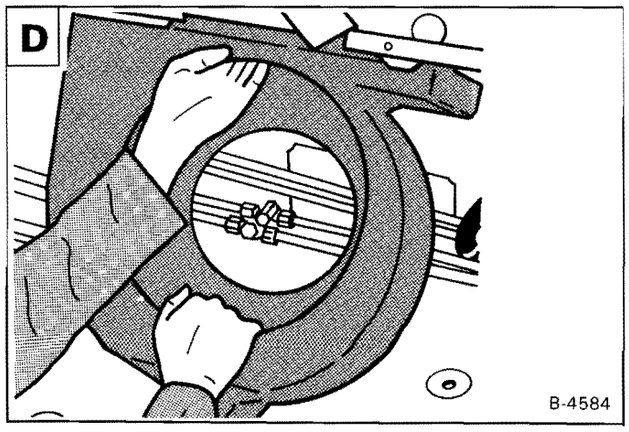


ENGINE SHROUDING

To remove the blower housing remove the bottom bolt or rivet [C].



Remove the shrouding [D].



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ENGINE MOUNTS

Replacing Engine Mounts

Lubricate the outside of the rubber mounts with water (Item 1) and install them in the engine mounts [A].

NOTE: **Soap or oil will deteriorate the rubber mounts. DO NOT use soap or oil when installing mounts.**

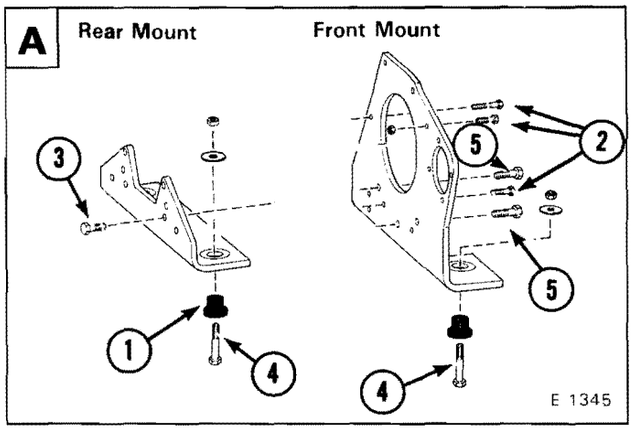
Install the front mount on the engine. Use Loctite on the bolts (Item 2) [A]. Tighten the bolts to 32-34 ft.-lbs. (43-47 Nm) torque.

Install and tighten the bolt (Item 5) to 40-44 ft.-lbs. (54-60 Nm) torque [A].

Install the rear mount on the engine. Use Loctite on the 6 bolts (Item 3) [A]. Tighten the bolts to 93-103 ft.-lbs. (125-140 Nm) torque.

Install the engine.

Install the bolts (Item 4) and tighten to 90-100 ft.-lbs. (125-135 Nm) torque [A].

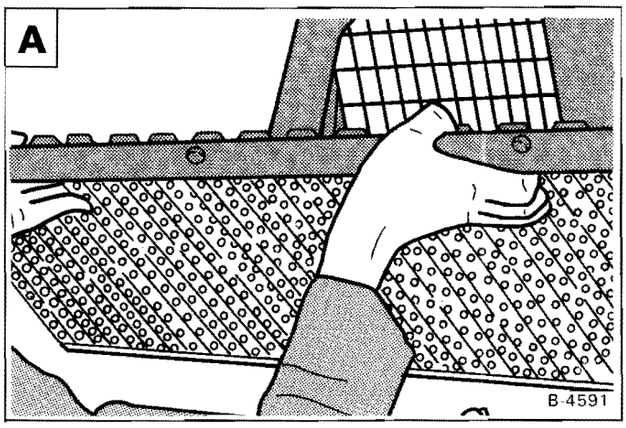


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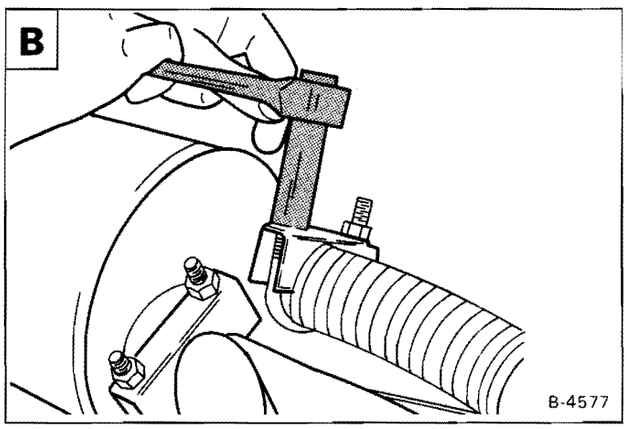
MUFFLER

Removal and Installation

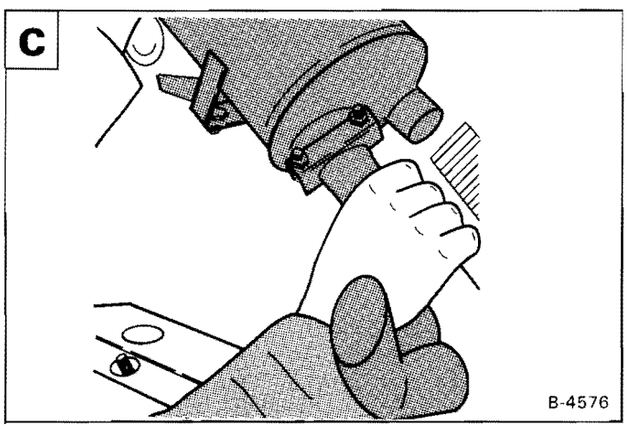
Remove the grill [A].



Remove the clamp [B].



Remove the four bolts holding the muffler and remove the muffler [C].

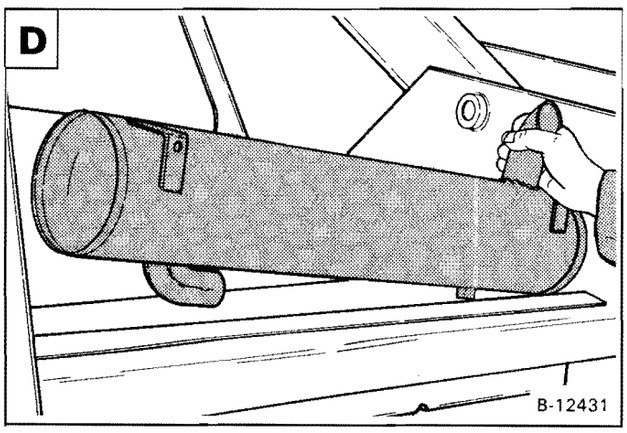


Later Built Models:

Remove the clamps and the flexible hose.

Remove the muffler mounting bolts.

Remove the muffler [D].



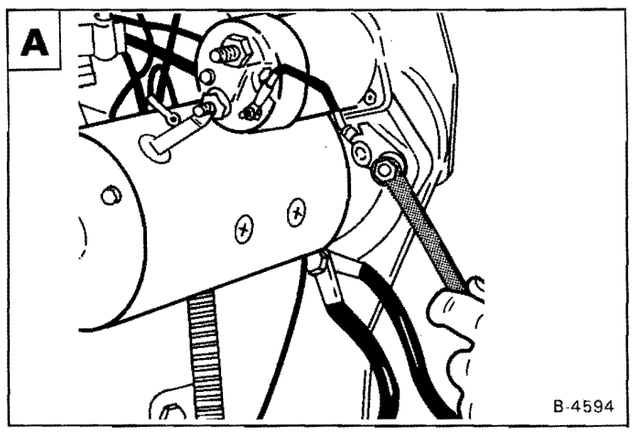
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STARTER

Removal and Installation

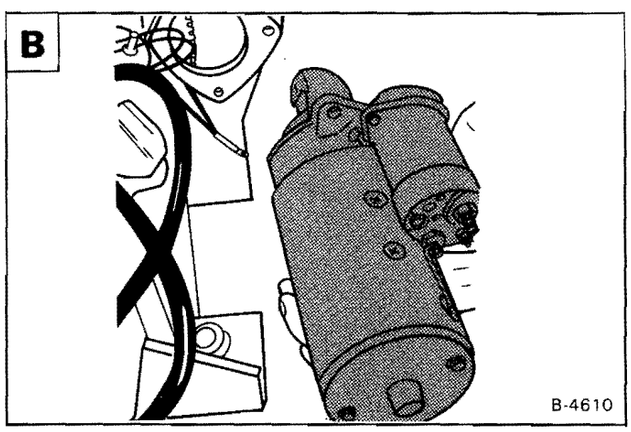
Remove the battery cables (negative cable first).

Remove the mounting bolts [A].



Remove the starter [B].

See Page 6—18 for Starter Repair.



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ENGINE SERVICE (742)

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CAMSHAFT BEARINGS	7B–35	7B–33
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VALVE SPRING RETAINER & STEM SEAL (With Cylinder Head Removed)	7B–22	7B–23
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WATER PUMP	7B–24	7B–25

742 FORD

⚠ WARNING

DO NOT service the Bobcat loader without instructions or taking the necessary safety precautions. Before working on the loader, see the warnings and instructions at the beginning of this Service Manual. After making the repair or adjustment, always check the function of the loader. Failure to obey warnings may cause injury or death.

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ENGINE SERVICE (Ford 742)

TROUBLESHOOTING

The following troubleshooting chart is provided as an assistance in locating and correcting problems which are most common. Many of the recommended procedures must be done by authorized Bobcat Service Personnel only.

PROBLEM	CAUSE
Engine will not turn over with the starter.	1, 2, 3, 4, 5, 6, 7
Engine will not start or is difficult to start.	8, 9, 10, 11, 12, 13, 14, 15, 16
Engine will not run correctly (misses) or stops.	15, 17, 18, 19
Engine overheats.	20, 21, 22, 23, 24

KEY TO CORRECT THE CAUSE

1. Battery has lost its charge.
2. Loose battery connections.
3. Loose starter connections.
4. Damaged starter switch.
5. Broken or disconnected wire harness.
6. Damaged starter or solenoid.
7. Fuse has damaged.
8. Wrong starting procedure.
9. No fuel in tank.
10. Dirty air cleaner.
11. Fuel tank vent cap is restricted.
12. Fuel line has air leak, dirt or water.
13. Hydraulic/Hydrostatic load on engine.
14. Fuel pump is damaged.
15. Ignition system is damaged or timing is wrong.
16. Incorrect crankcase oil.
17. Dirty fuel mixture.
18. Poor compression.
19. Water in the fuel.
20. Engine is overloaded.
21. Radiator grill is dirty.
22. Dirty engine oil.
23. Restricted exhaust system.
24. Coolant level is low.
25. Oil cooler has restriction.

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7B—2 CHECKS AND ADJUSTMENTS

7B—2.1 Oil Pressure

Engine oil pressure can be checked by installing a gauge in the sender switch port. Normal pressure is 35-40 PSI at 2000 RPM.

7B—2.2 Valve Clearance (Fig. 7B—1)

Make adjustment of valve clearance with the engine stopped.

Put a feeler gauge between rocker arm and pushrod and turn adjustment screw in or out to get the correct clearance. (See Section 8B Specifications for the correct clearance.)

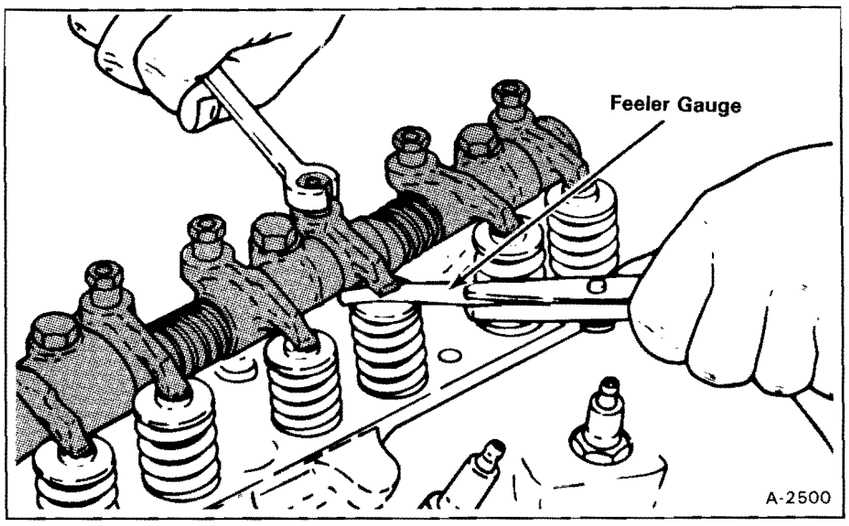


Fig. 7B—1 Adjusting Rocker Arms

7B—2.3 Compression

(1) Make sure the crankcase oil level is correct, and the battery has a full charge.

(2) Start the engine and operate for about 30 minutes at 1200 RPM or until the engine is at normal operating temperature.

(3) Stop the engine and remove all the spark plugs.

(4) Put the carburetor throttle plate and choke plate in the full open position.

(5) Install a compression gauge in the No. 1 cylinder. (No. 1 cylinder is at the rear of the machine.)

(6) Operate the starter until it turns the engine at least five compression strokes and record the highest reading. Count the number of compression strokes to get the highest reading.

(7) Test each cylinder.

(8) Make a comparison of the highest and the lowest compression readings. If the lowest is at least 75% of the highest compression pressures are normal (Fig. 7B—2).

If one or more of the cylinders show a low reading, put 1/2 oz. (14,75 ml) of oil in the low reading cylinders and make the compression test again.

(1) If there is a lot of increase in the compression, the piston rings are worn.

Maximum	Minimum	Maximum	Minimum
PSI	PSI	PSI	PSI
134	101	222	166
136	102	224	168
138	104	226	169
140	105	228	171
142	107	230	172
144	108	232	174
146	110	234	175
148	111	236	177
150	113	238	178
152	114	240	180
154	115	242	181
156	117	244	183
158	118	246	184
160	120	248	186
162	121	250	187
164	123		
166	124		
168	126		
170	127		
172	129		
174	131		
176	132		
178	133		
180	135		
182	136		
184	138		
186	140		
188	141		
190	142		
192	144		
194	145		
196	147		
198	148		
200	150		
202	151		
204	153		
206	154		
208	156		
210	157		
212	158		
214	160		
216	162		
218	163		
220	165		

Fig. 7B—2 Compression Chart

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(2) If compression does not show increase, the valves are not operating correctly.

(3) If two cylinders side by side each have a low compression and putting oil in the cylinders does not cause an increase in compression, the damage could be a cylinder head gasket leak between the cylinders.

Head gasket leakage can cause oil or coolant to enter the cylinders and cause damage to the engine.

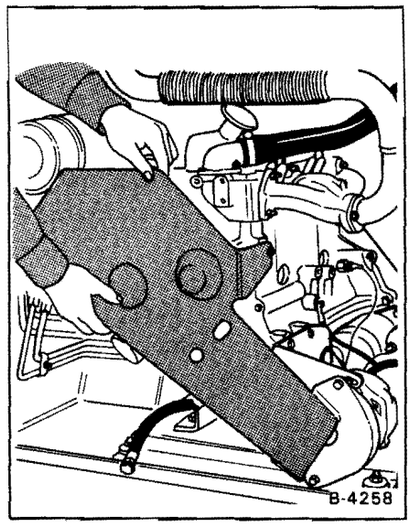


Fig. 7B—3 Removing Belt Shield

7B—2.4 Carburetor, Throttle and Governor Adjustments

(1) Put blocks under the frame of the Bobcat so that there is no danger of the machine falling and causing personal injury.

(2) Remove the belt shield (Fig. 7B—3).

(3) Loosen the governor fastening bolts and make adjustment of belt to give 1/4" (6,35 mm) freeplay (Fig. 7B—4). Tighten the governor fastening bolts.

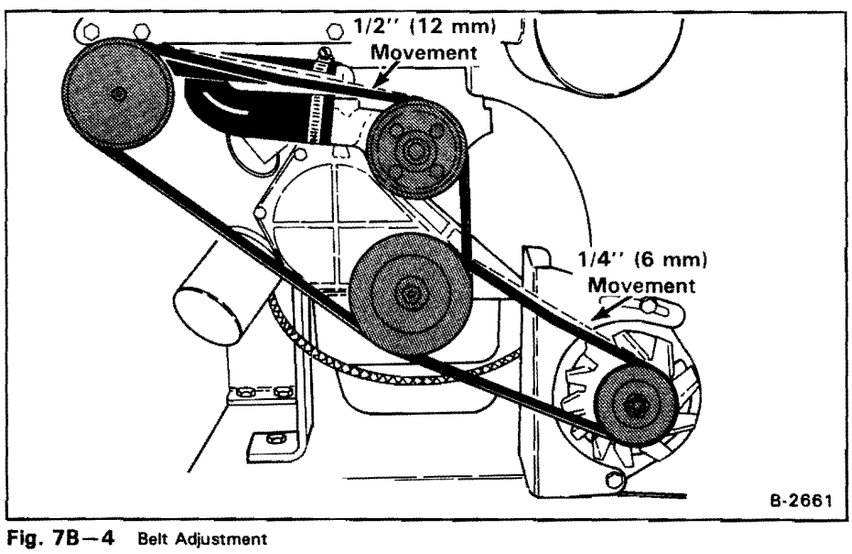


Fig. 7B—4 Belt Adjustment

(4) Install the belt shield.

NOTE: If only the belt needs adjustment, make adjustment to the linkage (Fig. 7B—4, Item 1).

(5) Disconnect the throttle rod and the governor linkage (Fig. 7B—5, Item 1).

(6) Remove the linkage from the governor control arm (Fig. 7B—5, Item 2).

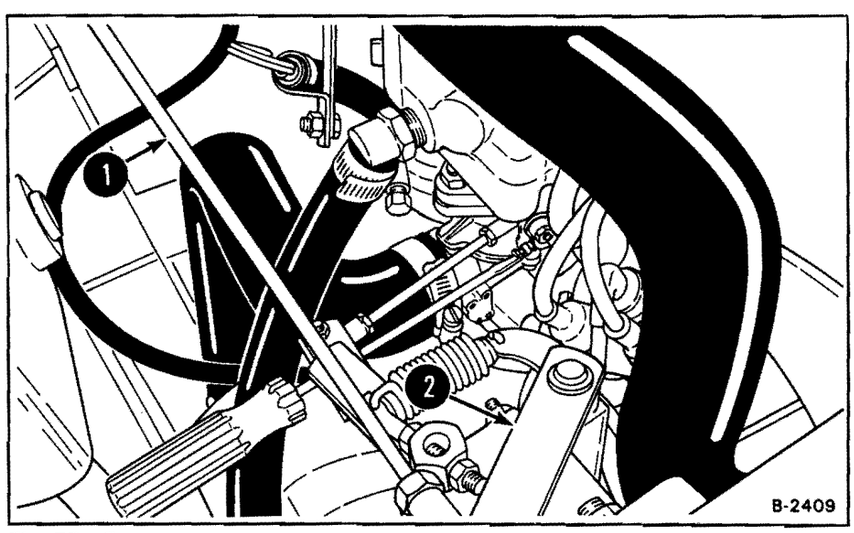


Fig. 7B—5 Throttle/Governor Adjustment

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(7) Make adjustment of the linkage so the distance between the pivot points is 4-7/8" (123,8 mm), (Fig. 7B—6).

(8) Check that there is free movement of the throttle plate in the carburetor.

(9) Install the linkage on the governor control arm.

(10) Loosen the control arm stop until it has no effect on the governor control arm (Fig. 7B—7).

(11) Loosen the two screws on the governor control arm (Fig. 7B—8).

(12) Move the governor control arm and control arm of the carburetor linkage as shown in (Fig. 7B—8).

(13) Hold the control arm and linkage in position and tighten the two screws. .

(14) Start the engine and turn the idle adjustment screw on the carburetor to adjust the idle speed at 550 - 650 RPM (Fig. 7B—9).

(15) Adjust the ignition timing. (See Section 7B—2.7 "Ignition Timing" for the correct procedure).

(16) Put the throttle lever in idle position.

(17) Hold the governor control arm all the way to the left as shown in (Fig. 7B—8). Then adjust the throttle rod until the pin goes into the hole in the throttle linkage.

(18) Start the engine and put the throttle lever (inside the Operator Cab) at full RPM. Make adjustment to the top bolt until the engine runs at 2600-2675 RPM.

(19) Turn the control arm stop (Fig. 7B—7) until there is an increase of 25 RPM.

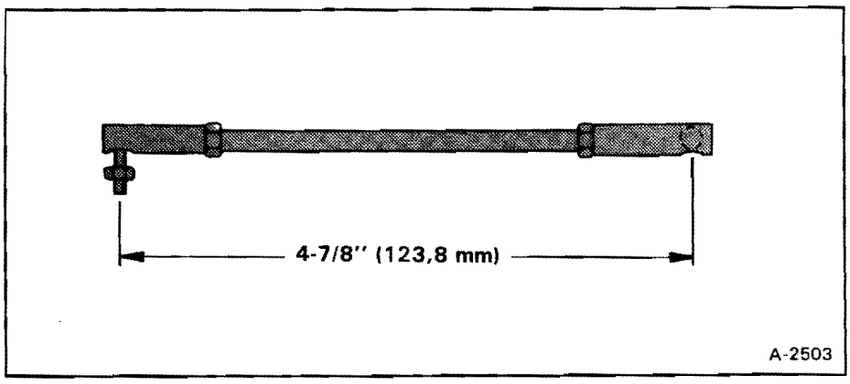


Fig. 7B—6 Linkage Adjustment

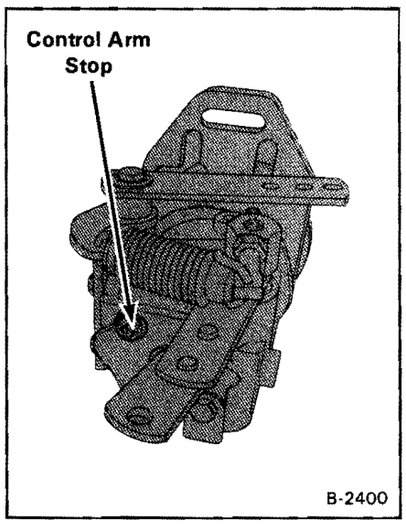


Fig. 7B—7 Control Arm Stop

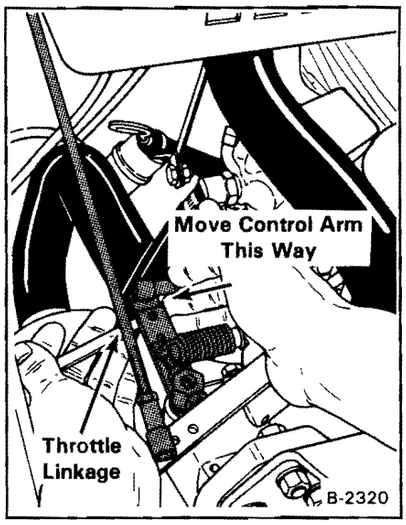


Fig. 7B—8 Control Arm Adjustment

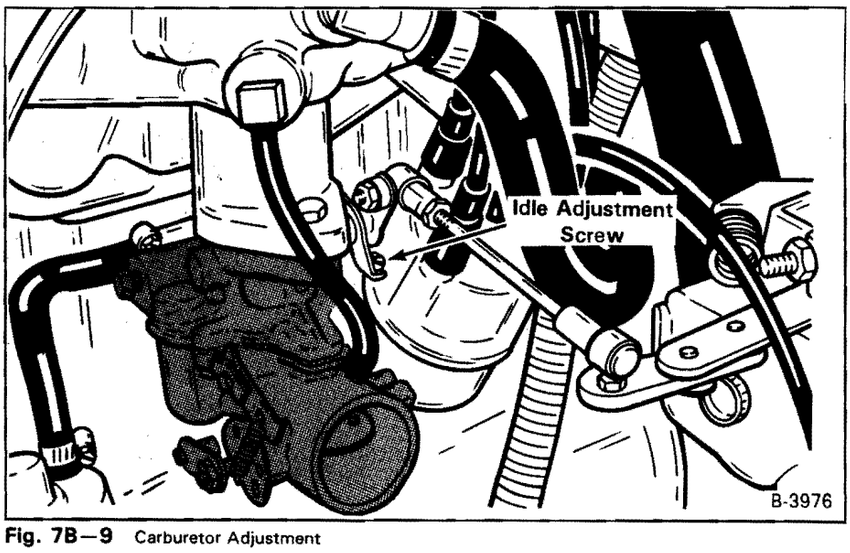


Fig. 7B—9 Carburetor Adjustment

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7B—2.5 Ignition System

Coil to Ground Voltmeter Test

(1) Connect the voltmeter wires as shown in (Fig. 7B—10).

(2) Operate the starter until the breaker points are fully closed.

(3) Turn all the lights and accessories off.

(4) Turn the ignition switch on.

(5) If the voltmeter reading is 0.25 volt or less the primary circuit from the coil to the ground is good.

(6) If the voltmeter reading is more than 0.25 volt test the voltage loss between each of the following:

a. The connector marked "DIST" on the coil and the connection on the distributor.

b. The moving breaker point and the stationary breaker point.

c. The breaker point and the distributor.

d. The distributor housing and the engine ground.

If the voltage loss of all the above has a total of more than 0.25 volt, it will cause bad engine performance.

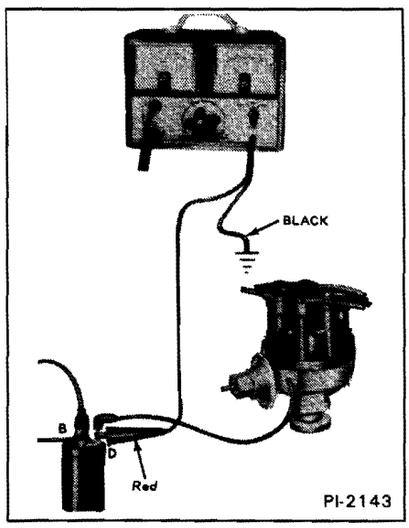


Fig. 7B—10 Coil to Ground Test

Spark Plug Wires Resistance Test

These wires include the wires connecting the distributor cap to the spark plug and the wire connecting the center connection of the distributor cap to the center connection of the ignition coil.

These wires are the radio resistance-type. The resistance of each wire must not be more than 5000 ohms per inch. (25,4 mm). When checking the resistance of the wires or adjusting ignition timing, do not damage the wires. This can cause separation in the conductor.

Spark Plug Test

Check and clean the electrodes and adjust the spark plug gap. After the gap is correct, check the plugs on a testing machine. Compare the operation of the old plug with a new plug.

Distributor Tests

Test Connections

(1) Disconnect the distributor primary wire from the coil. Connect a short jumper wire to the "DIST" connection of the coil and the distributor primary wire. Connect the red wire to the jumper wire.

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(2) Connect the black wire to a good ground location on the engine.

Dwell Angle Check

(1) Connect the tester.

(2) Turn the test control knob to the set position.

(3) Adjust the control knob until the needle on the dwell meter is in alignment with the set line.

(4) Start the engine and let it idle.

(5) Turn the cylinder selector to the four.

(6) Read the dwell angle on the dwell meter and compare the reading to specifications in (Section 8 "Technical Data").

(7) Turn off the engine.

(8) If the dwell angle was below the specified amount, the breaker point gap is wide. If the dwell angle was above the specified amount, the breaker point gap is narrow.

If the dwell is at specifications, turn the test selector knob to the "OFF" position and disconnect the tester leads and jumper wire.

Make adjustment to the points as needed.

Spark Strength Tests

(1) Remove the coil high voltage wire from the distributor cap.

(2) Turn the ignition switch to "ON" position.

(3) While holding the high tension lead about 3/16" from the cylinder head or any other good ground turn the engine over. If the spark is good, the problem is in the secondary circuit. Spark plugs or spark plug wires are damaged.

If there is no spark or a small amount of spark, the problem is in the primary circuit. The coil to the distributor wire, or the coil is damaged.

7B—2.6 Ignition System Tests

Battery to Coil Voltmeter Test

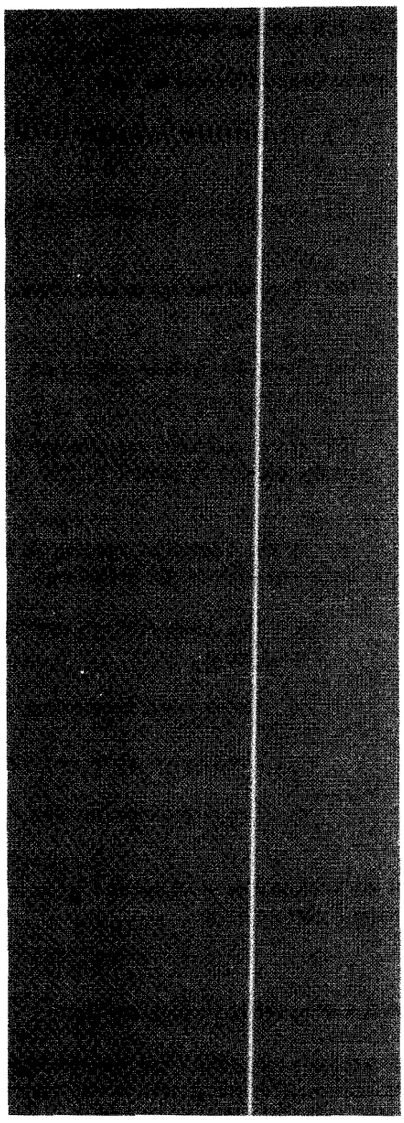
(1) Connect the voltmeter wires as shown in (Fig. 7B—11).

(2) Connect a jumper wire to the distributor connection of the coil and to a good ground location on the distributor housing.

(3) Turn the lights and accessories off.

(4) Turn the ignition switch to "ON" position.

(5) If the voltmeter reading is between 4.5 and 6.9 volts the primary circuit from the battery to the coil is good.



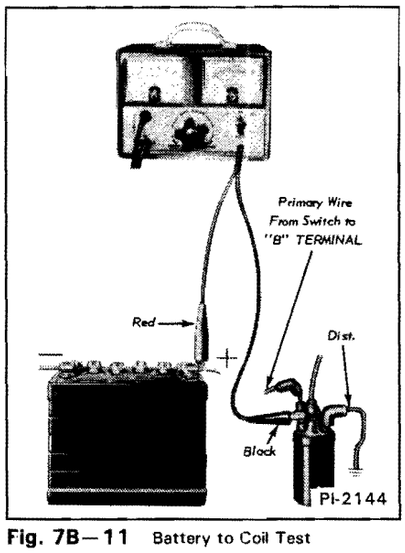


Fig. 7B—11 Battery to Coil Test

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(6) If the voltmeter reading is more than 6.9 volts, check the following:

a. The battery and cables for loose connections or corrosion.

b. The primary insulation, broken wires and loose or corroded connections.

c. If the voltmeter reading is less than 4.5 volts, the ignition resistor must be replaced.

d. Check the start relay to the ignition switch for damage.

Starting Ignition Circuit Voltmeter Test

(1) Connect the voltmeter wires as shown in (Fig. 7B – 10).

(2) Disconnect and ground the coil to distributor high voltage wire at the distributor.

(3) With the ignition switch in the "OFF" position turn the engine with an auxiliary starter switch while reading the voltage loss.

(4) If the voltage loss is 0.4 volt or less, the starting ignition circuit is good.

(5) If the voltage loss is more than 0.4 volts clean and tighten the connections in the circuit or make replacement of the wiring as needed.

Breaker Point Gap Adjustment

(1) Turn the engine over until the points are fully opened.

Put the correct thickness blade of a clean feeler gauge between the breaker points (Fig. 7B – 12 & 7B – 12a). Make adjustment of the points to correct gap and tighten the screws.

Clean the cam area, then put a small amount of cam lubricant on the cam when new points are installed. Do not use engine oil as a lubricant.

7B – 2.7 Ignition Timing

When installing distributor (Brown Cap) do the following:

Align the timing marks as shown (Fig. 7B – 13).

Install the distributor with rotor marks (Item 1) and housing marks (Item 2) in alignment (Fig. 7B – 12b).

Timing Marks Location

The timing mark locations are shown in (Fig. 7B – 13).

Initial Ignition Timing

(1) Disconnect the vacuum advance hose from the distributor and put a plug in the hose.

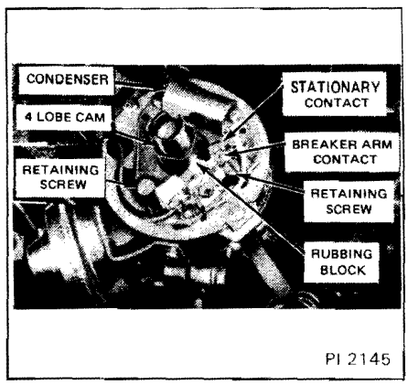


Fig. 7B – 12 Point Gap Adjustment

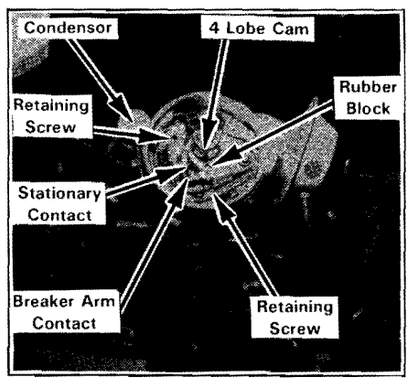


Fig. 7B – 12a Point Gap Adjustment

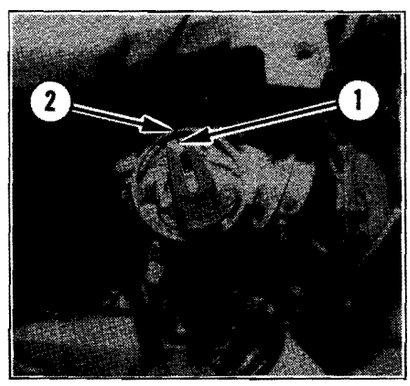


Fig. 7B – 12b Dist. Timing Marks

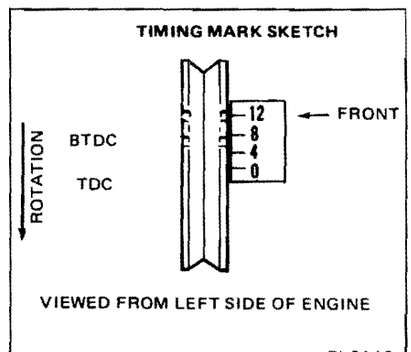


Fig. 7B – 13 Timing Marks

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(2) Clean and mark the correct timing mark with chalk or white paint.

(3) Connect a timing light to No. 1 cylinder spark plug wire (Fig. 7B 14). Connect a tachometer to the engine.

(4) Start the engine and decrease the idle speed to 750 RPM to make sure that the centrifugal advance is not operating. Make the adjustment of the initial ignition timing to 12° BTDC by loosening the 7/16" bolt and rotating the distributor in the correct direction.

(5) Check the centrifugal advance for correct operation by starting the engine and running the engine at 2000 RPM. If the ingition timing advances, the centrifugal advance mechanism is operating correctly. Note the engine speed when the advance starts and the amount of total advance. Stop the engine.

(6) Connect the vacuum hose.

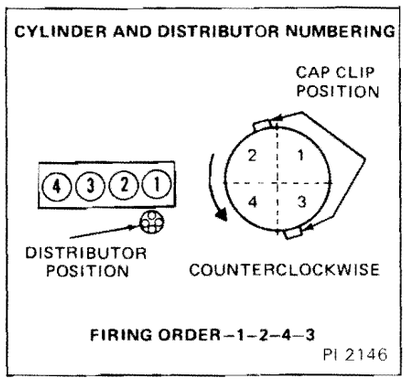


Fig. 7B – 14 Firing Order

7B – 3 CARBURETOR REPAIR (Fig. 7B – 15)

(1) Remove the four screws (Item 1).

(2) Remove the throttle body (Item 2) and the gasket (Item 3) from the fuel body (Item 4). Be careful not to cause damage to the float assembly (Item 5).

(3) Put a screwdriver against the float axle (Item 6) at the slotted side of the float hinge and push the axle through the slotted side of the bracket. Remove the hinge and remove the float assembly (Item 5).

(4) Remove the fuel valve needle (Item 7), the valve seat (Item 8) and the fiber washer (Item 9).

(5) Use new parts in the repair kit to replace the above parts.

(6) The correct float lever for the carburetor is 1-1/8" to 1-3/16" as measured from the machined surface of the throttle body (inverted) to the top of the float (Fig. 7B – 15a). Measurement is made without the gasket.

(7) Use a needle nose pliers to bend the lever on the float body to get the correct float adjustment.

NOTE: If parts need replacement and are not in the carburetor kit, replace the carburetor assembly.

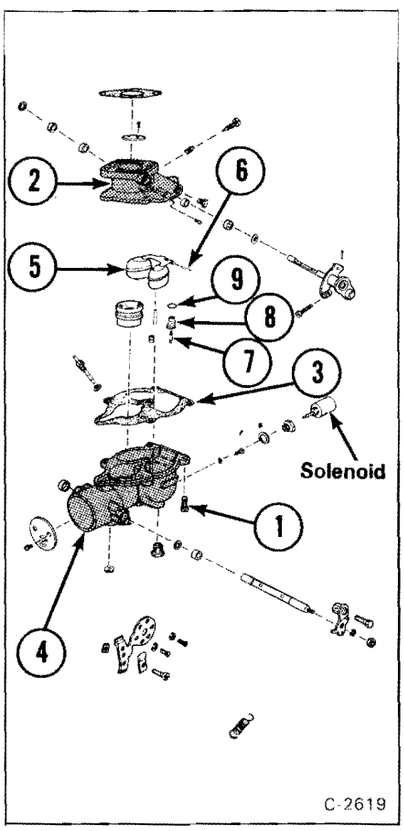


Fig. 7B – 15 Carburetor Assembly

7B – 4 ENGINE DIAGNOSIS AND TESTING

7B – 4.1 Camshaft Lobe Lift

Check the lift of each camshaft lobe and make a note of the readings.

(1) Remove the rocker arm cover.

(2) Remove the rocker arm shaft assembly.

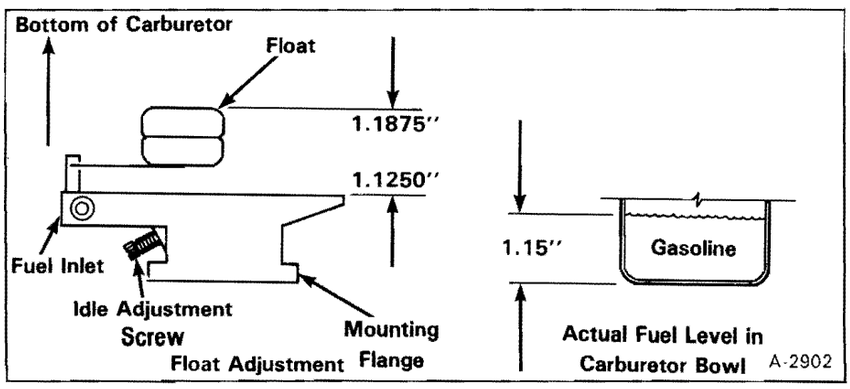


Fig. 7B – 15a Float Level Adjusment

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(3) Make sure the pushrod is in the valve lifter socket. Install a dial indicator so the ball socket adapter of the indicator is on the end of the pushrod and is the vertical with the pushrod movement (Fig. 7B—16).

(4) Turn the crankshaft over until the lifter is in its lowest position, highest indicator reading.

(5) Position the dial indicator at zero. Continue to rotate the crankshaft at a slow rate until the rushrod is in the highest position, highest indicator reading.

(6) Compare the total reading on the indicator with the specifications.

(7) To check the original indicator reading, continue to rotate the crankshaft until the indicator reads zero. If the reading on any lobe is below the specified wear limits, the camshaft and the valve lifters must be replaced.

(8) Remove the dial indicator gauge.

(9) Install the rocker shaft assembly.

(10) Install the rocker cover.

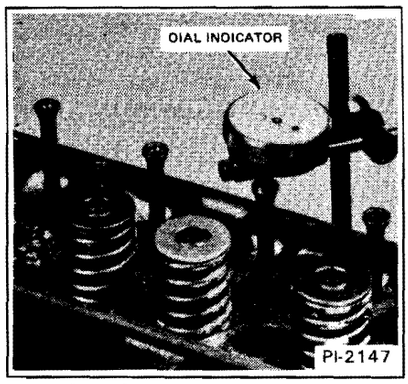


Fig. 7B—16 Checking Camshaft Lift

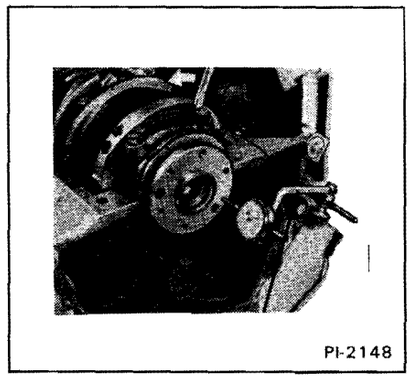


***Fig. 7B—17** Checking Crankshaft End Play

7B—4.1 Crankshaft End Play

(1) Move the crankshaft toward the rear, flywheel end, of the engine.

(2) Install a dial indicator and position the contact point against the crankshaft flange at the front of the engine and the indicator is parallel to the crankshaft (Fig. 7B—17).

(3) Position the dial indicator at zero. Push the crankshaft forward and note the reading on the dial.

(4) If the end play is more than the wear limit, according to specifications, install new thrustwashers. If the end play is less than the minimum limit, check the thrust bearing surfaces for scratches, rough areas or debris.

7B—4.2 Flywheel Surface Alignment Check

(1) Move the crankshaft fully forward or to the rear.

(2) Install a dial indicator so that the indicator point is against the flywheel surface.

(3) Position the dial indicator at zero and turn the crankshaft. Check the indicator reading.

(4) If alignment is not to specification, remove the flywheel and check for dirt or other debris between the flywheel and crankshaft flange. If alignment is not to specifications, install a new flywheel or grind the crankshaft or flywheel as needed to correct the alignment.

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7B—4.3 Camshaft End Play

(1) Push the camshaft toward the rear, flywheel end, of the engine.

(2) Install a dial indicator. Position the indicator point on the hub of the camshaft sprocket.

(3) Position the dial indicator at zero.

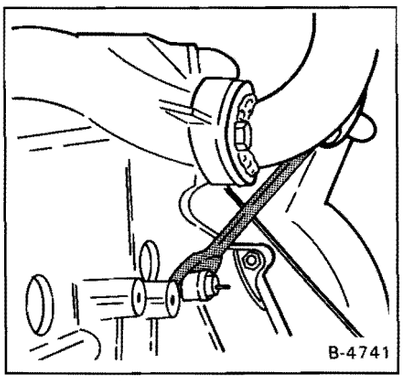


Fig. 7B—18 Removing Temp. Sender

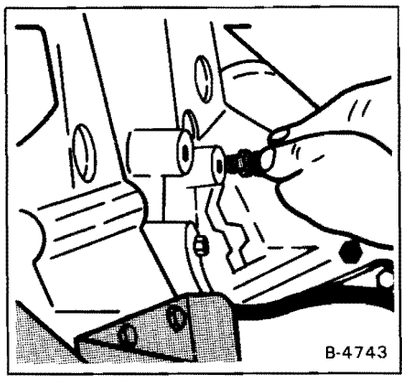


Fig. 7B—19 Installing Drain Fitting

(4) Put a large screwdriver between the camshaft sprocket and the cylinder head. Pull the camshaft forward and release it.

(5) Check the indicator reading. If reading is more than the specification replace the thrust plate that holds the camshaft.

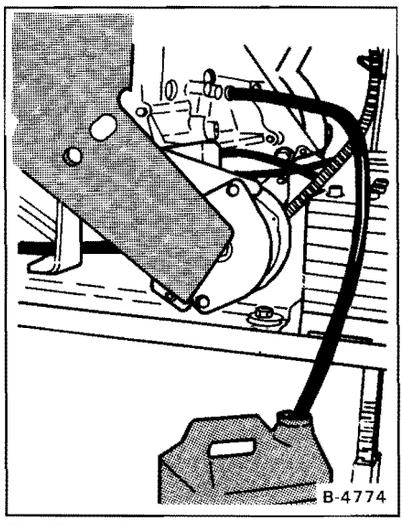


Fig. 7B—20 Removing Coolant

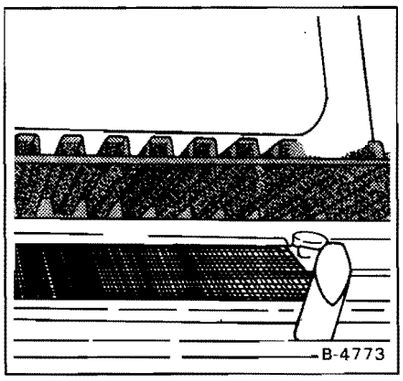


Fig. 7B—21 Removing the Grill

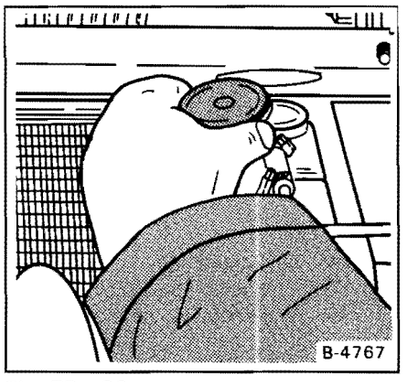


Fig. 7B—22 Removing the Radiator Cap

7B—5 ENGINE REMOVAL

(1) Remove the temperature sender (Fig. 7B—18).

(2) Install a fitting of the correct threads in the sender hole location (Fig. 7B—19).

(3) Install a hose on the fitting and drain the coolant into a container (Fig. 7B—20).

(4) Remove the grill (Fig. 7B—21).

(5) Remove the radiator cap (Fig. 7B—22).

(6) Remove the line from the coolant recovery tank and remove the tank (Fig. 7B—23).

(7) Loosen the exhaust pipe clamp (Fig. 7B—24).

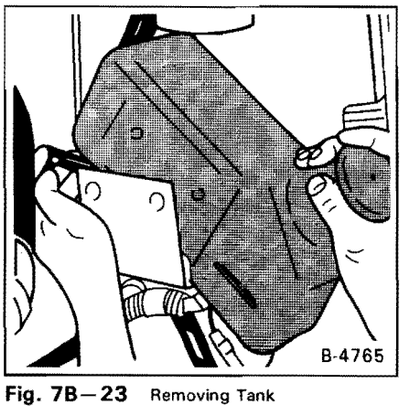


Fig. 7B—23 Removing Tank

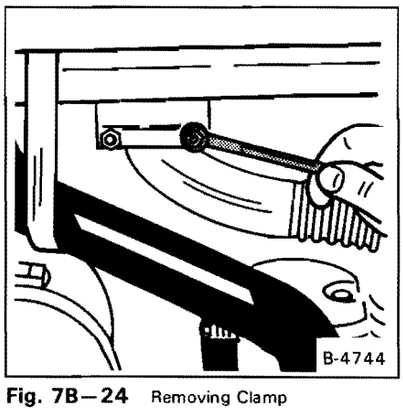


Fig. 7B—24 Removing Clamp

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(8) Remove the bolts from the manifold (Fig. 7B—25).

(9) Remove the exhaust pipe from the muffler (Fig. 7B—26).

(10) Remove the throttle rod from the governor linkage (Fig. 7B—27).

(11) Remove the coil wire and remove the other wires (Fig. 7B—28) from the coil.

(12) Remove air cleaner hose from the engine (Fig. 7B—29).

(13) Remove the coolant hoses from the engine.

(14) Remove the solenoid from the recovery tank bracket (Fig. 7B—30).

(15) Disconnect the fuel line from the engine.

(16) Remove the engine ground cable (Fig. 7B—31).

(17) Remove the engine mounting bolts (Fig. 7B—32).

(18) Raise the operator guard.

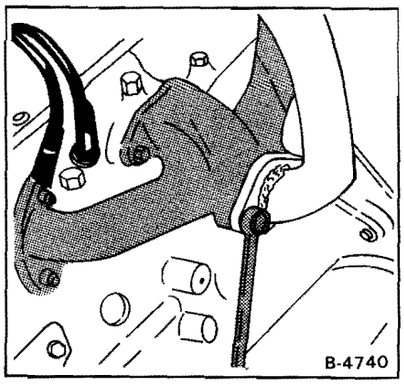


Fig. 7B—25 Removing Exhaust Pipe

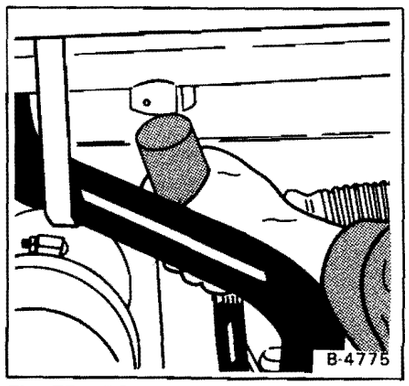


Fig. 7B—26 Removing Exh. Pipe from Muffler

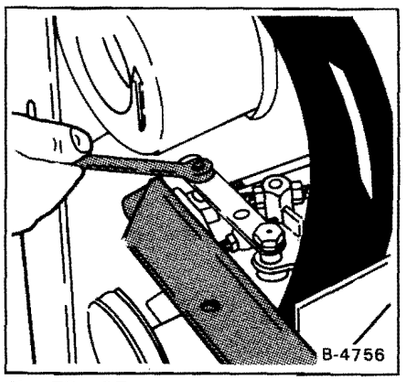


Fig. 7B—27 Removing the Throttle Rod

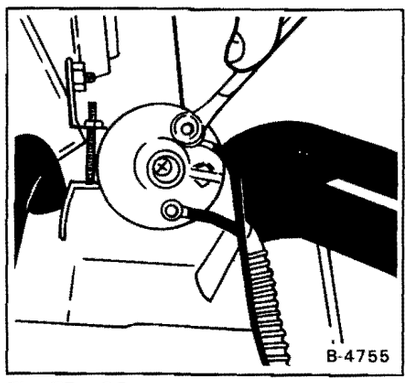


Fig. 7B—28 Removing the Wires from the Coil

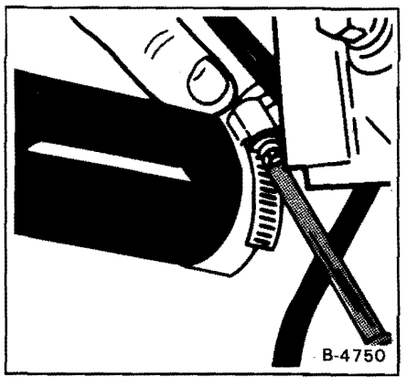


Fig. 7B—29 Removing the Air Cleaner Hose

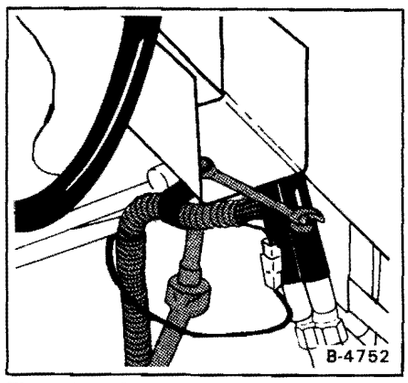


Fig. 7B—30 Removing the Solenoid

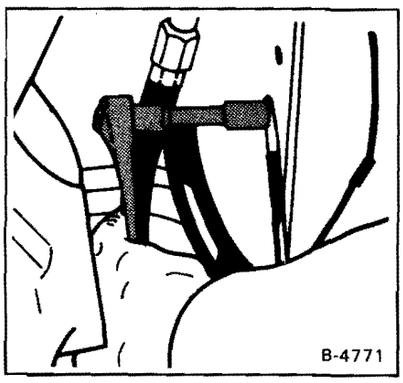


Fig. 7B—31 Removing the Engine Ground

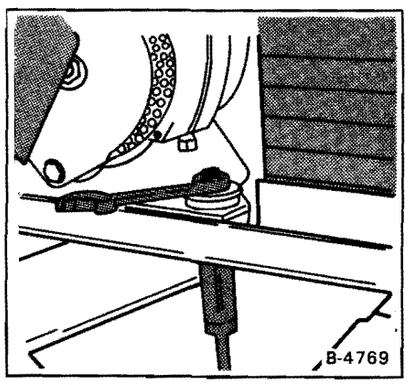


Fig. 7B—32 Removing the Eng. Mtg. Bolts

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(19) Disconnect the engine harness from the chassis harness (Fig. 7B—33).

(20) Remove the choke control from the front panel (Fig. 7B—34) and put it in the engine compartment.

(21) Remove any other items necessary.

(22) Remove the engine using a table as shown in (Fig. 7B—35).

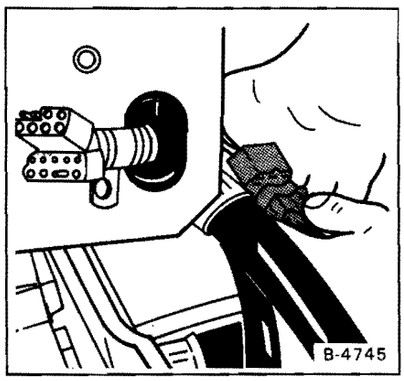


Fig. 7B—33 Disconnecting Engine Harness

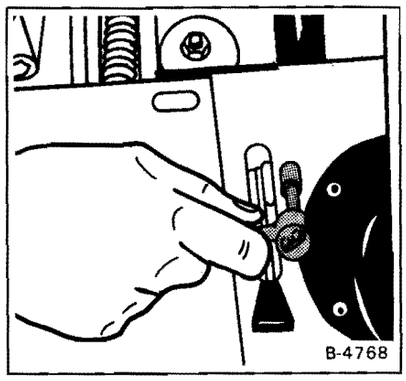


Fig. 7B—34 Removing Choke Control

7B—6 ENGINE REPAIR

7B—6.1 Cylinder Head

Do not grind more than .010" (0,254 mm) from the cylinder head gasket surface. Remove all rough edges and scratches with an oil stone.

7B—6.2 Valve Guides

If the valve guides become worn, it will be necesary to install valves with an oversize stem.

Valves with oversize stems are available in the following oversize amounts:

.003" .015" .030"

Use a reamer of the correct size to make valve guides larger.

When going from a standard size valve to a oversize valve, always use the reamer in steps. Grind the valve seat after the valve guide has been cut and use a sharp tool to break the sharp inside diameter corner, at the top of the valve guide.

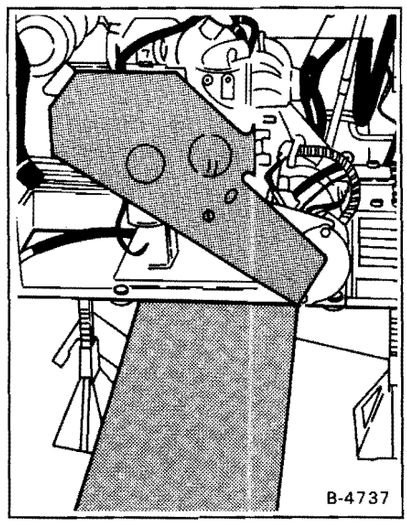


Fig. 7B—35 Removing the Engine

7B—6.3 Grinding The Valve Seats (Fig. 7B—36)

The valve seats are part of the cylinder head. If the valve seats become damaged so that the valves and seats are not in correct contact, grinding of the valve seats is necessary.

Grind both the intake and the exhaust valve seats at 45°. Grind only enough to give the valve seat a smooth surface.

Grind the valve seat the correct width (See Page 8B—4). Use a 60° grinding wheel to remove the material from the bottom of the valve seat and a 30° grinding wheel for the top of the valve seat. The valve seat must be in contact at approximately the center of the valve surface.

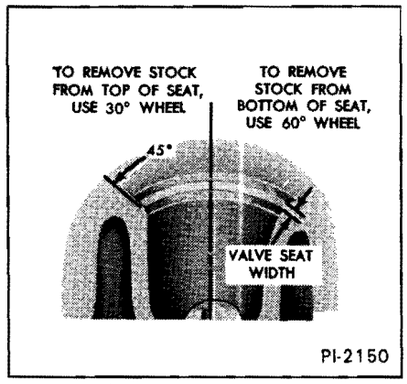


Fig. 7B—36 Grinding Valve Seat

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7B—6.4 Valves

Small burns, grooves, etc., can be removed. Remove valves that are damaged, if the surface alignment cannot be corrected by finishing or if the valve stem clearance is more than specifications allow.

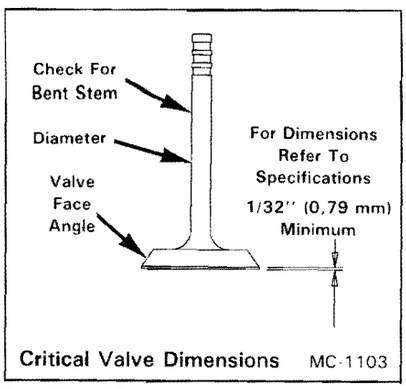


Fig. 7B—36a

7B—6.5 Grinding Valves

If the valve surface alignment is not with in specifications grind the valve to a 45° angle. Remove only enough material to correct the alignment or to make the surfaces smooth. If the edge of the valve head is less than 1/32" thick after grinding (Fig. 7B—36a), install new valve as the old valve will cause engine to run hot. Remove all grooves or scratches from the end of the valve stem, and make chamfer as needed. DO NOT remove more than 0.010" (0,245 mm) from the end of the valve stem.

If the valve or valve seat has been finished, it till be necessary to check the clearance between the rocker arm and the valve stem with the rocker assembly installed in the engine.

7B—6.6 Select Fitting of the Valves

If the valve stem to valve guide clearance is more than the wear limit, use a reamer to cut the valve guide to the next oversize valve stem. Valves with oversize stem diameters of 0.003", 0.015" and 0.030" are available as service parts. Grind the valve seat after the valve guide has been cut.

7B—6.7 Camshaft Repair

Remove small marks from the camshaft machined surfaces with a smooth oil stone.

7B—6.8 Crankshaft

Remove small marks with an oil stone. If the journals are damaged or worn, they must be machined to the correct size for the next size smaller bearing.

7B—6.9 Repairing Journals

After machining the bearing surfaces, put a chamfer in the oil holes; then finish the bearing surfaces with a No. 320 grit cloth and engine oil. Crocus cloth may also be used for finishing.

7B—6.10 To Check Crankshaft or Connection Rod Bearings With Plastigage

(2) Clean crankshaft bearing surfaces. Check the surfaces and thrust bearings for damage. When making replacement of standard size bearings, install bearing of minimum specified clearance. If the needed clearance cannot be made with a standard bearing use a 0.002" size smaller in combination with a standard bearing to get the correct clearance. (See Specification Section 8B.)

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(2) Put a piece of plastigage on the bearing surface across the full width of the bearing cap and about 1/4" (6,35 mm) off center (Fig. 7B—37).

(3) Install the cap and tighten the bolts to correct torque. DO NOT turn the crankshaft while Plastigage is in position.

(4) Remove the cap. Using the Plastigage scale, check the width of plastigage at the widest point to get the minimum clearance. Check Plastigage at narrowest point to get maximum clearance. The difference between the readings is the taper of the bearing surfaces.

(5) If the clearance is more than specified limits, on the connecting rod bearings, use a 0.002" size smaller bearing in combination with the standard bearings. Bearing clearance must be within specified limits. If 0.002" size smaller main bearings are used on more than one bearing surface, be sure they are installed in the cylinder block side of the bearing. If standard size and 0.002" smaller size bearings do not make clearance within the needed limits, machine the crankshaft bearing surface, and install the smaller size bearings.

(6) After the bearing has been checked, remove Plastigage and put a small amount of oil on the bearing surface and the bearings. Install the bearing cap. Tighten the bearing caps bolts to the correct torque.

(7) Do the above for all bearings that need replacement.

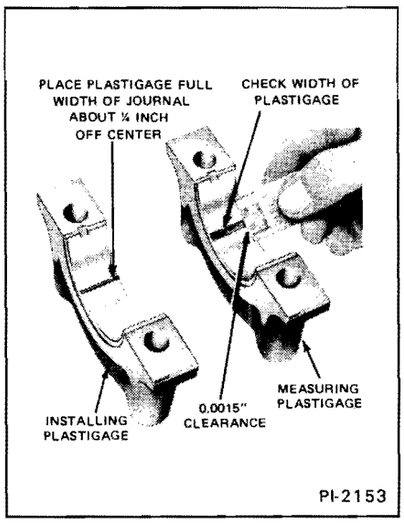


Fig. 7B—37 Installing Measuring Plastigage

7B—6.11 Installing Pistons

Pistons are availabe for service in standard sizes and over sizes.

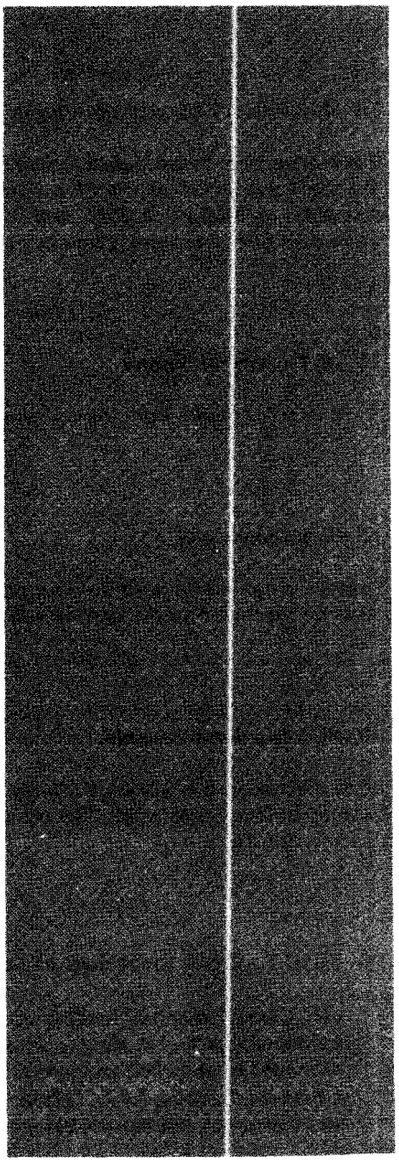
The standard size pistons are color coded red or blue or have .0025 O.S. marked on the top. Refer to Specification Section 8B for standard size piston dimensions.

Measure the piston diameter to be sure you have the specified clearance. When a new piston has been checked for clearance, mark the piston to the cylinder to which it was checked in. If the taper and piston to cylinder bore clearance conditions of the cylinder bore are within specified limits, new piston rings will give good service. If new rings are to be installed in a used cylinder that has not been finished, remove the cylinder wall glaze with a hone. Be sure to clean the cylinder bore after honing.

(1) Find the correct size piston to be used by marking a cylinder bore check.

(2) Find the correct size piston to give the correct clearance (Refer to Specification Section 8B). Measure the piston 2-1/4" (57,15 mm) below the top and at 90° to the piston pin bore.

(3) Make sure the piston and cylinder block are at room temperature, 70°F (21,1°C). After any finishing oation, let the cylinder bore cool and be sure the piston and the bore are clean and dry before the piston fit is checked.



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7B—6.12 Installing Piston Rings

The piston uses two compression rings and one oil control ring. The lower compression ring is stepped on the bottom outer, edge and the upper ring is chrome plated and tapered on the outside diameter. Both rings are marked top and must be installed correctly. The upper ring, when new, has a red and brown compound on the outer edge. This compound must not be removed. The oil control rings have narrow ring cases and can be installed either way.

(1) Use the correct size ring for the size of cylinder bore you have.

(2) Put the ring in the cylinder bore it is going to be used in.

(3) Use the head of a piston to push the ring in the bore about 1'' (25,4 mm) so that the ring is square with the cylinder wall. Be careful not to damage the ring or the cylinder bore.

(4) Measure the gap between the ends of the ring with a feeler gauge (Fig. 7B—38). If the ring gap is not in the specified limits, use another ring set.

(5) Check the side clearance of the compression rings with a feeler gauge installed between the ring and its lower edge (Fig. 7B—39). The gauge must move easily around the ring circumference. If the grooves are worn, make replacement of the piston.

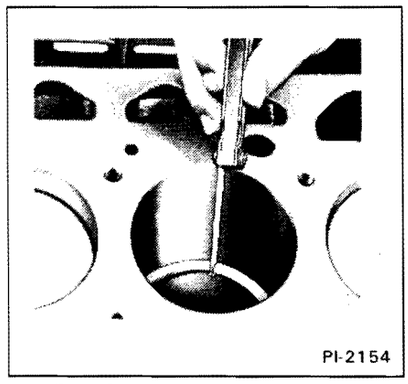


Fig. 7B—38 Checking Gap of Piston

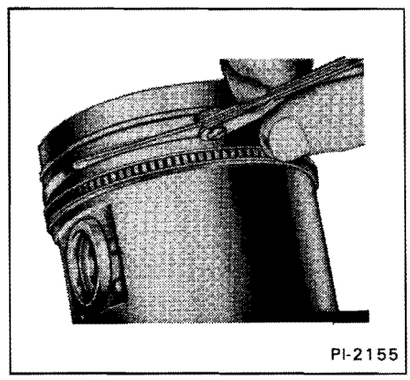


Fig. 7B—39 Checking Side Clearance

7B—6.13 Installing the Piston Pins

Pistons and piston pins are available as a unit only and cannot be purchased as individual parts. Keep the correct pins and pistons together.

7B—6.14 Valve Rocker Arm and Shaft Assembly

Use a hone to remove small surface damage to the rocker arm shaft and to the rocker arm bore.

If the valve end of the rocker arm has a grooved radius replace the rocker arm. You cannot grind this surface.

7B—6.15 Push Rods

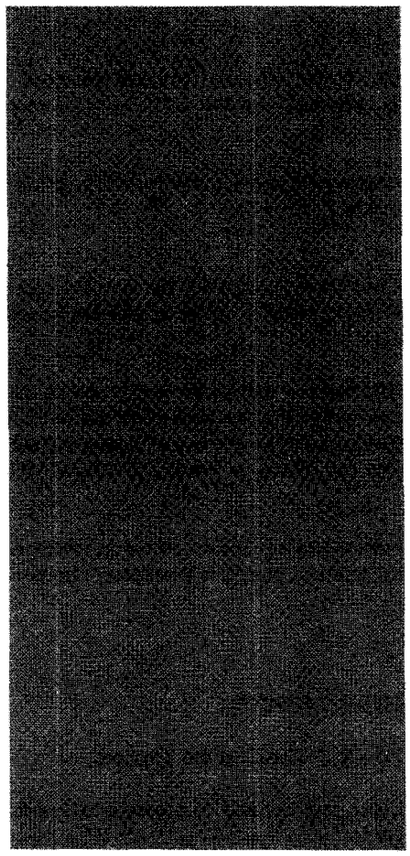
Make sure the push rods are straight.

If the push rod is not in specification replace the push rod.

7B—7 CYLINDER BLOCK

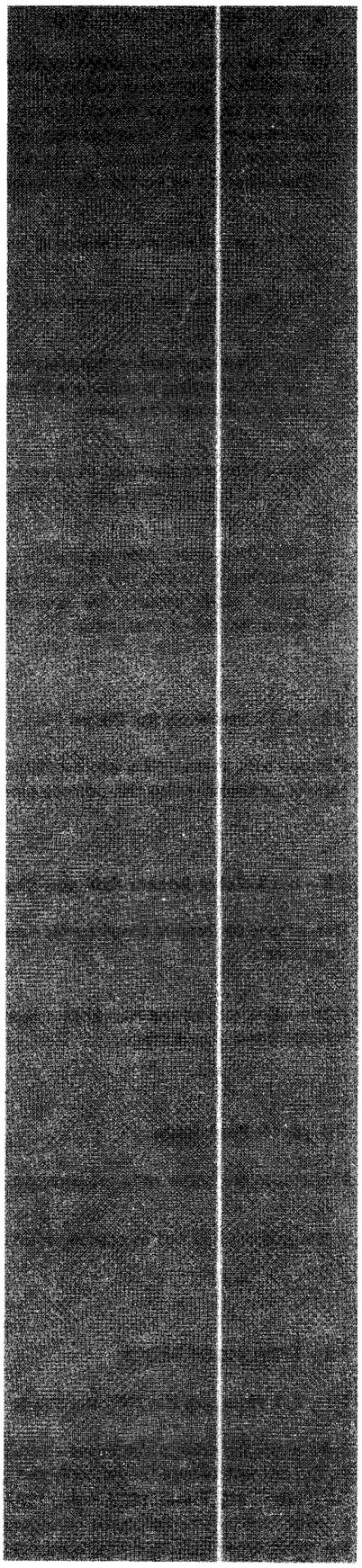
7B—7.1 Finishing the Cylinder Walls

Before any cylinder is machined all main bearing caps must be position and tightened to the correct torque. Finish only the cylinder or cylinders that need to be finished. All pistons are the same weight, both standard and oversize; and various sizes of pistons can be used without changing the engine balance. Finish the cylinder with the most wear first to find the maximum oversize.



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Finish the cylinder to within 0.0015" (.038 mm) of the oversize diameter. This will leave enough material for the final step of honing for correct surface finish and pattern. Use a motor driven hone with spring pressure. Use an RPM of 300 - 500 and grit sizes 180 - 200. Use a lubricate mixture of equal parts of kerosene and SAE No. 20 motor oil.



7B—8 CYLINDER HEADS

7B—8.1 Cleaning the Cylinder Heads

With the valves installed to protect the valve seats, remove deposits from the combustion chambers and valve heads with a scraper and a wire brush. Be careful not to damage the cylinder head gasket surface. Remove the valves and clean the valve guide cleaning tool. Use cleaning solvent to remove grease and other debris. Clean all the bolt holes. Remove all the deposits from the valves with a fine wire brush or buffing wheel.

7B—8.2 Checking the Cylinder Heads

Check the cylinder head for cracks and check the gasket surface for debris and scratches.

When a cylinder head is removed because of gasket leaks, check the flat area of the cylinder head gasket surface for correct specifications. If necessary to finish the cylinder head gasket surface, do not machine off more than 0.010" (0,254 mm).

Check the valve seat with a gauge. If the wear is more than specifications allow, grind the valve and valve seat. Measure the valve seat width. Grind the valve seat when the width is not in specification.

Check the valve surface and the edge of the valve head for damage. Check the stem for damage and the end of the valve stem for wear.

Check the valve stem to valve guide clearance of each valve in its correct valve guide.

Check the springs for the correct pressure at the specified spring lengths. Use tool (P/N 6513-DD). Replace any springs not in specifications.

Check each spring for being round, using a steel square and a flat surface. Put the spring and square on end on the flat surface. Move the spring up to the square. Turn the spring and check the space between the top coil of the spring and the square. The out of round limits are 0.078" (1,98 mm).

Follow the same procedure to check new valve springs before installation. Be sure the correct spring is installed. The springs are color coded.

7B—9 TAPPETS

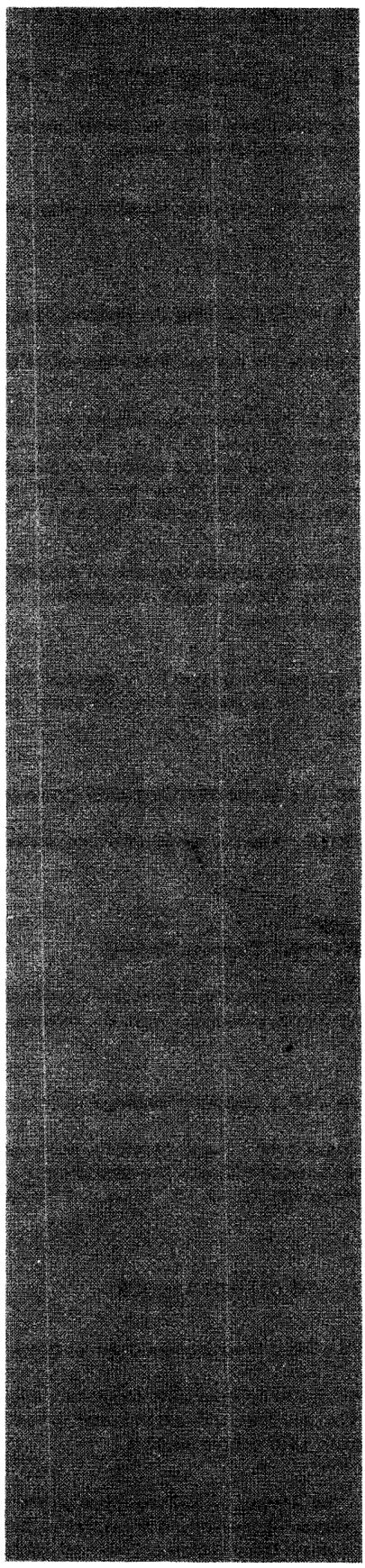
7B—9.1 Cleaning the Tappets

Clean the tappets in cleaning solvent and wipe the tappets with a clean lint free cloth.

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7B—9.2 Checking the Tappets

Check the tappets for wear or damage. Check the bottom end of the tappet to make sure that it has a small amount of convex. Replace tappets that are damaged, worn, or if the bottom is not smooth. If the bottom surface is worn flat, it can be used with the original camshaft only.



7B—10 CAMSHAFT

7B—10.1 Cleaning and Checking the Camshaft

Clean the camshaft in solvent and wipe it dry. Check the camshaft lobes for damage and wear. The camshaft does not need replacement unless the lobe lift is worn more than 0.005'' (0,127 mm).

The lift of the camshaft lobes can get checked with the camshaft installed in the engine or on the centers. Make reference to 7B—4 ''Camshaft Lobe Lift''.

7B—11 CRANKSHAFT

7B—11.1 Checking the Crankshaft

Measure the diameter of each journal in at least four locations to look for out of round taper or smaller size conditions.

7B—12 FLYWHEEL

7B—12.1 Checking the Flywheel

Check the flywheel for cracks, or other damage.

Check the ring gear for wear and damage to the teeth. If the teeth have damage, install a new ring gear.

With the flywheel installed on the crankshaft, check the flywheel surface alignment.

7B—13 CONNECTING RODS

7B—13.1 Cleaning the Connecting Rods

Remove the bearings from the rod and cap. Mark the bearings for identification if you are to use them again. Clean the connecting rods in solvent, including the rod bore and under the bearings. Clean all pasages with compressed air using a low air pressure.

7B—13.2 Checking the Connecting Rods

Check the connecting rod bearing bores for out of round and taper. Check the inside diameter of the connecting rod piston pin bore. If the pin bore in the connecting rod is larger than the specification, install a 0.002'' oversize piston pin. First fit the oversize piston pin to the piston pin bore by using a reamer tool. Then assemble the piston, the piston pin and the connecting rod.

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7B—14 PISTONS, PINS AND RINGS

7B—14.1 Cleaning the Pistons, Pins and Rings

Remove debris from the piston surfaces. Clean debris from the piston skirt, piston pins and rings with solvent.

Clean the ring grooves with a ring groove cleaner. Make sure the oil ring slots are clean.

7B—14.2 Checking the Pistons, Pins and Rings

Replace the pistons that show signs of over maximum wear or damage.

Check the piston to cylinder bore clearance by measuring the piston and bore diameters. Refer to 7B—7 "Cylinder Block" for the bore measurement procedure. Measure the outside diameter of the piston with micrometers about 2-1/4" (57,15 mm) below the dome and at 90° to the piston pin bore. Check the ring side clearance. (See Section 7B—6.11 "Installing Piston Rings".)

Check the outside diameter of the piston pin and the inside diameter of the pin bore in the piston. Make replacement of any piston pin or piston that is not in specification.

Replace all rings that have damage. Check the end gap and the side clearance. Rings must not be moved from one piston and installed on another.

7B—15 MAIN BEARING AND CONNECTING ROD BEARINGS

NOTE: Main bearings have color codes to identify size. See Specification Section 8B.

7B—15.1 Cleaning Bearings

Clean the bearing inserts and caps in solvent and dry them with compressed air. Do not remove deposits from the bearing shells.

7B—15.2 Checking Bearings

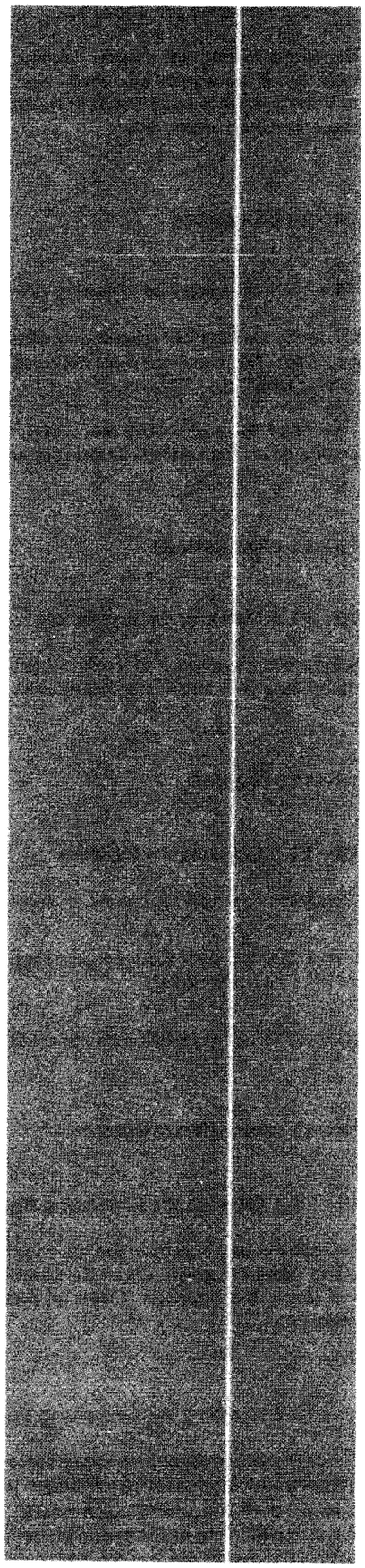
Check each bearing carefully. Bearings that have damage or excessive wear need replacement. Check the clearance of bearings that look good with Plastigage (See Paragraph 7B—6.10 "Main and Connecting Rod Bearings").

7B—16 CYLINDER BLOCK

7B—16.1 Cleaning the Cylinder Block

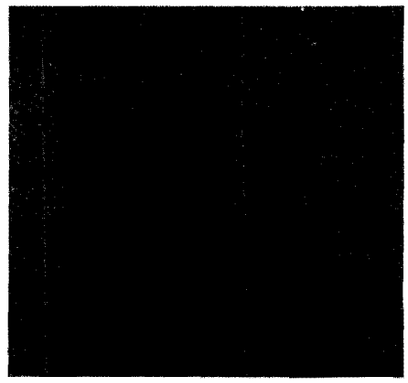
After any cylinder bore repair operation clean the bore with soap and water. Then rinse the bore with clean water to remove the soap and wipe the bore with a clean cloth with engine oil on it.

If the engine is disassembled clean the block with solvent. Remove old gasket material from all machined surfaces. Remove all pipe plugs that seal oil passages and clean all the passages. Clean all passages, bolt holes, etc., with compressed air. Make sure the threads in the cylinder head bolt holes are clean.



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Use a tap to clean the threads and to remove any debris. Clean the groove in the crankshaft bearing and bearing retainers.



7B—16.2 Checking the Cylinder

Check the cylinder walls for damage and wear. Check the cylinder bore for out of round and taper. Measure the diameter of each cylinder bore at the top, center and bottom with the gauge positioned at the right angles and parallel to the centerline of the engine. Use only the measurement at 90° to the engine centerline when calculating the piston to cylinder bore clearance.

Machine the cylinders that are damaged or when out of round or taper is more than the wear limits allow.

7B—17 OIL PUMP

7B—17.1 Cleaning the Oil Pump

Wash all parts in a solvent and dry them with compressed air. Use a brush to clean the inside of the pump housing and the pressure relief valve chamber. Be sure all dirt and metal particles are removed.

7B—17.2 Checking the Oil Pump

Check the inside of the pump housing and the outer race and rotor for damage or wear.

Measure the outer race to housing clearance (Fig. 7B—40). Check the clearance between the outer race and the rotor lobes (Fig. 7B—41).

With the rotor assembly installed in the housing. Put a straight edge over the rotor assembly and the housing. Measure the clearance (rotor end play) between the straight edge and the rotor (Fig. 7B—42). The outer race, shaft and rotor can be replaced only as an assembly. Check the drive shaft to housing bearing clearance by measuring the outside diameter of the shaft and the inside diameter of the housing bearing. Check the relief valve spring tension.

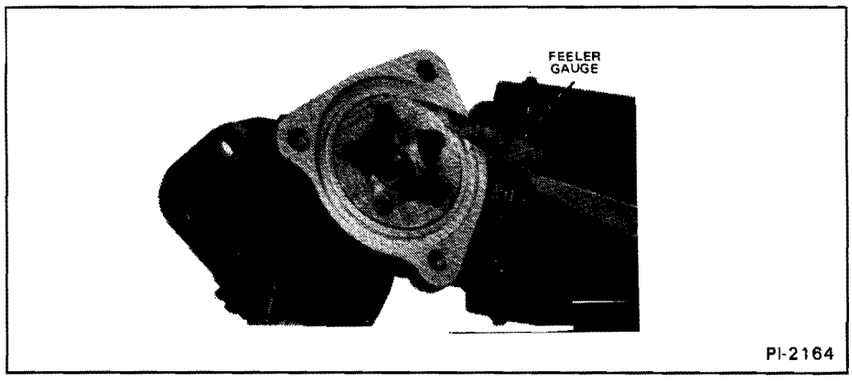


Fig. 7B—40 Checking the Outer Race to Housing Clearance

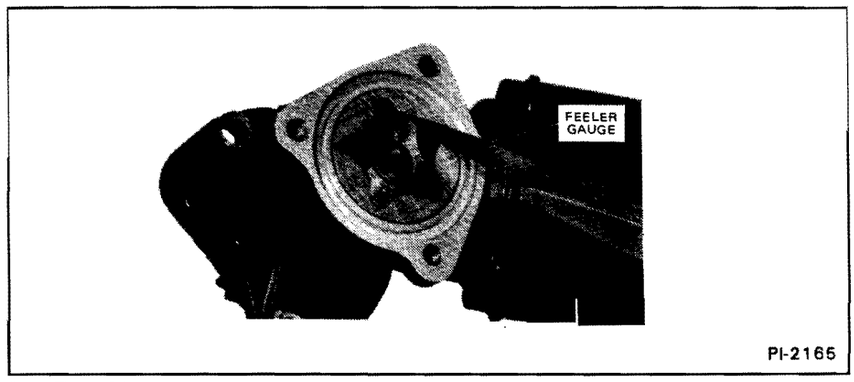


Fig. 7B—41 Checking Rotor Lobes to Race Clearance

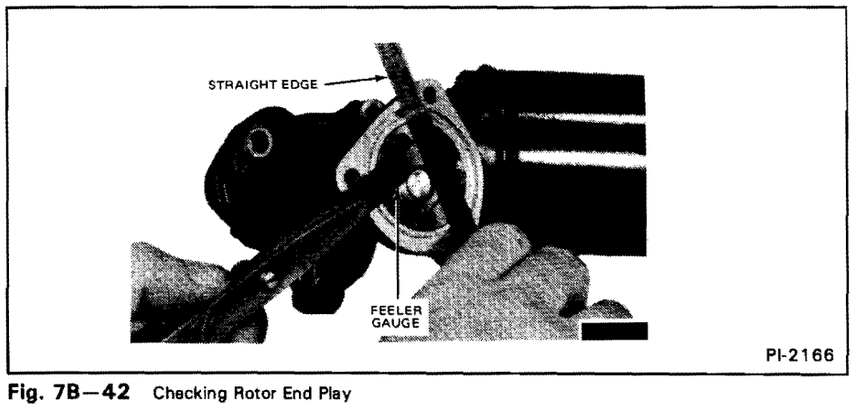


Fig. 7B—42 Checking Rotor End Play

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If the spring tension is not within specificacions and the spring is worn or has damage, install a new spring. Check the relief valve piston for damage and free movement in the bore.

7B—18 VALVE ROCKER ARM COVER AND ROCKER ARM SHAFT

7B—18.1 Removing and Disassembly of the Rocker Arm Shaft

(1) Disconnect the spark plug wires and remove them from the fastener on top of the rocker cover.

(2) Remove the rocker cover fastening screws. Remove the rocker cover and the gaskets.

(3) Remove the rocker arm shaft attaching bolts evenly and lift off the rocker arm shaft assembly (Fig. 7B—43).

(4) Remove the cotter pin from one end of the shaft and pull the flat washer, the crimped washer and the second flat washer from the shaft. The rocker arm shaft supports, the rocker arms and the springs can be removed from the shaft.

(5) Remove the plugs from the rocker shaft ends by drilling a hole in one plug. Install a long rod through the drilled plug and hit the other plug out of the shaft. Remove the drilled plug using the same method.

(6) Clean the component parts of the shaft assembly in cleaning solvent.

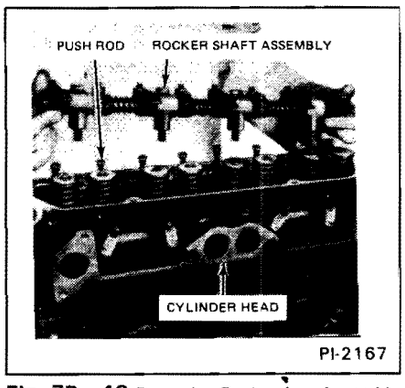


Fig. 7B—43 Removing Rocker Arm Assembly

7B—18.2 Installing Rocker Arm Shaft

(1) Put new plugs in the ends of the rocker shaft.

(2) Assemble the rocker shaft. The bolt hole in the rocker shaft support must be on the same side as the adjustment screw in the rocker shaft. The rocker arms are right and left hand, the rocker pads are angled towards the support. Install the cotter pins with the heads up and bend the legs apart.

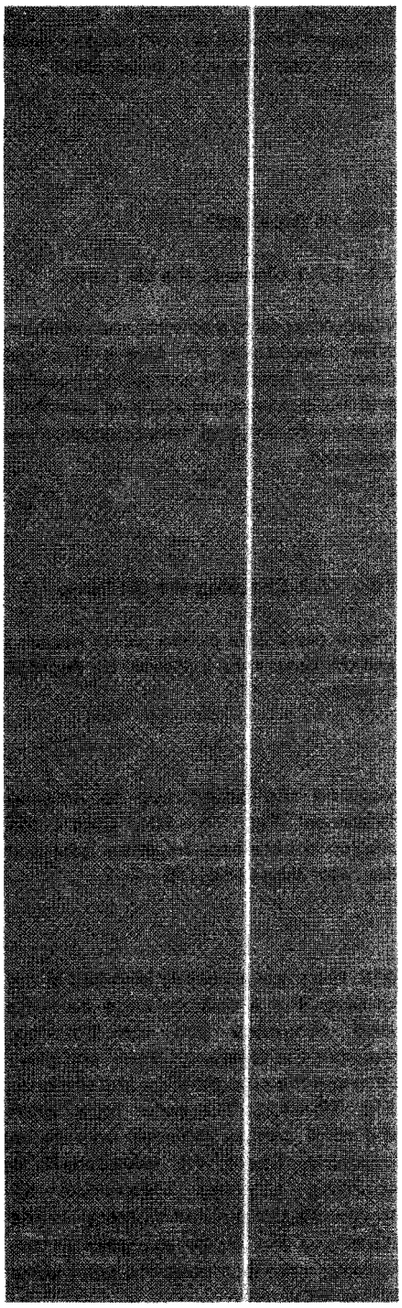
(3) Put oil on the valve stem tops, rocker arm pads and the pushrod ends. Install the rocker shaft assembly on the cylinder head and put the pushrods on the adjustment screws. Install and tighten the bolts evenly. (See Section 8B for Torque Specifications.)

(4) Make adjustment of the valve clearance to specifications.

(5) Remove the old gasket material from the contacting surfaces.

(6) Put the rocker cover and gasket on the cylinder head and fasten with the screws. Tighten the screws to the correct torque specifications (See Section 8B).

(7) Put the spark plug wires in the rocker cover fasten fastener and connect then to the correct spark plug.



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7B—19 VALVE PUSHRODS

7B—19.1 Removing the Valve Pushrods

(1) Remove the rocker shaft bolts evenly and lift off the rocker arm shaft assembly.

(2) Remove the pushrods and keep them in the correct order.

7B—19.2 Installing the Valve Pushrods

(1) Put oil on both ends of the pushrods and install them in the correct bores.

(2) Put oil on the valve stem and the rocker arm pads, and install the rocker arm shaft assembly on the cylinder head. Put the pushrods on the adjustment screws. Tighten the bolts 25 - 30 ft.-lbs. (34 - 41 Nm) torque.

(3) Make adjustment of the valve lifters according to the specifications.

7B—20 INTAKE MANIFOLD

7B—20.1 Removing the Intake Manifold

(1) Remove the coolant from the cooling system.

(2) Disconnect the throttle linkage from the throttle lever on the carburetor.

(3) Disconnect the fuel line from the carburetor.

(4) Disconnect the water hose from the intake manifold.

(5) Remove the intake manifold.

7B—20.2 Installing the Intake Manifold

(1) Put a water resistance sealer on both sides of the new gasket and around the water port. Install it on the cylinder head.

(2) Install the intake manifold and tighten the nuts and bolts evenly 15 - 18 ft.-lbs. (20 - 24 Nm) torque.

(3) Connect the water hose to the intake manifold.

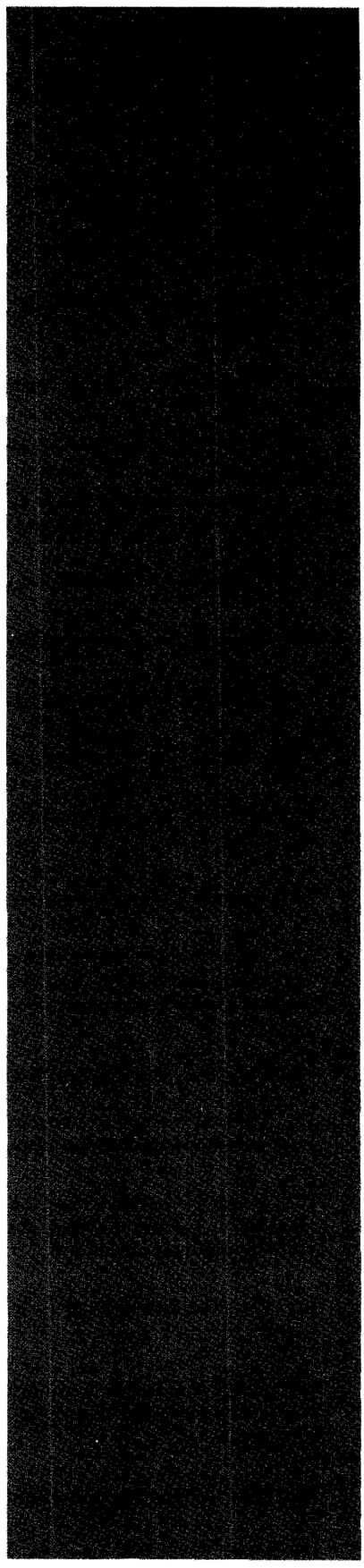
(4) Connect the fuel line to the carburetor.

(5) Connect the throttle linkage.

(6) Install the dipstick tube bracket to the intake manifold and install the fastening bolt.

(7) Fill the cooling system with the correct coolant.

(8) If a new manifold is to be installed put all the needed parts on the new manifold.



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7B—21 CYLINDER HEAD

7B—21.1 Removing the Cylinder Head

(1) Remove the air cleaner hose from the carburetor.

(2) Disconnect the fuel line from the carburetor.

(3) Remove the coolant from the cooling system.

(4) Disconnect the spark plug wires, remove them from the fastener on the rocker cover.

(5) Disconnect the water outlet hose at the intake manifold.

(6) Remove the muffler from the manifold.

(7) Disconnect the throttle linkage, the choke cable and the distributor vacuum advance hose from the carburetor.

(8) Disconnect the throttle linkage at the governor.

(9) Remove the governor mounting bracket.

(10) Remove the thermostat housing and remove the thermostat.

(11) Remove the rocker cover and the gasket.

(12) Remove the rocker shaft bolts evenly and lift off the rocker shaft assembly.

(13) Lift out the pushrods and keep them in the correct.

(14) Remove the cylinder head bolts and lift off the cylinder head and gasket. Do not put the cylinder head flat on its contact surface. Damage to the spark plugs or gasket surface can result.

7B—21.2 Installing the Cylinder Head

(1) Clean all the gasket material from the contact surfaces and put the cylinder head gasket on the cylinder block using the pilot studs.

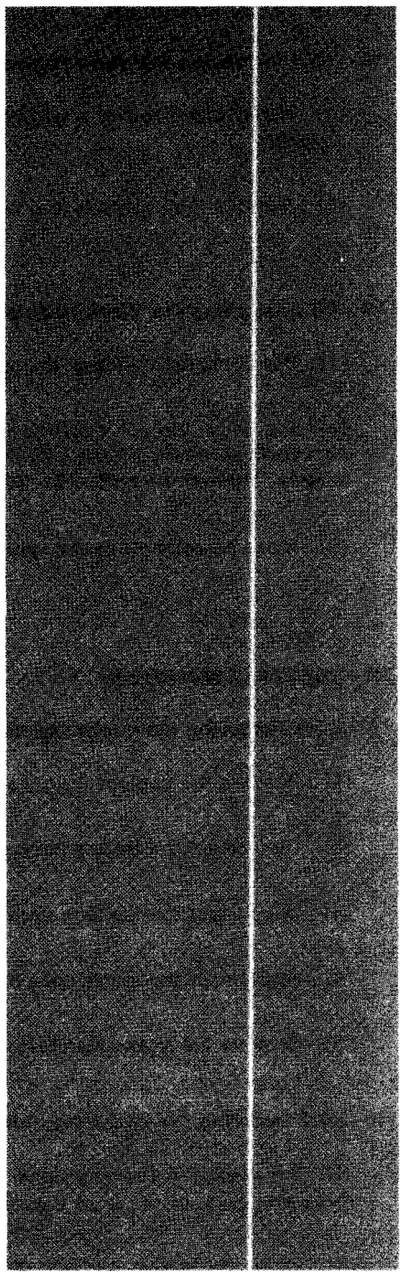
(2) Install the cylinder head, remove the pilot studs and install the cylinder head bolts. Tighten the bolts evenly (Fig. 7B—44) and in three steps, to the correct torque specifications.

(3) Put oil on both ends of the pushrods and install the pushrods in the correct bores.

(4) Install the rocker arm shaft assembly on the cylinder head. Put the pushrods on the adjustment screws. Tighten the bolts 25 - 30 ft.-lbs. (34 - 41 Nm) torque.

(5) Make adjustment of the valve clearances.

(6) Install the muffler onto the manifold.



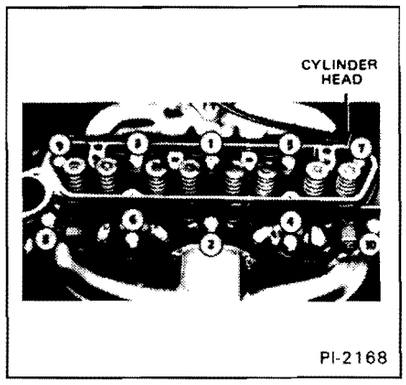


Fig. 7B—44 Tightening Bolts in Cyl. Head

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(7) Connect the distributor vacuum advance hose, the throttle linkage and choke cable to the carburetor.

(8) Connect the water outlet hose to the intake manifold.

(9) Install the thermostat in the cylinder head and install the gasket and thermostat housing.

(10) Fill the cooling system with coolant.

(11) Install governor and mounting bracket to cylinder head and install the bolts.

(12) Loosen the governor adjustment bolts and install the belt on the governor sheave. Make adjustment of the belt to the specification and tighten the bolts.

(13) Connect the throttle linkage to the governor.

(14) Connect the ignition wires to the spark plugs in the correct firing order.

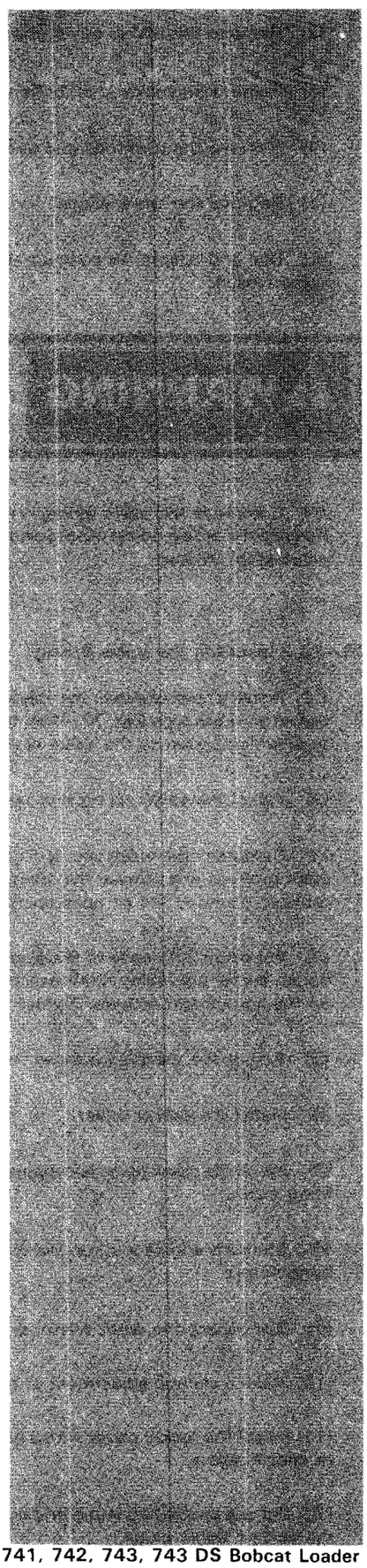
(15) Make a second adjustment of the valve clearances to specification.

(16) Install the rocker arm cover.

(17) Install the air cleaner hose to the carburetor.

(18) Make adjustment to the carburetor idle speed and mixture setting.

(19) Adjust the governor.



7B—22 VALVE SPRING, RETAINER AND STEM SEAL (With the Cylinder Head Removed)

7B—22.1 Removing the Valve Spring

(1) Remove the muffler from the manifold and remove the spark plugs.

(2) Compress the valve spring with a valve spring compressor and remove the keepers, rotators, spring and retainer.

(3) Remove the seal and remove the valve.

7B—22.2 Installing the Valve Spring

(1) Install the valve and a new valve stem seal.

(2) Install the valve spring and the retainer over the valve stem.

(3) Compress the valve spring. Install the rotator on the exhaust valve. Put the retainer locks in the valve stem grooves and release the spring compressor to engage the locks in the retainer tappets.

7B—23 VALVE SPRING, RETAINER AND STEM SEAL (With the Cylinder Head Installed)

(1) Disconnect the spark plug wires and remove them from the fastener on the rocker cover.

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(2) Remove the rocker cover and the gasket.

(3) Remove the rocker shaft bolts evenly and remove the rocker shaft assembly.

(4) Remove the pushrods and keep them in the correct order.

(5) Remove the spark plugs.

(6) Use and adapter to connect air pressure hose to the cylinder to keep the valve closed.

⚠ WARNING **Be sure piston is at top dead center or bottom dead center before applying air pressure. If not the engine can turn and cause injury.**

(7) Compress the valve spring, and remove the valve spring, retainer locks. Release the spring compressor remove the valve spring, rotator, retainer and the valve stem oil seal.

7B—23.2 Installing the Valve Spring

(1) Install a new seal over the valve stem. Two (2) types are used. Early engines use an umbrella type (Fig. 7B—44a, Item 1). Later production engines use pedestal type which fasten to the valve stem guide (Fig. 7B—44a, Item 2).

(2) Install the valve spring and retainer on the valve stem.

(3) Compress the valve spring. Put the valve spring retainer locks in the valve stem grooves and release the spring at a slow rate to engage the locks in the retainer. Remove the air hose and adapter.

(4) Put oil on both ends of the pushrods and install the pushrods in the correct bores. Install the rocker shaft assembly to the cylinder head, put the pushrods on the adjustment screws. Tighten the bolts evenly to specifications.

(5) Adjust the valve clearances to specification.

(6) Install the rocker cover.

(7) Install the spark plugs and connect the wires to the spark plugs in the correct firing order.

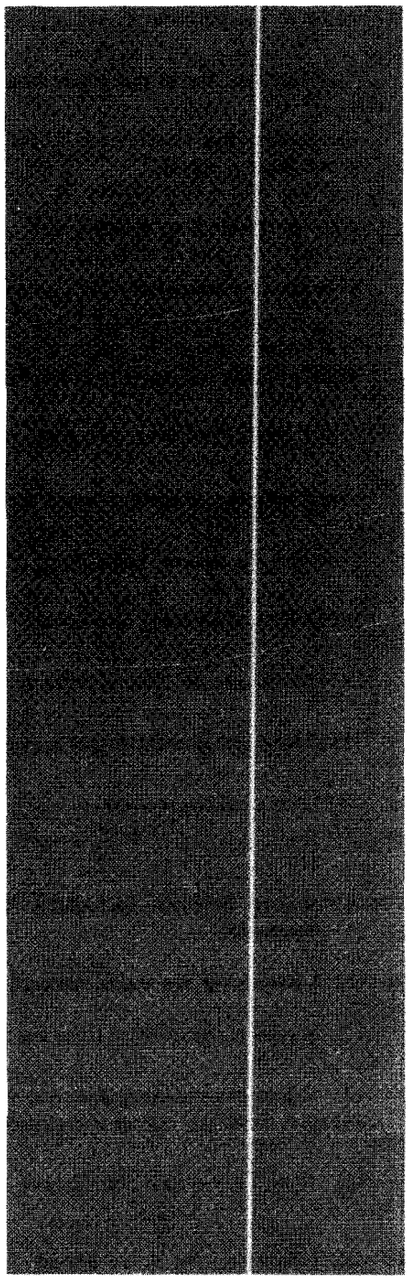
(8) Start the engine and run the engine until the engine is at normal operating temperature.

(9) Disconnect the wires from the spark plugs and remove the rocker cover.

(10) Make a second adjustment of the valve clearances (hot) to specifications.

(11) Install the rocker cover with a new gasket and tighten the fastening screws to specification.

(12) Put the spark plug wires in the rocker cover fastener and connect them to the correct spark plugs.



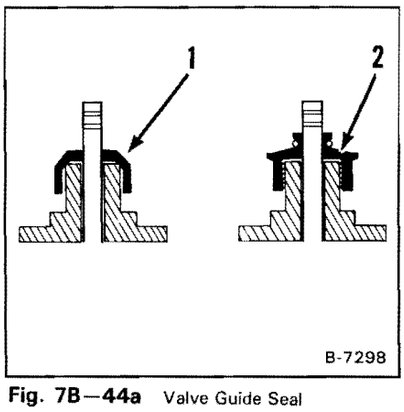


Fig. 7B—44a Valve Guide Seal

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7B—24 WATER PUMP

7B—24.1 Removing the Water Pump

(1) Remove the coolant from the cooling system.

(2) If a new water pump is being installed, move the water hose connection to the new water pump.

(3) Put the water pump and the gasket on the cylinder block and fasten with the bolts.

(4) Connect the manifold water hose the water pump and tighten the clamp.

(5) Connect the lower hose on the water pump and tighten the clamp.

(6) Install the sheave and the fan. Install the bolts and tighten to the correct torque specification.

(7) Install the drive belt over the crankshaft, fan and governor sheave and make adjustment of the belt tension to specifications. Tighten the governor fasten fastening and adjusting bolt to specifications.

(8) Adjust the governor.

(9) Fill the radiator and install the radiator cap. Start the engine and check for leaks.

7B—25 CYLINDER FRONT COVER, TIMING CHAIN AND CRANKSHAFT SPROCKETS

7B—25.1 Removal

(1) Remove the engine coolant by opening the drain valve on the radiator and removing the drain plug in the cylinder block.

(2) Disconnect the radiator hoses from the engine.

(3) Remove the governor belt and remove the water pump sheave.

(4) Remove the water pump.

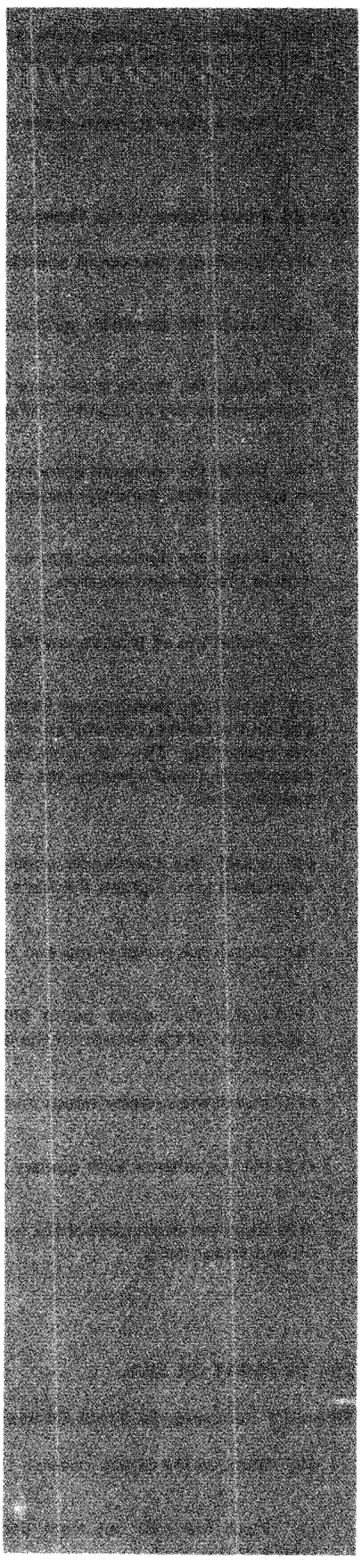
(5) Remove the crankshaft sheave, using a puller.

(6) Remove the four bolts that hold the oil pan to the timing chain cover. Remove the six bolts that hold the timing cover to the cylinder block.

NOTE: Be careful not to cause damage to the oil pan gasket. If the gasket becomes damaged it will be necessary to remove the oil pan and replace the gasket. A damaged gasket will cause an oil leak.

7B—25.2 Removing the Timing Cover

(7) Remove the crankshaft oil thrower. Remove the crankshaft sprocket retainer and the bolts.



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(8) Remove the timing chain tightening arm. Remove the camshaft sprocket and disconnect the timing chain.

(9) Use a puller to remove the crankshaft sheave (Fig. 7B—45).

7B—25.3 Installation of the Timing Cover

(1) Install the crankshaft sprocket if removed (Fig. 7B—46).

(2) Install the camshaft sprocket.

(3) Install the timing chain over the camshaft and crankshaft sprockets so the timing marks are in alignment (Fig. 7B—47).

(4) Install the camshaft sprocket retainer and the bolts, then tighten the bolts to specification. Bend the locking tabs.

(5) Install the tightening arm on the pivot pin while holding the tightening the cam in the released position.

(6) Install the oil thrower on the crankshaft. Install the timing chain tightener.

(7) Install the timing cover gasket, the oil pan gasket (if needed) and the end seal on the front cover with an oil resistant sealer at the ends. Make alignment of the cover (Fig. 7B—48) with the tool. Tighten the fastening bolts evenly to specification and remove the alignment tool. Tighten the oil pan bolts to specification.

(8) Install the crankshaft sheave, making alignment of the slot with the crankshaft key. Tighten the fastening bolt to specifications.

(9) Install the water pump and tighten the fastening bolts to specification.

(10) Install the water pump sheave. Install the governor belt and make adjustment of the tension of the belt to specifications.

(11) Install the radiator hoses and tighten the clamps.

(12) Fill the radiator with coolant.

(13) Start the engine and check for oil and water leaks.

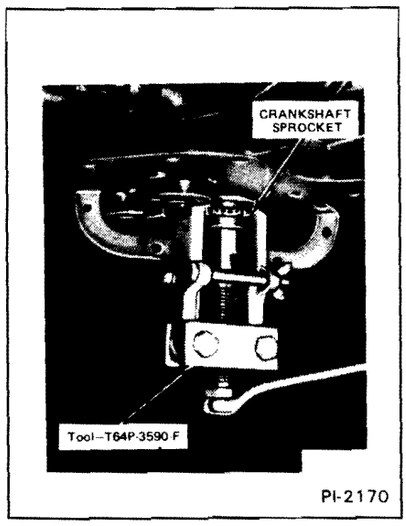


Fig. 7B—45 Removing Crankshaft Sprocket

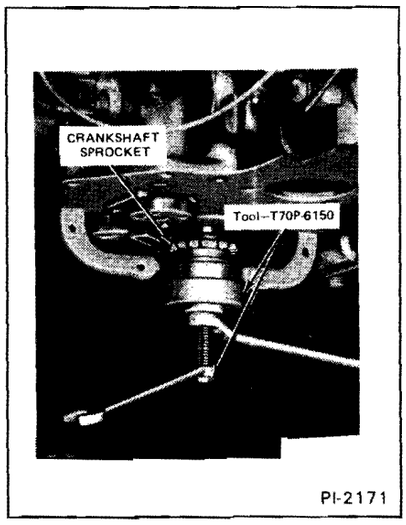


Fig. 7B—46 Installing Crankshaft Sprocket

7B—26 FRONT OIL SEAL

7B—26.1 Removing the Front Oil Seal

(1) Remove the timing cover.

(2) Push the seal out from the inside of the cover.

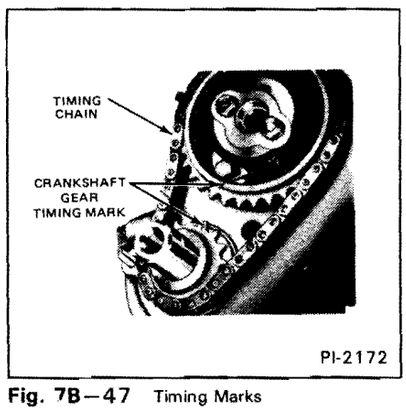


Fig. 7B—47 Timing Marks

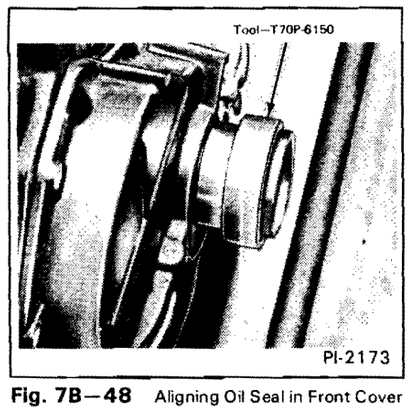


Fig. 7B—48 Aligning Oil Seal in Front Cover

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7B—26 FRONT OIL SEAL

7B—26.1 Removing the Oil Seal

(1) Remove the timing cover.

(2) Push the seal out from the inside of the cover.

7B—26.2 Installing the Oil Seal

(1) Push the new seal into the housing (Fig. 7B—49). Put a support under the housing near the seal to keep housing from breaking.

(2) When installing the cover it is important that the oil seal is in alignment with the crankshaft and sheave boss.

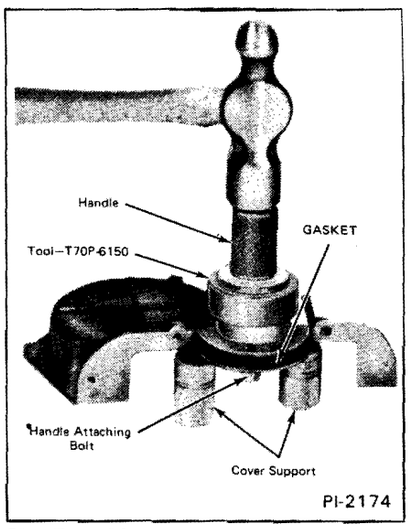


Fig. 7B—49 Installing Oil Seal in Front Cover

7B—27 TIMING CHAIN TIGHTENING

7B—27.1 Removing the Chain Tightener

(1) Remove the timing chain cover (and oil pan if necessary).

(2) Remove the timing chain tightener and arm by removing the two fastening bolts (Fig. 7B—50).

7B—27.2 Installing the Chain Tightener

(1) Install the tightener arm on the pivot pin.

(2) Install the tightener and install the two bolts.

(3) Install the timing chain cover (and oil pan if necessary).

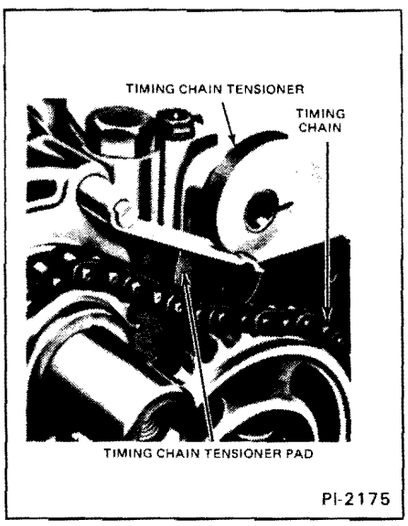


Fig. 7B—50 Tightening for Timing Chain

7B—28 CAMSHAFT AND VALVE LIFTERS

7B—28.1 Removing the Camshaft and Valve Lifters

(1) Remove the engine assembly and put the engine on a stand. Remove the crankcase oil.

(2) Disconnect the fuel line at the fuel pump.

(3) Loosen the governor adjustment bolts and remove the belt.

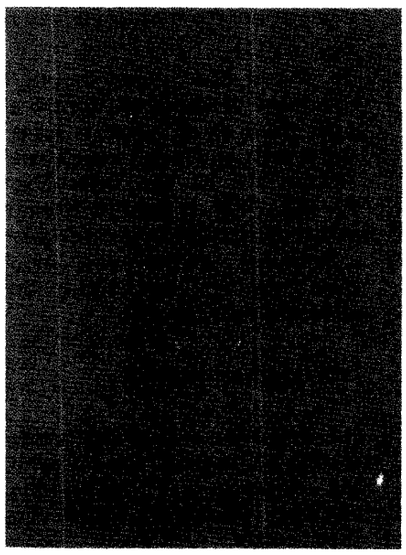
(4) Remove the water pump sheave.

(5) Remove the oil and fuel pumps from the cylinder block.

(6) Disconnect the spark plug wires from the spark plugs and remove the rocker cover. Clean all gasket material from the rocker arm cover and cylinder head.

(7) Remove the distributor from the cylinder block.

(8) Remove the rocker shaft bolts evenly and lift off the rocker shaft.



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(9) Remove the pushrods from the cylinder block and keep them in the correct order.

(10) Turn the complete engine over on the stand and remove the oil pan and the gaskets.

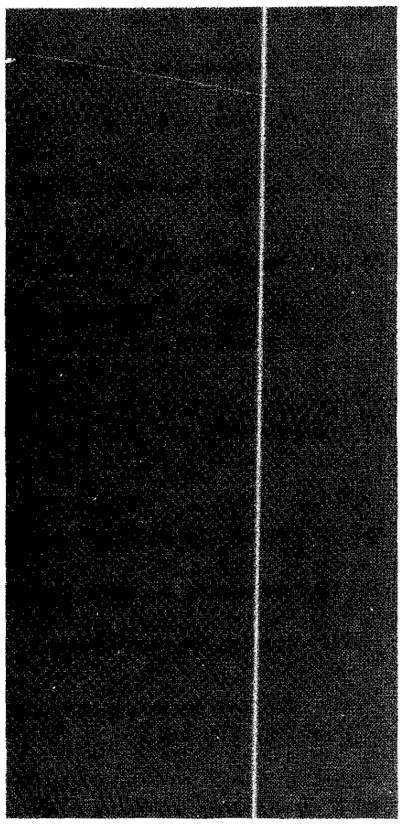
(11) Remove the crankshaft sheave, the timing cover and the oil thrower.

(12) Remove the timing chain tightener assembly.

(13) Remove the camshaft sprocket and the timing chain.

(14) Remove the camshaft thrust plate and remove the camshaft (Fig. 7B—51).

(15) Remove the tappets from the cylinder block and keep them in the correct order.



7B—28.2 Installing the Camshaft and Valve Lifters

(1) Install a new timing cover oil seal (Fig. 7B—49).

(2) Install the tappets.

(3) Install the camshaft and install the thrust plate in the camshaft groove. Tighten the fastening assembly bolts to specification and bend the locking tabs.

(4) Check the camshaft end play.

(5) Put the timing chain on both sprockets. (Be sure marks on the sprockets are in alignment.) Install the sprockets on the crankshaft and the camshaft then tighten the bolts to specification and bend the locking tabs.

(6) Find the tightener arm on the pivot pin and install the timing chain tightener.

(7) Install the oil thrower on the crankshaft.

(8) Put the gasket on the timing cover with an oil sealer at the end. Make alignment of the front cover and tighten the bolts evenly to specification.

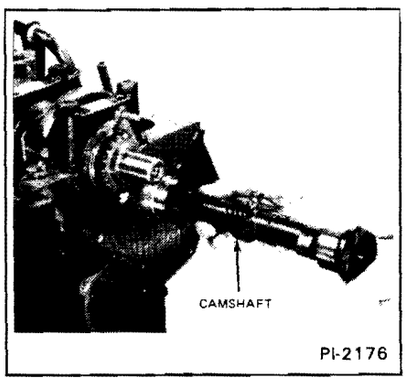


Fig. 7B—51 Removing the Camshaft

(9) Put a new gasket on the block flange using an oil resistant sealer compound at each end. Put the end seals (chamfered ends) into the groove, again using an oil resistant sealer at the ends and install the oil pan. Tighten the oil pan bolts (Fig. 7B—52) 6-8 ft.-lbs. (8-1 Nm) torque. First tighten according to alphabetical order (A-B-C etc.) then tighten according to numerical order (1-2-3).

(10) Install the dipstick.

(11) Install the crankshaft sheave, making alignment of the slot with the crankshaft key. Tighten the sheave fastening bolt to specification.

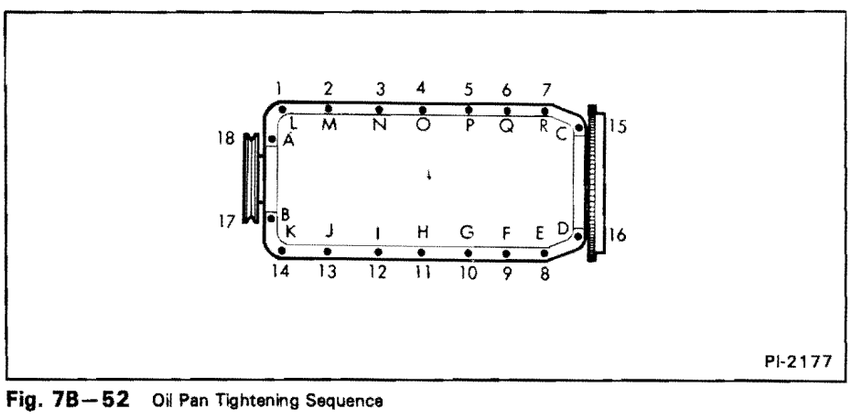
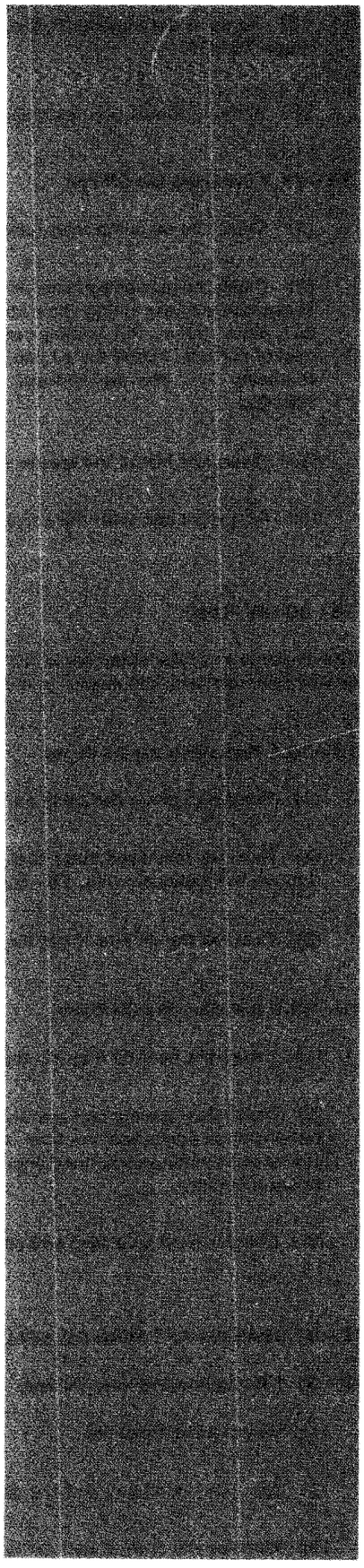


Fig. 7B—52 Oil Pan Tightening Sequence

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(12) Turn the engine over on the stand. Install the distributor and adjust the timing.



(13) Install a new gasket on the oil pump mounting flange and install the oil pump and the filter assembly. Tighten the fastening bolt to specification.

(14) Install a new gasket on the fuel pump flange and install the pump lever through the slot in the block so that the lever is on the lobe of the camshaft. Fasten the fuel pump to cylinder block with the two washers and bolts. Tighten the bolts evenly to specifications.

(15) Put oil on the contact surfaces of the pushrods, valve stems and rocker arms. Install the pushrods in the correct bores and install the rocker shaft assembly. Be sure to put the end of the pushrods on the adjustment screws. Tighten the rocker shaft fstening bolts evenly to specification.

(16) Adjust the valve clearance (See Specification Section 8B).

(17) Connect the distributor vacuum advance line to the carburetor.

(18) Install the water pump sheave. Install the drive belt on the sheave and make adjustment of the belt tension to specifications. Connect the fuel line from the carburetor to the fuel pump.

(19) Install distributor cap and connect the wires to the spark plugs.

(20) Remove the engine from the stand.

(21) Install the engine assembly in the Bobcat loader.

(22) Start the engine and check for oil and water leaks.

(23) Make a second adjustment of the valve clearances (cold) to specifications.

(24) Install the rocker cover and install a new gasket and fasten with screws. Tighten to specifications.

(25) Start the engine and make adjustment of the ignition timing if needed.

(26) Make adjustment of the carburetor idle speed and fuel air mixture to specifications.

7B—29 OIL PAN

7B—29.1 Removing the Oil Pan

(1) Remove the crankcase oil

(2) Remove the dipstick.

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(3) Remove the three bolts and remove the starter (See Paragraph 7B—43.1, Page 7B—39).

(4) Remove the oil pan fastening bolts and remove the pan and the gasket.

7B—29.2 Installing the Oil Pan

(1) Clean the oil pump inlet tube and the screen assembly.

(2) Clean the gasket surfaces of the block and the oil pan. Be sure to clean the seal grooves in the timing chain cover and the rear seal retainer. the oil pan has a two piece gasket. Put sealing compound on the block surface and the oil pan gasket surface. Install the oil pan and tighten the bolts evenly to specifications following first the alphabetical, then the numerical steps shown in (Fig. 7B—52).

(3) Clean and install the starter and fasten it with three bolts.

(4) Fill the oil pan with the correct engine oil and install the dipstick.

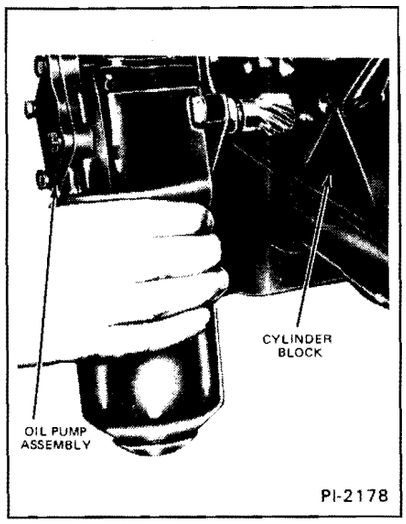


Fig. 7B—53 Removing Oil Pump

7B—30 OIL PUMP

The oil pump and filter assembly is installed on the left side of the cylinder block and can be removed with the engine in the machine.

7B—30.1 Removing the Oil Pump

(1) Put a pan under the oil pump.

(2) Remove the three bolts that hold the oil pump and filter assembly and remove the assembly (Fig. 7B—53).

(3) Remove the oil filter from the oil pump.

7B—30.2 Installing the Oil Pump

(1) Install the new oil filter on the oil pump assembly.

(2) Make sure the contact surfaces are clean of the old gasket material, then install the oil pump and the filter assembly on the cylinder block, using a new gasket with sealing compound and fasten with the three bolts. Tighten the bolts to specification.

(3) Check the oil level and add oil if needed.

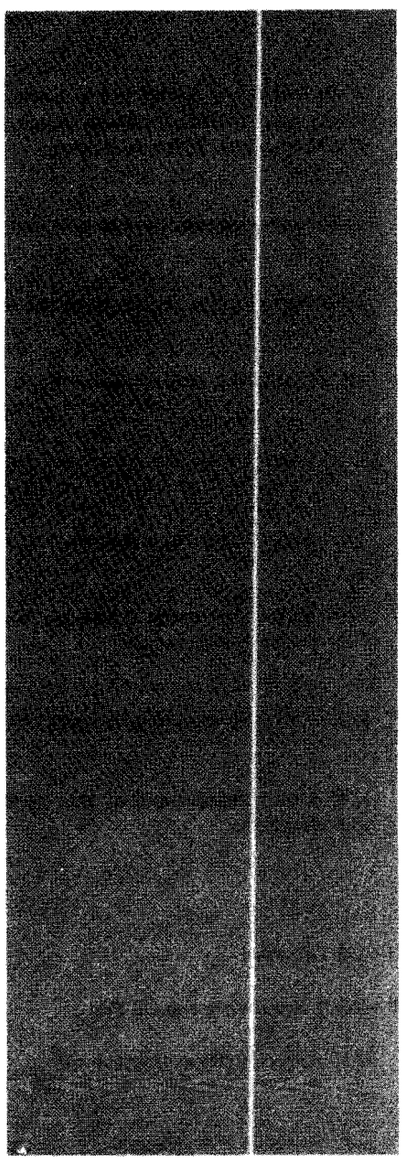
7B—31 CRANKSHAFT REAR OIL SEAL

7B—31.1 Removing the Rear Oil Seal

(1) Remove the flywheel.

(2) Remove the oil pan and the gasket.

(3) Remove the rear oil seal carrier and remove the seal.



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7B—31.2 Installing the Rear Oil Seal

(1) Install a new crankshaft rear oil seal (Fig. 7B—54).

(2) Put a new gasket on the rear oil seal carrier using a sealing compound at the end, and the carrier on the block rear surface. Tighten the bolts evenly to specifications.

(3) Put new gaskets on the block flange using sealing compound at each end. Install the end seals with the chamfered end into the grooves, again using a sealing compound and install the oil pan. Tighten the bolts to the correct torque using the steps in (Fig. 7B—55).

(4) Install the flywheel on the crankshaft flange. Be sure contact surfaces of flywheel and crankshaft are clean. Tighten the bolts evenly to specifications.

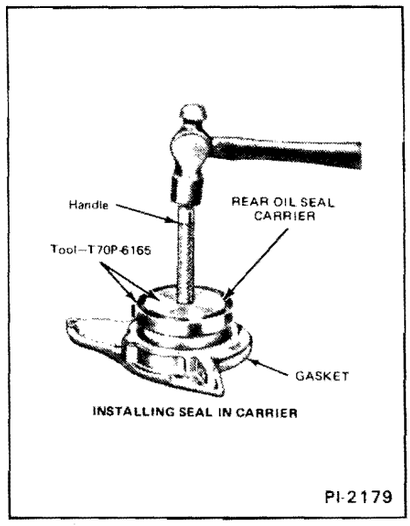


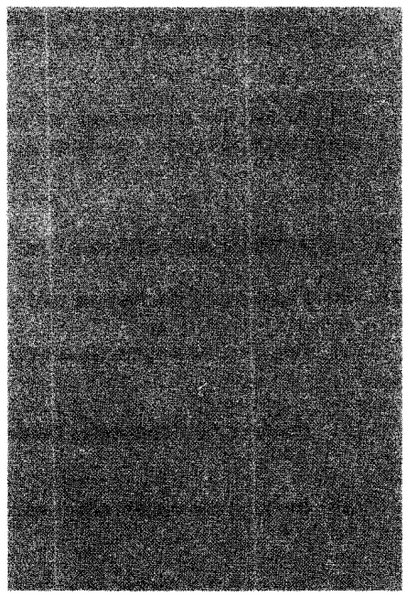
Fig. 7B—54 Installing Oil Seal for Crankshaft

7B—32 MAIN BEARINGS

The cast iron crankshaft is supported by five bearings.

The main bearing caps must be kept in original position. An arrow in the cap points to the front of the engine location marks are on the caps.

The front bearing cap has the letter "F". The second cap has the number "2". the center cap has the letter "C". The fourth cap has the number "4". The rear cap does not have a marking.



7B—32.1 Removing the Main Bearings

(1) Remove the main bearing caps and the thrustwashers. Keep the caps in order so each cap will be installed in its original position.

(2) Remove the bearing halves from the cylinder block and from the caps.

(3) Check the caps and the crankshaft for damage.

(4) Install new bearing halves in the cylinder block and from the bearing caps.

(5) Make sure that the crankshaft and the bearings are free from dirt and other debris.

(6) Measure the bearing clearances using Plastigage (See Paragraph 7B—6.10, Page 7B—13).

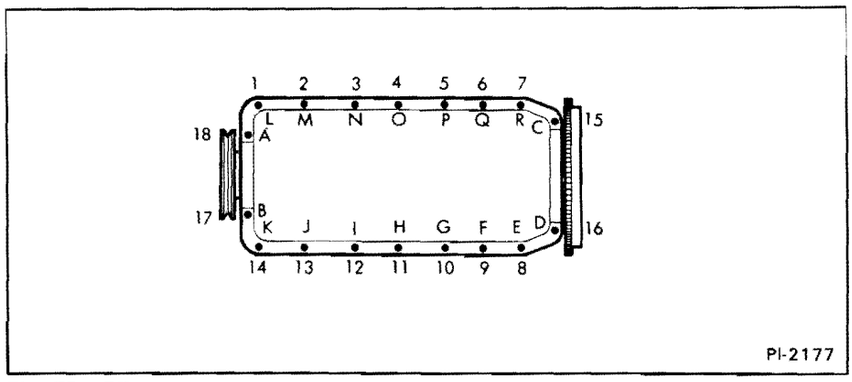


Fig. 7B—55 Tightening Sequence for Oil Pan Bolts

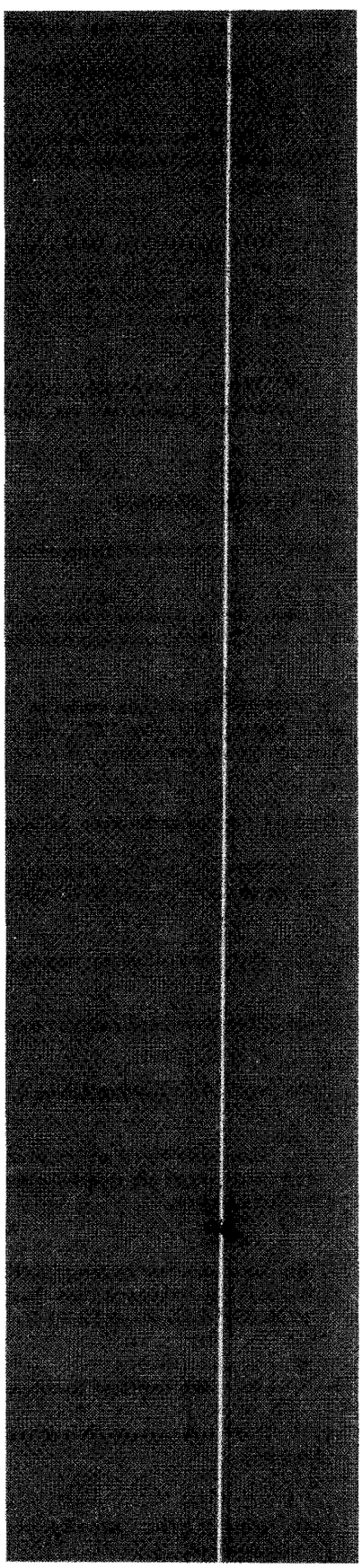
7B—32.2 Installing the Main Bearings

(1) Clean the crankshaft and the bearings.

(2) Install the crankshaft thrustwashers.

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(3) Put oil on the bearing surfaces and install the bearing caps in their original positions and tighten the bolts to specifications.



7B—33 CONNECTING ROD BEARINGS

7B—33.1 Removing the Connecting Rod Bearings

(1) Turn the crankshaft to remove the number one connecting rod cap. Loosen he connecting rod bolts two or three turns and hit the bolts to release the cap. Remove the bolts and remove the cap. Keep the caps in order so each cap will be installed in its original position.

(2) Remove the bearing halves from the connecting rod caps.

7B—33.2 Installing the Connecting Rod Bearings

(1) Install the upper and lower bearings in the correct locations.

(2) Measure the bearing clearances using Plastigage (See Section 7B—6.10 To Check Crankshaft or Connecting Rod Bearing).

(3) Install the connecting rod caps on the connecting rods in their original positions and tighten the bolts to specifications.

7B—34 PISTONS AND CONNECTING RODS

7B—34.1 Removing the Pistons and Connecting Rods

(1) Remove the engine (See Section 7B—5 Removing the Engine).

(2) Remove the thermostat housing and remove the thermostat.

(3) Remove the rocker cover and the gasket.

(4) Remove the rocker shaft bolts evenly and remove the rocker arm shaft assembly.

(5) Remove the pushrods and keep them in the correct order.

(6) Remove the cylinder head bolts and remove the cylinder head and gasket. Do not put the cylinder head flat on its surface. Damage to the spark plugs or the gasket surface can result.

(7) Remove the starter and the oil pan.

(8) Clean the oil pan and the cylinder block surfaces and remove the end seals.

(9) Loosen the bearing cap bolts several turns and hit the bolts to release the bearing cap. Remove the bolts and remove the bearing cap. Keep the bearing caps in order so each can be installed in its original positions. Push the piston and the connecting rod out of the bore.

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7B—34.2 Installing the Pistons and Connecting Rods

(1) Install the bearing halves in the connecting rods and the end caps. Turn the crankshaft as needed to fit each connecting to the crankshaft, but do not install the end cap.

(2) Measure the bearing clearances using Plastigage (See Section 7B—6.10 To Check Crankshaft or Connecting Rod Bearing).

(3) Clean all the bearing surfaces of the Plastigage material. If needed use new rod bearings to get the correct clearances.

(4) Install the connecting rods on the crankshaft and tighten the connecting rod bolts to specifications.

(5) Install a new gasket on the block flange using sealing compound at each end. Install the end seals with the chamfered ends into the grooves again using sealing compound.

(6) Install the oil pan and tighten the bolts to the correct torque, following the tightening sequence. (See Section 7B—31.2 Step 3.)

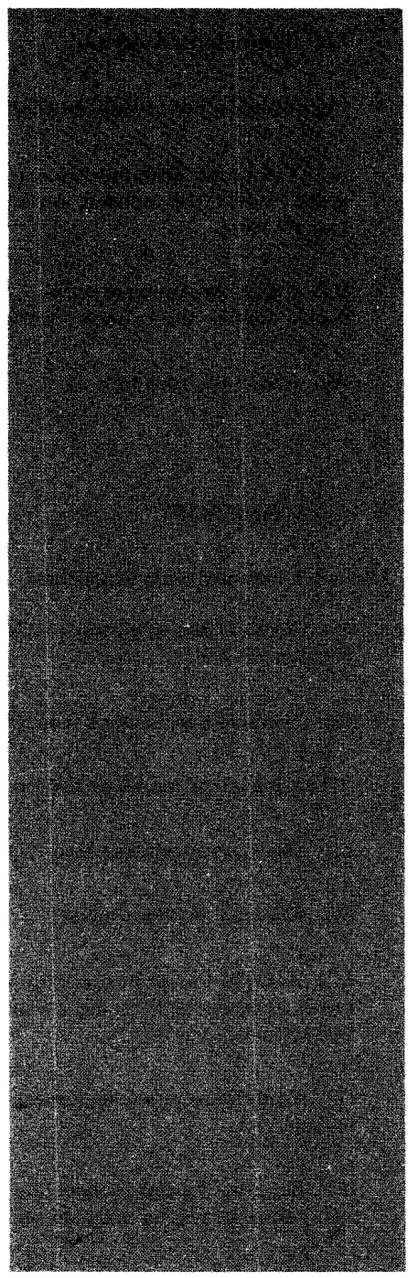
(7) Clean and install the starter. Fasten the starter with the two bolts.

(8) Clean all the gasket material from the contact surfaces and install the cylinder gasket on the cylinder block using alignment studs.

(9) Install the cylinder head. Remove the alignment studs and install the cylinder head bolts. Tighten the bolts (See Section 7B—21.2 Installing the Cylinder Head).

(10) Put oil on both ends of the pushrods and install the pushrods in the correct bores.

(11) Install the rocker shaft assembly on the cylinder head put the pushrods on the adjustment screws. Tighten the bolts to the correct specification.



7B—35 CAMSHAFT BEARINGS

The service bearings for the camshaft are machines to fit and need no machining after installation. When one bearing needs replacement replace all three bearings to be sure of the correct camshaft alignment.

Made sure that the oil holes in the bearings and the cylinder block are in correct alignment before installation and that the bearing openings are at 45° to the vertical (Fig. 7B—56).

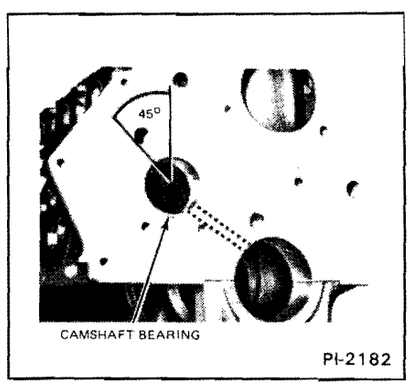


Fig. 7B—56 Crankshaft Bearing Position

7B—35.1 Removing the Camshaft

(1) Remove the enigine (See Section 7B—5).

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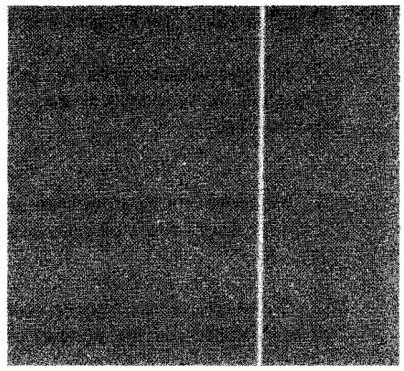
(2) Remove the flywheel.

(3) Remove the crankshaft rear oil seal bracket (Fig. 7B—54).

(4) Put a new gasket on the rear oil seal bracket using sealing compound at the ends. Install the bracket on the cylinder block and tighten the bolts to specification.

(5) Install the flywheel on the crankshaft flange. Be sure contact surfaces are clean. Tighten the fastening bolts to specification.

(6) Install the camshaft.



7B—36 CRANKSHAFT

7B—36.1 Removing the Crankshaft

(1) Remove the engine from the Bobcat and put it in an engine stand (See Section 7B—5).

(2) Remove the flywheel from the crankshaft.

(3) Loosen the governor fastening bolts and remove the drive belt.

(4) Remove the sheave from the front of the crankshaft.

(5) Remove the front cover.

(6) Remove the oil thrower from the shaft (Fig. 7B—57). Remove the timing chain tightener and timing chain. Remove the crankshaft sprocket from the crankshaft.

(7) Turn the engine over, remove the oil pan. Remove the oil inlet tube and the screen.

(8) Remove the four connecting rod bearing caps and keep them in order so that each cap will be installed on the correct rods.

(9) Remove the five main bearing caps and keep them in order so that each will be installed in the correct location.

(10) Carefully remove the crankshaft from the cylinder block.

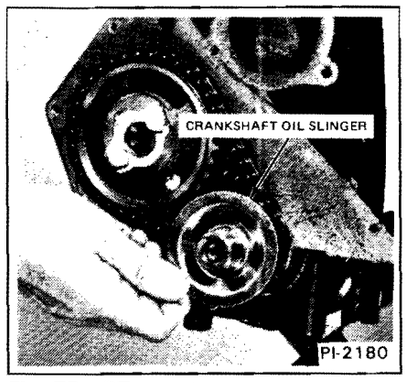
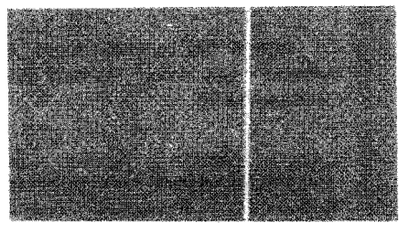


Fig. 7B—57 Oil Thrower



7B—36.2 Installing the Crankshaft

(1) Install the main bearings in the cylinder block. Install the crankshaft and check the bearing clearance using the Plastigage method. (See Section 7B—6.10). Install the correct main bearing caps and tighten to specification.

(2) Check the crankshaft end play (See Section 7B—4.2).

(3) Install the correct thickness of thrustwashers to give the correct endplay (Fig. 7B—58).

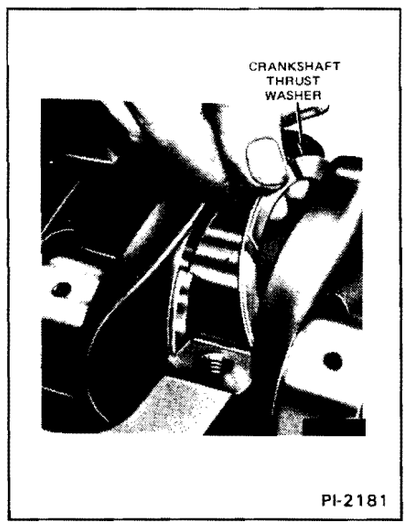


Fig. 7B—58 Installing Thrustwasher

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(4) Check the connecting rod bearings using the Plastigage method (See Section 7B–6.10).

(5) Install the rod bearings and the correct connecting rod caps in the correct locations and tighten the cap bolts to specification.

(6) Install the oil inlet tube and the screen.

(7) Install the crankshaft sprocket and timing chain making sure that the timing marks are in alignment.

(8) Install the oil thrower timing chain tightener and timing chain tightener and timing chain cover. Install the crankshaft sheave.

(9) Install the oil pan and new gaskets. Tighten the oil pan fastening bolts to specification (See Section 7B–31.2, Step 3).

(10) Turn the engine over again and install the governor drive belt. Make belt adjustment to specified tension.

(11) Install the flywheel.

(12) Install the engine in the Bobcat loader.

(13) Fill the crankcase and the cooling system to the correct level with the specified oil and coolant. Start the engine and check for oil and water leaks.

7B–37 UNIVERSAL JOINT

The tool listed will be needed to do the following procedure:

MEL-1187 – Socket

7B–37.1 Universal Joint Removal

(1) Remove the engine (See Paragraph 7B–5, Page 7B–10).

(2) Remove the bolts (Fig. 7B–59, Item 1), holding the u-joint o the flywheel.

(3) Remove the u-joint assembly.

7B–37.2 Universal Joint Installation

(1) Put loctite on the four bolts.

(2) Install the u-joint.

(3) Install the bolts and tighten 270-300 in.-lbs. (31-34 Nm) torque.

(4) Put spline lube (MEL-1121) on the splines before installation.

7B–38 FLYWHEEL

7B–38.1 Flywheel Removal

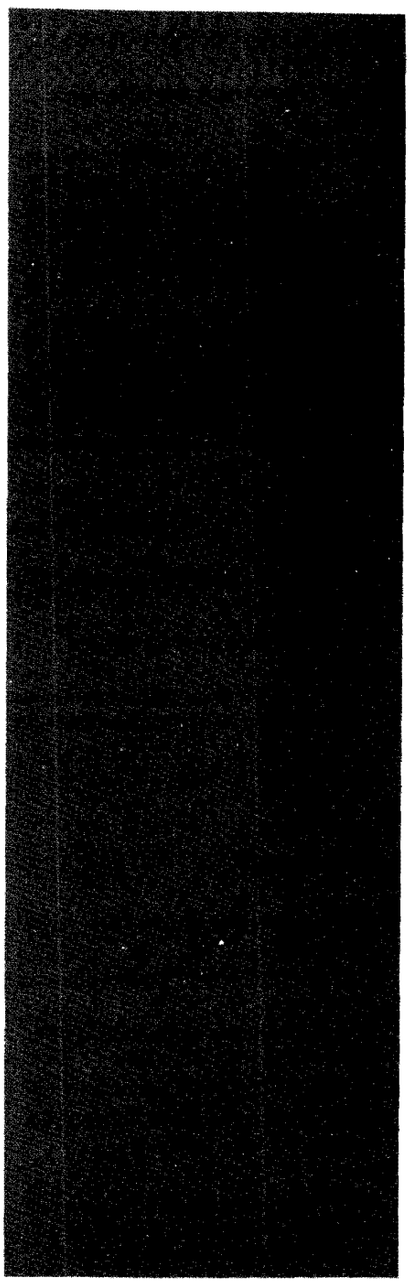
(1) Remove the bolts that attach the blower fan to the flywheel (Fig. 7B–59, Item 2).

(2) Remove the blower fan.

(3) Remove the bolts holding the flywheel onto the crankshaft. Installation: Tighten the bolts to 45-50 ft.-lbs. (61-68 Nm) torque.

(4) Remove the flywheel.

(5) Installation is the reverse of removal.



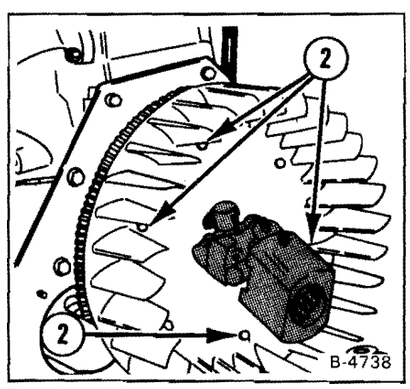


Fig. 7B–59 U-Joint

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7B—39 FLYWHEEL RING GEAR

7B—39.1 Removing the Ring Gear

⚠ 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.**

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(1) Cut between the teeth with a hacksaw.

(2) Use a chisel to break the ring gear.

7B—39.2 Installing the Ring Gear

(1) Heat te ring gear to a temperature of not more than 600°F (315°C). Temperature of more than 600° will cause damage to hardness of the ring gear.

(2) Install the hot ring gear on the flywheel.

7B—40 MUFFLER

7B—40.1 Removing the Muffler

(1) Remove the rear grill.

(2) Remove the exhaust pipe from the muffler (Fig. 7B—60).

(3) Remove the bolts holding the muffler on (Fig. 7B—61).

(4) Installation is the reverse of removal.

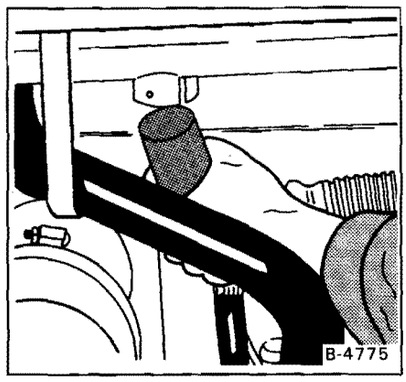


Fig. 7B—60 Removing Exhaust Pipe

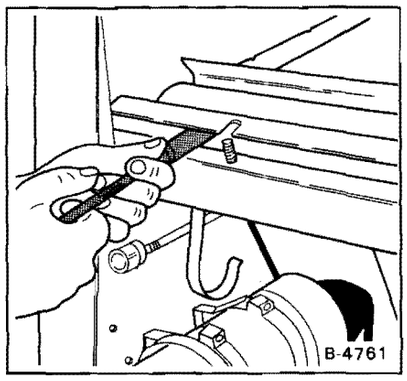


Fig. 7B—61 Removing Muffler Bolts

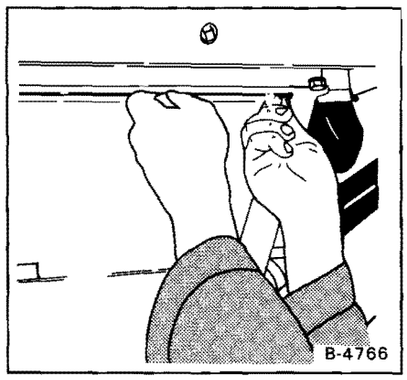


Fig. 7B—62 Removing Panel

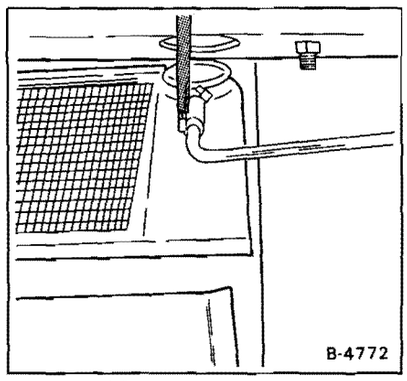


Fig. 7B—63 Removing Clamp from Overflow

7B—41 RADIATOR

7B—41.1 Removing the Radiator

(1) Remove the panel from the blower housing (Fig. 7B—62).

(2) Loosen the hose clamp on the overflow tube (Fig. 7B—63).

(3) Loosen the clamp on the overflow tube by the recovery tank and remove the tank (Fig. 7B—64).

(4) Remove the overflow tube (Fig. 7B—65).

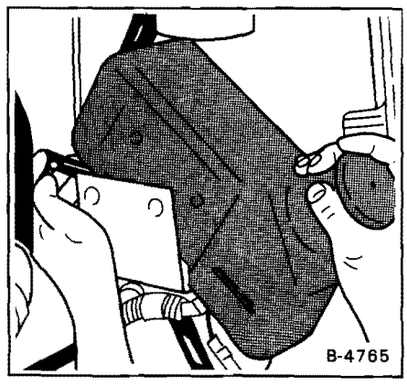


Fig. 7B—64 Removing Coolant Tank

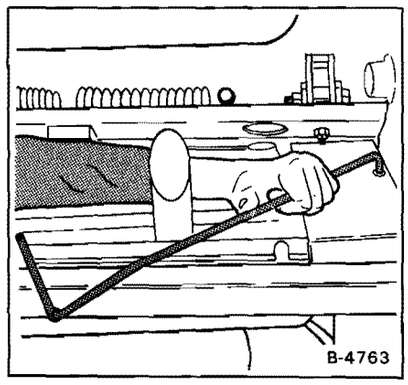


Fig. 7B—65 Removing Overflow Tube

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(15) Remove the muffler exhaust pipe.

(6) Remove the inlet radiator hose (Fig. 7B—66).

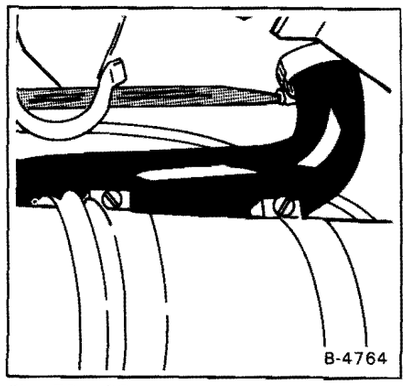


Fig. 7B—66 Removing Inlet Hose

(7) Remove the outlet radiator hose (Fig. 7B—67).

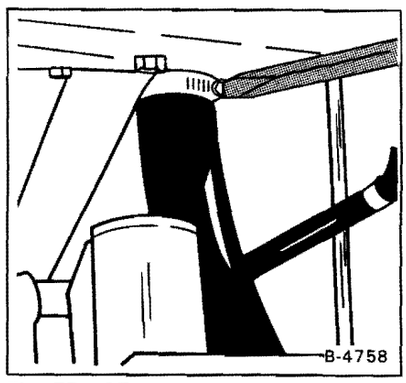


Fig. 7B—67 Removing Outlet Hose

(8) Remove both the inlet and the outlet tubelines from the oil cooler (Fig. 7B—68).

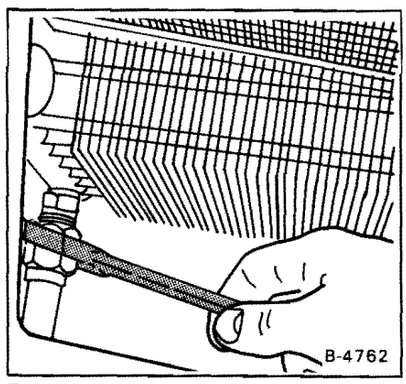


Fig. 7B—68 Removing Tubeline

(9) Remove the right mounting bolt for the radiator assembly (Fig. 7B—69).

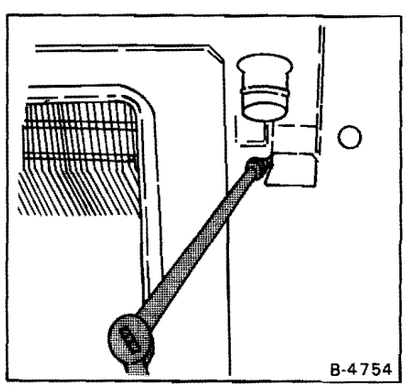


Fig. 7B—69 Removing Bolt

(10) Remove the left mounting bolt for the radiator assembly (Fig. 7B—70).

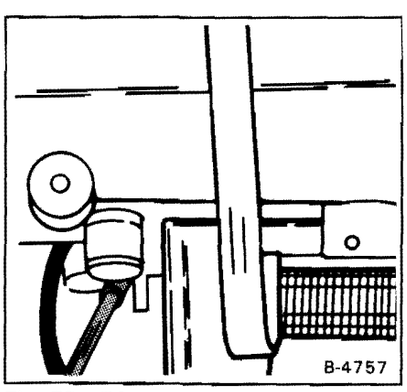


Fig. 7B—70 Removing Bolt

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(11) Remove the radiator assembly (Fig. 7B—71).

(12) Remove the radiator mounting bolts (Fig. 7B—72).

(13) Remove the radiator from the assembly.

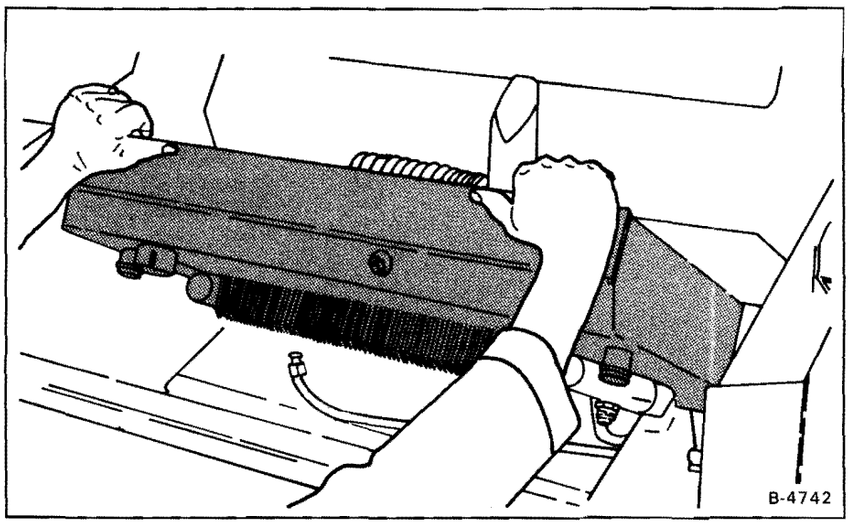


Fig. 7B—71 Removing Radiator Assembly

7B—41.2 Installing the Radiator

(1) Install the mounting bolts (Fig. 7B—72).

(2) Tighten the mounting bolts 180 - 200 in.-lbs. (21 - 23 Nm) torque.

(3) Install the radiator assembly (Fig. 7B—71).

(4) Install the assembly mounting bolts (Fig. 7B—68 & 7B—69). Tighten the bolts 180 - 200 in.-lbs. (21 - 23 Nm) torque.

(5) Install the tubelines to the oil cooler.

(6) Install the two radiator hoses.

(7) Install the muffler exhaust pipe.

(8) Install the overflow tube and the coolant recovery tank.

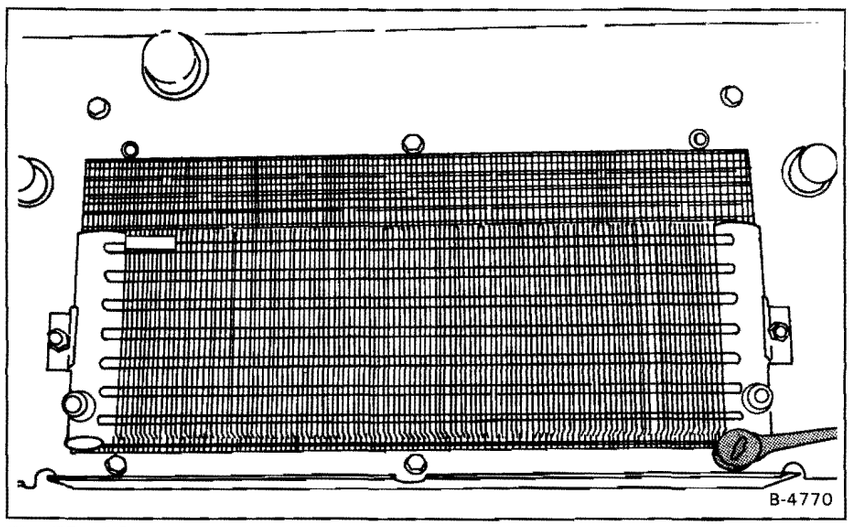


Fig. 7B—72 Removing Mounting Bolts

(9) Connect the overflow tube at both ends and tighten the hose clamps.

(10) Install he panel on the blower housing. Tighten the bolts 180 - 200 in.-lbs. (21 - 23 Nm) torque.

7B—42 BLOWER HOUSING

7B—42.1 Removing the Blower Housing

(1) Remove the engine (See Section 7B—5).

(2) Remove the radiator, oil cooler assembly (See Section 7B—42).

(3) Disconnect the fuel lines from the fuel filter (Fig. 7B—73).

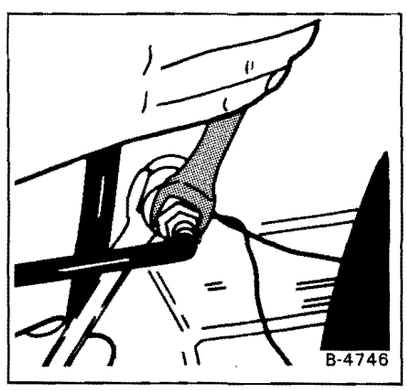


Fig. 7B—73 Disconnecting Fuel Line

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(4) Remove the center nut from the blower housing (Fig. 7B—74).

(5) Remove the bottom bolt from the blower housing (Fig. 7B—75).

(6) Remove the blower housing (Fig. 7B—76).

7B—42.2 Installing the Blower Housing

(1) Install the blower housing and install the bottom bolt (Fig. 7B—75). Tighten the bottom bolt 25 - 28 ft.-lbs. (34 - 38 Nm) torque.

(2) Install the center nut (Fig. 7B—74). Tighten the nut 180 -200 in.-lbs. (21 - 23 Nm) torque.

(3) Connect the fuel line to the fuel filter (Fig. 7B—73).

(4) Install the radiator, oil cooler assembly.

(5) Install the engine.

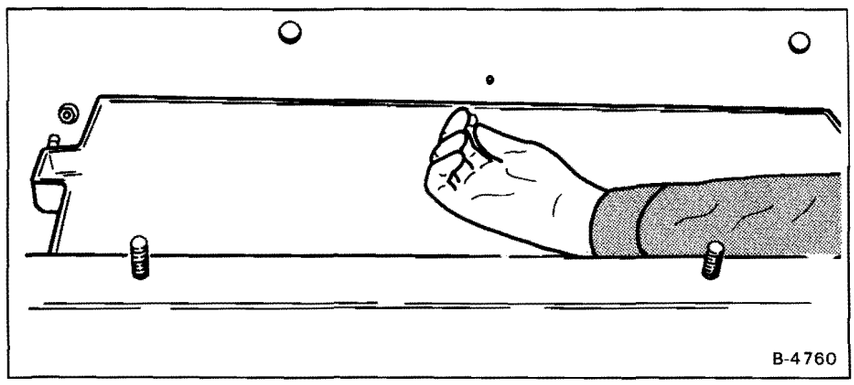


Fig. 7B—74 Removing Center Bolt

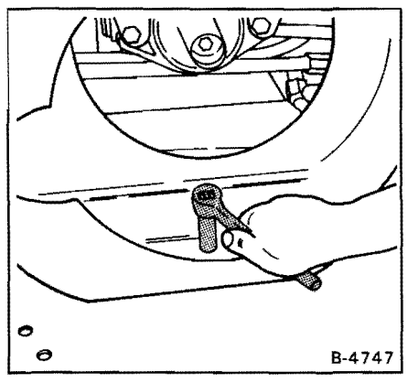


Fig. 7B—75 Removing Bolt

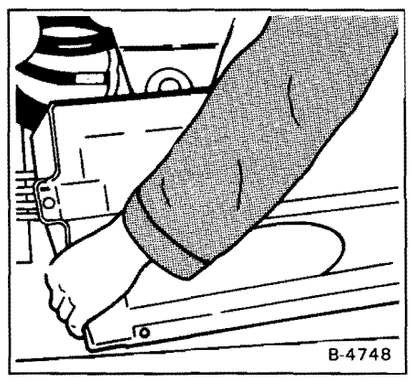


Fig. 7B—76 Removing Blower Housing

7B—43 STARTER

7B—43.1 Removing the Starter

(1) Disconnect the battery cables (negative battery cable first).

(2) Remove the wires from the starter (Fig. 7B—77). Make note of the wire connections to make sure the wires are connected correctly during assembly.

(3) Remove the starter mounting bolts (fig. 7B—78).

(4) Remove the starter (Fig. 7B—79).

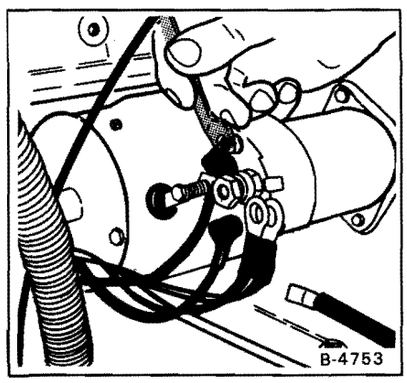


Fig. 7B—77 Removing Starter wires

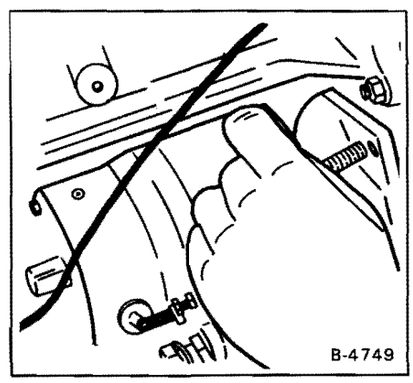


Fig. 7B—78 Removing Mounting Bolts

7B—43.2 Installing the Starter

(1) Install the starter (Fig. 7B—79).

(2) Install the mounting bolts and tighten 25 - 28 ft.-lbs. (34 - 38 Nm) torque.

(3) Connect the wires to the correct terminals (Fig. 7B—77).

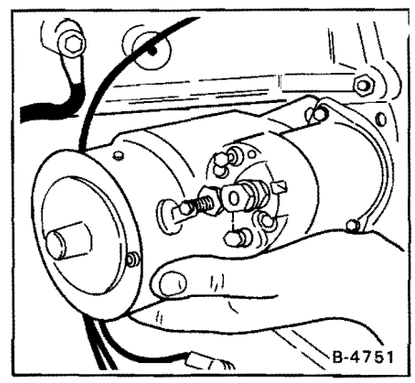


Fig. 7B—79 Removing Starter

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(Kubota 743)

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ENGINE SERVICE (Kubota 743)

TROUBLESHOOTING

The following troubleshooting chart is provided as an assistance in locating and correcting problems which are most common. Many of the recommended procedures must be done by trained service personnel only.

PROBLEM	CAUSE
Engine will not turn over with the starter.	1, 2, 3, 4, 5, 6
Engine will not start or is difficult to start.	7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19
Engine misses, runs irregularly or stops.	20, 21, 22, 23, 24
Engine overheats.	25, 26, 27, 28
Too much engine vibration.	29, 30

KEY TO CORRECT THE CAUSE

1. Battery has lost its charge.
2. Loose battery connections.
3. Loose starter connection.
4. Damaged starter switch.
5. Broken starter switch.
6. Damaged starter solenoid.
7. Wrong starting procedure.
8. No fuel in tank.
9. Air cleaner is dirty.
10. Fuel vent in cap has restriction.
11. Fuel line has air leak, dirt or water.
12. Damaged fuel lift pump.
13. Hydraulic/Hydrostatic load on engine.
14. Damage to fuel injection system.
15. Crankcase oil is thick.
16. Check glow plugs.
17. Check pre-heat solenoid.
18. Check the fuel shut off button.
19. Delivery valve nuts not tightened.
20. Fuel injection set wrong.
21. Dirty fuel, or fuel filter restricted.
22. Poor compression.
23. Wrong fuel (use diesel only).
24. Water in the fuel.
25. Engine is overloaded.
26. Dirty engine oil.
27. Exhaust system has restriction.
28. Injection timing is wrong.
29. Loose engine mounts.
30. Worn rubber mounts.

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FUEL FILTER

Replacing the Fuel Filter

The fuel filter is on the right hand side of the engine on the main frame. Replace the fuel filter every 250 hours of loader operation.

To replace the fuel filter element:

Clean the filter areas.

Shut-off the fuel at the fuel tank.

Remove the bolt from the top of the filter housing (Item 1) [A].

Remove the element and the rubber seal from the housing.

Install a new rubber seal on the housing and put a small amount of oil on the rubber seal.

Install the new filter element in the container and install on the filter head. Hand tighten only.

Open the fuel shut-off valve at the tank until the fuel filter container is full.

Tighten the bolt to prevent leakage.

Removing Air from the Fuel System

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

Open the rear door. The engine must be cool.

Open the vent plug (Item 2) [A].

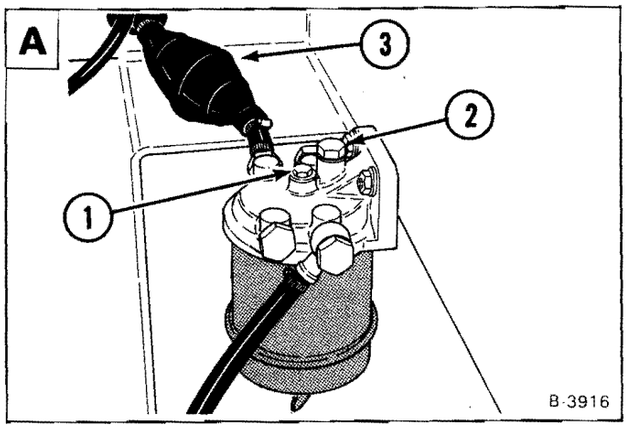
Operate the hand pump (Item 3) until fuel flows from the vent plug (Item 2) with no air bubbles [A].

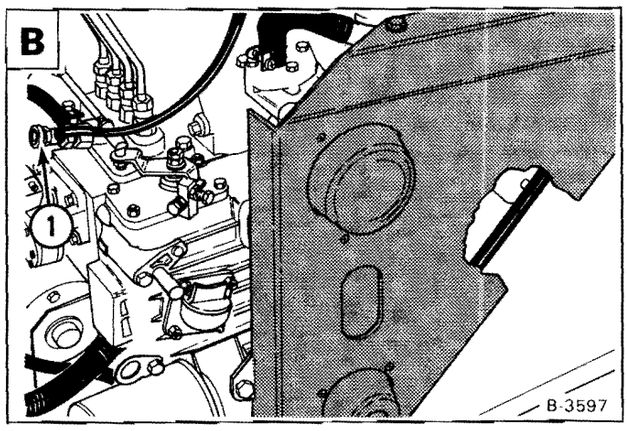
Tighten the vent plug.

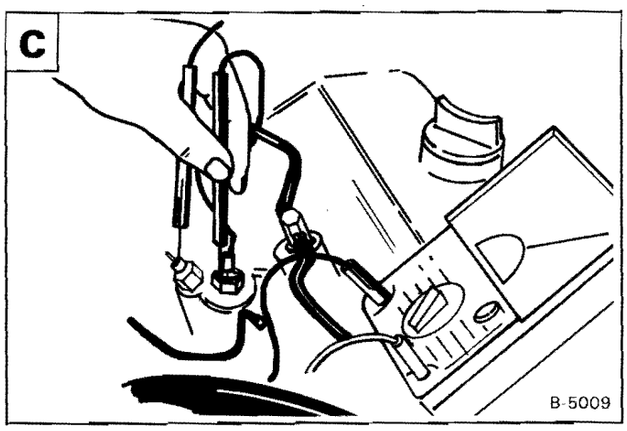
Operate the hand pump until it feels solid.

Move the throttle control to minimum RPM. Loosen the valve (Item 1) and squeeze the hand pump several times [B].

Start the engine. When the engine runs smoothly, close the valve (Item 1) [B].







GLOW PLUG

Checking

Disconnect the glow plug cables and leads.

Remove the glow plug from the cylinder head.

Connect a circuit tester, one terminal to each end of the glow plug [C].

The reading must be approximately 1.5 ohms. If the resistance is zero ohms the glow plug has a short circuit. If the resistance is infinite the coil of the glow plug is broken.

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FUEL INJECTION PUMP

The injection pump contains parts which have a very close tolerance and its operation has a direct effect on the performance of the engine.

IMPORTANT

Do not attempt maintenance or adjustment unless you are trained and have the correct equipment.

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Removal and Installation

Clean the area around the injection pump. Disconnect the fuel shut-off linkage (Item 1) [A].

Disconnect the fuel inlet hoses (Item 2) [A].

Disconnect the high pressure tubelines (Item 3) [A].

Installation: Tighten the delivery valve nuts to 29-36 ft.-lbs. (39-48 Nm) torque [B].

IMPORTANT

Do not bend the high pressure fuel injection tube when removing or installing them.

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Remove the side cover (Item 4) [A].

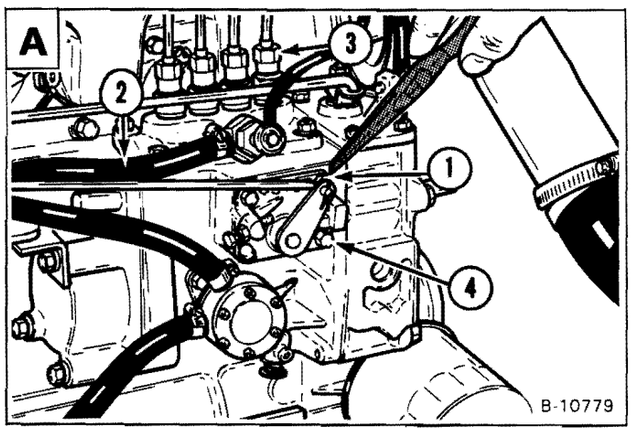
Remove the four mounting nuts.

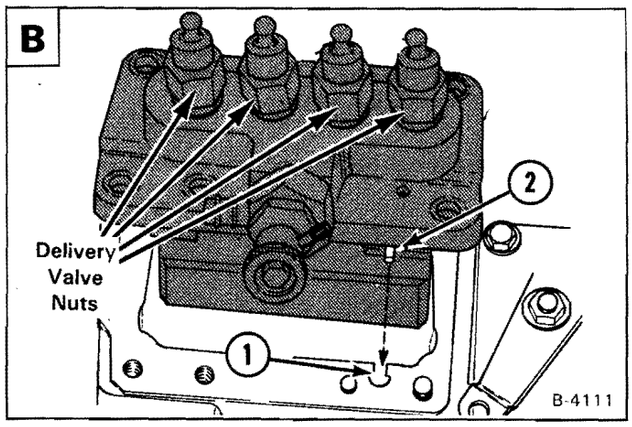
Installation: Tighten the nuts to 17-20 ft.-lbs. (23-27 Nm) torque.

Put the pin in the control rack in alignment with the slot in the engine block (Item 1) [B]. Remove the injection pump.

NOTE: **Make sure the same number of shims are installed under the injection pump. The shims are used for engine timing.**

Installation: When the injection pump is installed, make sure the pin (Item 2) on the control rack is correctly installed on the fork lever [B]. If the slot is not installed correctly, the engine will run over maximum speed and serious damage can result.





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FUEL INJECTION PUMP (Cont'd)

Timing the Injection Pump

Timing of the fuel system is done by changing the number of shims between the injection pump and the engine block. The timing of the fuel injection pump will be later when a shim is added, and earlier when a shim is removed.

⚠ WARNING

Diesel fuel or hydraulic fluid under pressure can penetrate skin or eyes causing serious injury. 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.

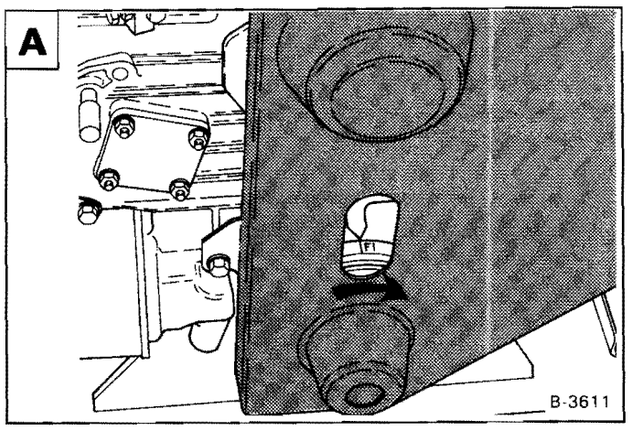
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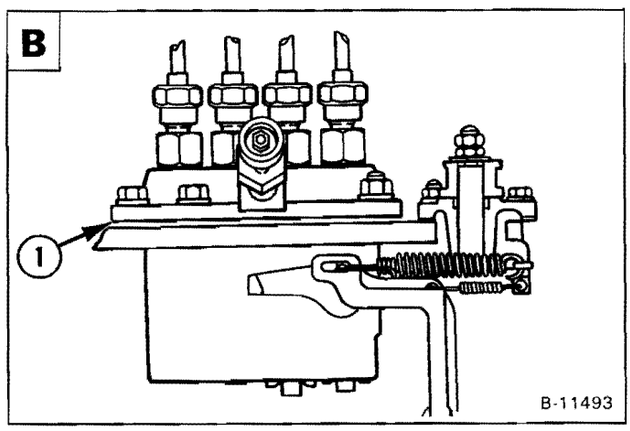
Remove the number 1 cylinder injector tubeline from the injector pump.

Install a short pipe to the outlet of the number 1 cylinder injector port. Point the pipe up (vertical).

With a fuel supply to the injection pump, rotate the engine in a clockwise direction. Fuel must flow from the pipe when the fixed mark "F-1" on the crankshaft pulley and the pointer comes into alignment [A].

The correct timing for the engine is 25 degrees B.T.D.C. (#1 cylinder). Add or subtract shims (Item 1) as needed to adjust the delivery time of the fuel [B]. Each shim will change the timing 1.5 degrees.





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FUEL INJECTION PUMP (Cont'd)

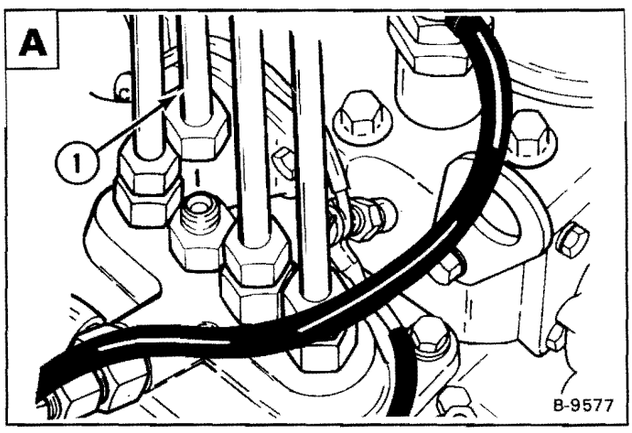
Checking the Injection Pump

The tools listed will be needed to do the following procedure:

MEL-1237 – Adapter Fuel Line
MEL-1173-1 – Pressure Gauge

To check the discharge pressure at the fuel injection pump, use the following procedure.

Disconnect a high pressure fuel line (Item 1) at the pump. Loosen the other end of the same high pressure line so it can be turned away from the fitting [A].



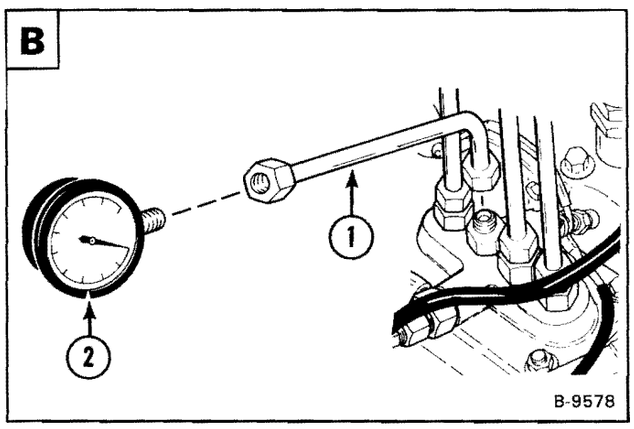
Connect the adapter fuel line (Item 1) to the fitting [B].

Connect the pressure gauge (Item 2) [B].

Rotate the engine, with the starter, until the pressure raises. Then turn the engine by hand until the pressure gauge reads 1400 PSI (9653 kPa).

Align "F1" on crankshaft pulley.

The injection pump must hold the 1400 PSI (9653 kPa) for at least 5 seconds. If not, replace or repair the injection pump.



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FUEL INJECTOR NOZZLES

⚠ WARNING

Diesel fuel or hydraulic fluid under pressure can penetrate skin or eyes causing serious injury. 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.

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Some problems caused by faulty injector nozzles:

The engine is hard to start or will not start. Rough engine operation and idle. The engine will not have full power. The engine exhaust smoke is black, white or blue.

Removal and Installation

The tool listed will be needed to do the following procedure:

MEL-1181 — Nozzle Wrench

IMPORTANT

Do not bend the high pressure fuel injection tube when removing or installing them.

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Disconnect the high pressure fuel lines at the fuel injectors [A].

Disconnect the high pressure fuel lines at the injection pump [B].

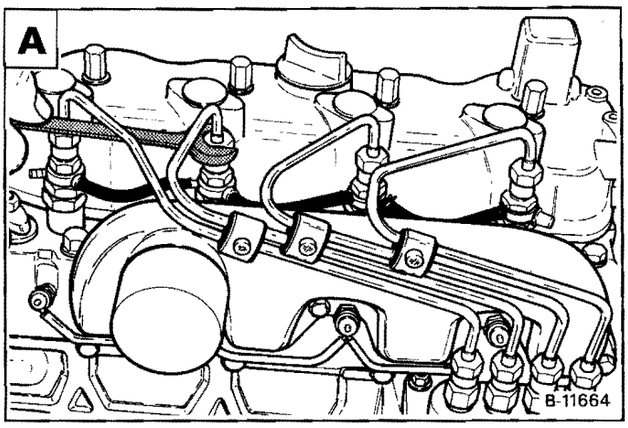
Remove the high pressure lines [C].

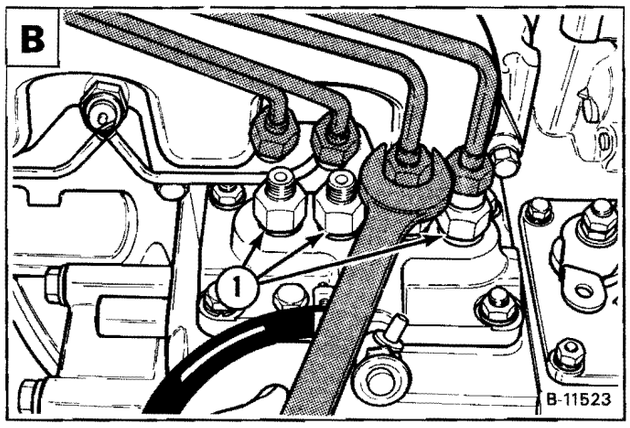
Disconnect the low pressure hoses (Item 1) at the injectors [D].

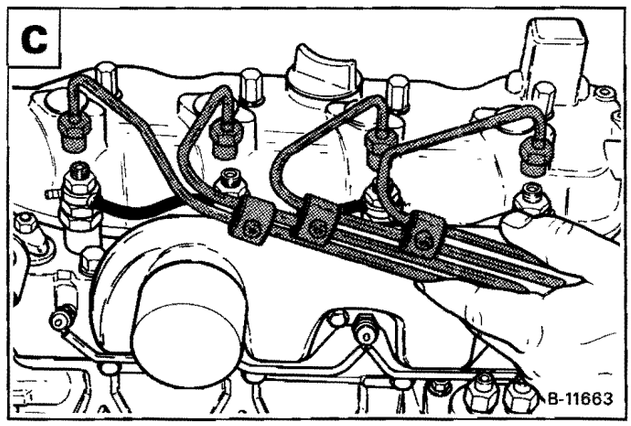
Use the special tool and remove the fuel injector from the cylinder head.

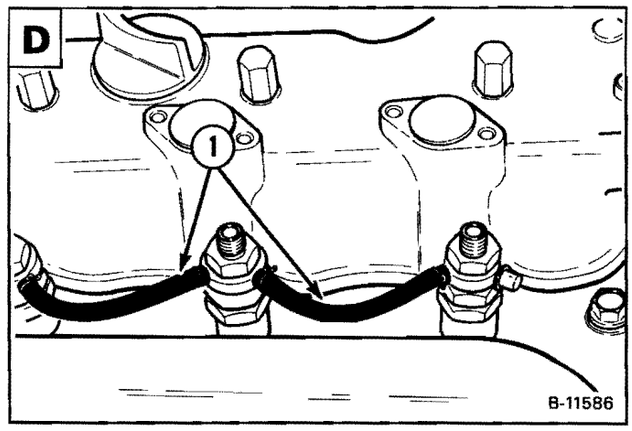
Installation: Tighten the delivery valve nuts (Item 1) to 29-36 ft.-lbs. (39-49 Nm) torque [B].

Tighten the nozzle holder to 22-36 ft.-lbs. (30-44 Nm) in the cylinder head.









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FUEL INJECTOR NOZZLES (Cont'd)

You can adjust the release pressure of the injector by adding or removing spacers (Item 1) at the top of the nozzle spring (Item 2) [A].

Each .0039" (0.1 mm) spacer will change the release pressure about 142 PSI (980,6 kPa). The release pressure must be 1920-2133 PSI (13238-14707 kPa).

Checking the Nozzles

Connect the injector nozzle to the tester with the nozzle down.

Use tools MEL-10018
MEL-10019

Operate the hand lever at a slow rate and note the opening pressure.

If the pressure is not correct, disassemble the injector nozzle and add or remove spacers.

Assemble the injector nozzle and check the pressure again.

When you assemble the injector nozzle, tighten the nozzle body (Item 3) to 43-58 ft.-lbs. (59-79 Nm) torque [A].

CAUTION: Do not over-tighten, or slow action of the valve will occur.

Check for inside leakage. Operate the hand lever until the pressure is almost enough to open the injector valve. Record the pressure.

Release the hand lever. Check the pressure decrease for 10 seconds.

If the pressure decrease is more than 740 PSI (5102 kPa) in 10 seconds, the nozzle is damaged.

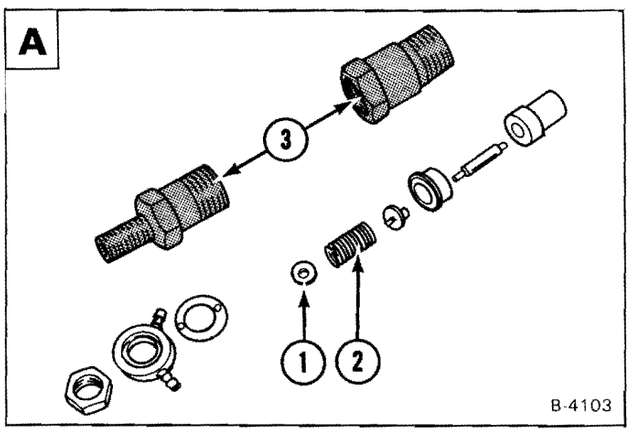
Check that the spray pattern is correct [B].

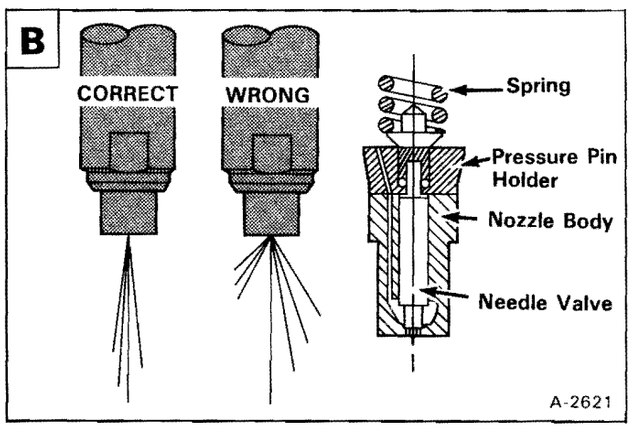
The spray pattern is not correct if any of the following occur.

a. Fuel comes out of the side of the nozzle.

b. Drops of fuel are present at the nozzle.

c. The nozzle does not have an even flow coming from the nozzle.





IMPORTANT

Do not disassemble or test the injector nozzles unless you have the correct service and testing tools.

⚠ WARNING

Diesel fuel or hydraulic fluid under pressure can penetrate skin or eyes causing serious injury. 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.

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ENGINE

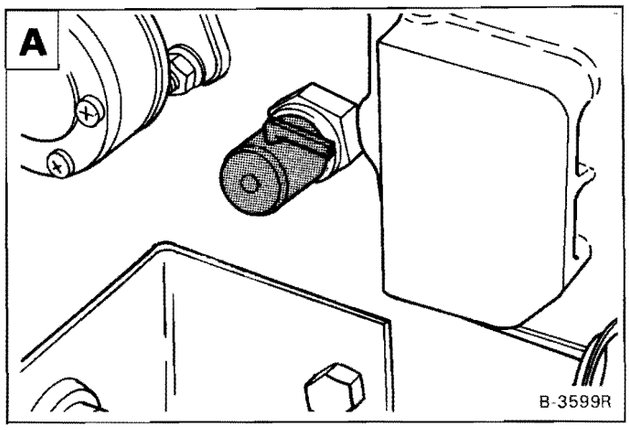
Removal

Open the rear door and clean the engine area.

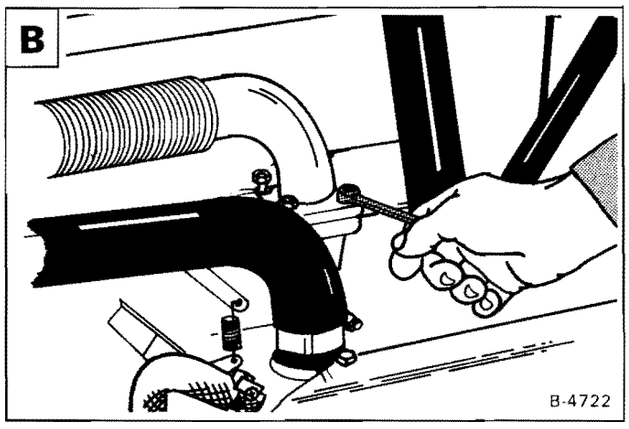
Disconnect the battery cables, ground cable first (See Page 6—2).

Remove the coolant from the engine. The radiator cap must be loosened to drain coolant.

Connect a hose to the valve or use a funnel to keep coolant from getting into the engine compartment. Open the valve (Item 1) and drain coolant into a container [A].



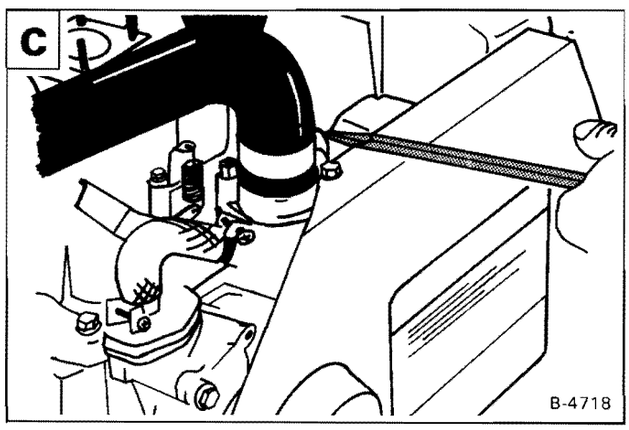
Turn the lever (Item 1) on the valve [A]. When all the coolant is removed close the valve.



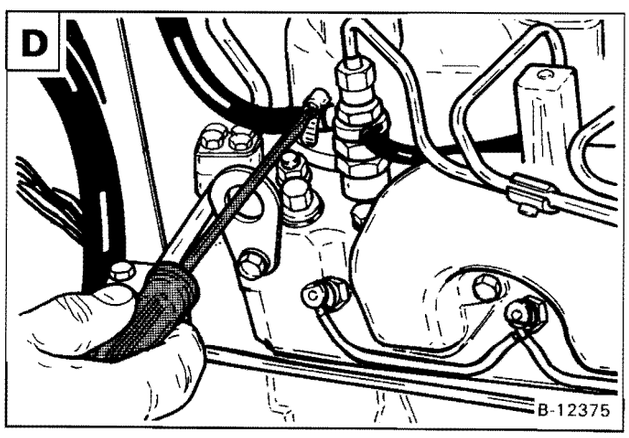
Close the shut-off valve.

Remove the exhaust pipe from the manifold [B].

Remove the radiator hoses [C].



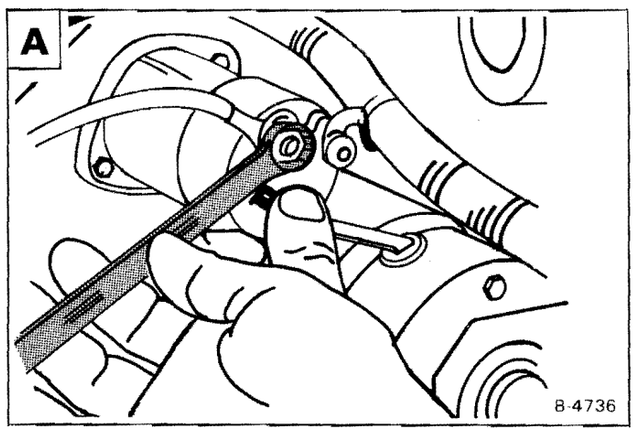
Remove the fuel return hose [D].



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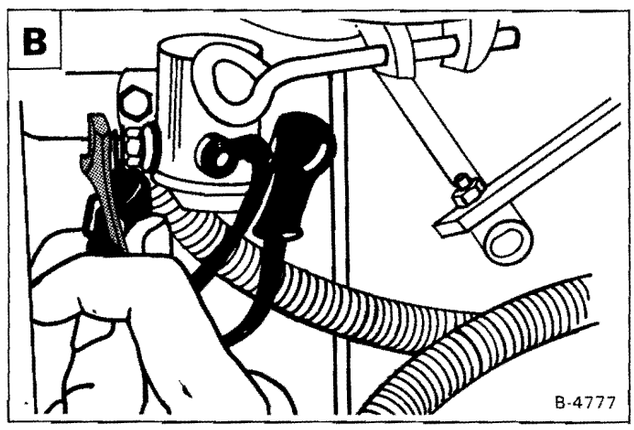
ENGINE (Cont'd)

Remove the hot wire from the starter [A]

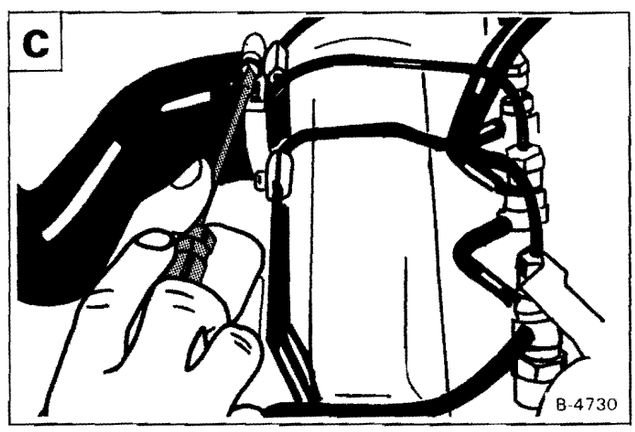


Remove the electrical wire from the solenoid [B].

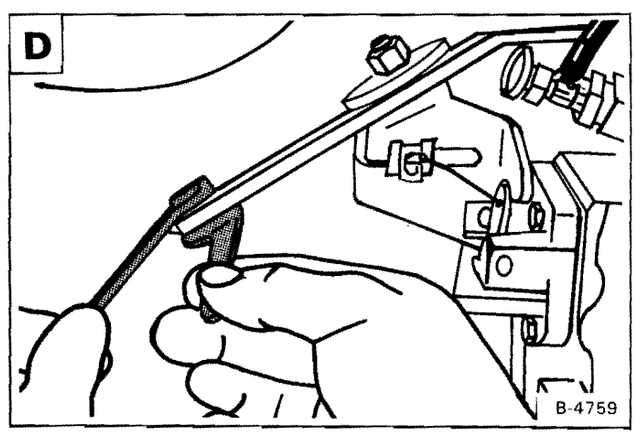
Remove the fuel inlet line at the fuel filter.



Remove the air cleaner hose [C].



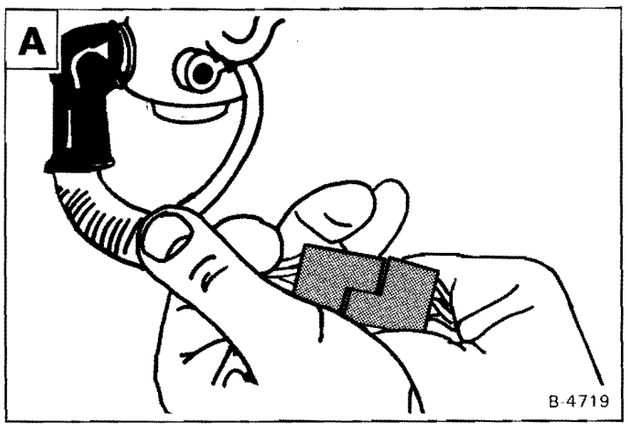
Remove the throttle linkage [D].



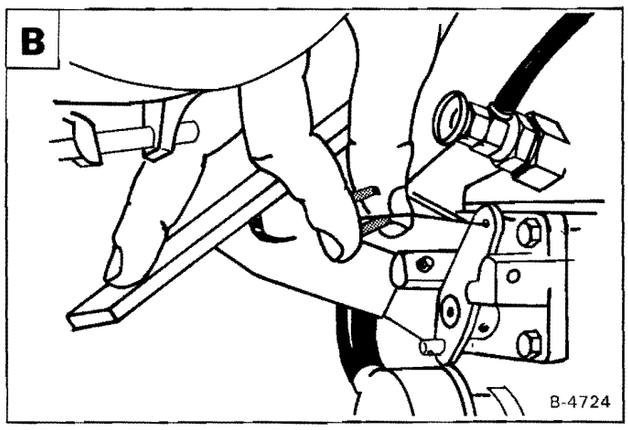
https://truckmanualshub.com/

ENGINE (Cont'd)

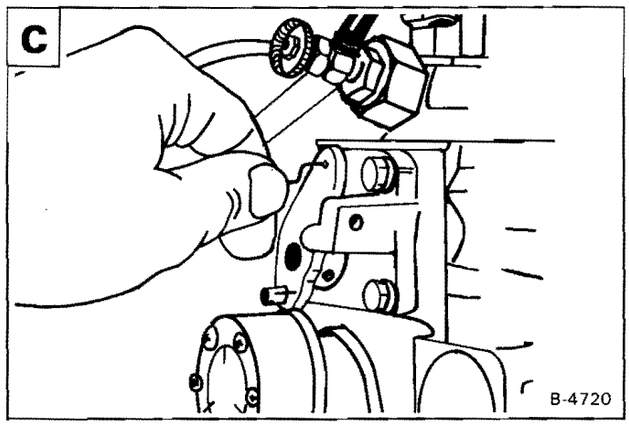
Disconnect the engine harness at the connector [A].



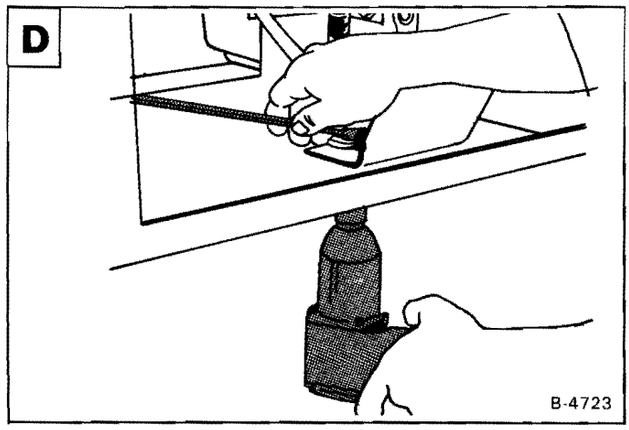
Remove the spring clamp from the fuel shut-off cable [B].



Remove the cable from the speed control arm [C].



Remove the engine mounting bolts [D].



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ENGINE (Cont'd)

Installation

Raise the operator cab.

Put the engine in the loader.

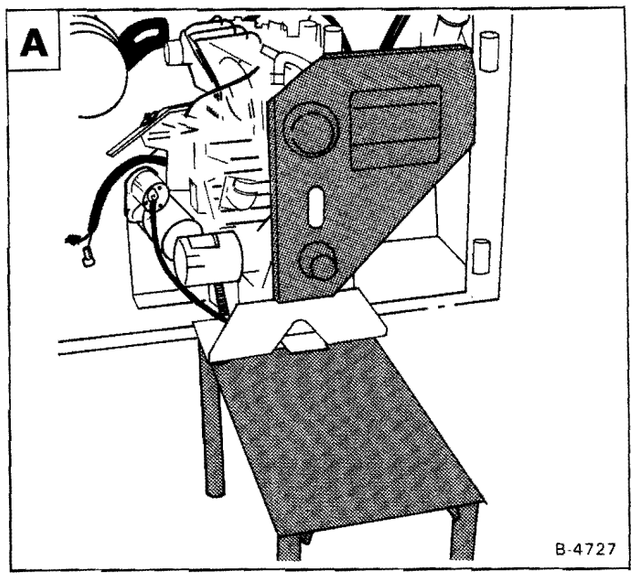
Have a second person in the pump area. Align the coupler on the engine flywheel to the splined shaft on the hydrostatic motor by turning the engine with the tool listed.

MEL - 1234 Crankshaft Nut Socket

NOTE: Belt shield must be removed.

Install the engine mount bolts and tighten to 65-70 ft.-lbs. (88-95 Nm) torque.

Install all other parts removed.

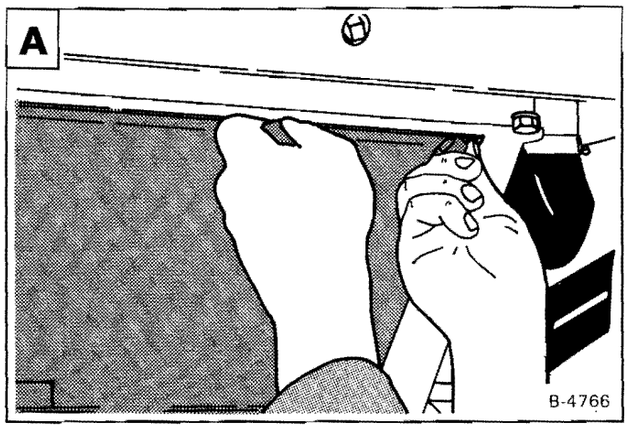


https://truckmanualshub.com/

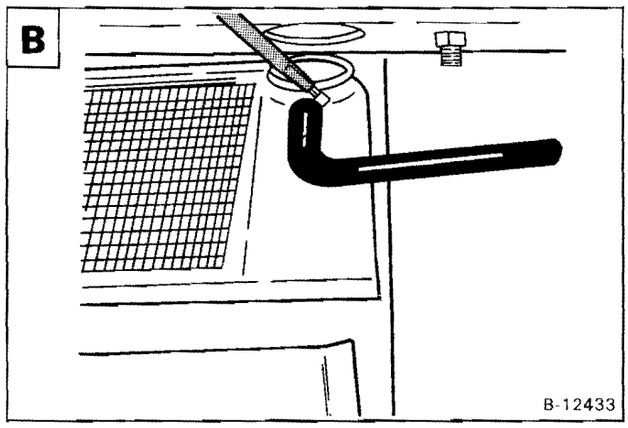
RADIATOR AND OIL COOLER

Removal and Installation

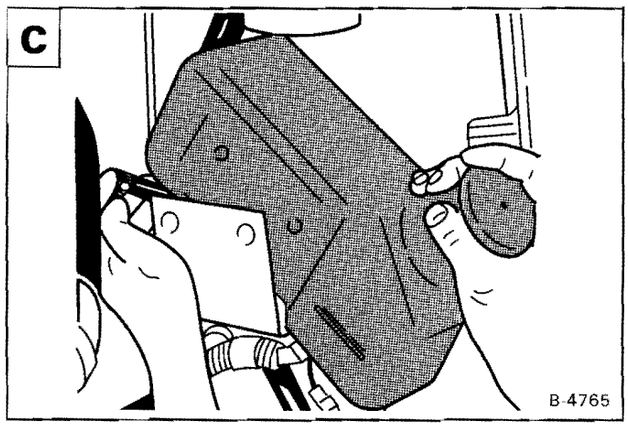
Remove the panel from the blower housing [A].



Loosen the hose clamp on the overflow hose [B].

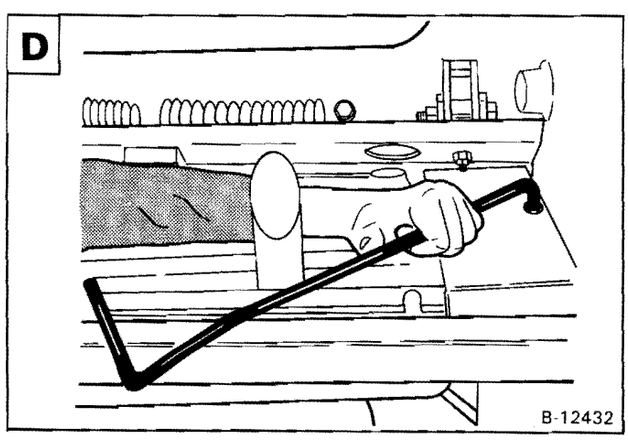


Drain the coolant tank and loosen the clamp on the overflow hose by the recovery tank and remove the tank [C].



Remove the overflow hose [D].

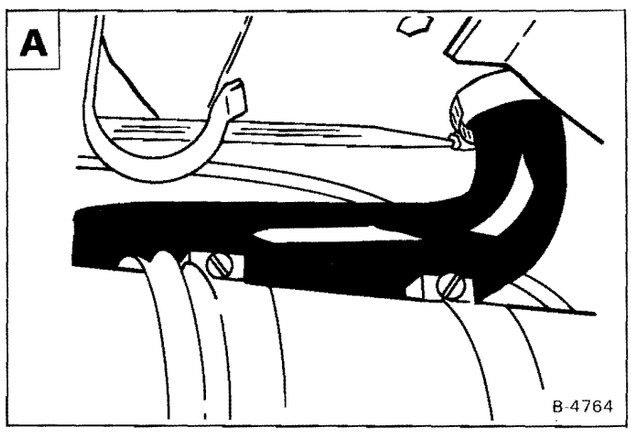
Remove the muffler exhaust pipe.



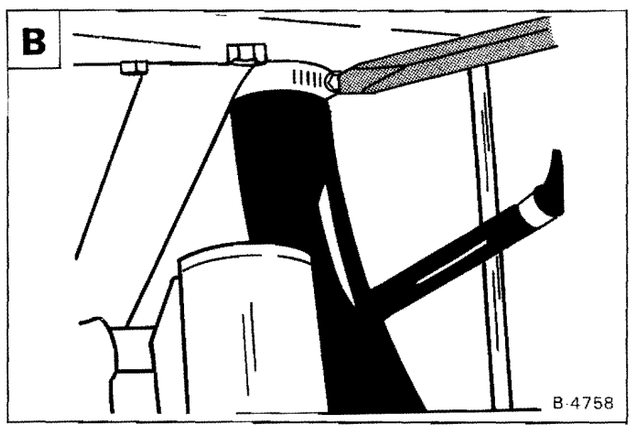
https://truckmanualshub.com/

RADIATOR AND OIL COOLER (Cont'd)

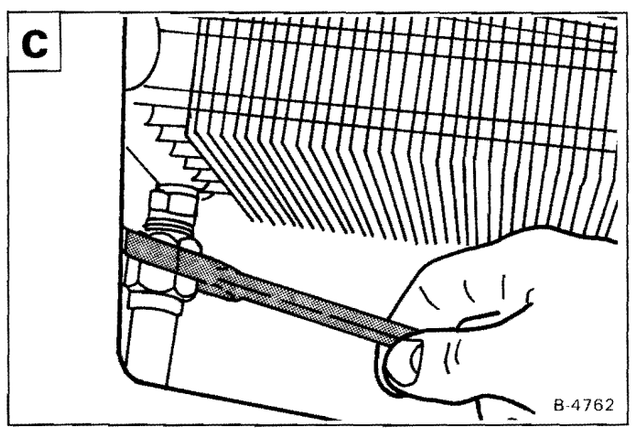
Drain the coolant and remove the inlet radiator hose [A].



Remove the outlet radiator hose [B].

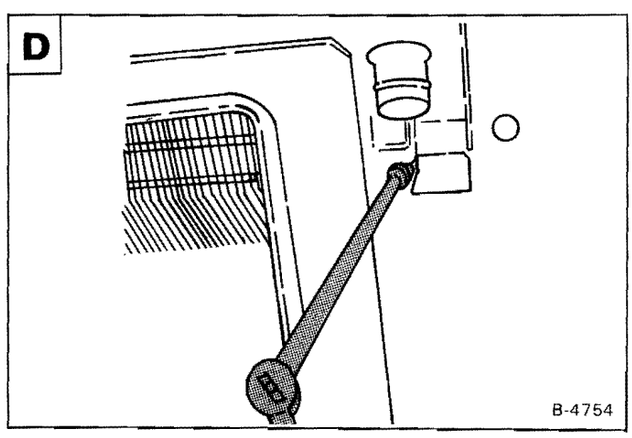


Remove both the inlet and the outlet tubelines from the oil cooler [C].



Remove the mounting bolts for the radiator assembly [D].

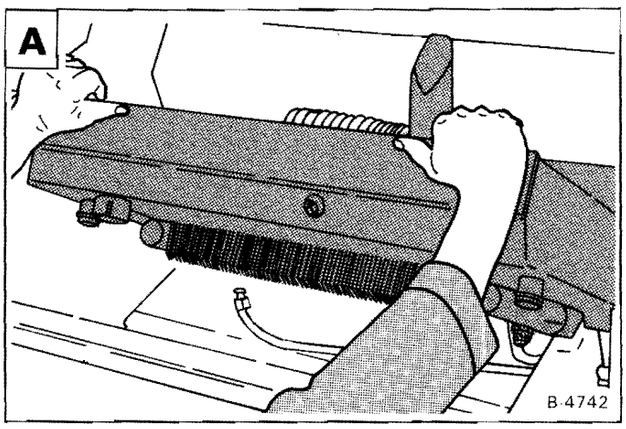
Installation: Tighten the bolts to 180-200 in.-lbs. (21-23 Nm) torque.



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RADIATOR AND OIL COOLER (Cont'd)

Remove the radiator assembly [A].



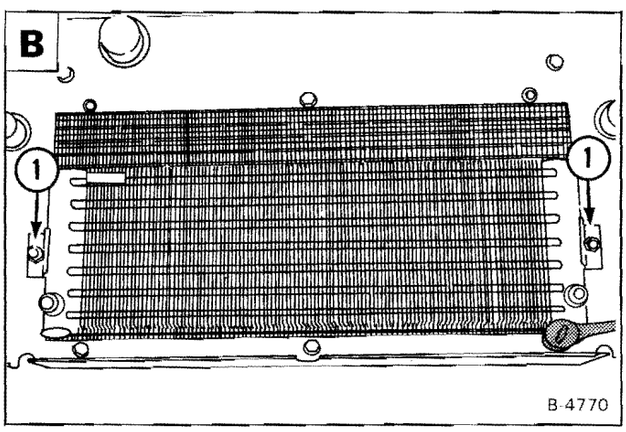
Remove the radiator mounting bolts [B].

Remove the radiator.

Remove the oil cooler mounting bolts (Item 1) [B].

Installation: Fill the radiator with pre-mixed coolant and install the radiator.

Install the grill. Fill the coolant recovery tank 1/3 full with pre-mixed coolant.



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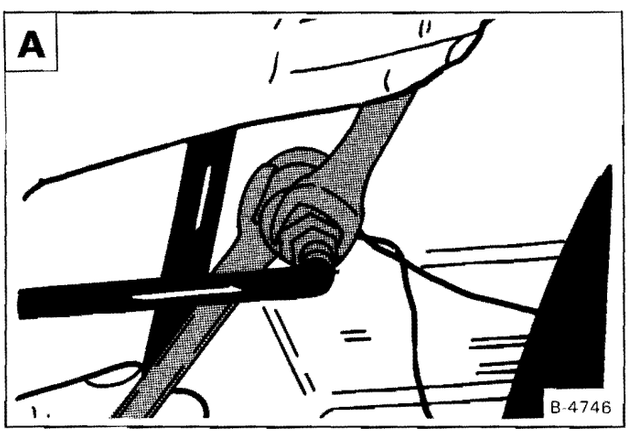
BLOWER HOUSING

Removal and Installation

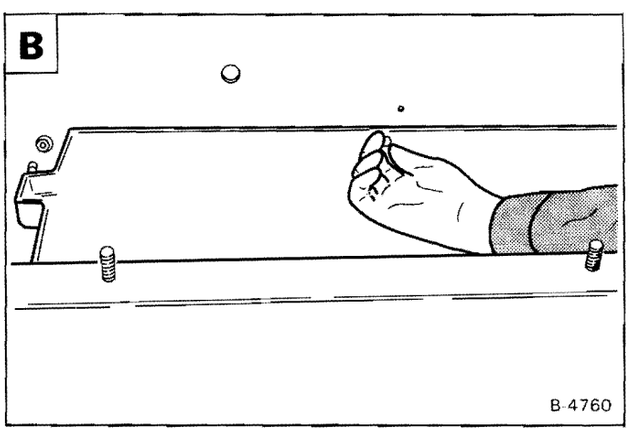
Remove the engine (See Page 7C – 8).

Remove the radiator, oil cooler assembly (See Page 7C – 12).

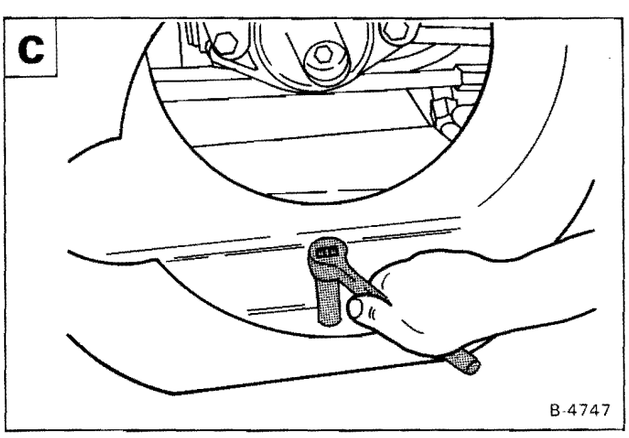
Disconnect the fuel lines from the fuel filter [A].



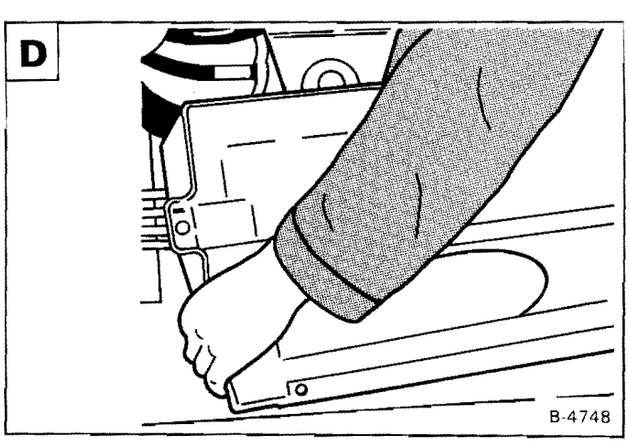
Remove the center nut from the blower housing [B].



Remove the bottom bolt from the blower housing [C].



Remove the blower housing [D].



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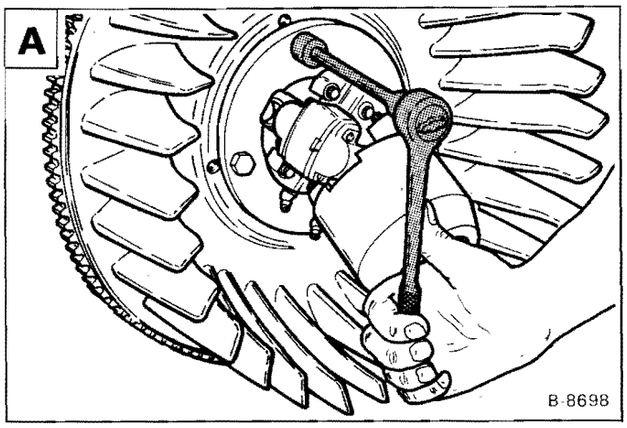
ENGINE FLYWHEEL AND U-JOINT

Removal and Installation

Remove the engine (See Page 7C – 8).

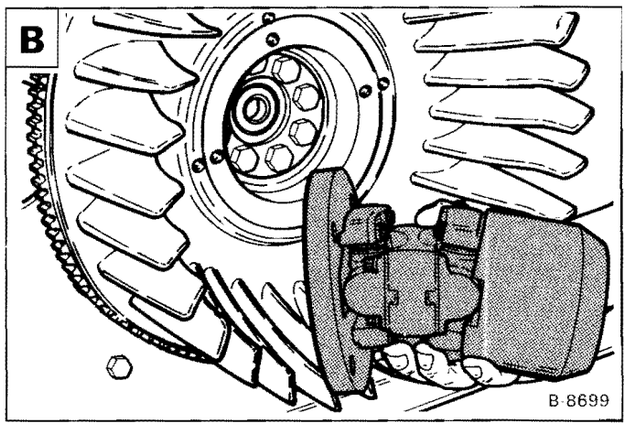
Remove the four bolts at the u-joint mounting flange [A].

Installation: Put Loctite on the four bolts. Tighten the bolts to 25-28 ft.-lbs. (43-48 Nm) torque.



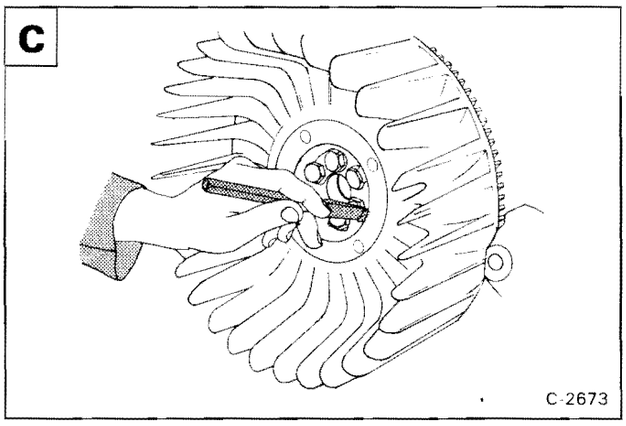
Remove the u-joint from the flywheel [B].

MEL-1187 – Socket



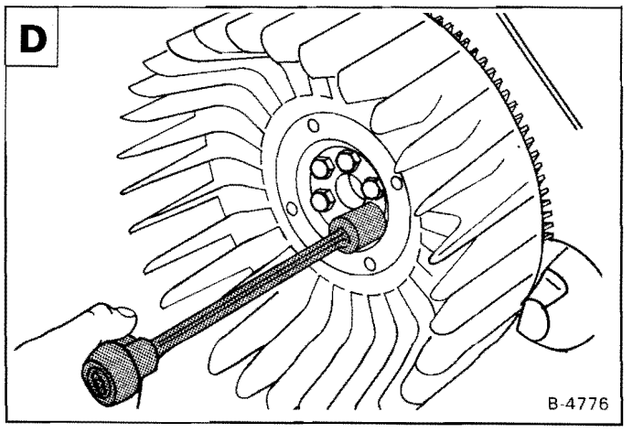
Bend the locking tabs away from the bolt flats [C].

Installation: Bend the locking tabs against the bolt flats.



Remove the flywheel bolts [D].

Installation: Tighten the bolts to 72-80 ft.-lbs. (98-108 Nm) torque.



Flywheel Ring Gear

The ring gear on the flywheel is an interference fit. Heat the ring gear enough to expand it and hit it with a hammer, evenly to remove it.

Clean the outer surface of the flywheel to give a smooth fit.

Clean the new ring gear and heat it to a temperature of 450-500°F (232-260°C).

Fit the ring gear over the flywheel. Make sure the gear is on its seat correctly.

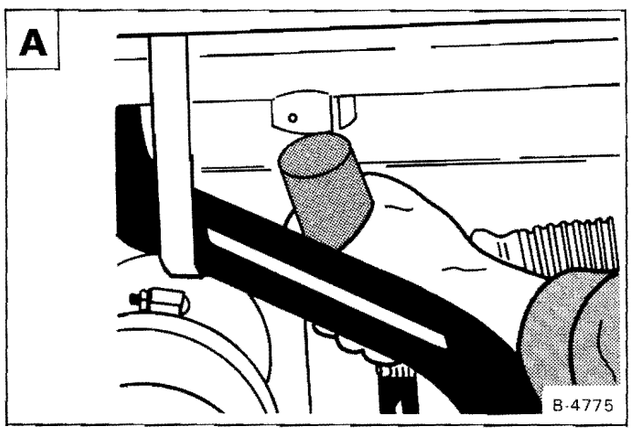
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MUFFLER

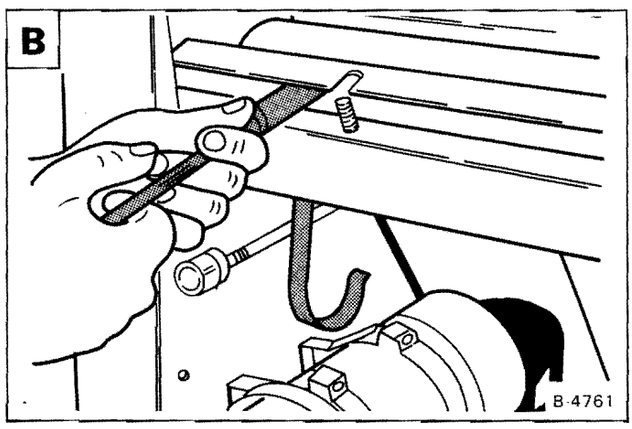
Removal and Installation

Remove the rear grill.

Remove the exhaust pipe from the muffler [A].



Remove the bolts holding the muffler [B].

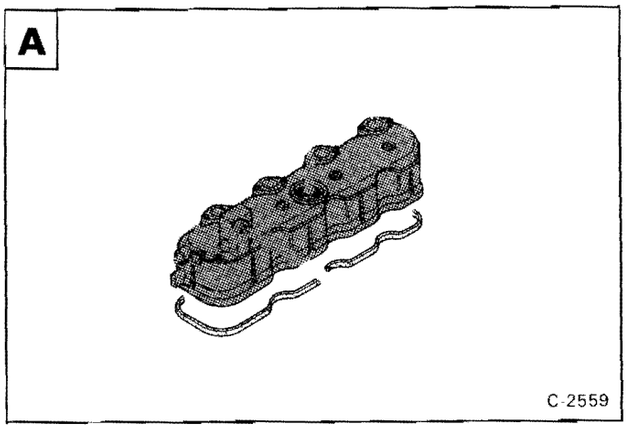


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CYLINDER HEAD

Removal

Remove the nuts from the valve cover and remove the valve cover [A].

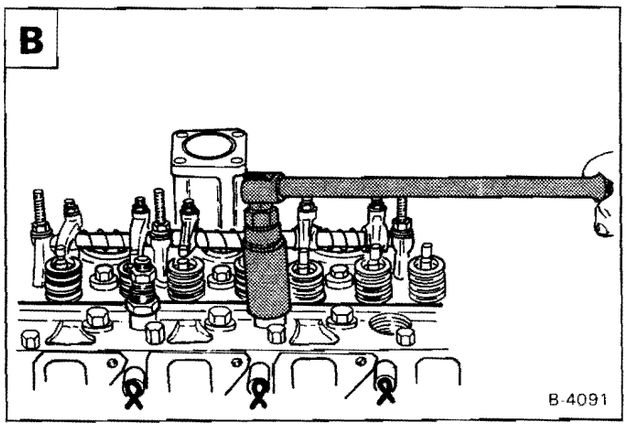


Disconnect the injector tubelines.

Remove the injector nozzles and the copper gasket [B].

Remove the intake manifold.

Remove the belt shield and remove the alternator.

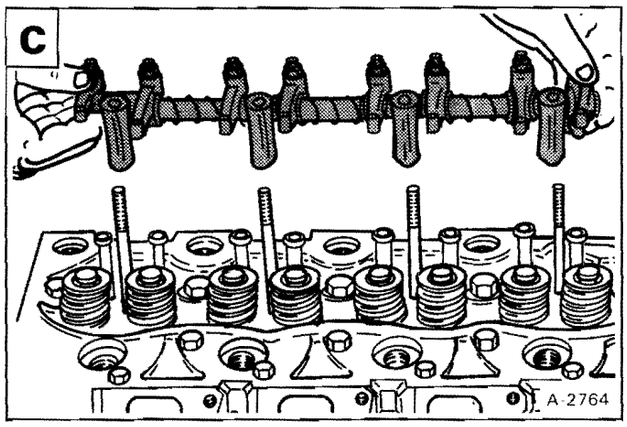


Remove the rocker arms [C].

Remove the push rods.

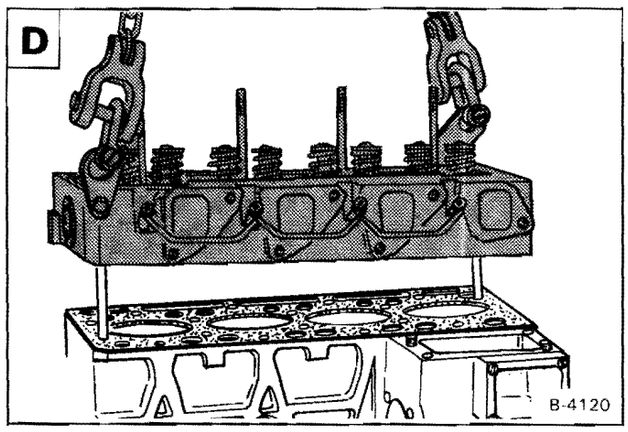
Remove the water return pipe.

Remove the cylinder head bolts.



Remove the cylinder head [D].

Remove the cylinder head gasket and the o-rings.



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CYLINDER HEAD (Cont'd)

Disassembly

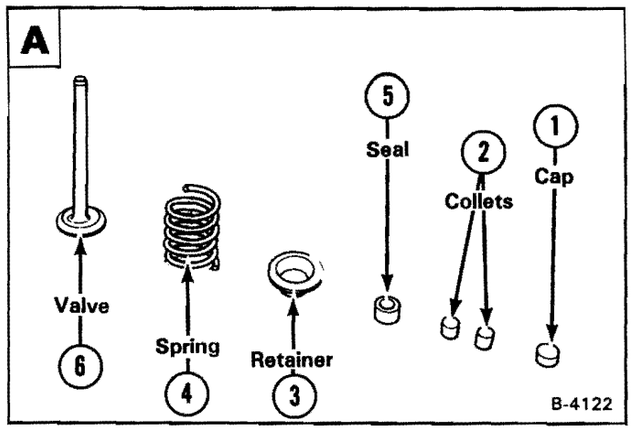
NOTE: There may be a shim under the head gasket. Use the shim over again or replace it with the same size shim.

Remove the valve cap (Item 1) and the valve spring collet (Item 2) [A].

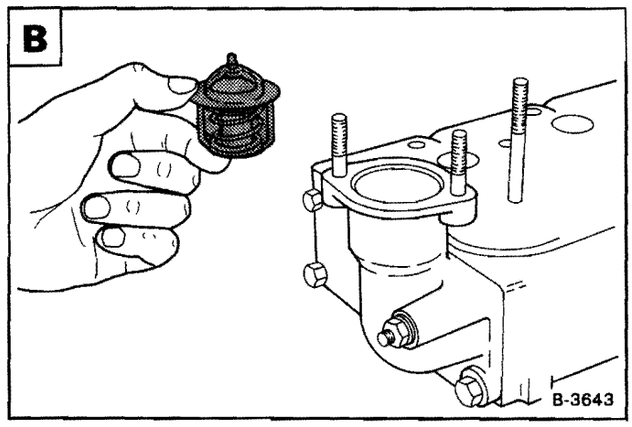
Remove the valve spring retainer (Item 3) [A].

Remove the spring (Item 4) [A].

Remove the seal (Item 5) and the valve (Item 6) [A].



Remove the thermostat [B].



Servicing

Use the tool listed for the following procedure:

MEL-1098 -- Valve Lapper

Clean the surface of the cylinder head.

Put a straight edge (Item 1) on the cylinder head [C].

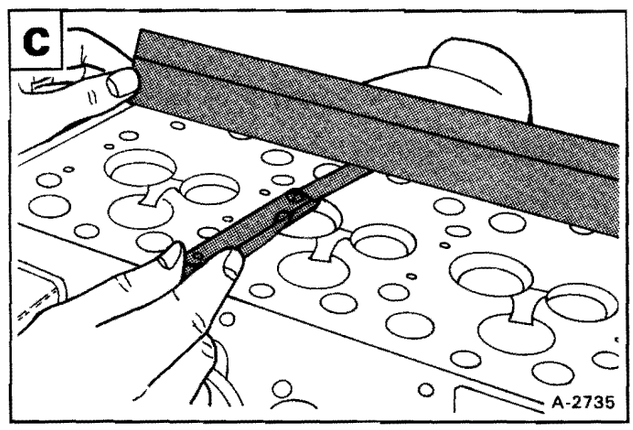
NOTE: Do not put the straight edge across the combustion chamber.

Put a feeler gauge (Item 2) between the straight edge and the surface of the cylinder head [C].

The maximum distortion of the cylinder head surface is + or -.002" (+ or -0,05 mm).

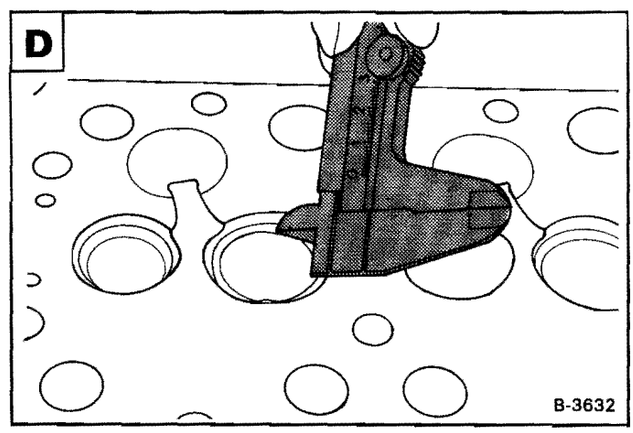
If the measurement is more than the specifications, the cylinder head must be planed.

NOTE: Place a soft brass rod through the injector hole and tap the combustion chamber out before planing the head. Plane the same amount from the bottom side of the combustion chamber before installing it back in the head.



Clean the valve surface.

Measure the width of the valve seat [D].



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CYLINDER HEAD (Cont'd)

The correct width of the valve seat is .0827 (2,1 mm) and the seat angle is 45 degrees.

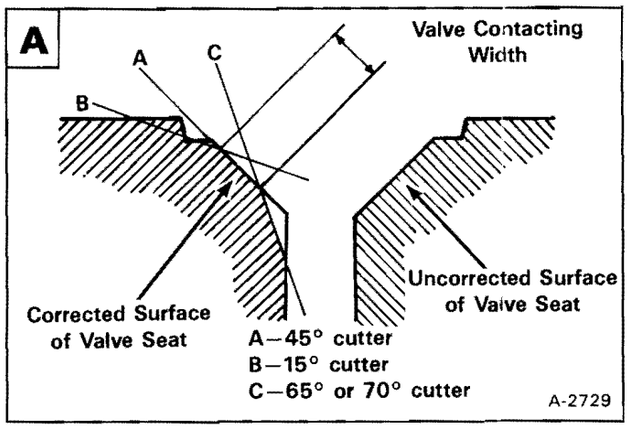
Grind the valve seats as follows:

a. Use a 45° cutter to grind the surface of the valve seat [A].

b. Use a 15° cutter to grind the front surface of the valve seat [A].

c. Use a 65° or 75° cutter to grind the rear surface of the valve seat to finish the seat to a .0827" (2,1 mm) width [A].

d. Grind the valve surface to a 45° angle.



Install the valve in the seat and check the depth [B].

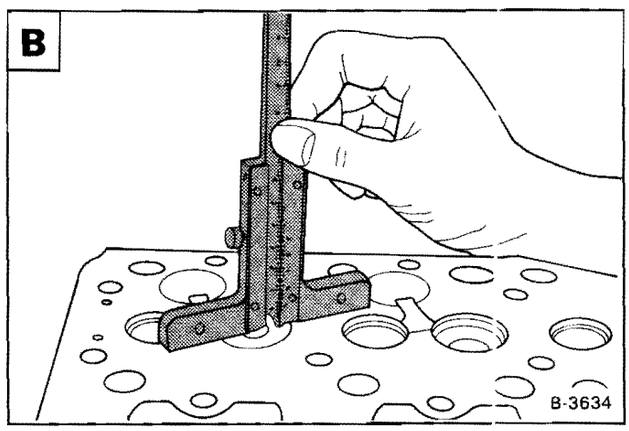
The specifications for the depth of the valve is .0433-.0512 (1,1-1,3 mm).

If the measurement is more than the specification, add the correct thickness of the washer under the valve spring to keep the correct tension on the spring.

Clean the valve guide.

Install the valve in the cylinder head.

Install the dial indicator.

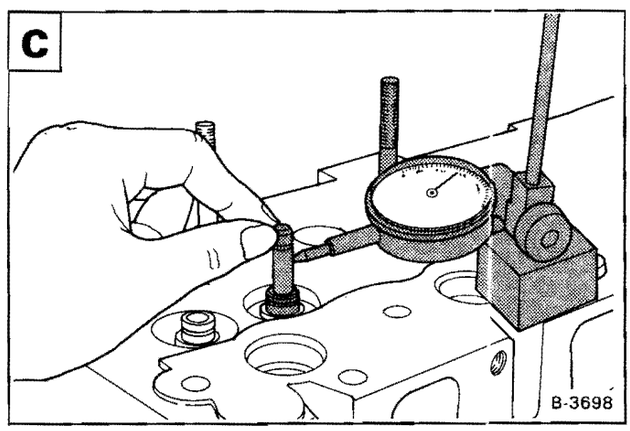


Measure the clearance of the valve guide and the valve [C].

The measurement must be .0016-.0023 (0,040-0,06 mm).

If the measurement exceeds the limit, replace the valve guide (See Page 7C—21 for valve guide installation).

Ream the new guide to the correct dimensions.

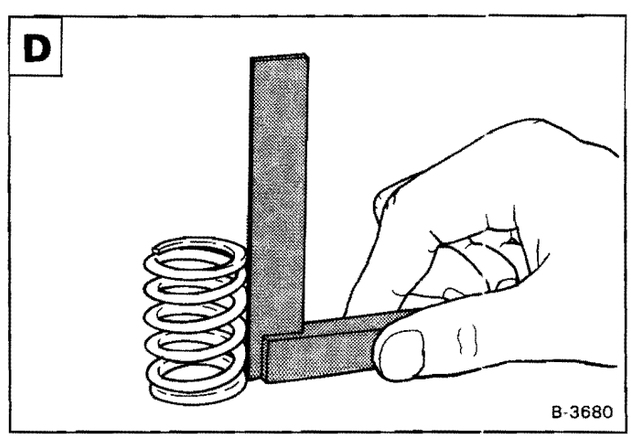


Measure the valve spring. The length of the spring must be 1.6417-1.6614 (41,7-42,2 mm).

Replace the valve spring if it does not meet these specifications.

Check the valve spring with a combination square to make sure it stands straight.

Replace it if it is not straight [D].



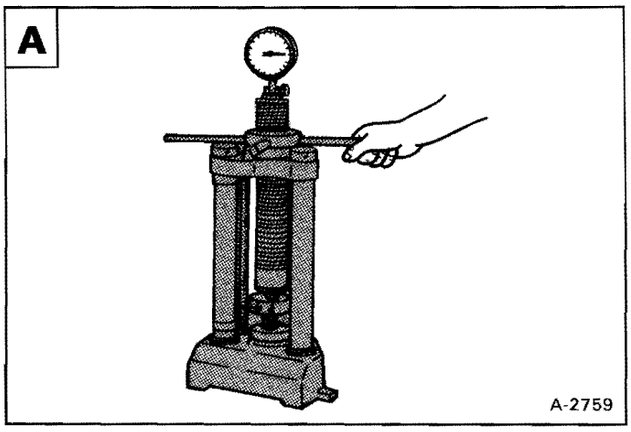
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CYLINDER HEAD (Cont'd)

Put the valve spring in a tester [A].

Push down on the spring 1.3839 (35,15 mm). The compression load must be 22.5-26.5 lbs. (10,21-12,03 kg).

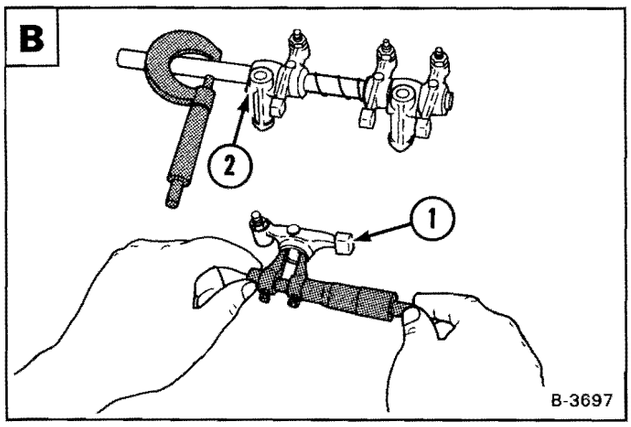
Replace the valve spring if it does not meet these specifications.



Measure the inside diameter of the rocker arm bushing (Item 1) and the shaft diameter (Item 2) [B].

The inside of the rocker bushing is .5513-.5529 (14,002-14,043 mm).

If the measurements are not within the specifications replace the needed parts.

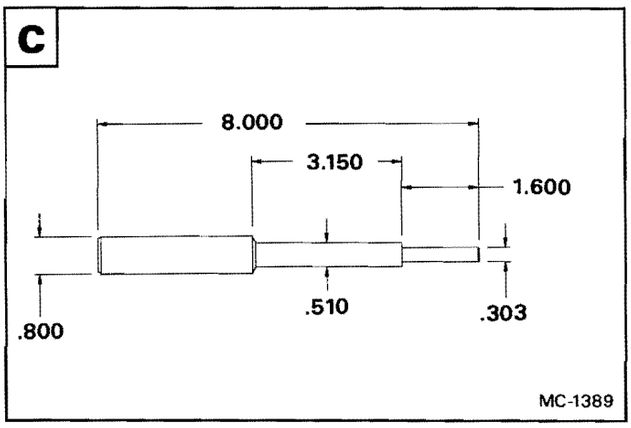


Valve Guide Installation

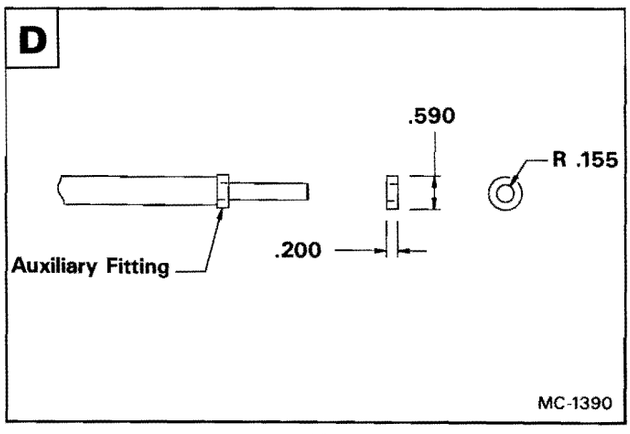
Use the tools listed to replace the valve guide:

1. press-fit tool
2. auxiliary fitting
3. Margin adjustment jig

See figure [C] for dimensions to make the press-fit tool.



See figure [D] for dimensions to make the auxiliary fitting.

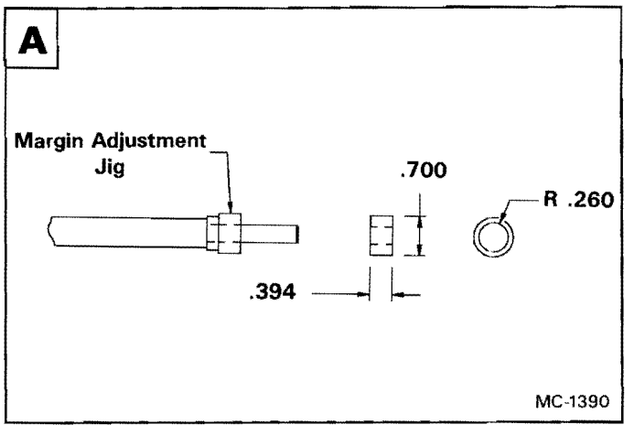


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CYLINDER HEAD (Cont'd)

See figure [A] for dimensions to make the margin adjustment jig.

* **A**



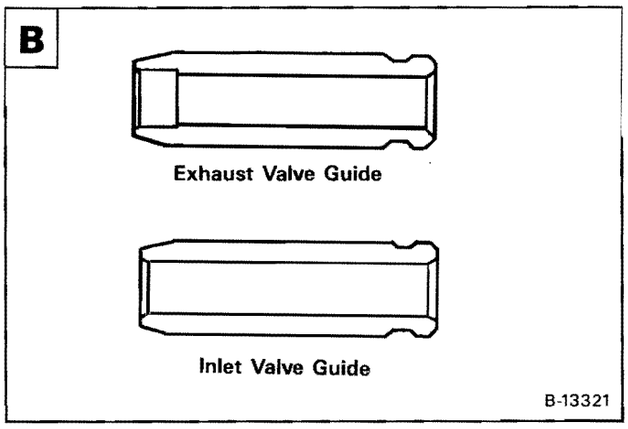
Use the following procedure to replace exhaust (Item 1) and inlet (Item 2) valve guides [B].

Remove the cylinder head (Page 7C—18).

Ream the new valve guide to the correct dimensions.

Use the press fit tool to remove the old valve guide from the cylinder head.

* **B**



Slide the auxiliary fitting (Item 1) over the narrow end of the press-fit tool until it makes contact with the middle section of the tool [C].

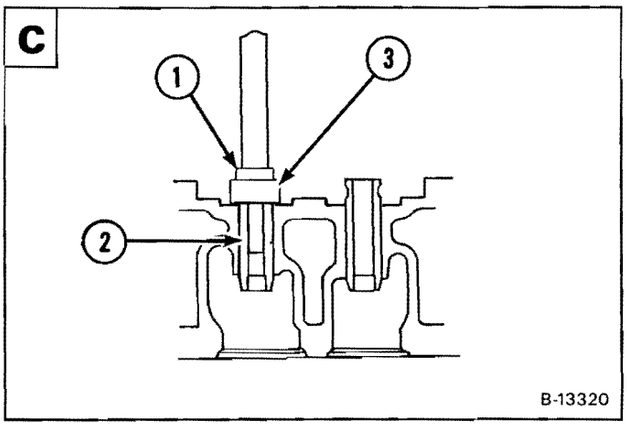
Slide the valve guide (Item 2) over the narrow end of the press-fit tool until it makes contact with the auxiliary fitting [C].

Position the margin adjustment jig (Item 3) above the valve guide hole [C].

Press the valve guide into the valve guide hole intil the auziliary fitting meets the margin adjustment jig [C].

The amount of valve guide protrusion will be thickness of the margin adjustment jig which is .394" (10,0 mm).

* **C**



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CYLINDER HEAD (Cont'd)

Assembly

Install the valves.

Put oil in the valve seal and install the seal on the valve.

Install the valve spring and the retainer.

Install the spring collet and the valve cap.

Install the thermostat.

NOTE: If a new cylinder head is installed be sure to install the screw plugs which are shipped with the new cylinder head.

Installation

Install a new gasket and O-ring. Install a shim if there was one removed.

Install the cylinder head on the engine block.

Put oil on the bolts and nuts and tighten to the following torque:

Flange Head Bolt . . . . . 65-68 ft.-lbs. (88-92 Nm)
Bolt W/Washer . . . . . 58-61 ft.-lbs. (79-83 Nm)

Use the tightening sequence as shown [A].

Lower the piston which is to be measured for the clearance, between the cylinder head and the piston.

Put a piece of solder in the injector port.

Make sure the solder does not touch the valves [B].

Turn the engine manually.

Remove the solder and measure it. The thickness must be 0.028-0.035 (0,7-0,9 mm).

If the measurement is not in the specifications, remove the cylinder head and add the correct shim between the cylinder head and the engine block.

Install the cylinder head and tighten the bolts and nuts [A].

NOTE: Be sure to torque the bolts and nuts again after the engine has been operated for 30 minutes.

Install the push rods.

Install the water return pipe.

Install the rocker arms.

Tighten the rocker arm holding nuts to 15 ft.-lbs. (20 Nm) torque.

Install the alternator, belt and shield.

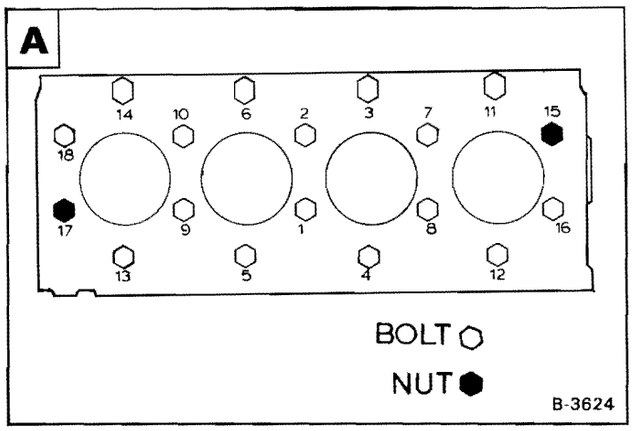
Install the intake manifold.

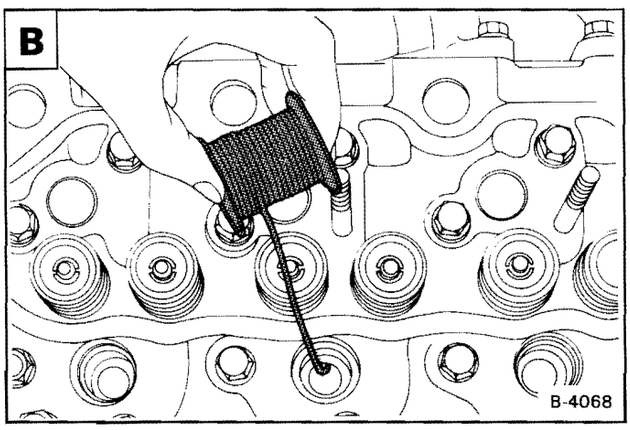
Install the injector nozzle with a new copper gasket. Tighten to 22-36 ft.-lbs. (30-49 mm) torque.

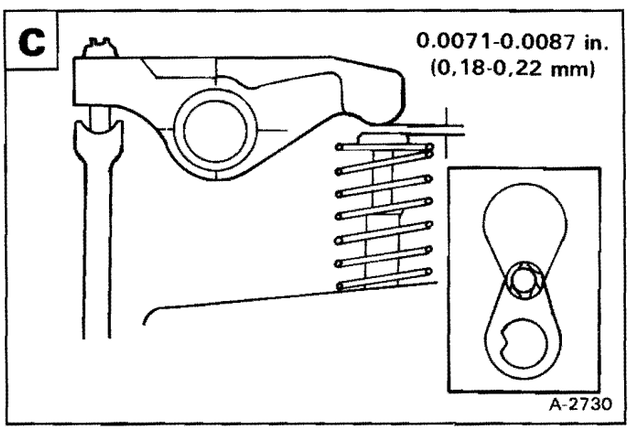
Install the injector tubelines.

Adjust the valve clearance. Make sure the piston is at T.D.C. when making the adjustment [C].

Install the valve cover.







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ENGINE REPAIR

Remove the cylinder head (See Page 7C—18).

Remove the push rods.

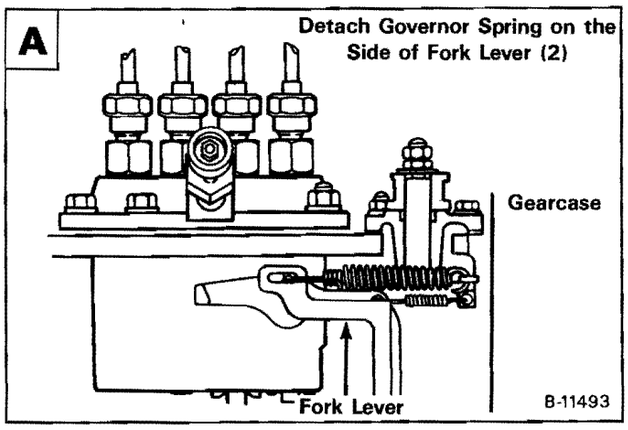
Remove the starter (See Page 6—17).

Remove the injector pump (See Page 7C—3).

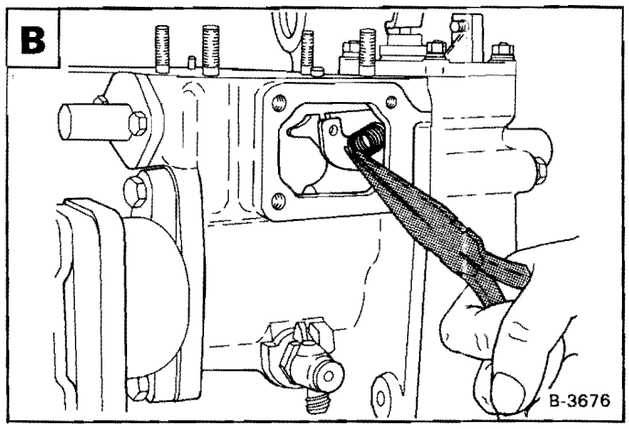
Gearcase Removal

Remove the governor spring from the governor fork [A] [B].

* A

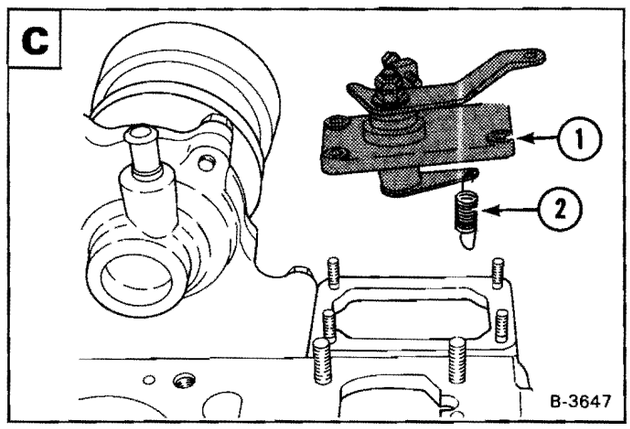


B



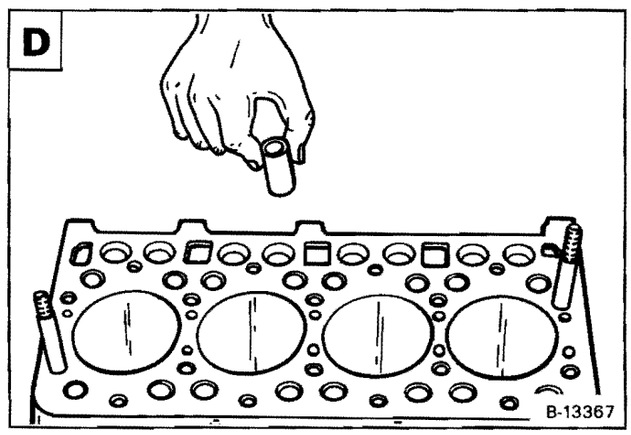
Remove the plate (Item 1) for speed control and the governor spring (Item 2) [C].

C



Remove the valve tappets [D].

* D



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ENGINE REPAIR (Cont'd)

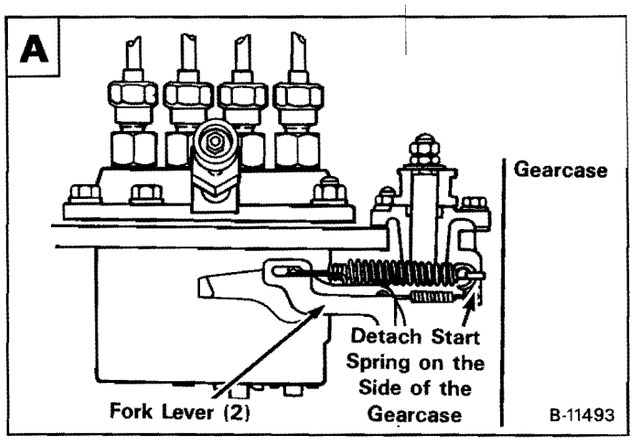
Remove the start spring from the gearcase [A] [B].

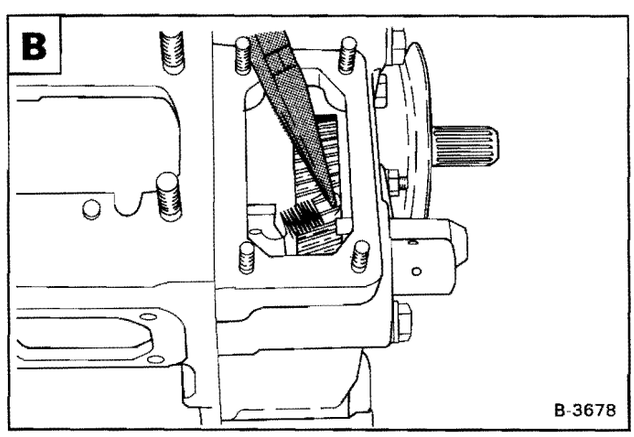
Straighten the washer on the crankshaft sheave. Remove the nut and washer.

Installation: Tighten the nut to 101-110 ft.-lbs. (137-149 Nm) torque.

After installation, bend the washer on the sheave.

*





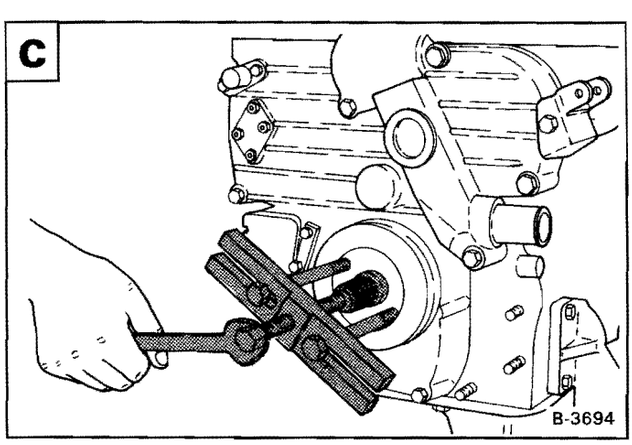
The tool listed will be needed for the following procedure:

MEL-1234 — Crankshaft Nut Socket

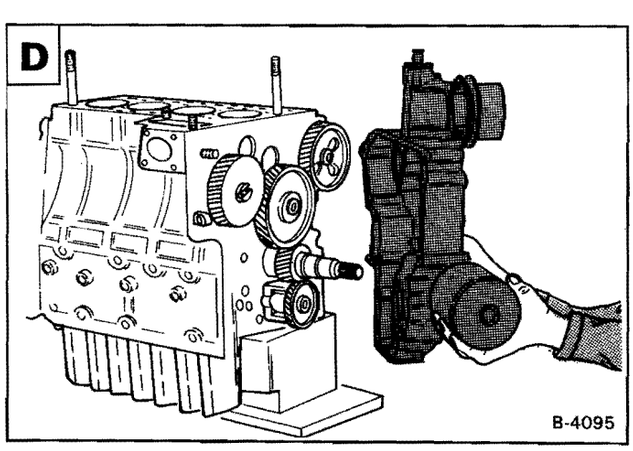
Use a puller and remove the engine crankshaft sheave [C].

Remove the key.

Remove the bolts from the gearcase.



Remove the gearcase [D].



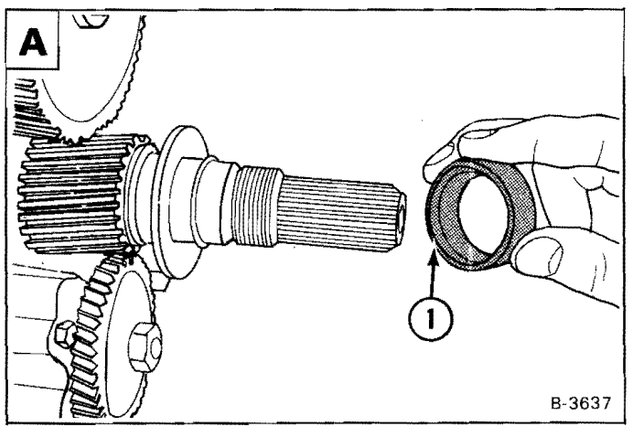
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ENGINE REPAIR (Cont'd)

Timing Gear, Camshaft and Oil Pump Removal

Remove the crankshaft collar (Item 1), O-ring, oil slinger and the gear collar [A].

Remove the snap ring on the idler gear.

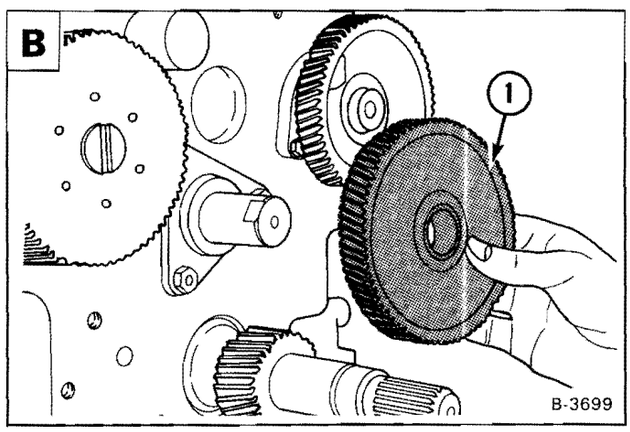


Remove the idler gear (Item 1) [B].

Remove the idler gear collar (Item 2) from the shaft [B].

Straighten the washer on the bolt for the camshaft stop.

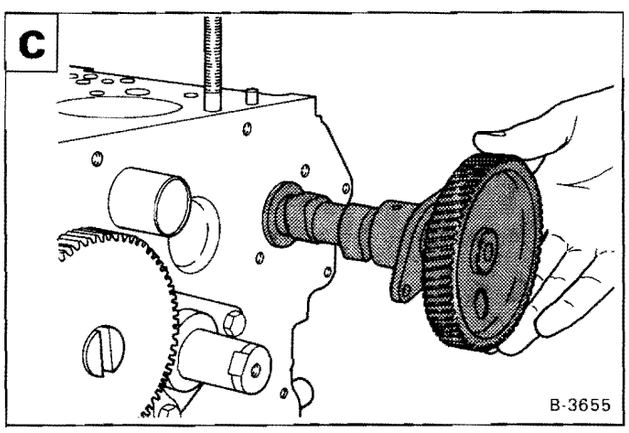
Remove the bolt for the camshaft stop.



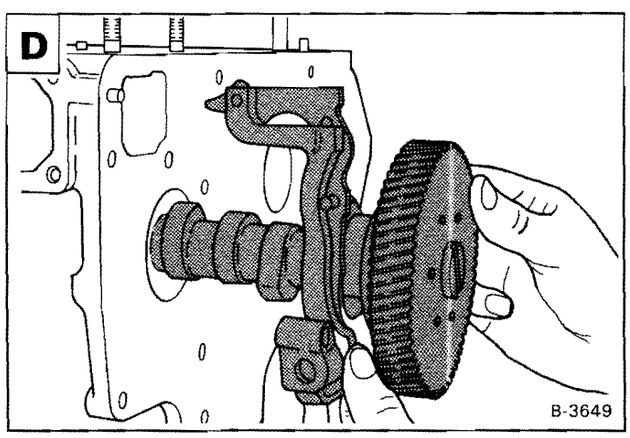
Remove the camshaft [C].

Remove the three (3) bolts that hold the fork lever on the fuel camshaft.

Remove the stop for the fuel camshaft.



Remove the fuel camshaft and the fork lever at the same time [D].



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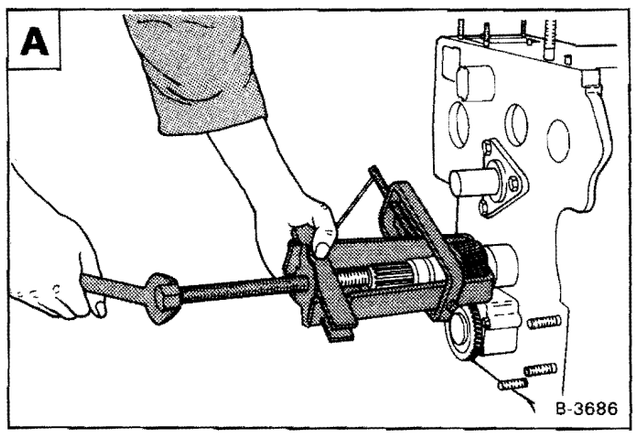
ENGINE REPAIR (Cont'd)

Remove the crankshaft gear with a puller [A].

Remove the key.

Straighten the washer on the gear of the oil pump.

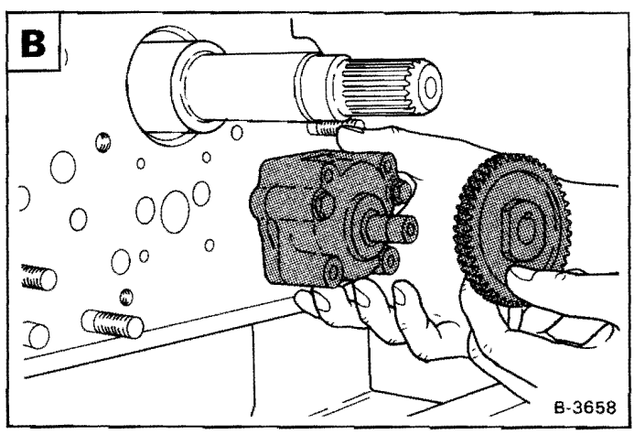
Remove the bolt on the gear of the oil pump.



Remove the gear pump (Item 1) [B].

Remove the oil pump bolt.

Remove the oil pump (Item 2) [B].



Pistons and Crankshaft Removal

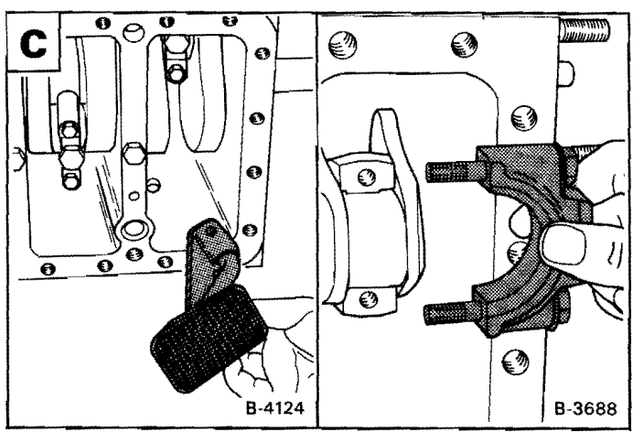
Remove the oil pan.

Remove the screen [C].

NOTE: Do not damage the O-ring.

Straighten the washer on the connecting rod bolts.

Remove the connecting rod bolts.



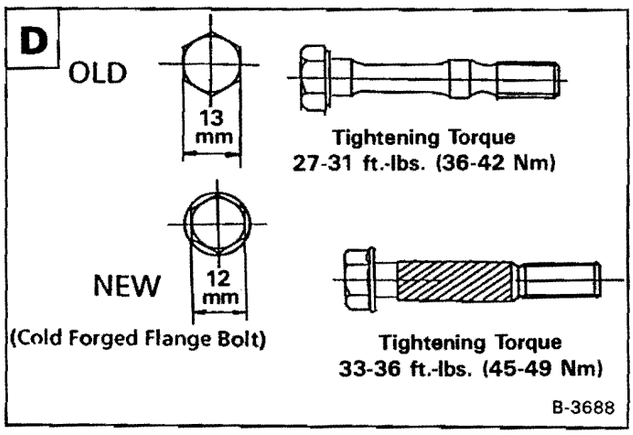
NOTE: Two types of bolts are used [D]. Install in matched pairs only. Do not mix on same rod.

Remove the cap and the bearing from the connecting rod [C].

Installation: Tighten the rod cap bolts to torque as follows:

Machine Bolt (13 mm size head)
27-31 ft.-lbs. (36-42 Nm)

Forged Bolt (12 mm size head)
33-36 ft.-lbs. (45-49 Nm)



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ENGINE REPAIR (Cont'd)

Remove the piston from the engine block [A].

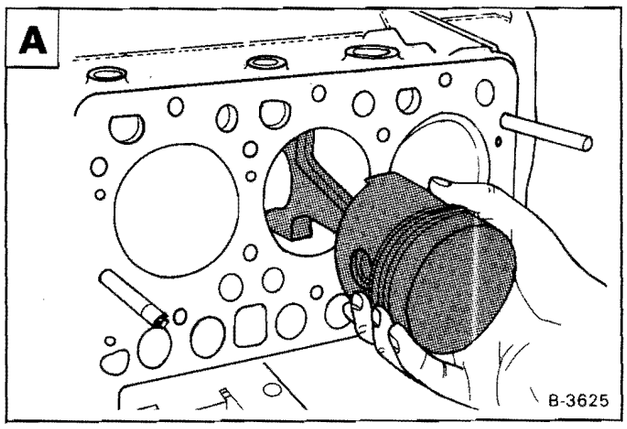
NOTE: Be sure the pistons are marked so they will be returned to the same cylinder.

Straighten the washer on the flywheel bolts.

Remove the bolts from the flywheel.

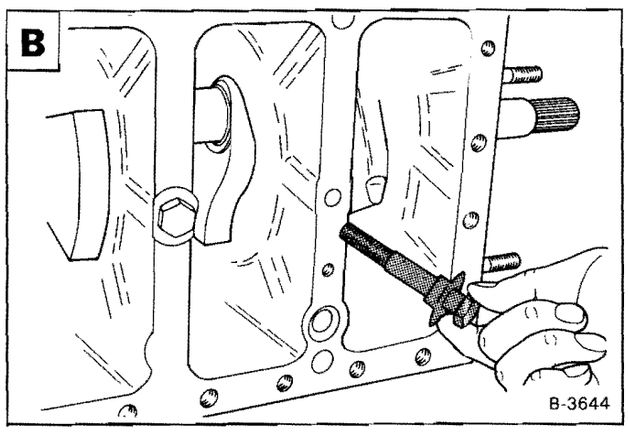
Use a puller to remove the flywheel.

Straighten the washer on the bolts that hold the main bearing in position.



Remove the main bearing bolts from the engine block [B].

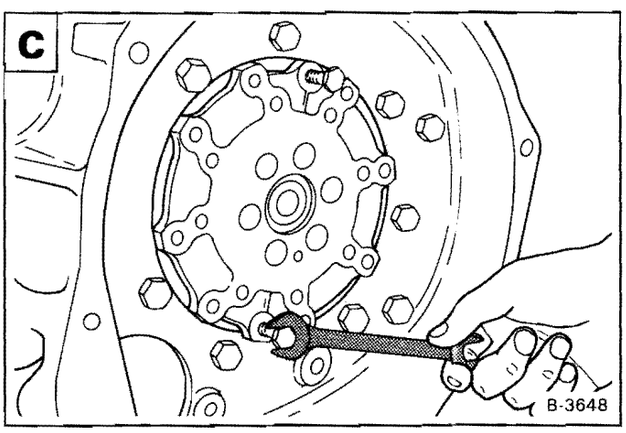
Installation: Tighten the main bearing bolts to 47-51 ft.-lbs. (64-69 Nm) torque.



Straighten the washer on the bolts that hold the main bearings in position.

Remove the bolts.

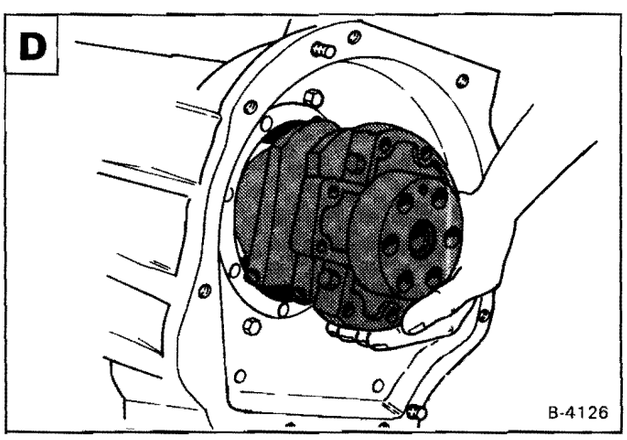
Install two bolts in the rear cover and pull the cover out [C].



Remove the crankshaft from the rear of the engine [D].

NOTE: Do not damage the crankshaft when removing it from the engine block.

Straighten the washer on the bolts of the main bearings.



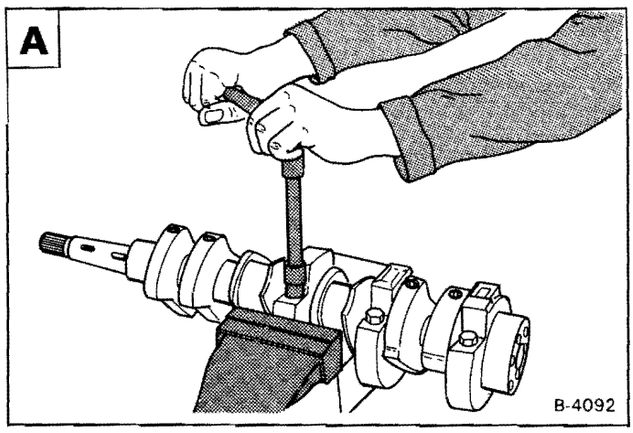
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ENGINE REPAIR (Cont'd)

Remove the bolts from the bearing cap halves [A].

Remove the halves of the main bearings.

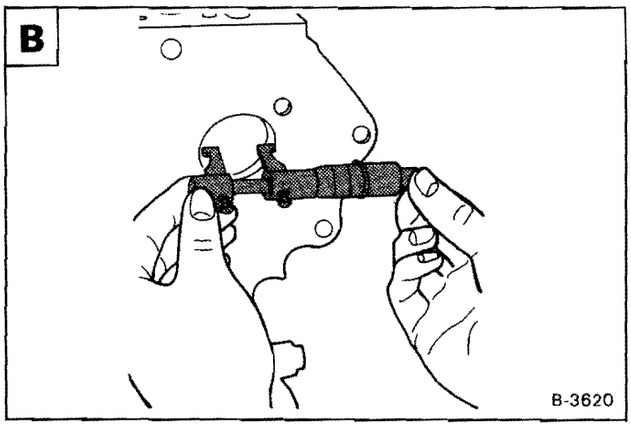
NOTE: **When installing the bearing cap halves, make sure to position the markings on the bearing caps toward the flywheel. Thrust washers must be installed with oil grooves facing outward.**



Timing Gear and Camshaft Service

Measure the camshaft bearing in the engine block [B].

The specification is 1.5748-1.5758 (40-40,041 mm). The wear limit is .002-.0036 (0,05-0,09 mm).



Measure the camshaft journal [C].

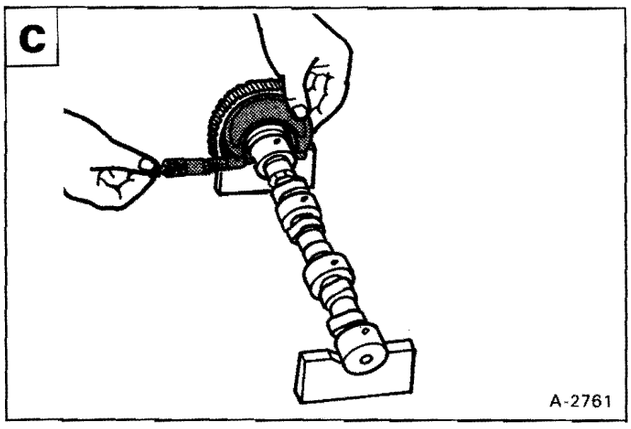
The specification is 1.5722-1.5728 (39,934-39,950 mm). The wear limit is .002-.0036 (0,05-0,09 mm).

If the measurements are not within the specifications replace the needed parts.

Put the camshaft on v-blocks.

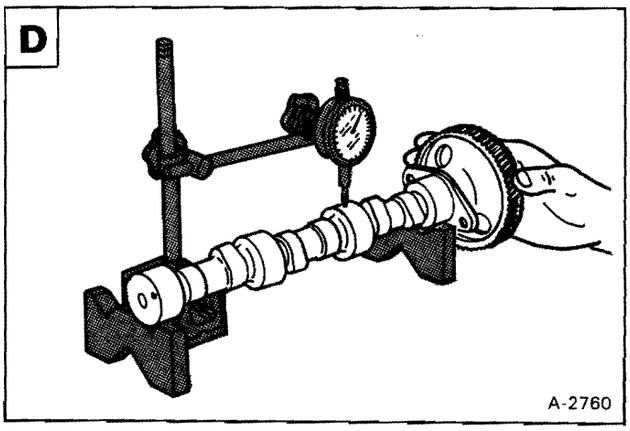
Put a dial indicator on the journals.

Turn the camshaft at a slow rate.



The wear limit is .0008 (0,02 mm) [D].

If the camshaft measurements are not within the specifications replace the needed parts.



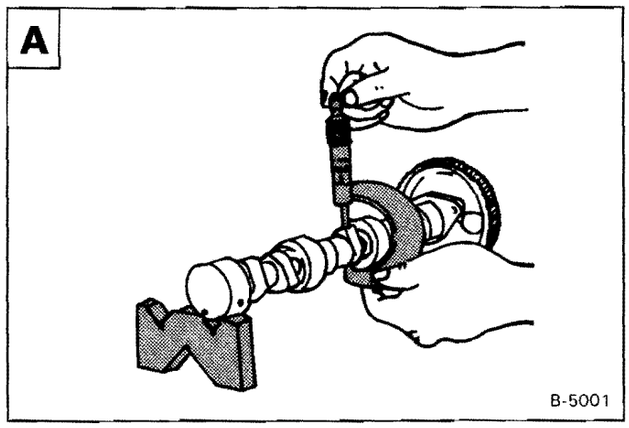
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ENGINE REPAIR (Cont'd)

Make a measurement of the highest point on each camshaft lobe [A].

The specifications are 1.3134 (33,36 mm).

The wear limit is 1.3115 (33,31 mm).

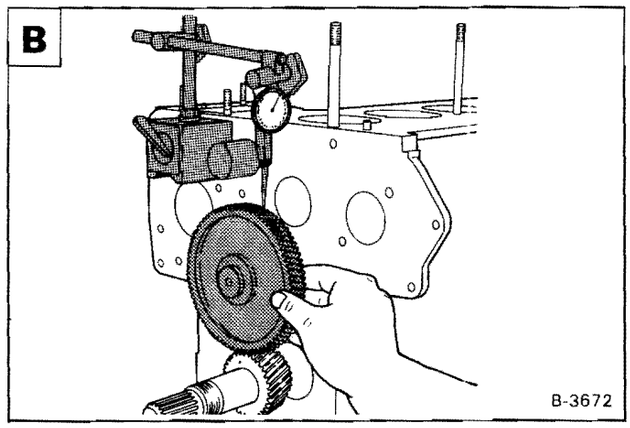


NOTE: After the crankshaft is installed, check the clearance for the camshaft gear.

Install a dial gauge.

Hold one gear while turning the other gear [B].

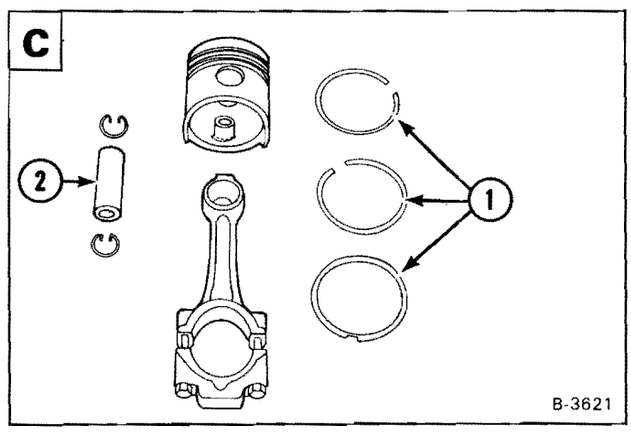
The specification is .006-.0045 (152-114 mm). The wear limit is .0118 (0,3 mm).



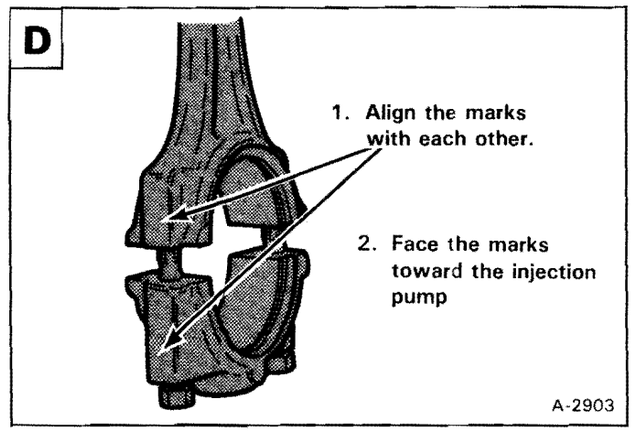
Servicing the Connecting Rods and Pistons

Remove the piston rings (Item 1) [C].

Remove the piston pin (Item 2) [C].



NOTE: Make sure to mark the piston and the connecting rod so they will be assembled correctly [D].

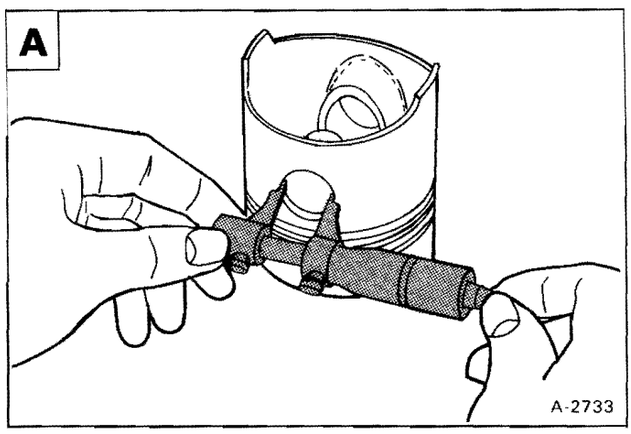


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ENGINE REPAIR (Cont'd)

Measure the piston pin hole [A].

The specifications are .9055-.9060 (23-23,013 mm). The wear limit is .9076 (23,053 mm).

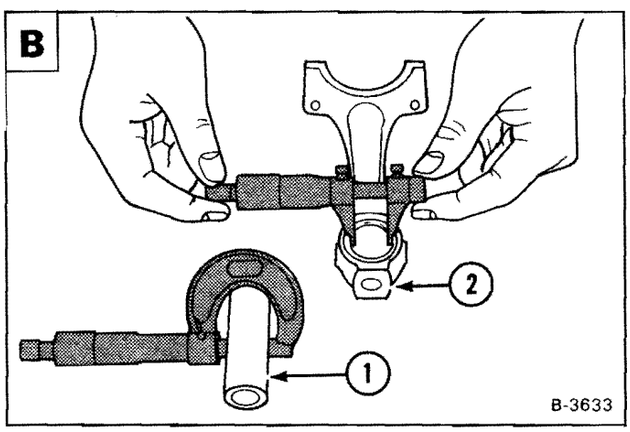


Measure the piston pin (Item 1) and the connecting rod bushing (Item 2) [B].

The clearance specification is 0.0006''-0.0026'' (0,015-0,07 mm).

The allowable limit is 0.0059'' (0,149 mm). If the clearance exceeds the allowable limit, replace the part.

NOTE: When the replacement bushing is installed, be sure to drill the oil hole in the bushing. De-burr the hole after drilling [B].

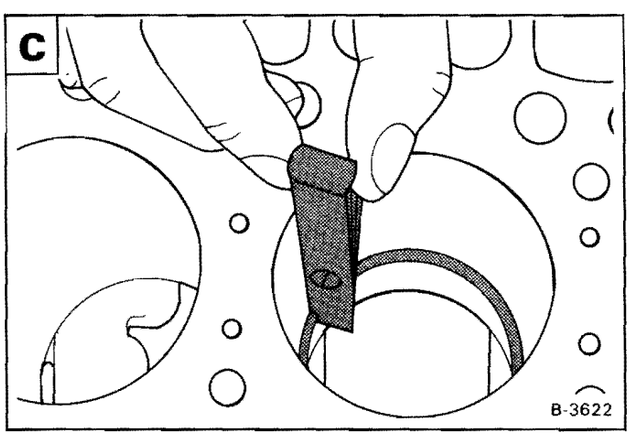


Put the piston ring on the bottom of the cylinder.

Check the clearance of the ring gap [C].

The specification is .0018-.0177 (0,046-0,45 mm). The wear limit is .0492 (1,25 mm).

Install the connecting rod on the tool for checking connecting rod alignment.

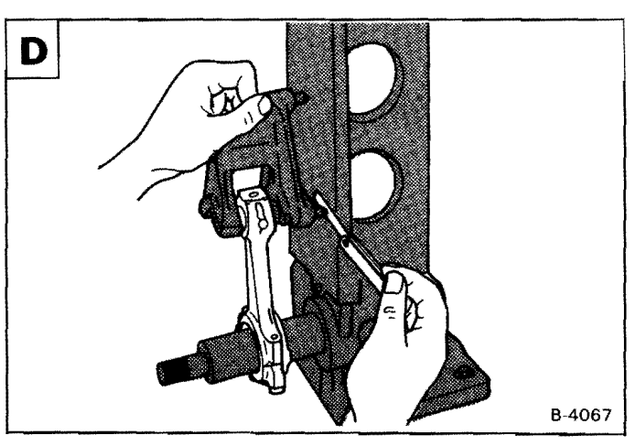


Check the clearance at the piston pin area [D].

The specifications are .0008 (0,02 mm).

The wear limit is .0020 (0,05 mm).

NOTE: Be sure the bushing diameter of the connecting rod is within specification.



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ENGINE REPAIR (Cont'd)

Crankshaft Service

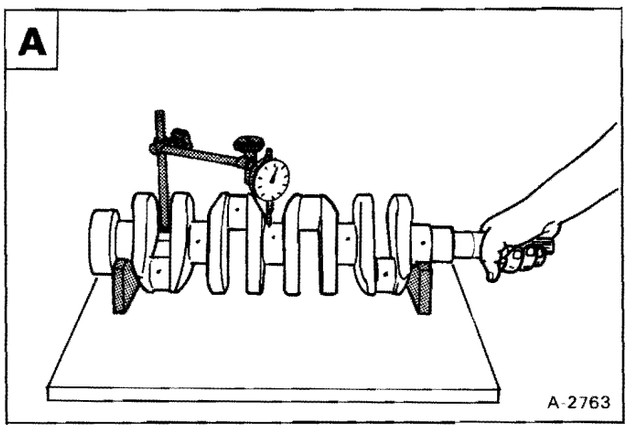
NOTE: If a new crankshaft is used, be sure the plugs that come with the crankshaft are installed in the crankshaft or engine damage will occur.

Put the crankshaft on v-blocks.

Put a dial indicator on the center journal and turn the crankshaft slowly [A].

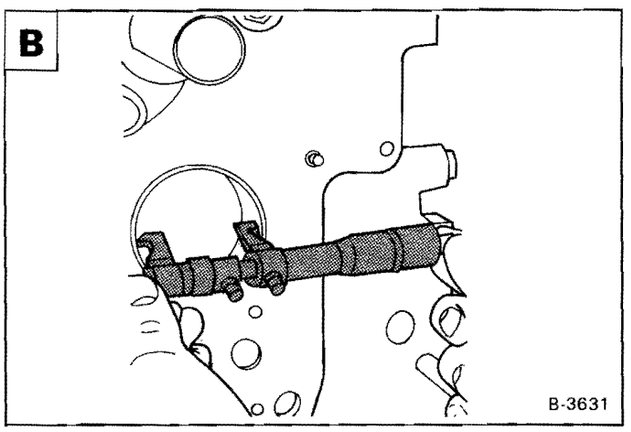
The specifications are .0008 (0,02 mm).

The wear limit is .0031 (0,08 mm).



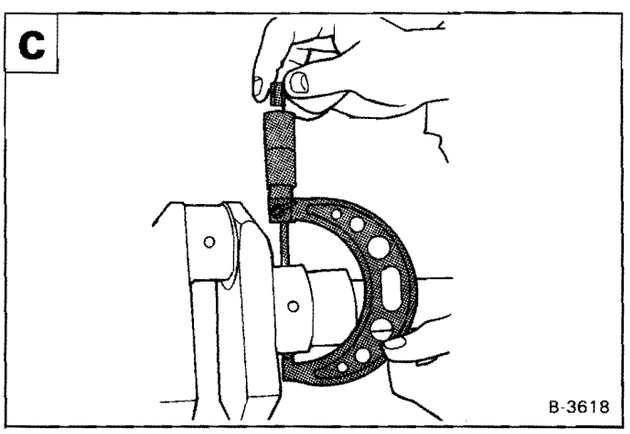
Check the inside diameter of the crankshaft bearing in the engine block [B].

The specification is 2.0465-2.0488 (51,980-52,039 mm). The wear limit is .0079 (0,2 mm).



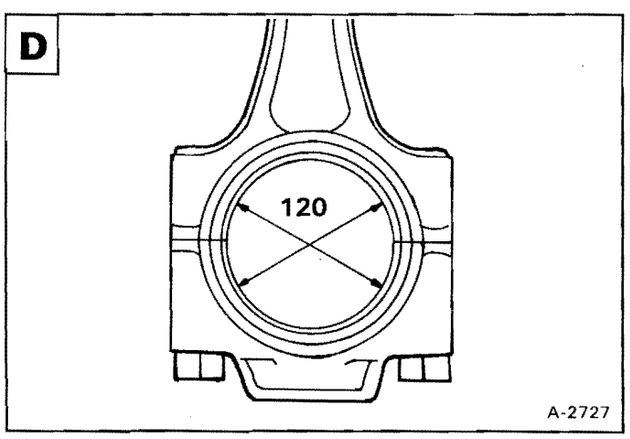
Check the outside diameter of the # 1 crankshaft journal [C].

The specification is 2.0441-2.0449 (51,921-51,940 mm). The wear limit is .0079 (0,2 mm).



Check the connecting rod bearings [D].

The specifications are 1.7327-1.7343 (44,010-44,052 mm). The wear limit is .0079 (0,2 mm).

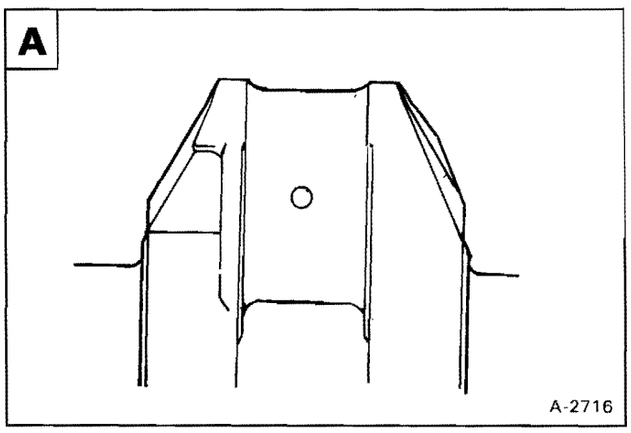


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ENGINE REPAIR (Cont'd)

Check the connecting rod journals [A].

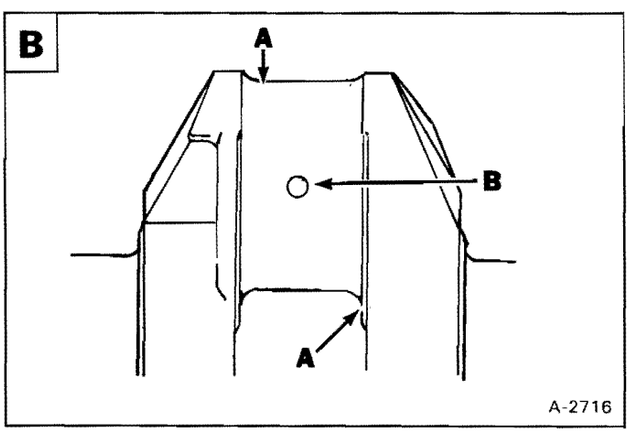
The specifications are 1.7307-1.7313 (43,959-43,975 mm). The wear limit is .0079 (0,2 mm).



If the connecting rod journals are not within specifications grind the journals as follows [B].

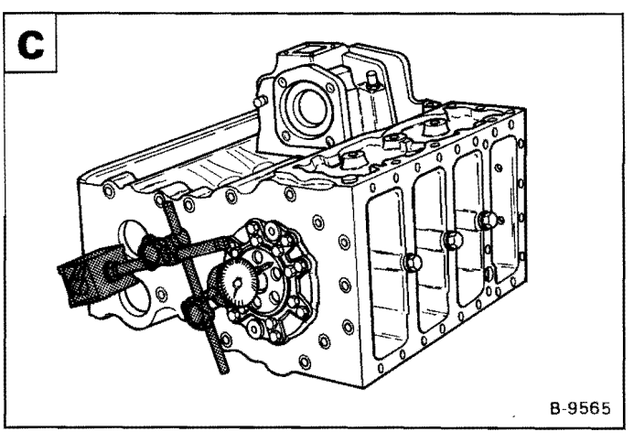
a. Crankshaft corner radius must be 0.1378R ±.0079 (3,5R ± 0,2 mm).

b. The oil hole must be champhered to .0394-.0591R (1-1,5R mm).



Install the crankshaft and check the endplay [C].

Normal end play is 0.0059-0.0122 (0,15-0,31 mm). Replace the thrust bearings on the main bearing if end play exceeds 0.020 (0,5 mm).

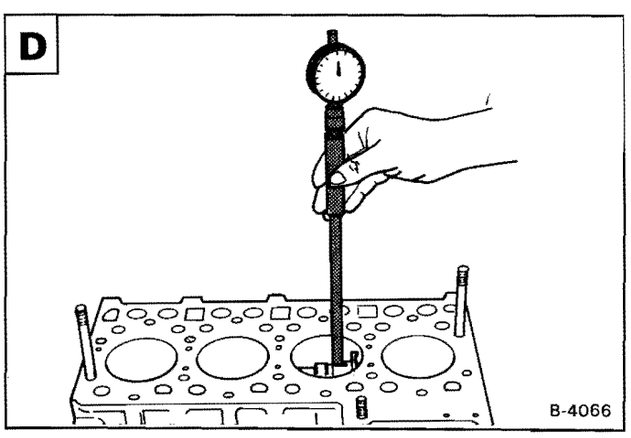


Cylinder Liner Service

Check the inside diameter of the cylinder liner [D].

The tools listed will be used for the following procedure:

MEL-1060 — Ridge Reamer
MEL-1180 — Dry Liner Puller



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ENGINE REPAIR (Cont'd)

To find the maximum wear check the inside diameter in three different locations [A].

The specifications are 3.2283-3.2292 (82-82,021 mm). The wear limit is + .0059 (+ 0,15 mm)

When the cylinder liner has more wear than specifications, bore and hone the cylinder to 3.2480-3.2489 (82,499-82,522 mm).

NOTE: Make sure you use the correct oversize pistons and rings.

If the cylinder liner is not within the specifications, replace the cylinder liner. These are dry liners.

Remove the cylinder liners.

Clean and rub oil in the bores of the engine block.

Clean and put oil on the outside of the cylinder liners.

Install the cylinder liners into the engine block with the inside and outside diameter champhered end down.

The top of the liner must be even with the top of the engine block machined surface.

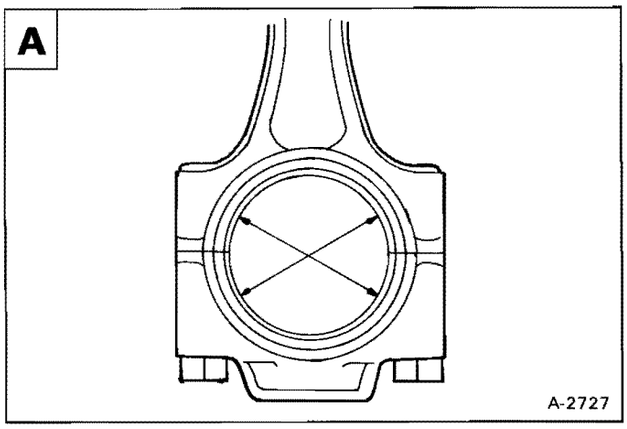
After installation, bore and hone the cylinder liner to 3.2283-3.2291 (82-82,019 mm).

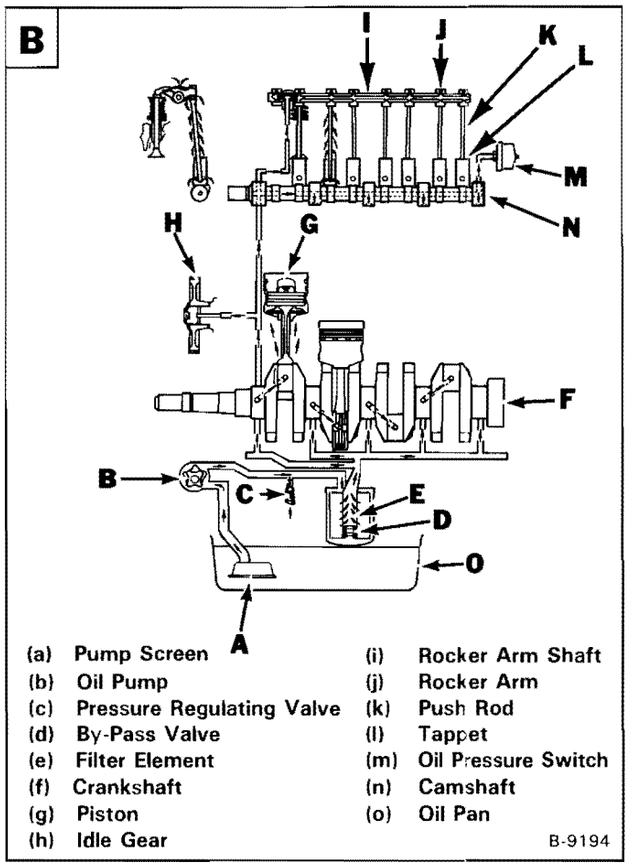
Lubrication System

The lubrication system consists of a trochoide rotor-type driven oil pump, oil filter cartridge, oil pressure regulating valve, oil switch, and oil filter [B].

Oil is siphoned by the oil pump (b) from the oil pan (o) through the oil filter (a), where the oil is kept at 42-64 PSI (294-441 kPa) by an oil pressure regulating valve (c) installed in the gear case. Then oil flows towards the filter cartridge where it will be further filtered. To insure the supply of lubricating oil, a by-pass valve (d) is provided, the valve opens when the filter element (e) is restricted from the filter cartridge, the pressurized oil is then distributed into two areas; some will be fed through crankshaft passage to the crank pin bearing and the rest to the rocker arm shaft (i) through the frame. Oil then returns to the oil pan by gravity.

The oil pressure switch (m) will indicate when oil pressure drops below 7 PSI (50 kPa). The oil pressure switch is connected to the oil pressure gauge in the dash panel. If the pressure reads low or zero while the engine is in normal operation, stop the engine immediately and check the oil level.





(a)	Pump Screen	(i)	Rocker Arm Shaft
(b)	Oil Pump	(j)	Rocker Arm
(c)	Pressure Regulating Valve	(k)	Push Rod
(d)	By-Pass Valve	(l)	Tappet
(e)	Filter Element	(m)	Oil Pressure Switch
(f)	Crankshaft	(n)	Camshaft
(g)	Piston	(o)	Oil Pan
(h)	Idle Gear		

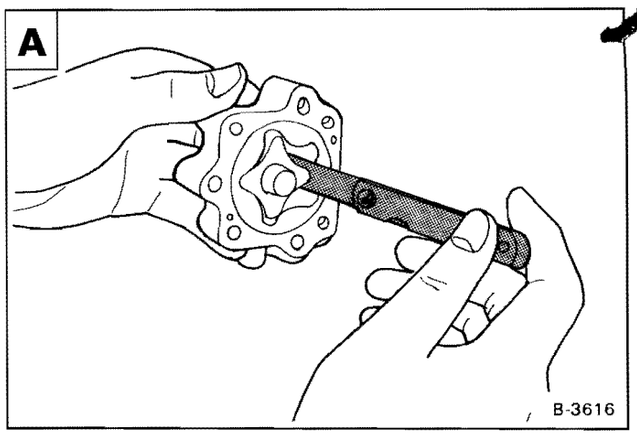
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ENGINE REPAIR (Cont'd)

Oil Pump Service

Check the clearance between the inner and outer rotor [A].

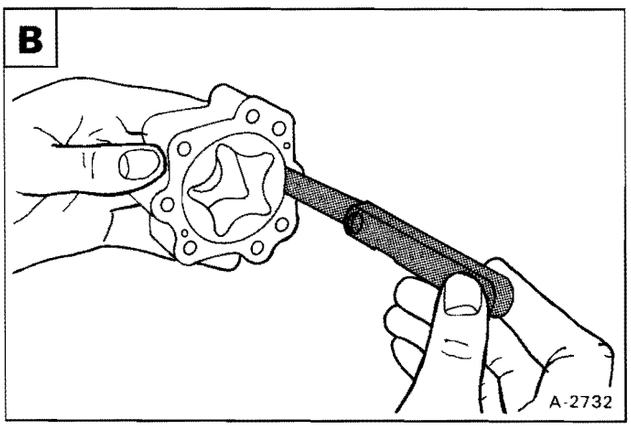
The clearance for the inner rotor is .0039-.0063 (0,099-0,0160 mm). The wear limit is .0079 (0,2 mm).



Check the clearance between the outer rotor and the body of the oil pump [B].

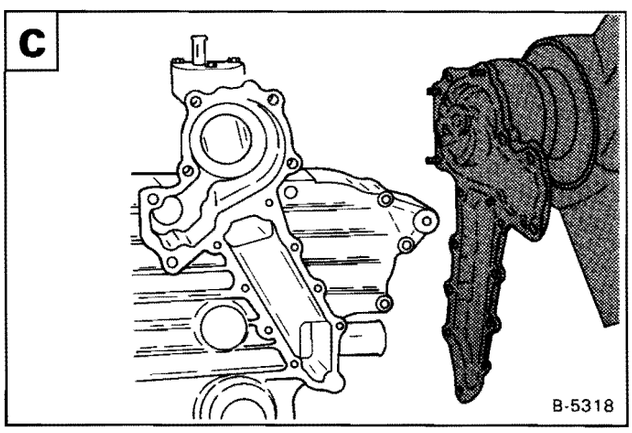
The clearance for the outer rotor is .0043-.0075 (0,11-0,19 mm).

At full rated engine speed, the normal oil pressure is 42-56 PSI (289,5-386,1 kPa) and a minimum of 35 PSI (241,3 kPa).



Water Pump Service

Remove the water pump from the gearcase [C].

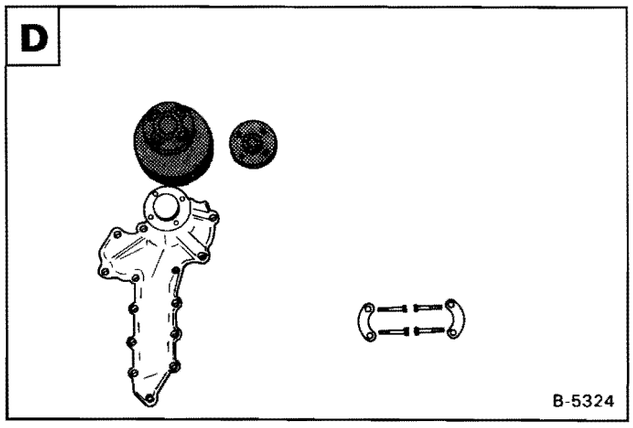


Put the water pump in a vise and remove the nut [D]. *

Remove the pulley using a puller.

Remove the key.

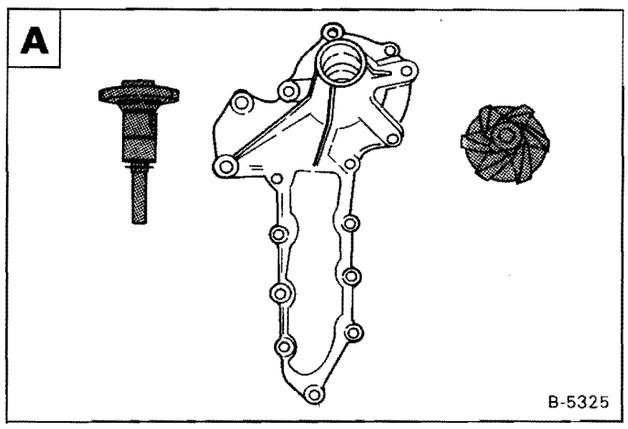
Remove the snap ring.



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ENGINE REPAIR (Cont'd)

Drive the shaft out of the impeller side [A].

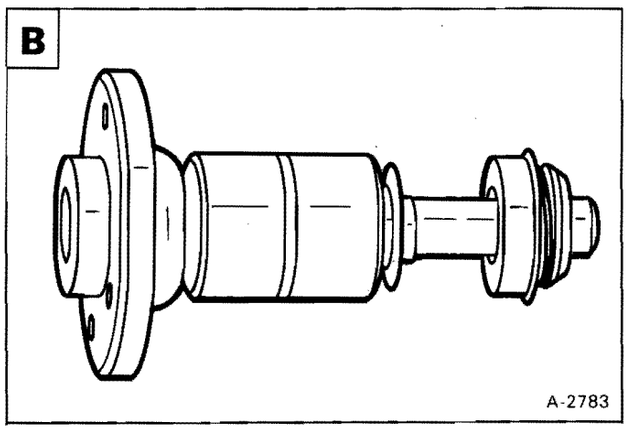


Install the new seals [B].

Install the shaft.

Put the water pump in a vise and tighten the nut to 50-57 ft.-lbs. (68,8-78,4 Nm) torque.

Install the water pump assembly on the gearcase with a new gasket.



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ENGINE ASSEMBLY

Crankshaft Installation

Install the main bearing case on the crankshaft journals with marks toward the flywheel end.

Tighten the bolts to 21-25 ft.-lbs. (29,4-34,3 Nm) torque.

Install the thrust bearing with the oil grooves to the outside.

Install the crankshaft in the engine block.

Each main bearing is numbered for correct location.

Make sure the oil holes in the main bearings are in alignment with the holes in the engine block [A].

Install the main bearing case bolts and tighten to 47-50 ft.-lbs. (63,7-68,6 Nm) torque.

Install new seals in the crankshaft rear cover.

Install the rear cover and tighten the bolts to 13-15 ft.-lbs. (17,7-20,7 Nm) torque

Installing the Pistons

The tools listed will be needed for the following procedure:

MEL-1063 — Ring Compressor
MEL-1064 — Piston Ring Expander

Assemble the connecting rod to the piston.

NOTE: Make sure the marks on the piston and the connecting rod are in the same direction.

Install the rings on the piston [B].

Position the top ring so the gap is not lined up with the piston pin. Position the other rings so there is a gap every 90°.

Use a ring compressor to install the pistons in the engine block with the marks away from the camshaft.

Align the bearing cap on the connecting rod [C].

Put oil on the bolts, install them in the bearing caps and tighten to 26-30 ft.-lbs. (36,3-41,2 Nm) torque.

Install the oil pump tube and screen.

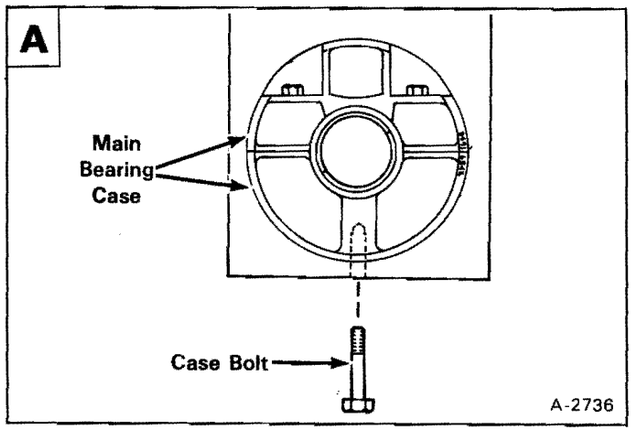
Install a new oil pan gasket and install the oil pan.

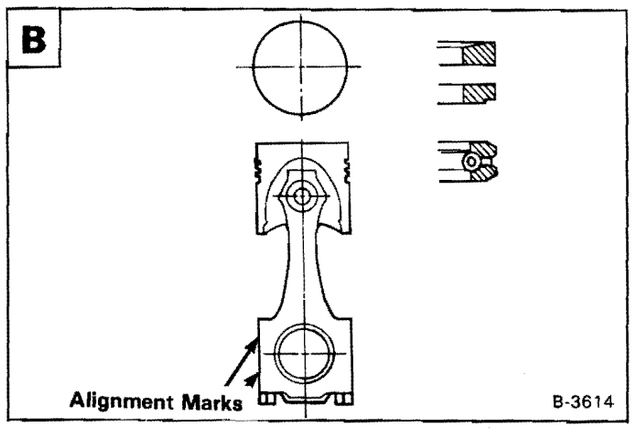
Installing the Camshaft and Timing Gears

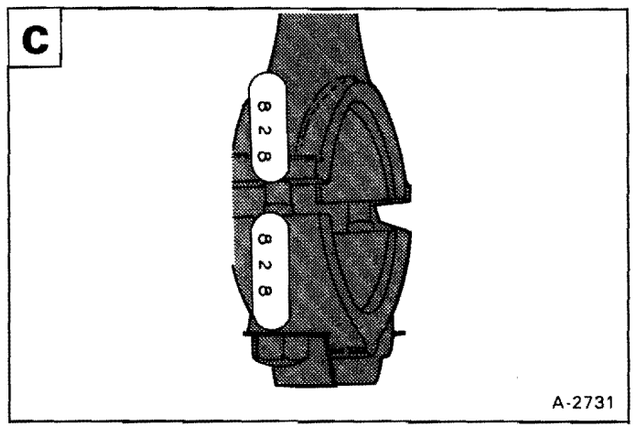
Install the oil pump and tighten the bolts to 60-72 in.-lbs. (6,7-8,1 Nm) torque [D].

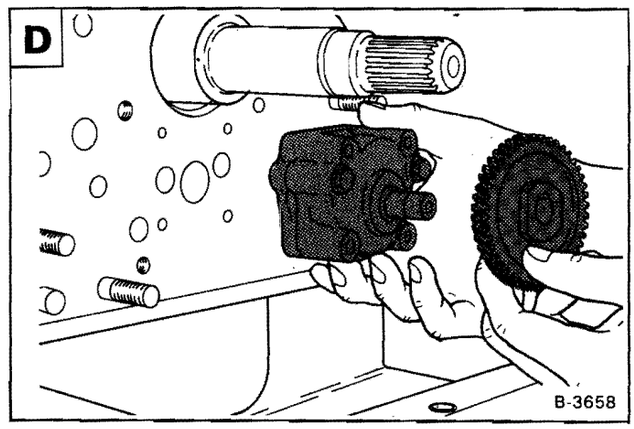
Install the gear and tighten the nut.

Install the key and the gear on the crankshaft.









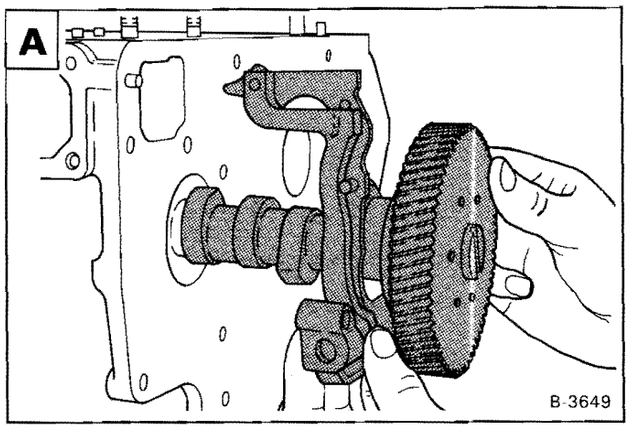
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ENGINE ASSEMBLY (Cont'd)

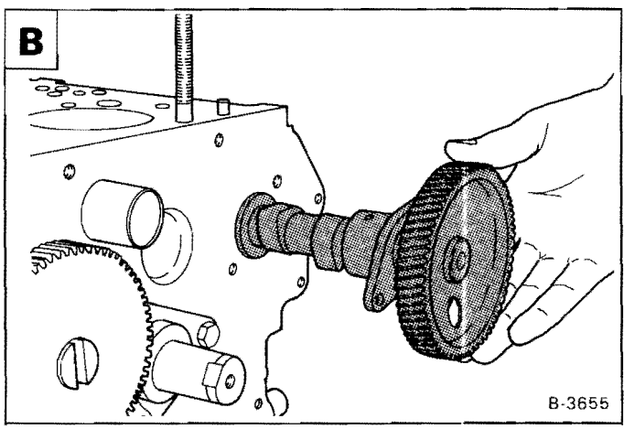
Install the fuel camshaft and the fork lever at the same time [A].

Install the stop bolt on the fork lever. Tighten the bolt to 60-72 in.-lbs. (6,8-8,1 Nm) torque.

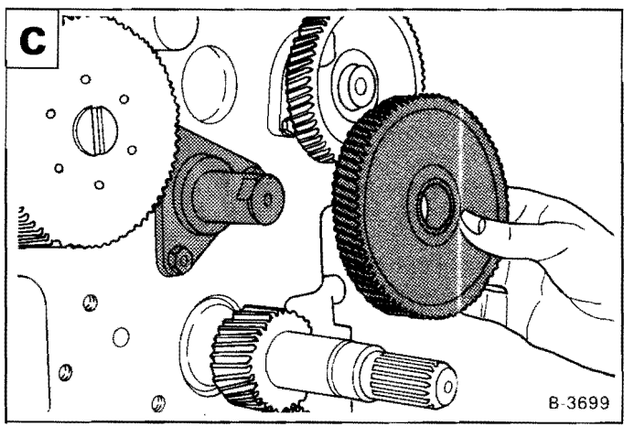
Install the bolts and tighten to 13-15 ft.-lbs. (17,7-20,6 Nm) torque.



Install the camshaft and tighten the bolts to 13-15 ft.-lbs. (17,7-20,6 Nm) torque [B].

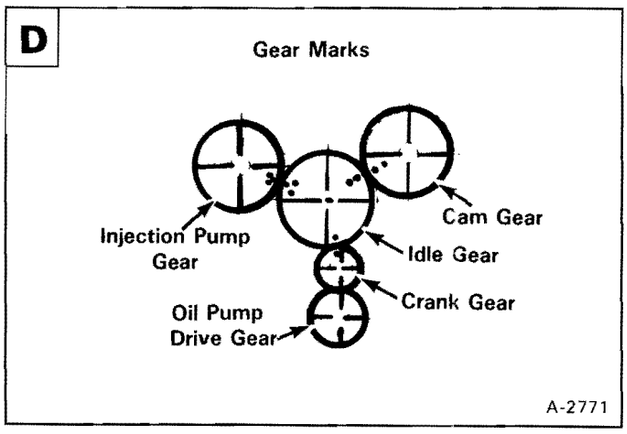


Install the idler gear [C].



Make sure the timing marks are in correct alignment [D].

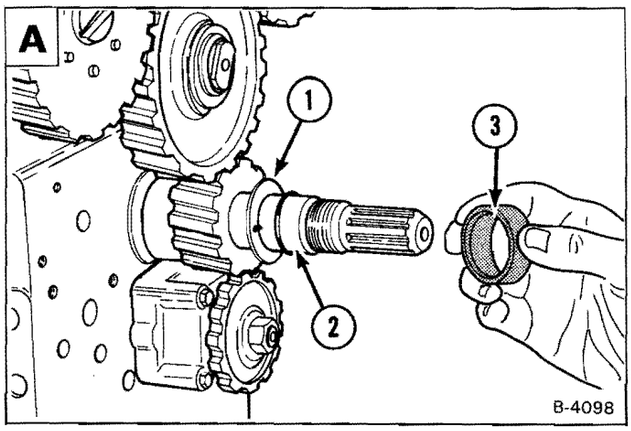
Install the snap ring on the idler gear shaft.



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ENGINE ASSEMBLY (Cont'd)

Install the oil slinger (Item 1). Put oil on the O-ring and install the O-ring (Item 2) and the collar (Item 3) [A].



Gearcase Installation

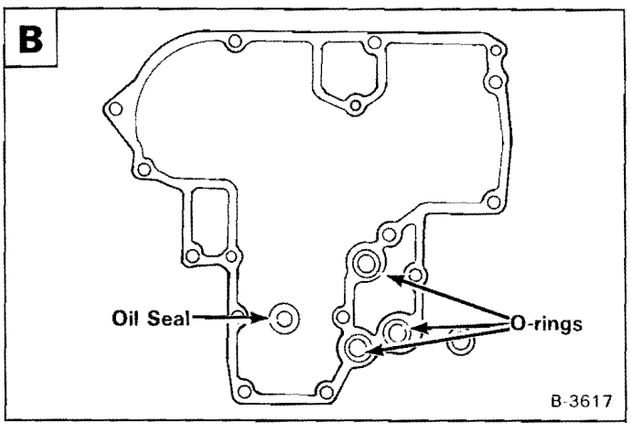
Install the O-ring and the oil seal in the gearcase cover [B].

NOTE: Put oil on the oil seal.

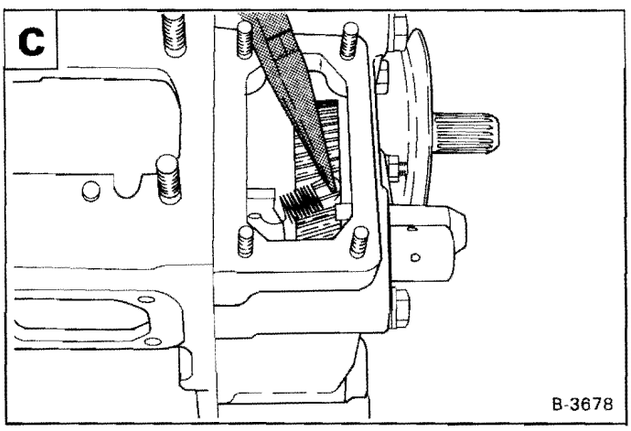
Install the gearcase cover and bolts.

Tighten the bolts to 13-15 ft.-lbs. (17,7-20,6 Nm) torque.

Install the crankshaft sheave and tighten the nut to 101-116 ft.-lbs. (137-157 Nm) torque.

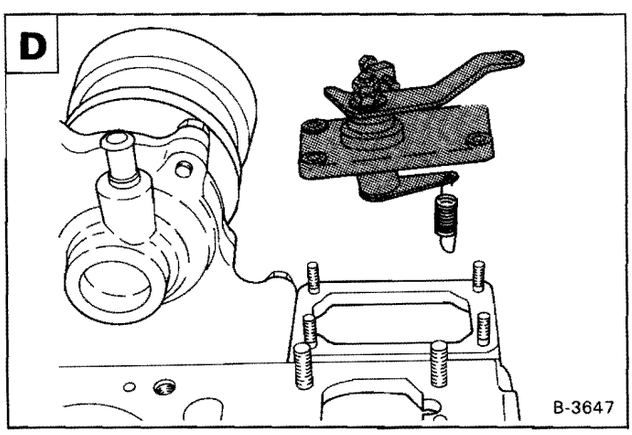


Install the start spring [C].



Install the speed control plate and governor spring [D].

NOTE: Do not drop the governor spring into the gear case.



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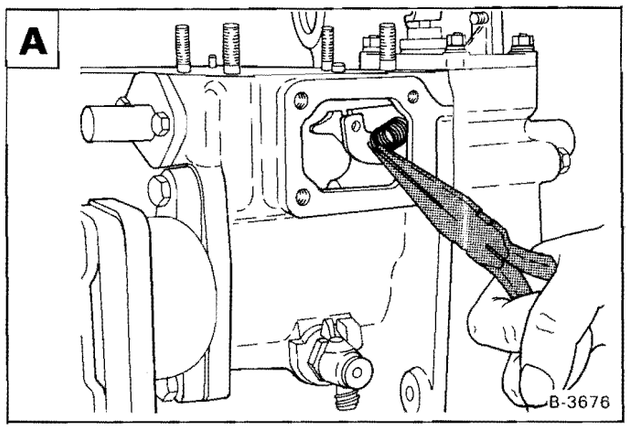
ENGINE ASSEMBLY (Cont'd)

Connect the governor spring [A].

Install the injector pump (See Page 7C—3).

Install the cylinder head (See Page 7C—23).

Install the engine (See Page 7C—11).



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ENGINE SERVICE (Mitsubishi 742)

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7 ENGINE SERVICE

TROUBLESHOOTING

The following troubleshooting chart is provided for assistance in locating and correcting problems which are most common. Many of the recommended procedures must be done by authorized Bobcat Service Personnel only.

PROBLEM	CAUSE
Slow cranking speed.	1, 2, 3, 4
Engine will not start.	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Rough idle.	9, 13, 14, 15, 16
Abnormal combustion.	9, 11, 14, 17, 18, 19, 20, 21
Engine noise.	8, 14, 22, 23, 24, 25, 26, 27, 28, 29
Acceleration insufficient.	5, 9, 11, 31, 32
Power insufficient.	5, 8, 9, 11, 12, 13, 14, 15, 17, 18, 21, 26, 31, 33, 34
Too much fuel consumption.	8, 9, 11, 12, 13, 14, 15, 16, 18, 26, 32
Too much engine oil consumption.	26, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45
Excessive engine vibration.	9, 11, 17, 31, 34, 45, 46
Overheating.	9, 11, 13, 20, 30, 47, 48, 49, 50
High Oil Pressure.	4, 51, 52

KEY TO CORRECT THE CAUSE	
1. Battery capacity low. 2. Bad electrical connections. 3. Faulty starter motor. 4. Incorrect grade of oil. 5. Burnt valve. 6. Intake manifold gasket leaking. 7. Carburetor mounting loose. 8. Piston, rings & cylinder worn. 9. Cylinder head gasket leaking. 10. Faulty electrical wiring. 11. Faulty ignition system. 12. Fuel system problem. 13. Restriction in the air cleaner. 14. Valve clearance not correct. 15. Worn valves and seats. 16. Worn valve stems or guides. 17. Valve stuck. 18. Weak valve springs. 19. Carbon accumulated in combustion chamber. 20. Restriction in the water jacket. 21. Carburetor mixture too lean. 22. Worn or damaged bearings. 23. Connecting rod bent. 24. Piston or piston pin worn. 25. Burnt piston. 26. Piston rings damaged.	27. Excessive camshaft end play. 28. Crankshaft thrust bearing worn. 29. Timing belt worn. 30. Water pump or fan belt faulty. 31. Poor compression. 32. Carburetor accelerator pump faulty. 33. Overheating. 34. Cold running. 35. Oil pan drain plug is loose. 36. Oil pan bolts are loose. 37. Oil pan gasket is faulty. 38. Timing gear cover is loose or gasket is broken. 39. Crankshaft front seal leaking. 40. Crankshaft rear seal leaking. 41. Valve cover gasket is leaking. 42. Fuel pump loose or faulty gasket. 43. Oil filter mounting loose. 44. Plugged oil return hole. 45. Piston rings stuck. 46. Faulty engine mounting. 47. Exhaust pipe restriction. 48. Faulty thermostat. 49. Plugged radiator. 50. Coolant level low. 51. Switch is defective. 52. Pressure relief sticking closed.

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VALVE CLEARANCE

Adjustment

NOTE: Always set the valve clearance after the cylinder head bolts are tightened to the correct torque.

Warm the engine until it is at operating temperature.

Valve clearance [A].

Intake Valve . . . . . 0.006" (0,15 mm) Hot
Exhaust Valve . . . . . 0.010" (0,25 mm) Hot

Stop the engine. Remove the valve cover.

Position the piston at T.D.C.

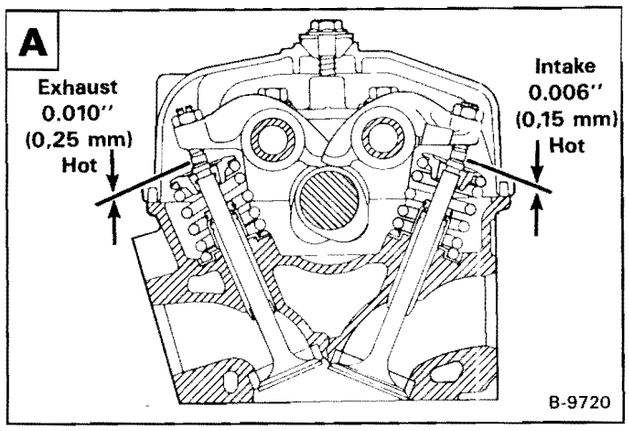
Loosen the lock nut.

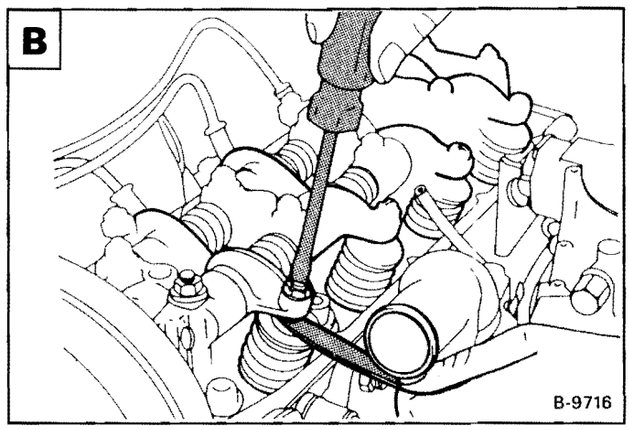
Adjust the valve clearance by turning the adjusting bolt and measuring with a feeler gauge [B].

Tighten the lock nut.

Repeat the procedure for each set of valves.

Start the engine, run at idle speed and check the clearance again. Make adjustments as needed.





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ENGINE COMPRESSION

Checking

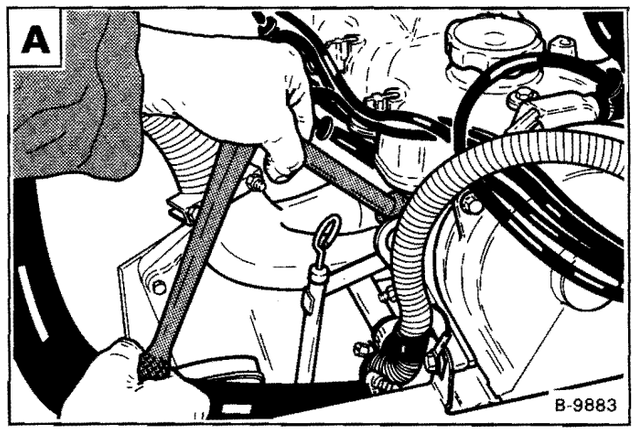
The tool listed will be needed to do the following procedure:

OEM-1073 — Compression Gauge & Hose

The engine must be at operating temperature.

Remove the spark plugs [A].

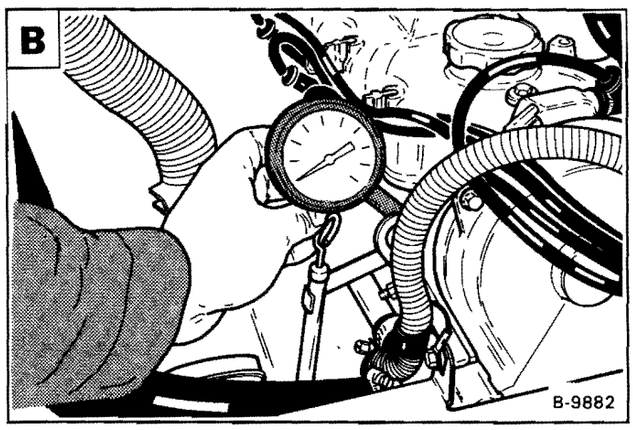
Installation: Tighten the spark plugs to 18 - 22 ft.lbs. (24 - 30 Nm) torque.



Connect a compression gauge [B].

The engine should be turning at about 250 RPM.

The compression should be about 150 PSI (1034 kPa) with no more than 10% difference between cylinders.



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IGNITION TIMING

Procedure

Mark the crankshaft pulley notch and 5° BTDC mark with chalk [A].

Connect the timing light to the No. 1 spark plug wire.

Connect the negative and positive cables of the timing light to the correct battery terminals.

⚠ WARNING

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

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Disconnect the vacuum line.

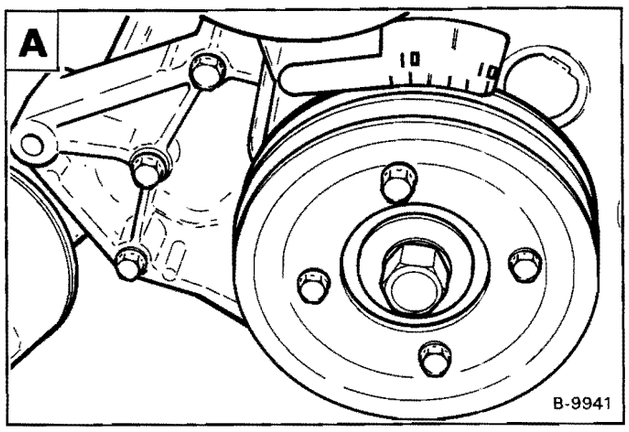
Start the engine. Run the engine speed at 600 - 650 RPM.

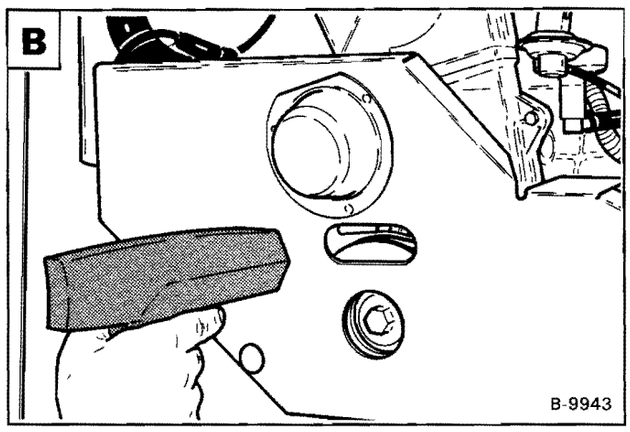
Check the timing setting [B].

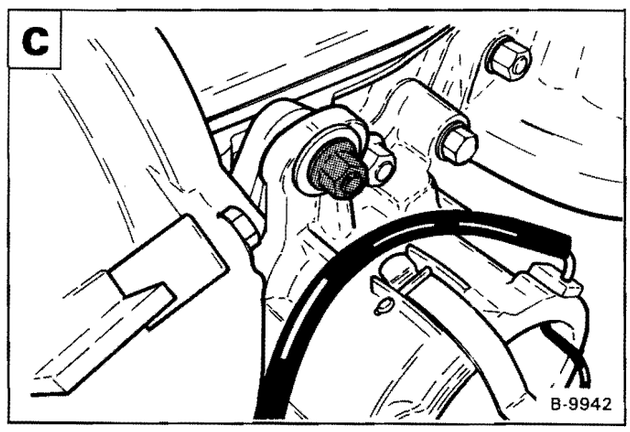
If the timing is not correct, loosen the distributor mounting nut [C].

Turn the distributor until the timing is set at 5° BTDC.

At 2800 RPM and vacuum line off, the timing should advance 10°.







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DISTRIBUTOR

Removal and Installation

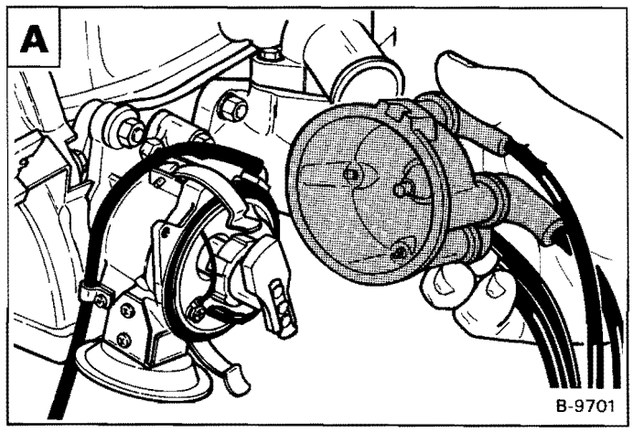
Turn the crankshaft until No. 1 piston is at T.D.C. on compression stroke.

Disconnect the negative battery cable.

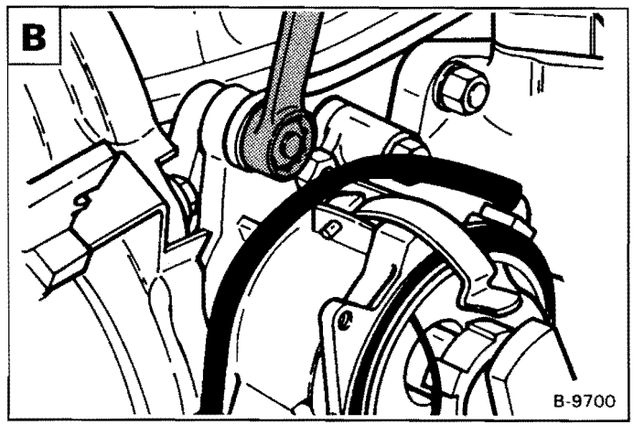
Disconnect the wires from the distributor cap.

Remove the distributor cap [A].

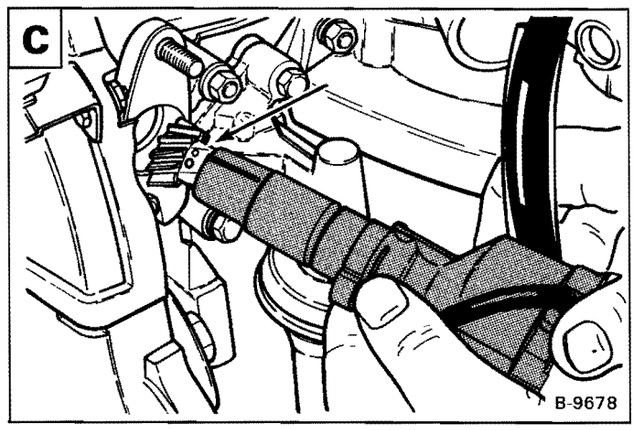
Disconnect the vacuum hose.



Remove the distributor mounting nut [B].



Installation: Align the mating mark (Item 1) on the distributor housing with the mark on the distributor gear [C].



Point Gap Adjustment

Remove the distributor cap.

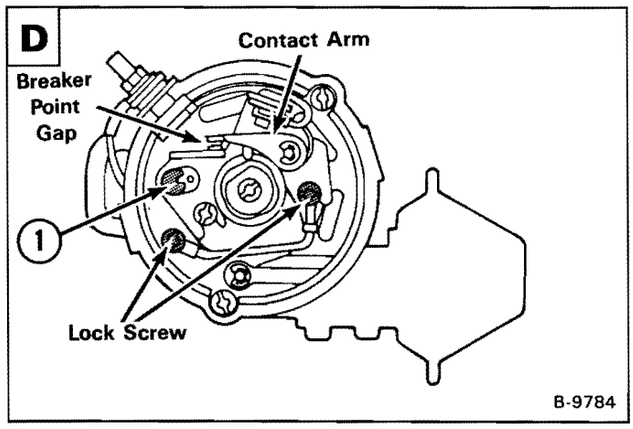
Remove the rotor.

Turn the crankshaft until the points are wide open. Check the breaker point gap with a feeler gauge, if it is out of specifications, adjust as follows:

Breaker Point Gap . . . . . 0.018 - 0.021"
(0,45 - 0,55 mm)

1. Loosen the two lock screws.
2. Put a screwdriver blade into the hole (Item 1) [D].
3. Adjust the points to the correct specifications.
4. Tighten the two lock screws.

NOTE: After the breaker points are adjusted, you must time the engine (See Page 7D—4).



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DISTRIBUTOR (Cont'd)

Disassembly and Assembly

Use the following procedure to disassemble and assemble the distributor [A]:

Remove the rotor (Item 3). Remove the snap ring from the spindle of the breaker base (Item 5).

Remove the screws holding the vacuum advance (Item 11) and remove. Disconnect the wires and remove the terminal.

Remove the breaker points. Remove the cam assembly.

Remove the springs (Item 7) and weights (Item 8).

Remove the roll pin (Item 14) from the gear (Item 15). Remove the gear and shaft assembly.

Checking Centrifugal Advance

Run the engine at idle low RPM. Remove the vacuum hose. Slowly increase the engine RPM to check advance.

1. Excessive Advance
   Weak Springs or broken.

2. Insufficient Advance
   Faulty operation of the centrifugal weights or cam.

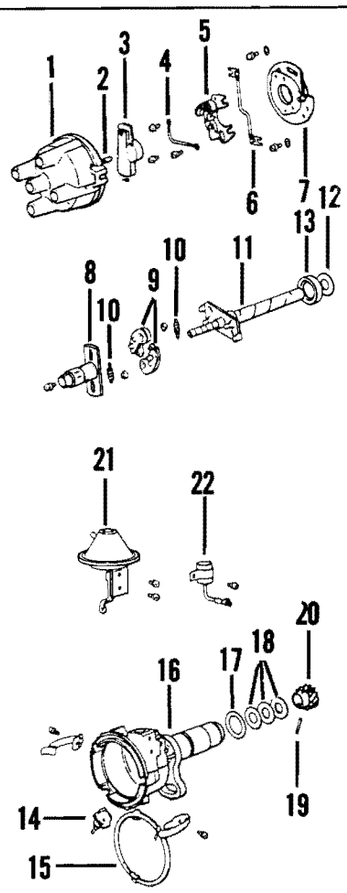
Checking Vacuum Advance

Set engine speed at 2800 RPM. Check advance by disconnecting and connecting the vacuum hose. Timing should advance 10°. For a accurate check, connect a vacuum pump and run engine at idle RPM. Slowly apply vacuum to check advance.

1. Excessive Advance
   Weak vacuum control spring or broken.

2. Insufficient Advance
   Breaker plate binding or diaphragm broken.

A

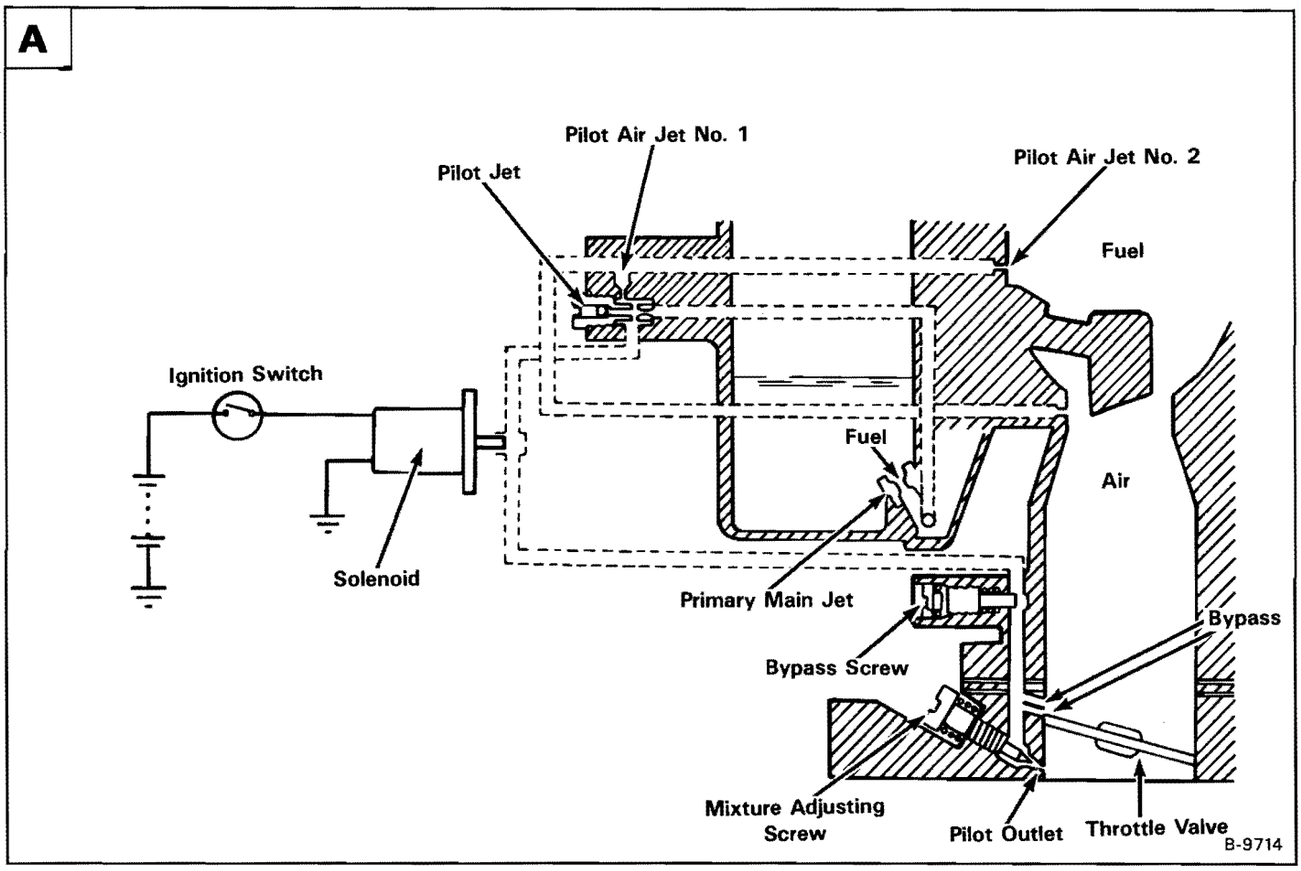


1.	Cap	12.	Washer
2.	Carbon Contact	13.	Oil Seal
3.	Rotor	14.	Terminal
4.	Wire	15.	Packing
5.	Arm Support	16.	Housing
6.	Wire	17.	O-ring
7.	Breaker Base	18.	Washer
8.	Cam	19.	Roll Pin
9.	Weight	20.	Gear
10.	Spring	21.	Vacuum Control
11.	Shaft	22.	Condenser

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CARBURETOR



The low-speed system provides air-fuel mixture for smooth low-speed engine operation for light-load performance [A].

Fuel from the float chamber is sent through the main jet and fuel passage to the pilot jet where the fuel is metered.

At the same time, air is fed through the venturi air orifice and pilot air jet No. 2 to the pilot air jet No. 1 where the air is metered then, air is mixed with the fuel.

The flow of air-fuel mixture is adjusted by the bypass screw and enters the air horn through the bypass hole and pilot outlet. It mixes with a small amount of air that goes past the closed or slightly open throttle valve. The final mixture flows into the cylinders.

The mixture adjusting screw is provided for adjusting air-fuel mixture necessary for idle.

The bypass screw is for adjusting the flow of fuel to the bypass hole which provides mixture for engine operation from "off idle" to a medium load operation.

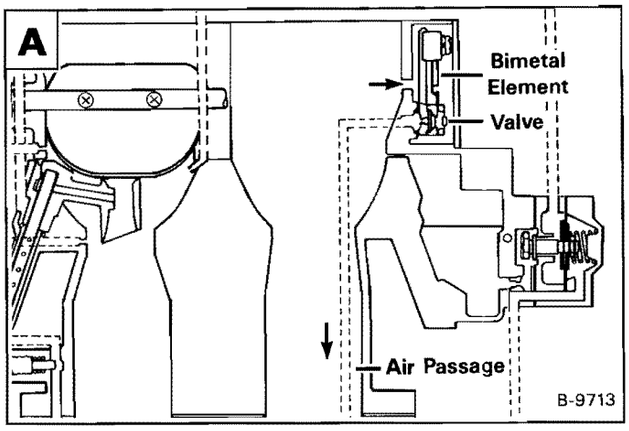
The fuel shut-off solenoid, in the low-speed system, functions as follows: When the key switch is "ON" it opens the valve to open the fuel line. When the key switch is "OFF" it closes the fuel feed line and prevents spontaneous running of the engine.

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CARBURETOR (Cont'd)

The idle compensator is operated by a bimetal element [A].

When the carburetor ambient temperature rises during idle operation, the bimetal bends enough to open the compensator valve. Now additional air, from the air horn, can flow through the air passage directly to the intake manifold. This leans out the mixture to make up for added gasoline vapor coming from the float chamber.



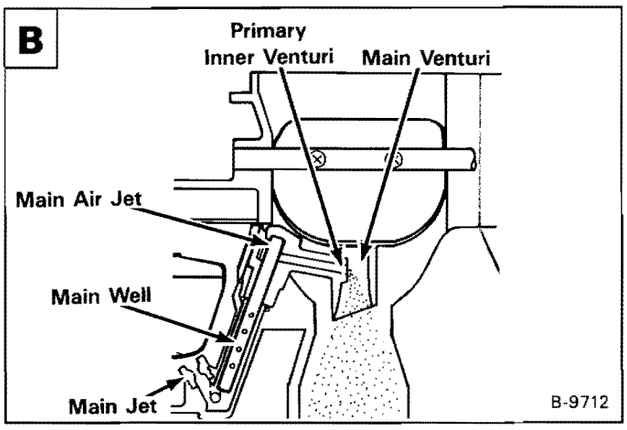
The main metering system functions as follows [B].

The wider the throttle valve opens, the faster the air flow is in the venturi. As the vacuum becomes greater, the main nozzle will inject fuel.

The main metering system is provided with the bleed valve press-fitted into the inner venturi and the main air jet.

Fuel metered by the main jet is bled by air from the main air jet and enters the bleed pipe through the holes. The main nozzle flows the fuel into the engine.

If percolation of the fuel is present along the main well, vapor can escape from the main air jet through outside bleed pipe, thus preventing fuel from spurting from the main nozzle.



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CARBURETOR (Cont'd)

The enrichment system does the following functions [A]:

This system provides additional fuel to the main metering system during high-speed large torque operation. The diaphragm is actuated by intake manifold vacuum and spring to open or close the fuel feed line.

During partial throttle operation, the manifold vacuum is apply to the vacuum chamber and acts on the diaphragm to close the valve against spring force.

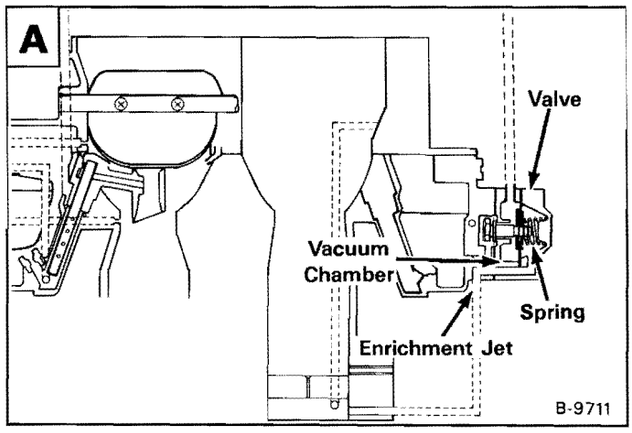
When the throttle is opened, manifold vacuum decreases. This allows the diaphragm spring to open the valve. Now, more fuel from the float chamber can flow through the valve into the enrichment jet.

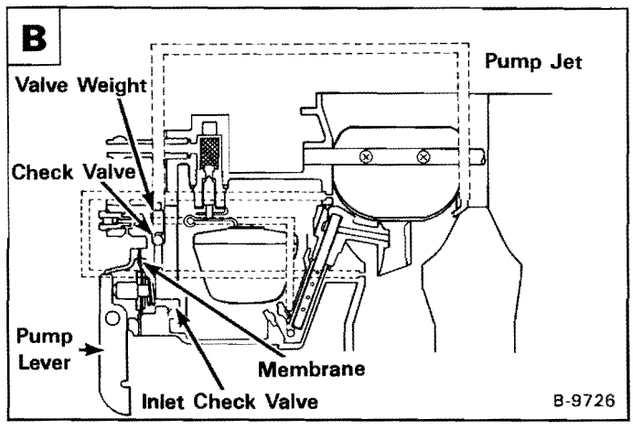
The accelerator-pump system does the following functions [B]:

Rapid opening of the throttle, requires a sudden demand for additional fuel.

Fuel from the inlet check valve is sent to the pump nozzle through the outlet check valve by movement of the diaphragm. The diaphragm is pushed by the pump lever linked to the throttle valve.

When the engine is decelerated, the diaphragm is pushed back by the spring and the chamber is refilled with fuel.





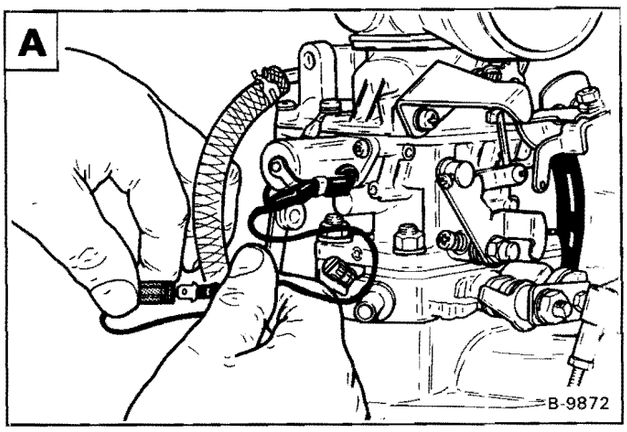
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CARBURETOR (Cont'd)

Removal and Installation

Disconnect the air cleaner hose at the carburetor air horn.

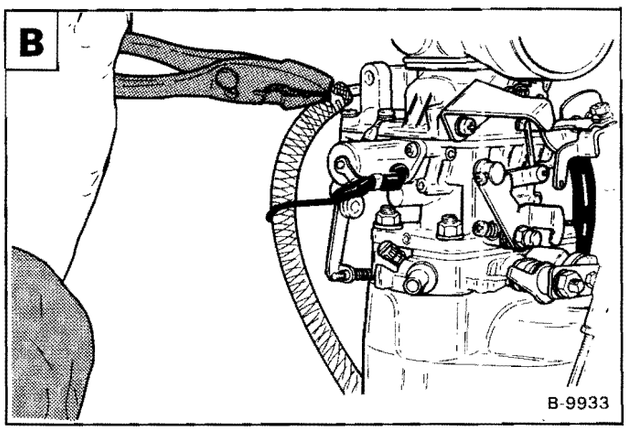
Disconnect the wire at the shut-off fuel solenoid [A].



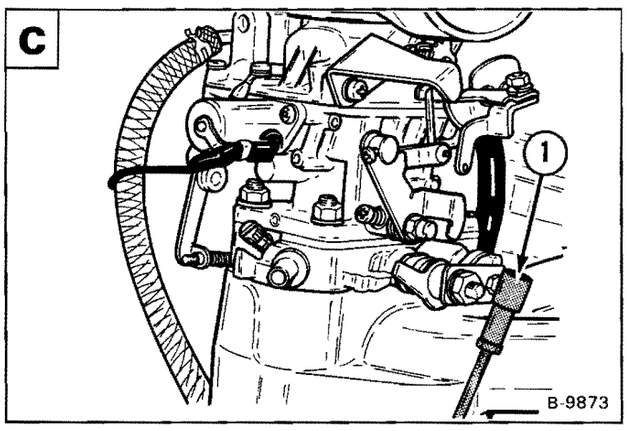
Disconnect the coke cable.

Disconnect the fuel line [B].

Disconnect the vacuum hose.

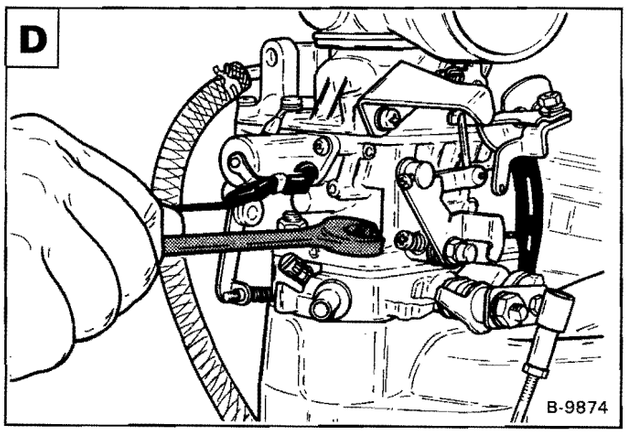


Disconnect the throttle linkage (Item 1) [C].



Remove the four mounting nuts [D].

Lift the carburetor from the intake manifold.



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CARBURETOR (Cont'd)

Disassembly and Assembly

Disassemble and assemble the carburetor as shown [A].

Use the correct tools to prevent burrs or scratches.

Keep the parts neatly and in order to prevent wrong assembly.

Do not remove the inner venturi unless it is necessary.

Do not remove the bypass screw unless it is necessary.

Do not disassemble the throttle shaft or remove the plug in the throttle plate.

Inspection

Clean the parts thoroughly with carburetor solvent.

Use air pressure to blow fuel passages and other parts dry.

Check the needle valves for correct contact, replace as needed.

Check the screen diaphragm and pilot screw seats for damage.

Check the throttle valve for wear and damage and be sure the plug in the throttle plate is tight.

Check the linkage for correct function.

Check the acceleration pump for correct function as follows:

Fill the pump chamber with fuel, operate the throttle lever and check for fuel spraying condition from the accelerator nozzle.

Push the connecting rod of the depression chamber, plug the vacuum passage with a finger, release the connecting rod and check for leakage from the diaphragm.

Check the float for being deformed, leakage, damage to the lip, wear of the float lever pin hole and the float lever bracket.

Adjustment

If the float level is out of alignment with the level mark, adjust the float by adding or removing the number of packings at the needle valve seat [A].

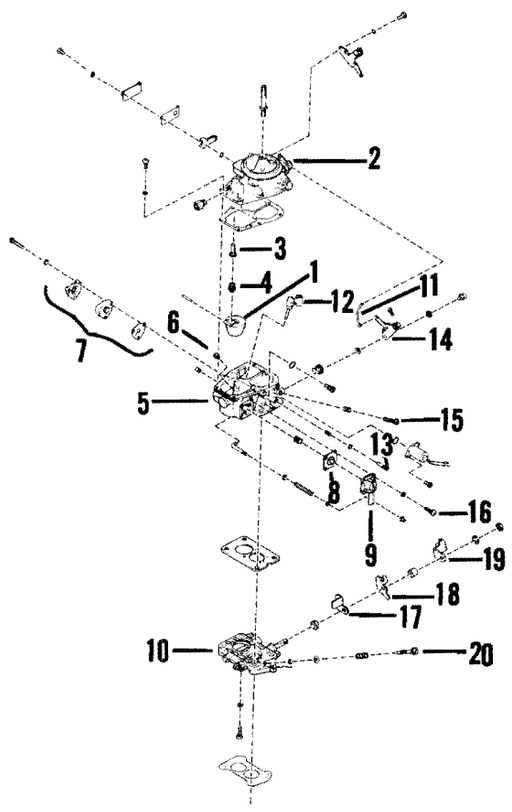
A slight difference of the float level from the level mark does not effect the carburetor or engine performance, it is normal if the float level is in the circle of the level mark.

⚠ WARNING

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

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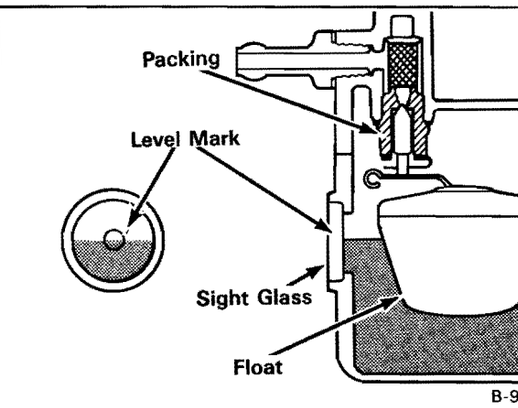
A



1. Float
2. Float Chamber Cover
3. Screen
4. Needle
5. Main Body
6. Main Jet
7. Enrichment Body Assembly
8. Diaphragm
9. Pump Cover
10. Throttle Body
11. Choke Connecting Rod
12. Inner Venturi
13. Pilot Jet
14. Choke Operating Lever
15. Speed Adjustment Screw
16. Bypass Screw
17. Throttle Stop Lever
18. Abutment Plate
19. Throttle Lever
20. Mixture Adjustment Screw

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B



B-9727

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CARBURETOR (Cont'd)

Set the engine idle speed (Item 1) to 850 - 950 RPM at operating temperature [A].

Turn the idle fuel adjustment (Item 2) in until the engine RPM decreases. Make a note of this position [A].

Turn the idle fuel adjustment (Item 2) out until the engine RPM decreases. Adjust the idle fuel adjustment between the two positions [A].

⚠ WARNING

When an engine is running in an enclosed area, fresh air must be added to avoid concentration of exhaust fumes. If the engine is stationary, vent the exhaust outside. Exhaust fumes contain odorless, invisible gases which can kill without warning.

W-2050-1285

Governor Adjustment

NOTE: Adjust engine timing (See Page 7D—4). Loosen three governor mounting bolts. Adjust governor belt tension to 1/4" movement at middle of belt. Keep governor level and tighten the bolts.

Disconnect throttle rod (Item 1) [B].

Hold carburetor linkage (Item 3) and governor linkage (Item 4) against their stops and tighten the screws (Item 2) [B].

Check the governor throttle lever for maximum travel.

Start the engine.

Check that the engine idle speed is at 700-750 RPM while holding governor lever agaist the idle stop.

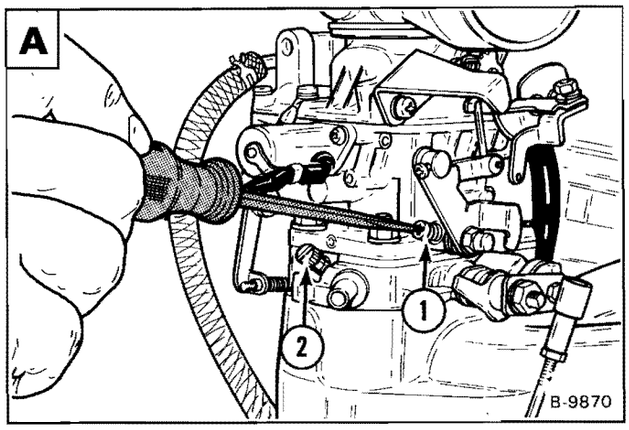
Set the throttle lever fast position stop bolt (Item 1) at rear of slot [C].

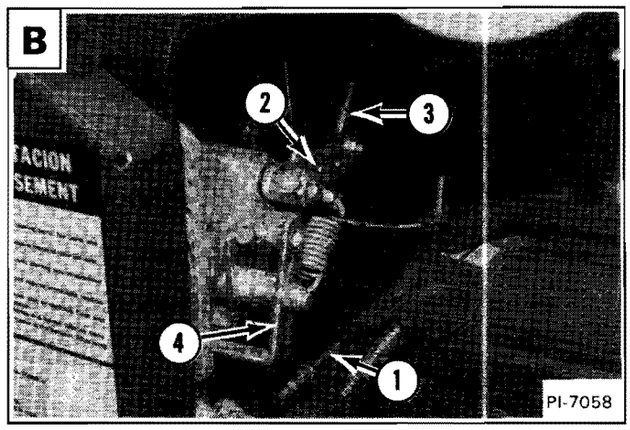
Push throttle lever fully forward.

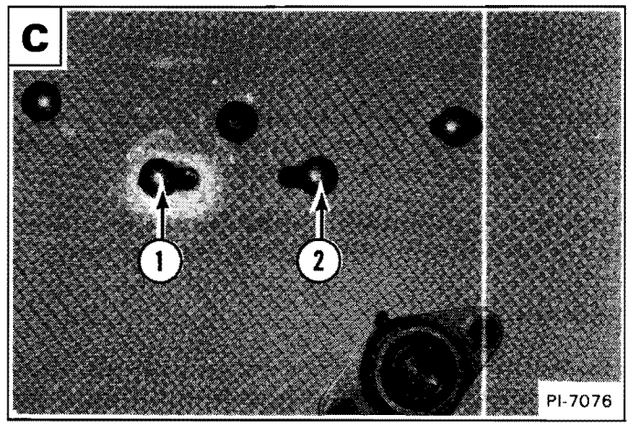
Set engine RPM at 2900-2975 RPM by adjusting the ball joint (Item 3) and high speed stop on the governor [B].

Pull throttle lever back until carburetor lever is against the idle stop screw.

Set and tighten the slow position stop bolt (Item 2) against the throttle lever [C].





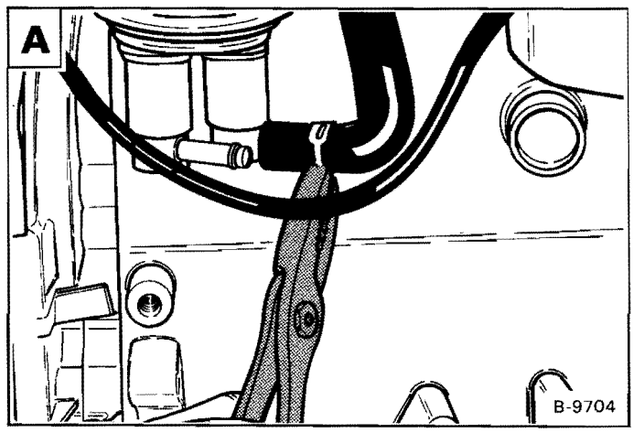


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FUEL PUMP

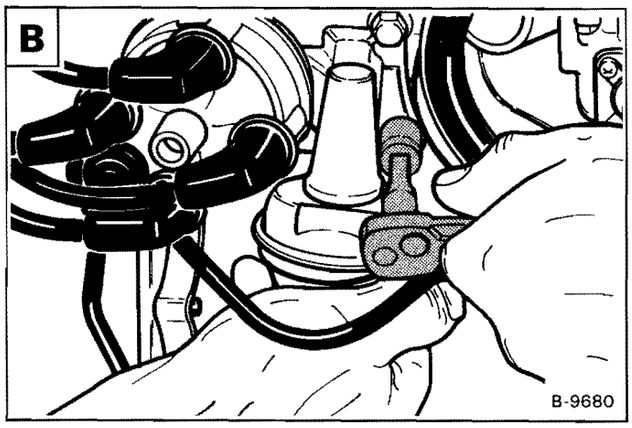
Removal and Installation

Disconnect the fuel lines from the fuel pump [A].

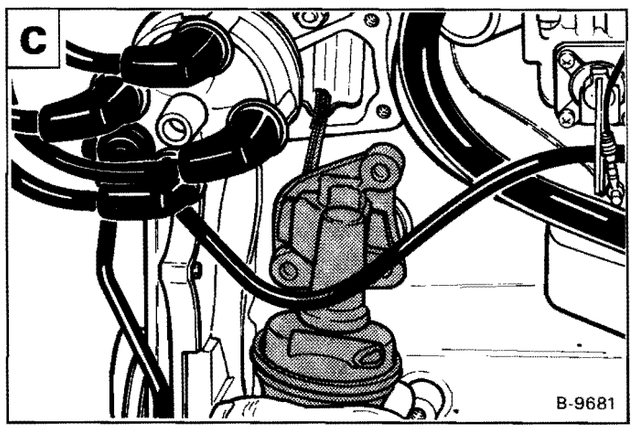


Remove the three bolts from the fuel pump [B].

Installation: Put Threebond 4A Sealant between the cylinder head and gasket.



Remove the fuel pump from the cylinder head [C].



Inspection

Check the rocker arm for smooth operation. Also check the spring for being weak and the pin for wear.

Check the pump body and cover for cracks and damage.

Checking the Fuel Pump

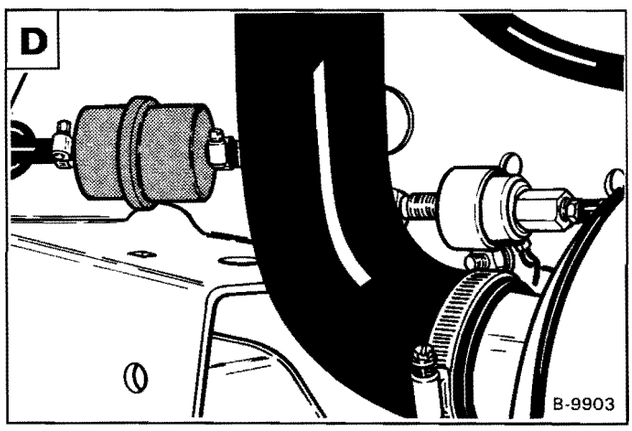
Disconnect the outlet hose from the fuel pump.

Connect a gauge to the port.

Start the engine and measure the delivery pressure. If not within specifications, replace as needed.

Delivery . . . . . 2.11 qts. (2 L) @ 5000 RPM

Closed Delivery Pressure . . . . . 3.7 - 5 PSI (25,5 - 34,5 kPa)



Fuel Filter

The fuel filter is located in front of the air cleaner [D].

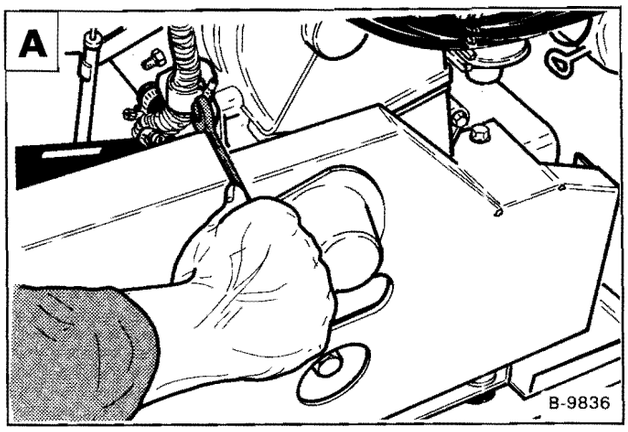
Change the fuel filter every 500 hours of loader operation.

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ENGINE BELT SHIELD

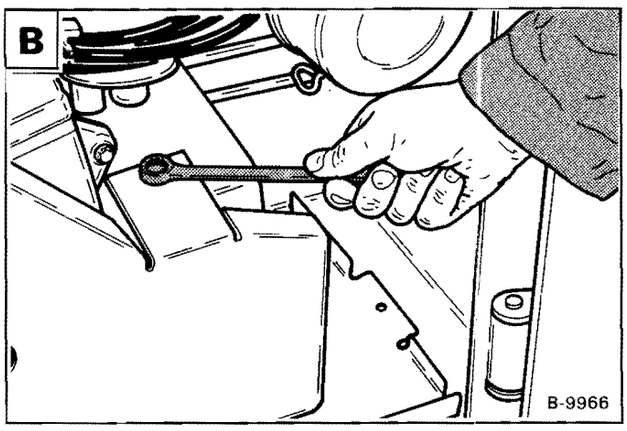
Removal and Installation

Remove the bolt from the belt shield above the alternator [A].

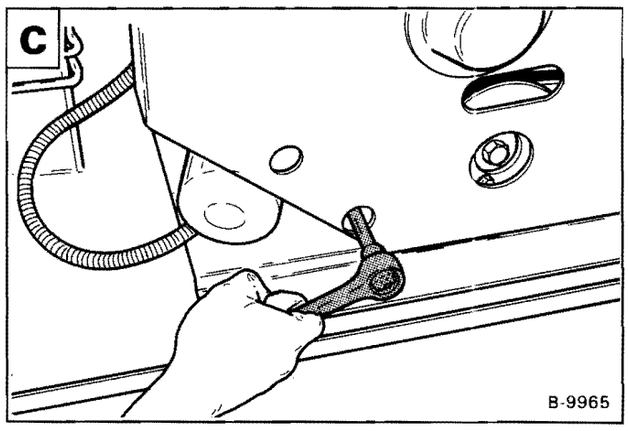


Remove the bolt from the governor bracket [B].

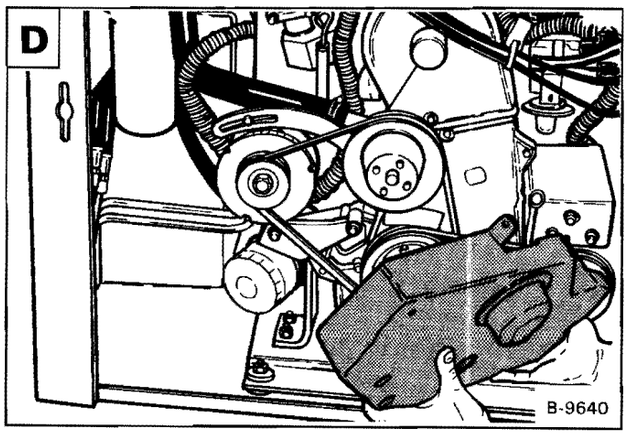
Remove the bolt below the governor which fastens the belt shield to the engine block.



Remove the bolt from the alternator mounting bracket [C].



Remove the belt shield from the engine [D].

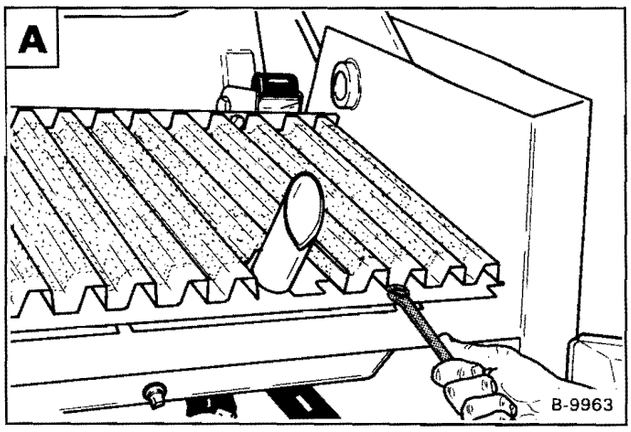


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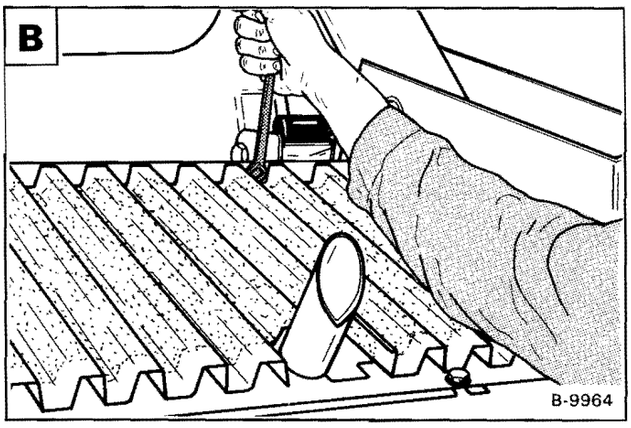
REAR GRILL

Removal and Installation

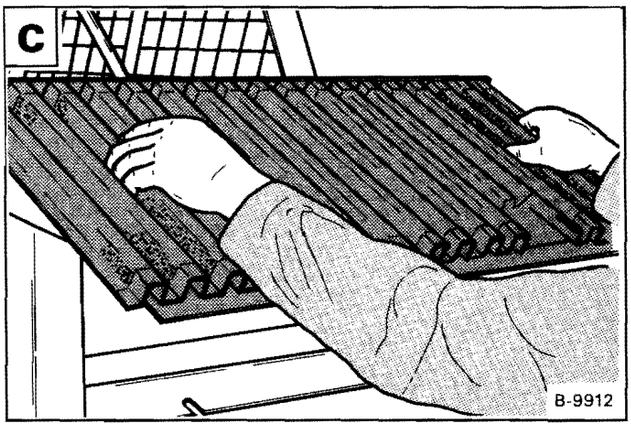
Remove the bolts along the bottom edge of the grill [A].



Remove the bolts along the top edge of the rear grill [B].



Lift the rear grill up and remove the grill from the loader [C].



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ENGINE

Removal and Installation

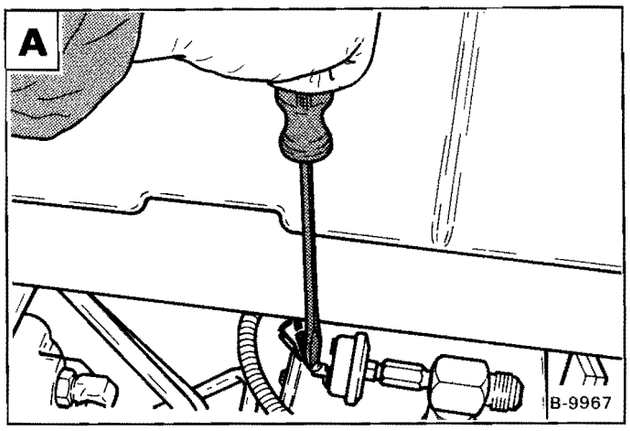
Lift and block the loader (See Page 1—2).

Remove the battery from the loader (See Page 6—2).

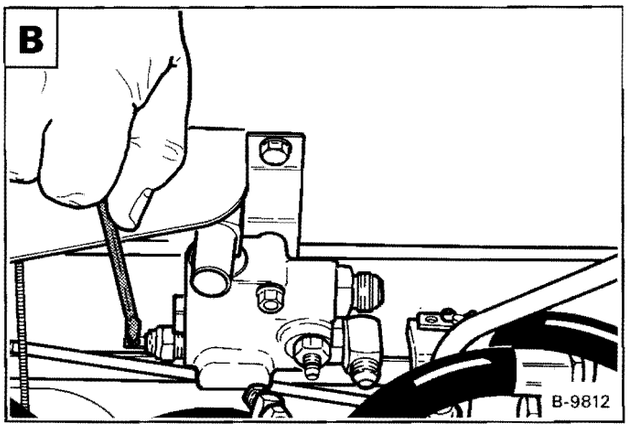
Remove the rear grill (See Page 7D—15).

Raise the operator cab (See Page 1—6).

Disconnect the wire from the charge pressure switch [A].

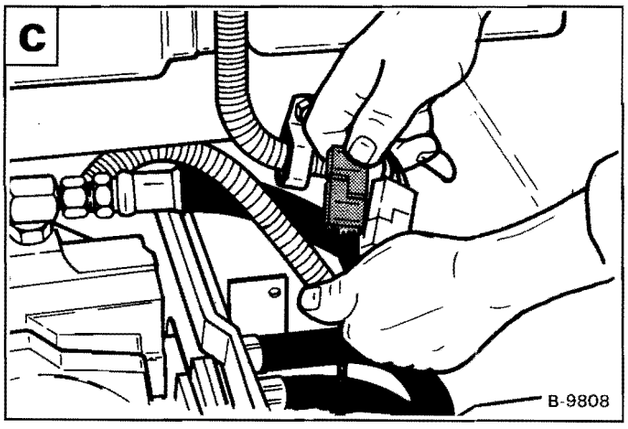


Disconnect the wire from the port block [B].

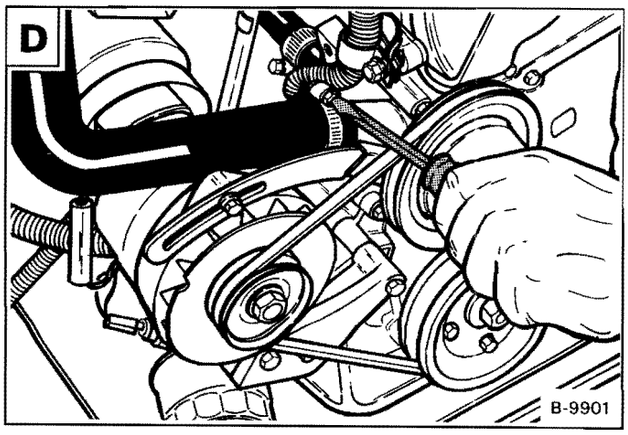


Disconnect the electrical connectors from the electrical harness [C].

Remove the belt shield (See Page 7D—14).



Remove the radiator hose from the water pump [D].

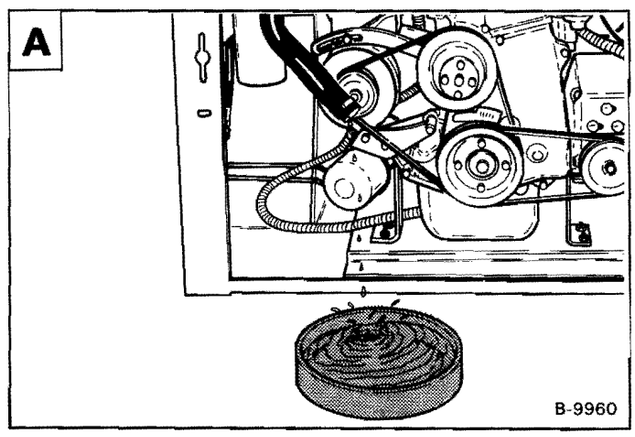


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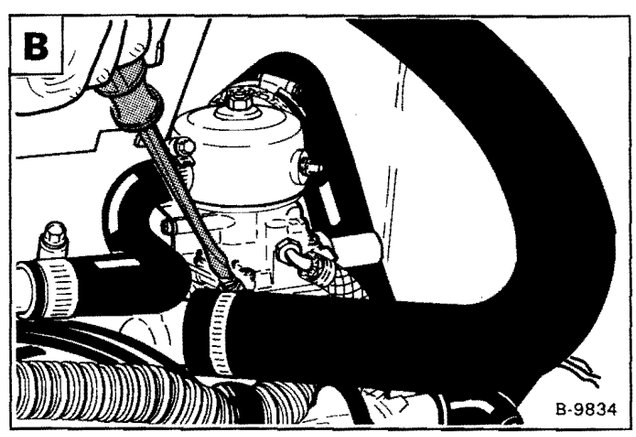
ENGINE (Cont'd)

Drain the coolant into a container [A].

Installation: Make sure to pre-mix the water (50%) and ethylene glycol (50%) before adding it to the cooling system.

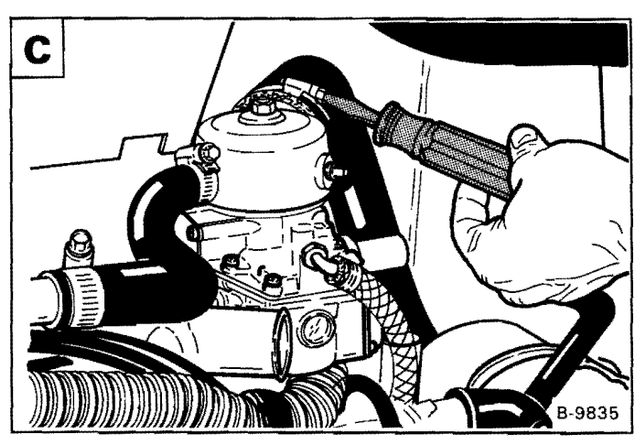


Remove the radiator hose from the thermostat housing [B].

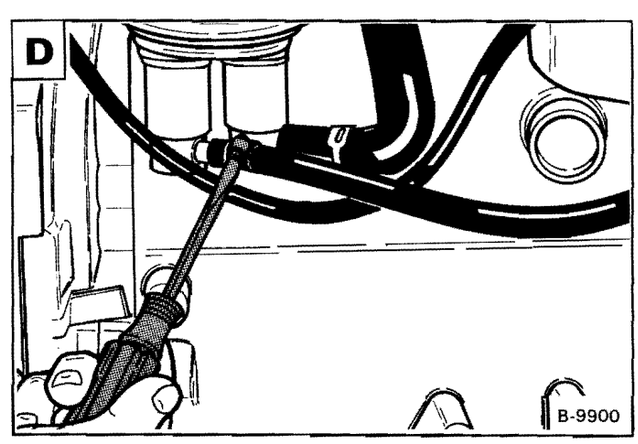


Disconnect the air cleaner hose [C].

Turn the fuel shut-off to the "OFF" position on the fuel tank.



Disconnect the fuel line from the fuel pump [D].



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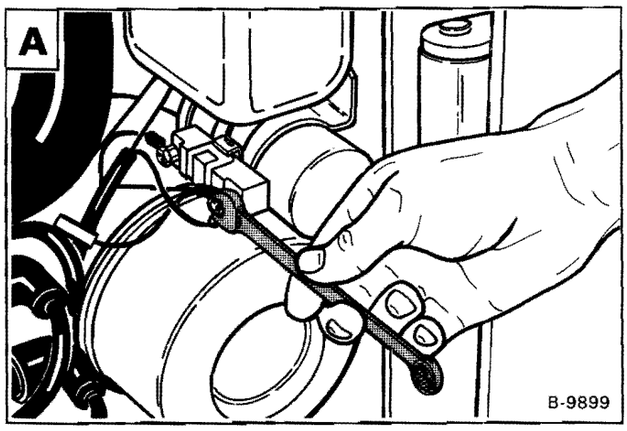
ENGINE (Cont'd)

Mark all the wires from the coil and resistor for correct installation.

Disconnect all the wires from the resistor and coil [A].

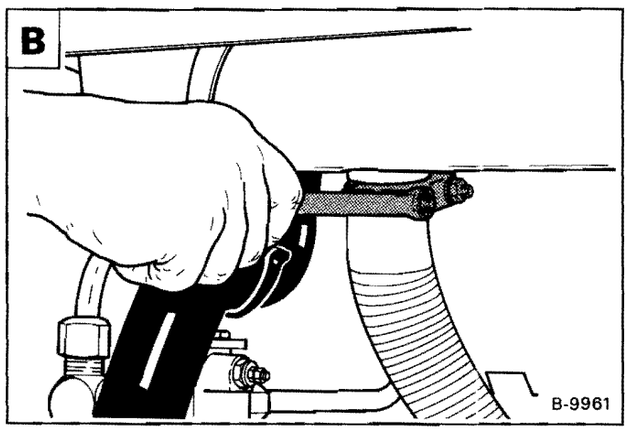
Disconnect the ground cable from the engine block behind the governor.

Disconnect the throttle rod from the governor.



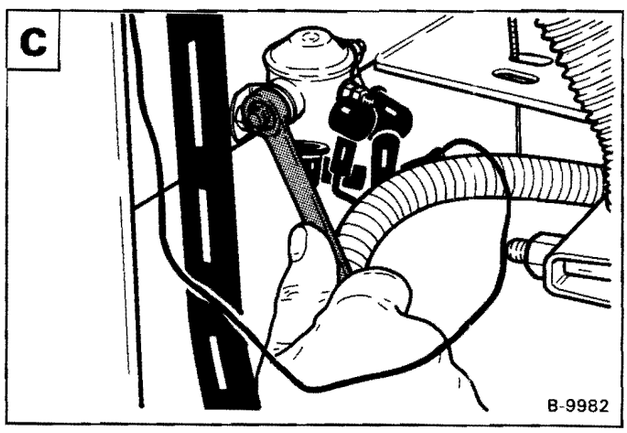
Remove the clamp from the exhaust pipe [B].

Disconnect the exhaust pipe.

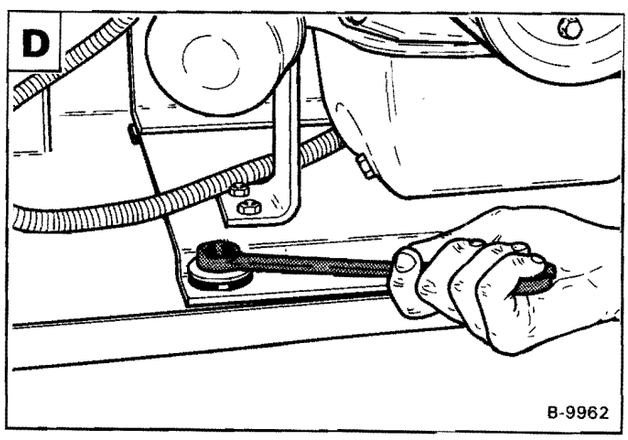


Disconnect the wires from the starter solenoid [C].

Mark the wires at the starter solenoid for correct installation.



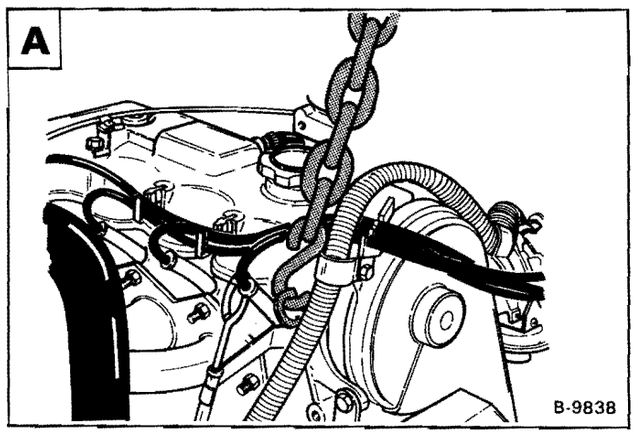
Remove the four bolts, washers and nuts from the engine mounting plate [D].



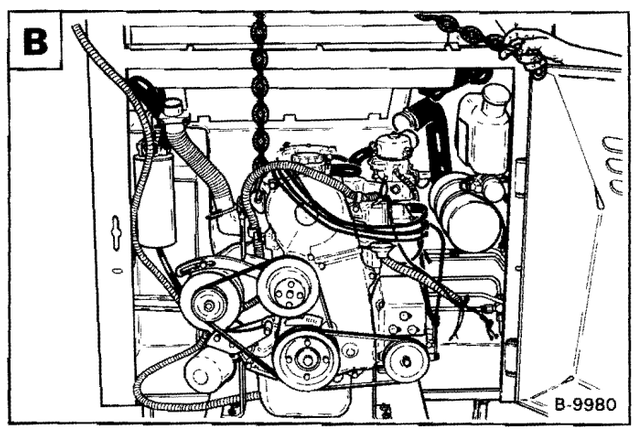
https://truckmanualshub.com/

ENGINE (Cont'd)

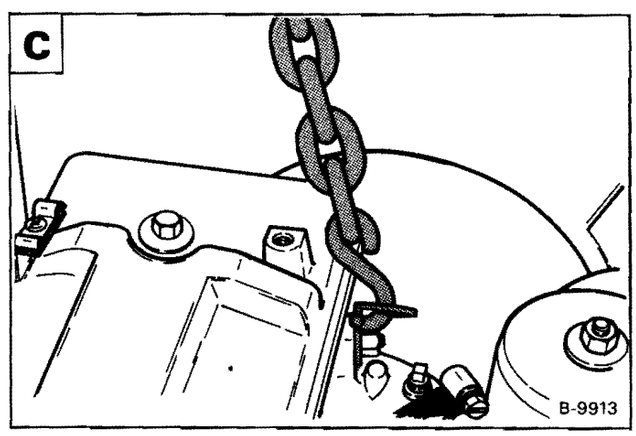
Hook one end of the chain hoist into the lift hook on the water pump end of the engine [A].



Lift the engine a small amount and slide it toward the rear of the loader until the engine mounting plate is just over the rear edge of the loader frame [B].

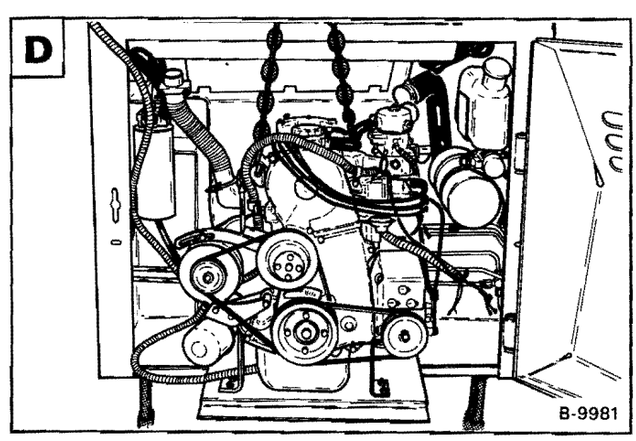


Lower the chain hoist. Connect the other end of the chain hoist to the lift hook on the flywheel end of the engine [C].



Lift the engine. Slide it out of the loader frame [D].

Installation: Move the engine into the loader until the u-joint is in the blower housing. Have a second person reach behind the blower housing (at the hydrostatic pumps) and guide the u-joint on the splines of the hydrostatic pump shaft.



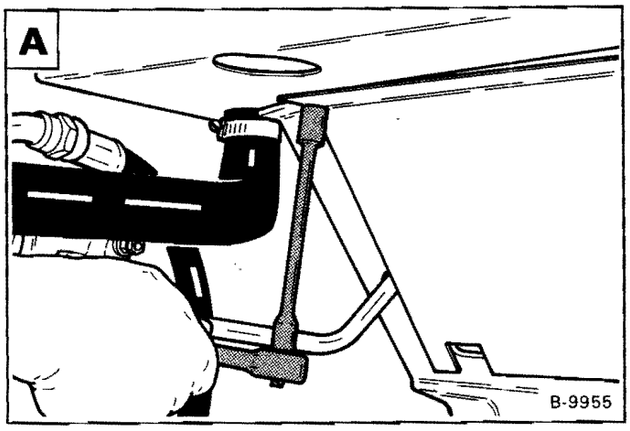
https://truckmanualshub.com/

OIL COOLER AND BLOWER HOUSING

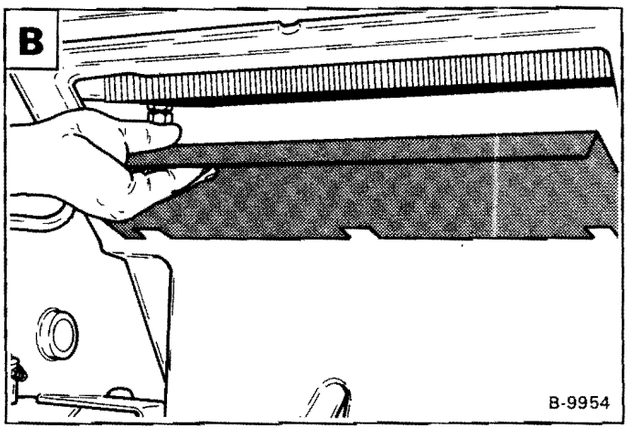
Removal and Installation

Remove the engine from the loader (See Page 7D—16).

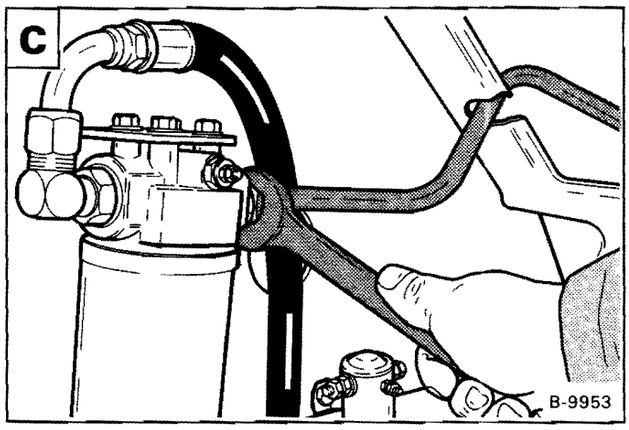
Remove the bolts from the blower housing cover plate [A].



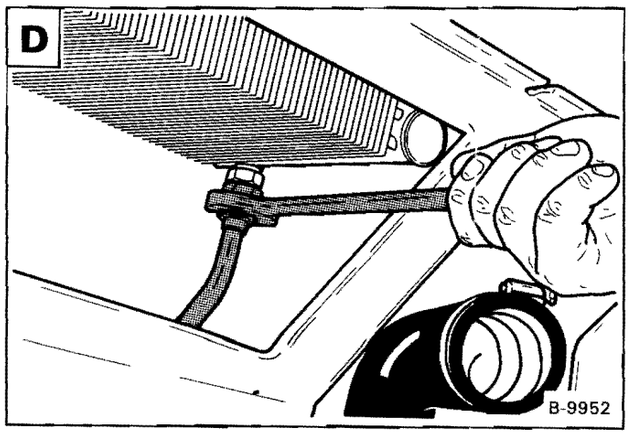
Remove the cover plate [B].



Disconnect the tubeline from the filter housing [C].



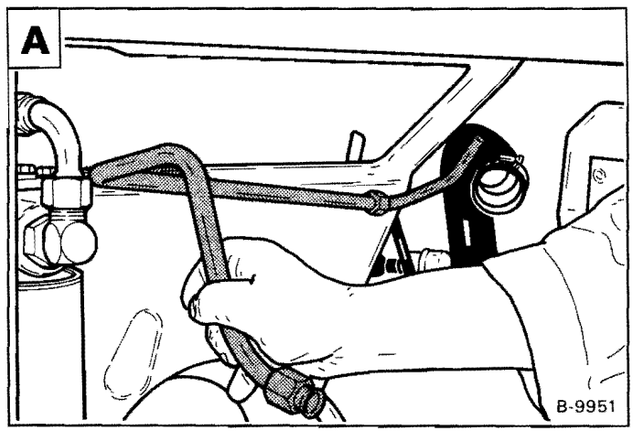
Disconnect the tubeline from the oil cooler [D].



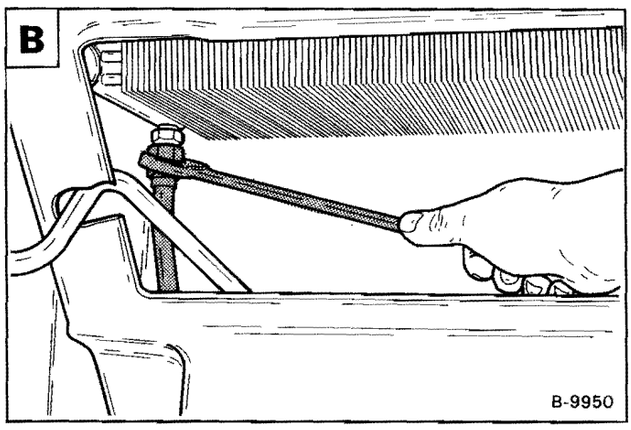
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OIL COOLER AND BLOWER HOUSING (Cont'd)

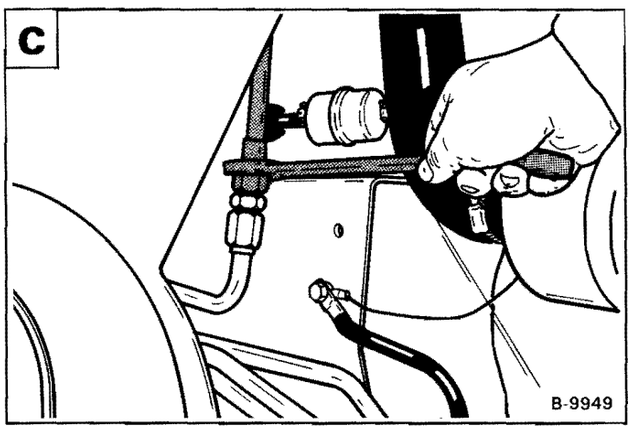
Remove the tubeline from the blower housing [A].



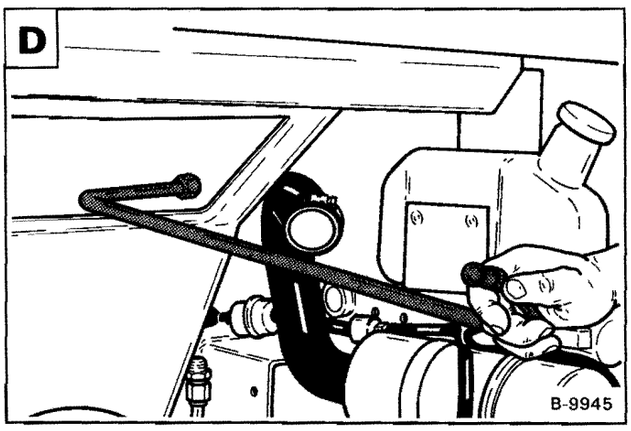
Disconnect the other tubeline from the oil cooler [B].



Disconnect the tubeline beside the blower housing [C].



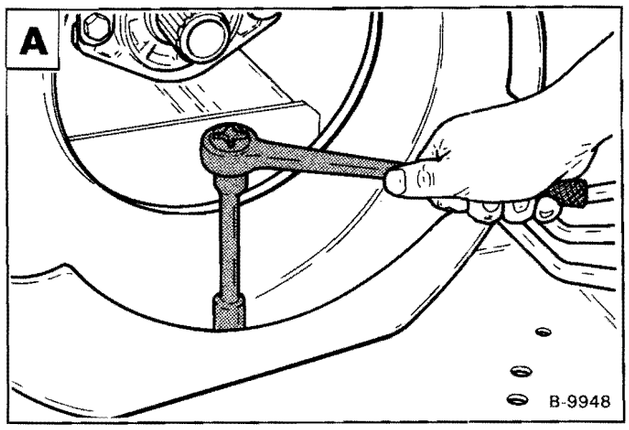
Remove the tubeline from the blower housing [D].



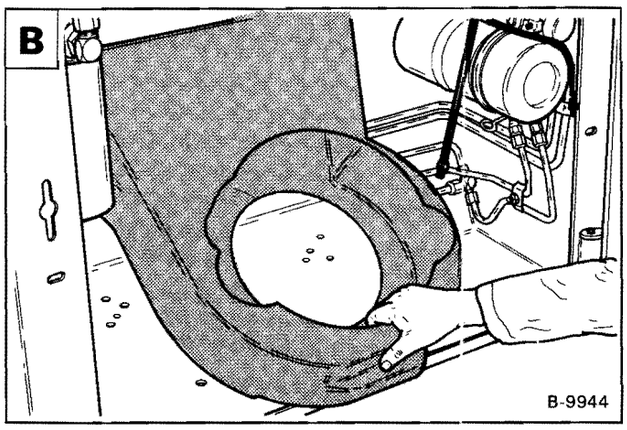
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OIL COOLER AND BLOWER HOUSING (Cont'd)

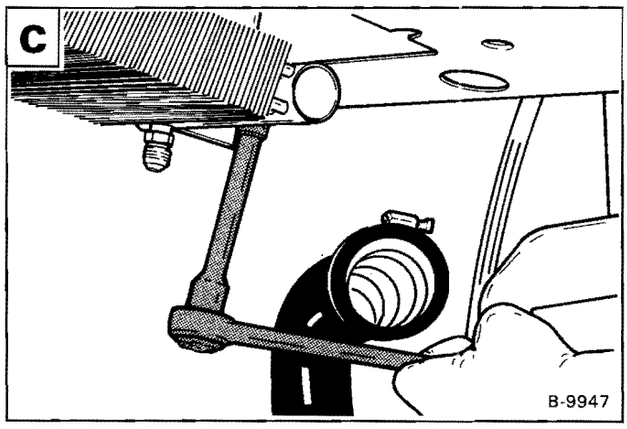
Remove the bolt and nut from the bottom of the blower housing [A].



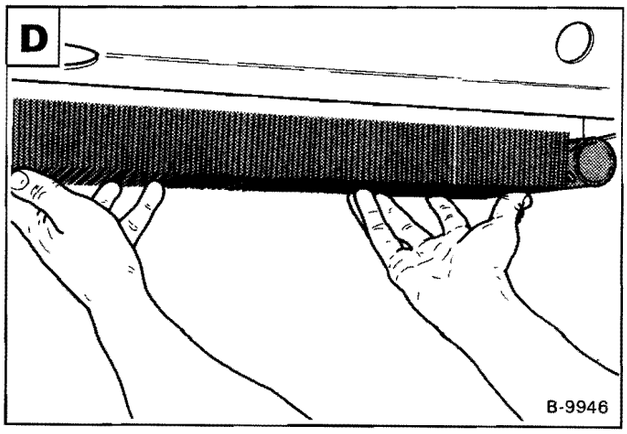
Remove the blower housing from the loader [B].



Remove the nuts from both sides of the oil cooler [C].



Lower and remove the oil cooler from the loader [D].



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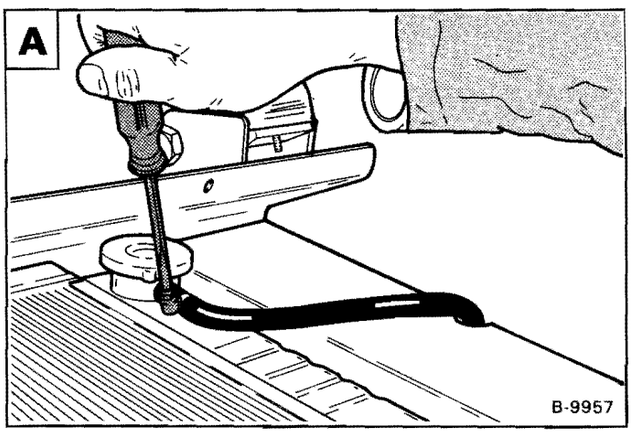
RADIATOR

Removal and Installation

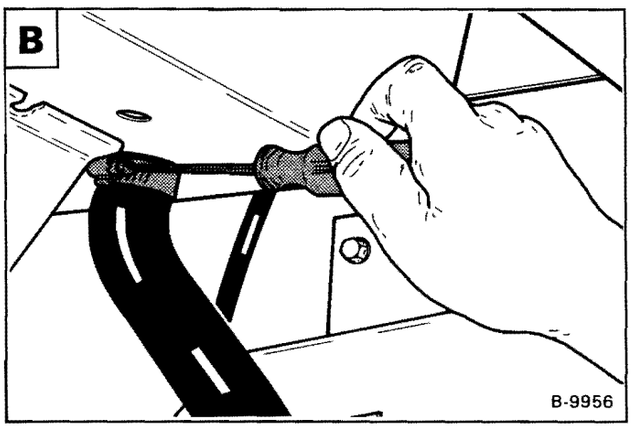
Remove the oil cooler and blower housing from the loader (See Page 7D—20).

Remove the engine muffler (See Page 7D—24).

Disconnect the over-flow hose from the radiator [A].

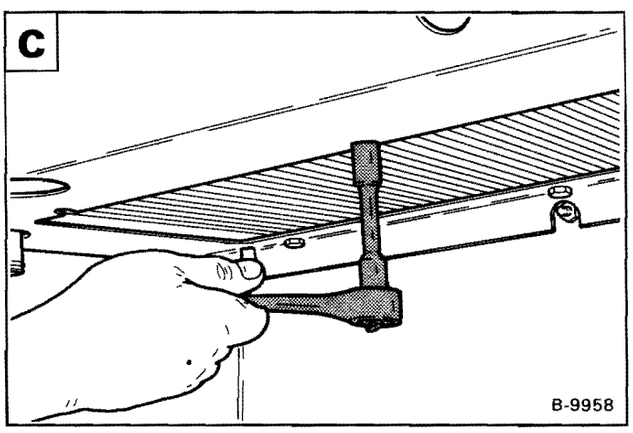


Remove both radiator hoses from the radiator [B].

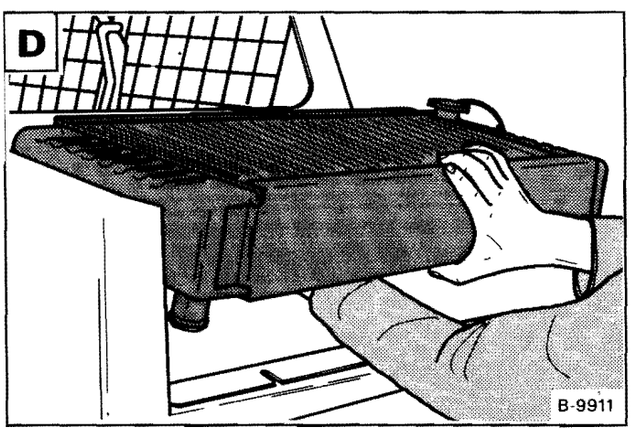


Remove the three bolts along the back edge of the radiator [C].

Remove the three bolts along the front edge of the radiator.



Lift the radiator from the loader [D].



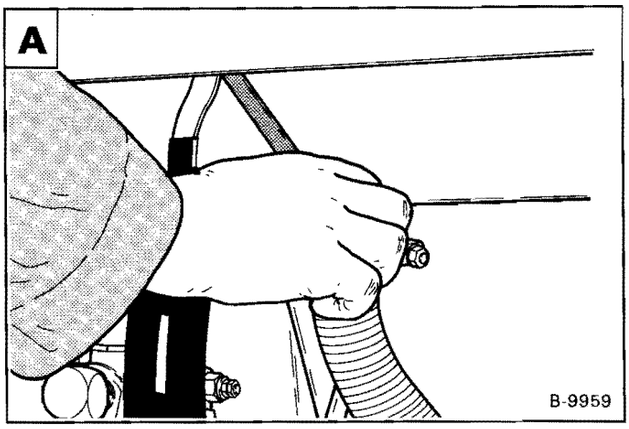
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ENGINE MUFFLER

Removal and Installation

Remove the rear grill (See Page 7D—15).

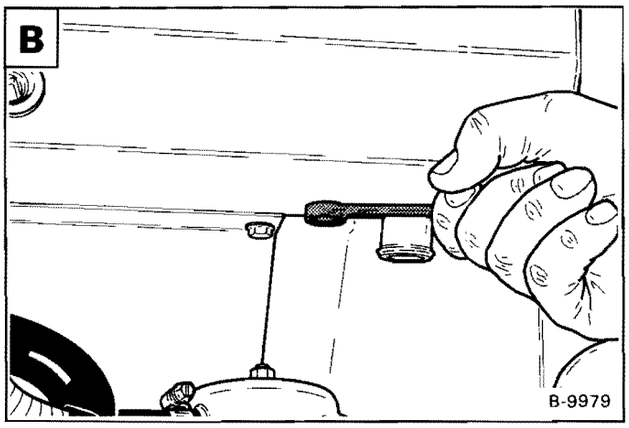
Remove the two bolts at the back edge of the muffler [A].



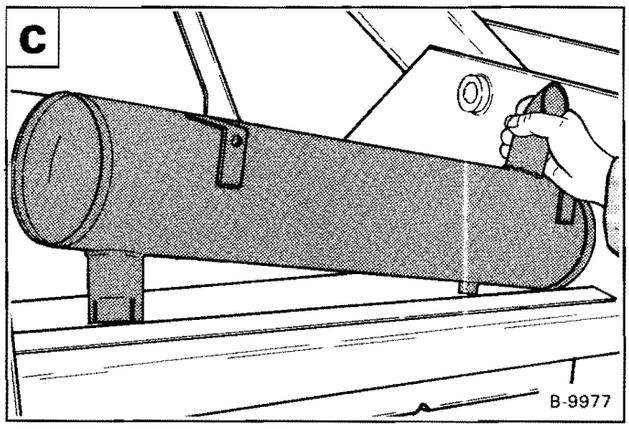
Remove the four bolts from the bottom of the muffler [B].

Remove the muffler exhaust pipe clamp.

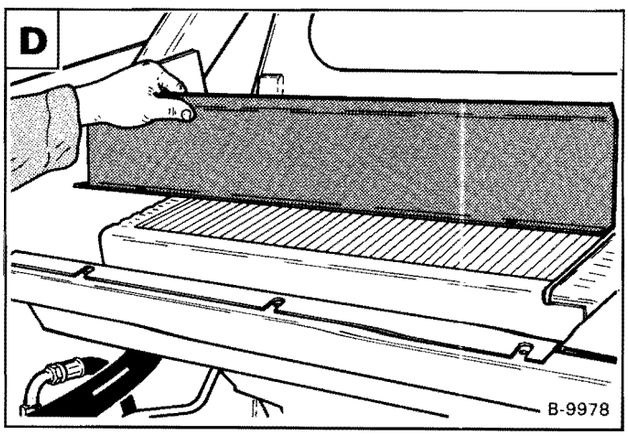
NOTE: The spark chamber plug may have to be removed so there is enough clearance for the muffler to be removed.



Remove the muffler from the loader [C].



Remove the plate between the muffler and the radiator.



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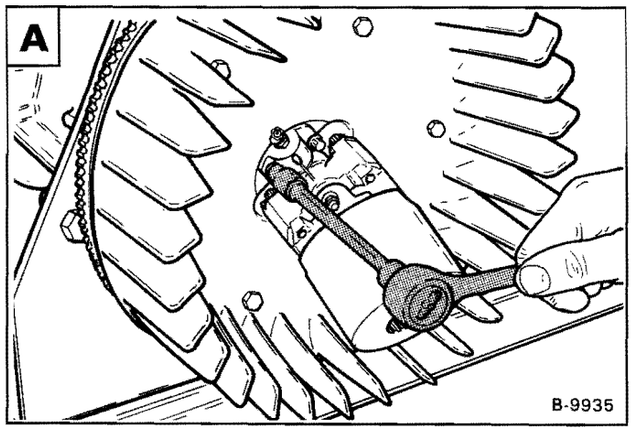
ENGINE FLYWHEEL AND U-JOINT

Removal and Installation

Remove the four bolts from the u-joint mounting flange [A].

Installation: Put loctite on the bolt and tighten to 25 - 28 ft.lbs. (34 - 38 Nm) torque.

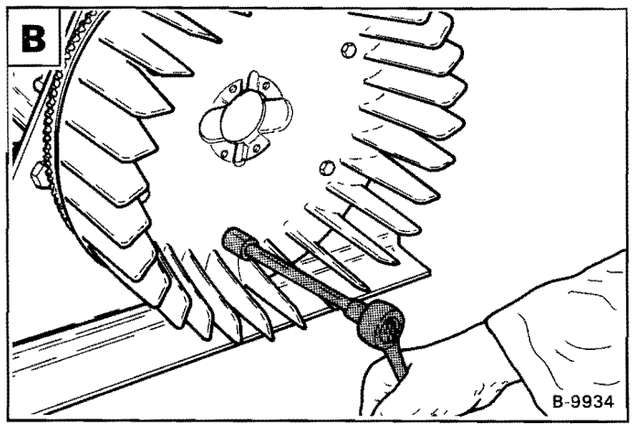
Remove the u-joint.



Remove the bolts from the cooling fan [B].

Installation: Tighten the bolts to 15 - 17 ft.lbs. (20 - 23 Nm) torque.

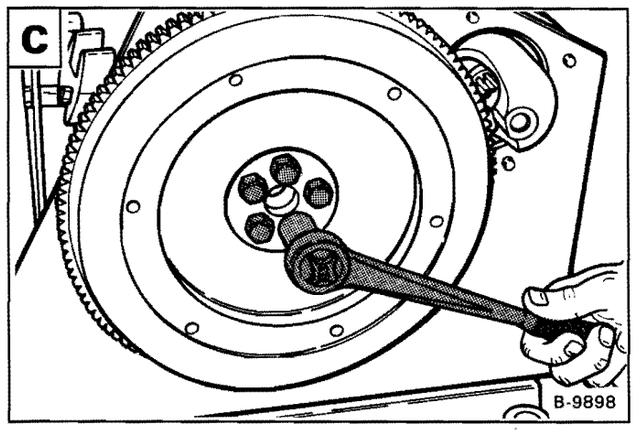
Remove the cooling fan.



Remove the bolts from the flywheel [C].

Installation: Tighten the bolts to 55 - 60 ft.lbs. (75 - 81 Nm) torque.

Remove the flywheel.



Flywheel Ring Gear

The ring gear on the flywheel is an interference fit. Heat the ring gear enough to expand it and hit the ring gear with a hammer, evenly, to remove it.

Clean the outer surface of the flywheel to give the ring gear a smooth fit.

Clean the new ring gear and heat it to a temperature of 450 - 500° F. (232 - 260° C.).

Fit the ring gear over the flywheel. Make sure the gear is on its seat correctly.

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ROCKER ARMS

Removal

Remove the valve cover.

Remove the front upper cover from the timing belt.

Turn the crankshaft until No. 1 cylinder is at T.D.C. compression stroke.

Make alignment of the mark on the camshaft sprocket (Item 1) with the timing mark (Item 2) at the upper cover back plate [A].

Make a mark on the timing belt (Item 3) in alignment with the other marks [A].

Remove the camshaft bolt.

Put a small piece of old timing belt (Item 1) between the sprocket and sprocket holder [B]. Do this to prevent the camshaft sprocket from lowering to such an extend that the timing belt comes off.

IMPORTANT

DO NOT turn the crankshaft after the camshaft sprocket is removed because engine timing will be changed.

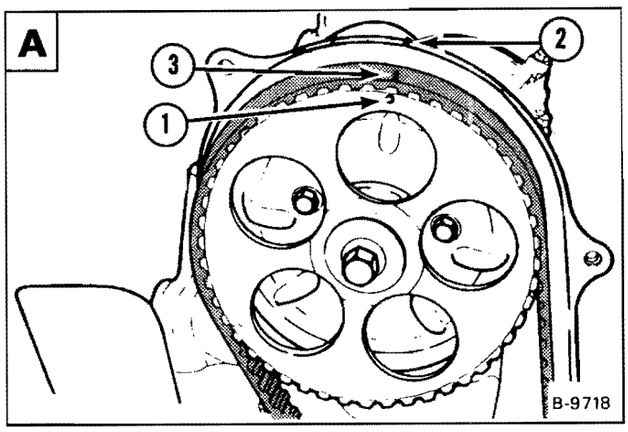
Remove the camshaft spacer [C].

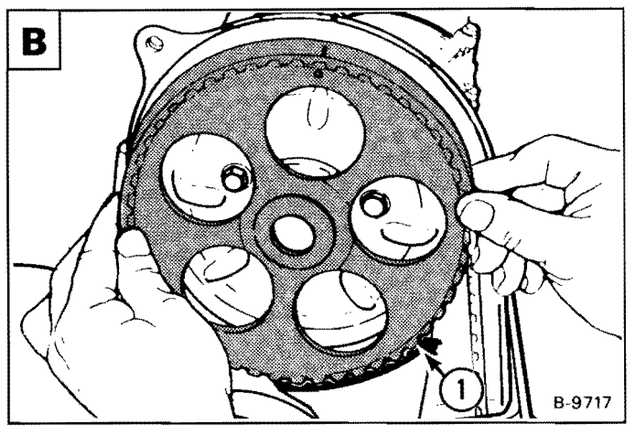
Remove the back plate for the upper cover.

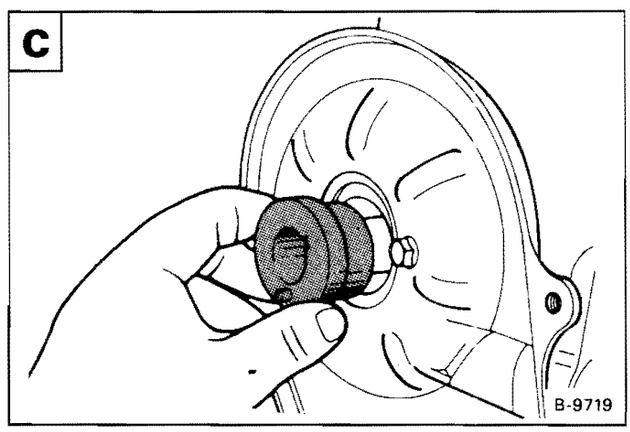
Remove the bolts from the bearing caps for the camshaft.

Remove the front seal for the camshaft.

Remove the rocker arms, rocker shaft and bearing cap assembly.





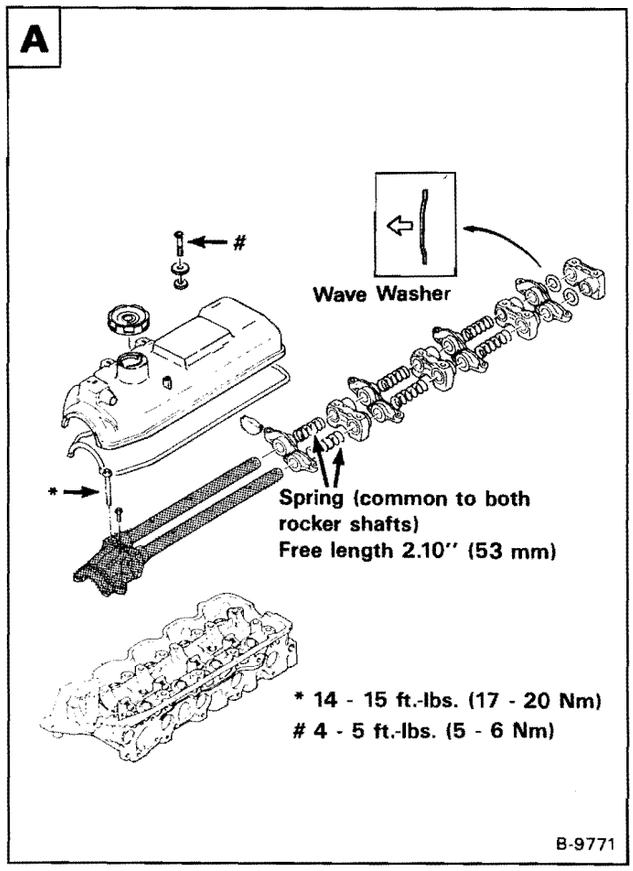


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ROCKER ARMS (Cont'd)

Mark the rocker arms for correct assembly.

Remove the bearing caps, wave washers, springs and rocker arms as shown [A].

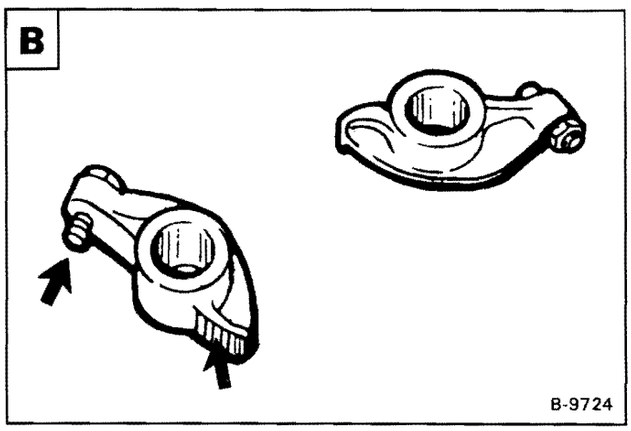


Inspection

Check the rocker arm surface that contacts the cam lobe and the adjusting bolt ends that contact the valve stem [B].

If worn or damage, replace the rocker arm.

Check the rocker arm shafts for damage. Replace the parts as needed.



Installation

The tool listed will be needed to do the following procedure:

MEL-1299 – Camshaft Seal Tool

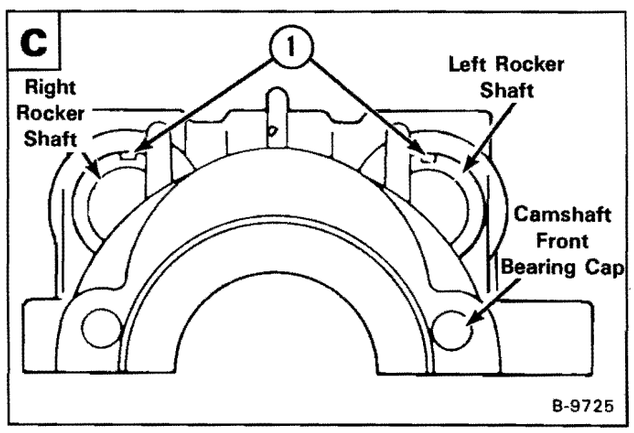
Install the right and left shafts into the front bearing cap. Temporarily install the bolts to hold the shafts.

Make sure the end slots (Item 1) at the front of the shaft are in the up position [C].

Install the rocker arms, springs and bearing caps in the order shown [A].

Make sure to install the wave washer in the right direction [A].

After the rear bearing cap is installed, temporarily install the bolts to hold them in position.



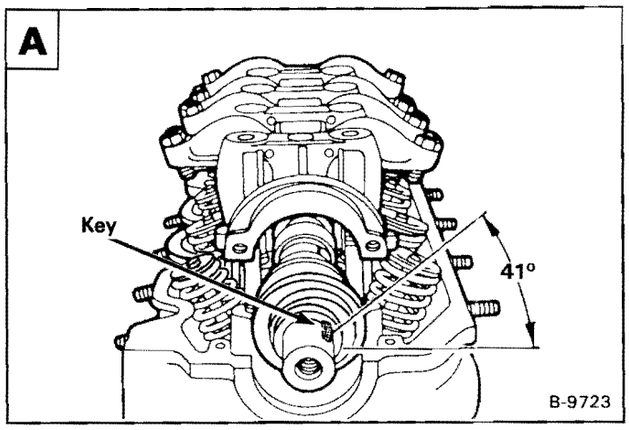
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ROCKER ARMS (Cont'd)

Install the assembled rocker arm shaft assembly into the cylinder head.

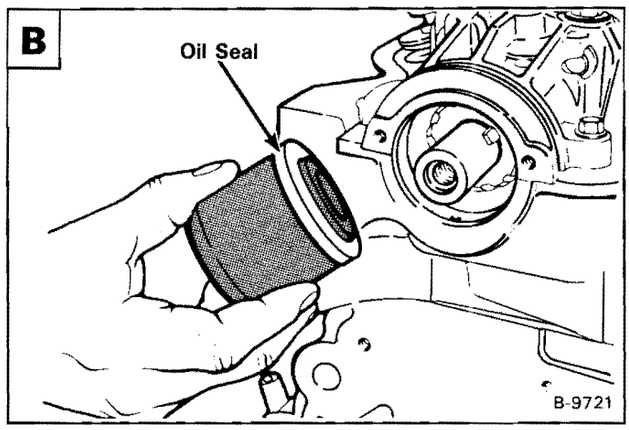
Position the camshaft key, at the front end, as shown [A].

Install the bolts in the camshaft bearing caps. Tighten the bolts to 14 - 15 ft.lbs. (17 - 20 Nm) torque.



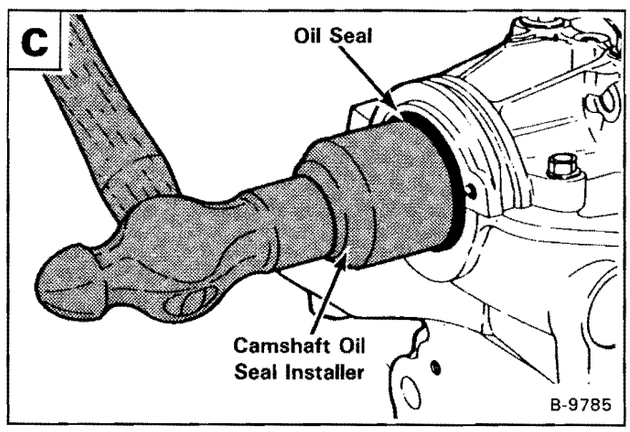
Use the camshaft seal installation tool and install the camshaft oil seal [B].

Put engine oil on the seal lips before installing the seal.

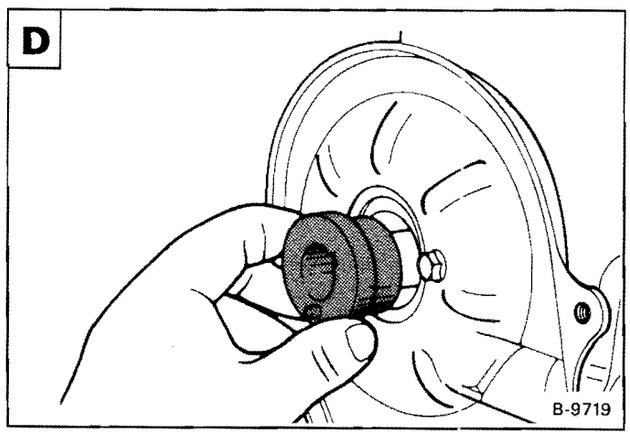


Use a hammer and install the seal [C].

Install the back plate for the upper cover.



Put oil on the outer surface of the camshaft spacer and install the spacer [D].



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ROCKER ARM (Cont'd)

Pull the camshaft sprocket up, and install it on the camshaft [A].

When the dowel pin hole of the camshaft sprocket does not align with the dowel pin at the end of the spacer, the camshaft can be turned by hitting the projections at the No. 2 camshaft journal [B].

NOTE: Make sure the crankshaft is not turned for correct alignment of the dowel pin and dowel pin hole.

Install the bolt at the camshaft sprocket and tighten to 36 - 43 ft.lbs. (49 - 58 Nm) torque.

NOTE: Check to make sure the timing marks are still in alignment.

Install the upper front cover. Adjust the valve clearance.

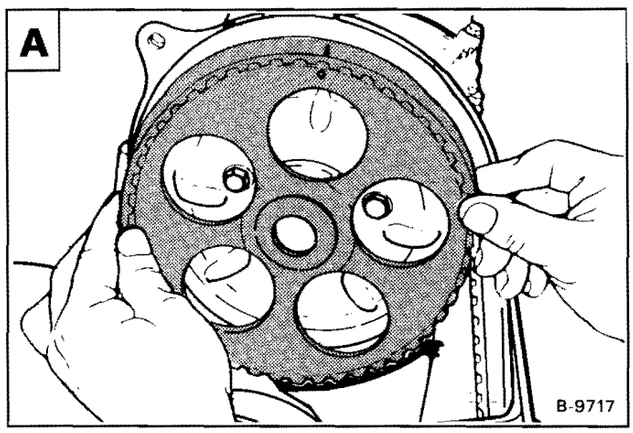
Clearance (Cold)
Intake . . . . . 0.03" (0,08 mm)
Exhaust . . . . . 0.07" (0,18 mm)

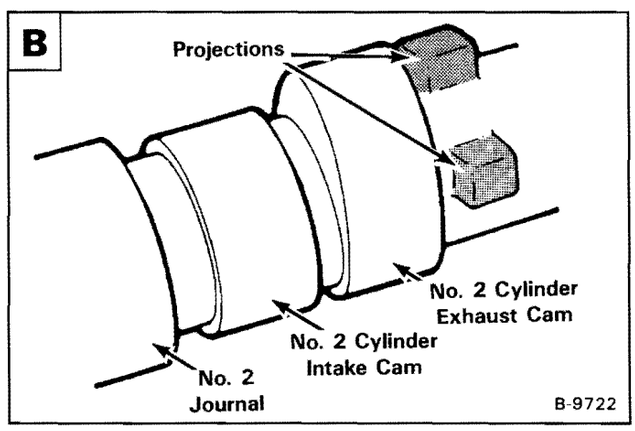
Temporarily install the valve cover. Start the engine, run until at operating temperature.

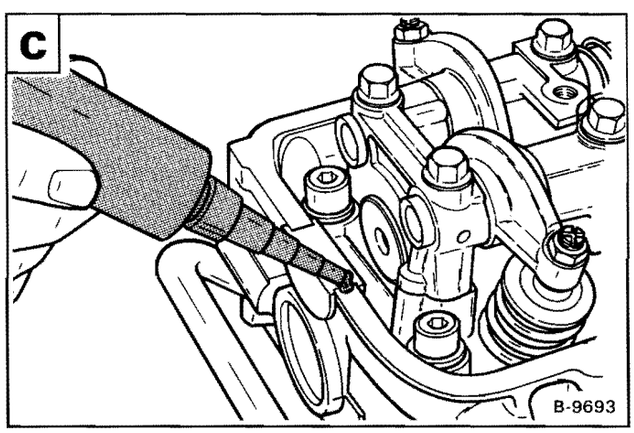
Set the valve clearance (See Page 7D—2).

Before installing the valve cover, put Sealant on the half plug at the cylinder head [C].

Install the valve cover and tighten the bolts to 4 - 5 ft.lbs. (5 - 6 Nm) torque.







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CAMSHAFT

Removal and Installation

Remove the rocker arms, rocker shaft and bearing cap (See Page 7D—27).

Installation: Lubricate the camshaft lobes and bearing journals before installing the camshaft. Tighten the camshaft sprocket bolt to the correct torque [A].

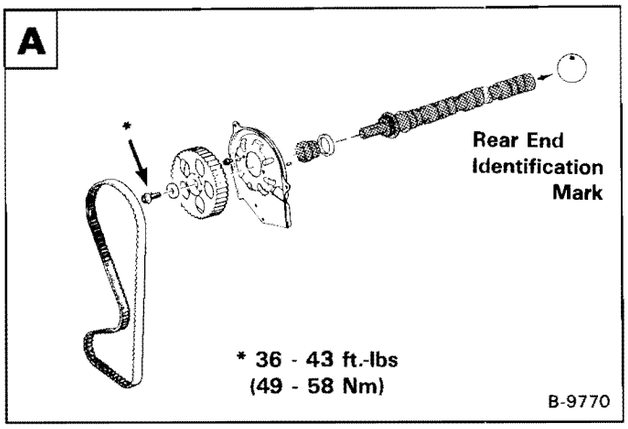
Inspection

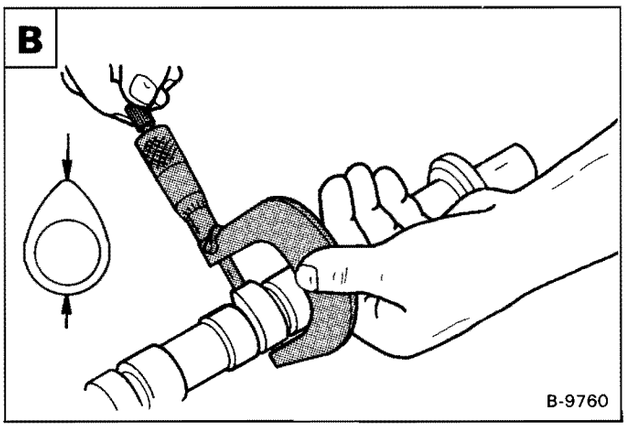
Check the camshaft journals for wear, scratches or seizure. If the journal is excessively worn, replace the camshaft.

Check the cam lobes for the correct specification [B].

Cam Lobe Height . . . . . 1.4331" (36,4 mm)
Service Limit . . . . . -0.020" (-0,5 mm)

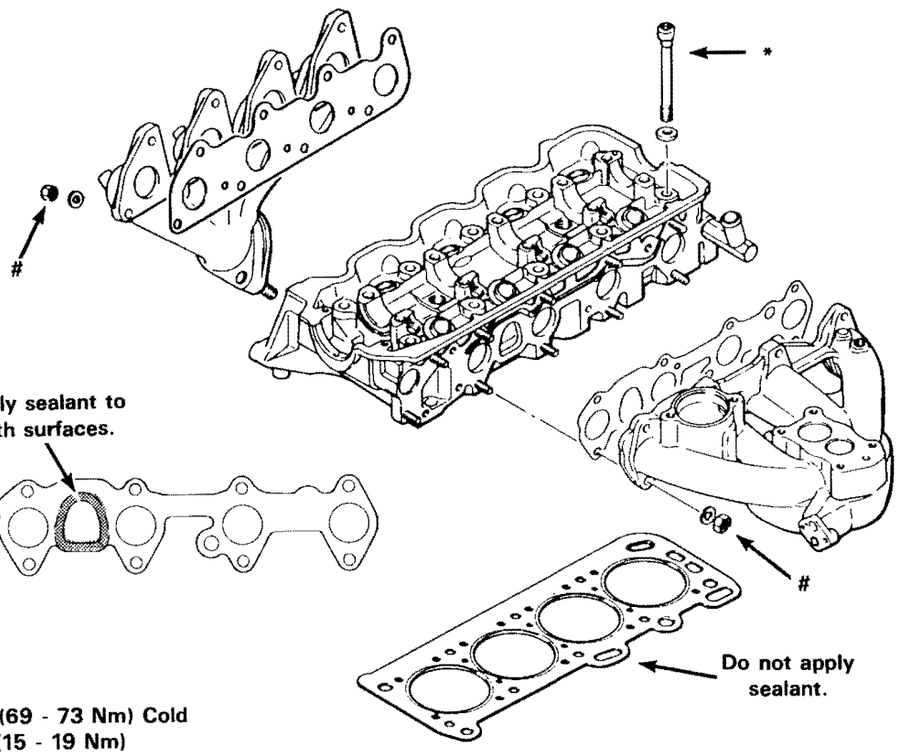
Camshaft End Play . . . . . 0.002 - 0.006"
(0,05 - 0,15 mm)





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A



* 51 - 54 ft.-lbs. (69 - 73 Nm) Cold
11 - 14 ft.-lbs. (15 - 19 Nm)

B-9769

CYLINDER HEAD

Removal and Installation

The tool listed will be needed to do the following procedure:

MEL-1297 — Head Bolt Tool

Remove the coolant from the coolant system.

Disconnect the radiator hose. Remove the spark plug wires.

Remove the distributor (See Page 7D—5).

Remove the fuel pump (See Page 7D—13).

Remove the exhaust manifold.

Remove the intake manifold and carburetor.

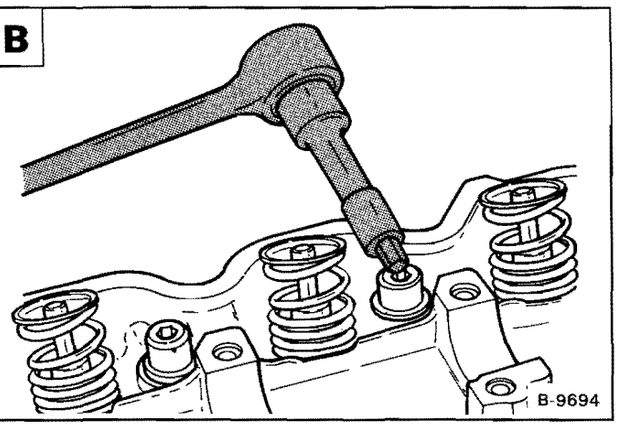
Installation: Put sealant on both surfaces around the water hole [A].

Remove the rocker arms, rocker shafts, bearing caps and camshaft (See Page 7D—27).

Use the special tool to remove the cylinder head bolts [B].

Remove the cylinder head bolts in the sequence shown to prevent cylinder head warpage [C].

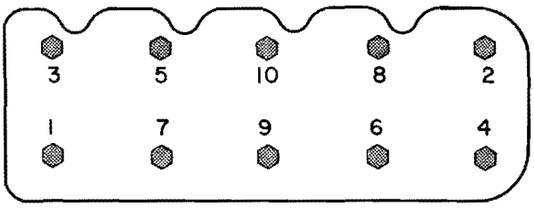
B



B-9694

C

Removing Head Bolt Sequence



B-9768

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CYLINDER HEAD (Cont'd)

Installation:

1. Tighten the bolts to 25 ft.lbs. (35 Nm) torque in the sequence shown [A].
2. Tighten to 51 - 54 ft.lbs. (69 - 73 Nm) torque in the sequence shown [A].

Remove the cylinder head. Remove the cylinder head gasket.

Installation: Use a new cylinder head gasket and do not use sealant on the gasket.

Inspection

Clean the cylinder head of all carbon deposits. Remove the valves (See Page 7D – 33).

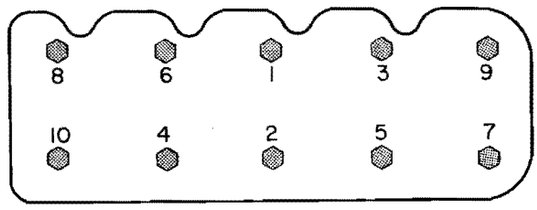
Check the cylinder head surface by using a straight edge in the direction of A, B, etc. [B].

Standard Dimension . . . . . 0.002" (0,05 mm) or less
Service Limit . . . . . 0.004" (0,1 mm)

If the cylinder head surface exceeds the service limit, either replace or grind the cylinder head.

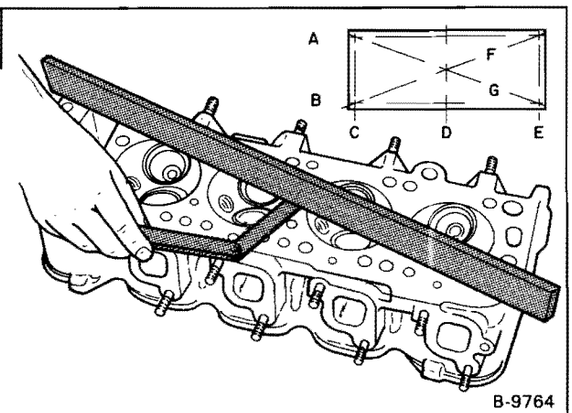
A

Installing Head Bolt Sequence



B-9767

B



B-9764

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VALVES

Removal

The tool listed will be needed to do the following procedure:

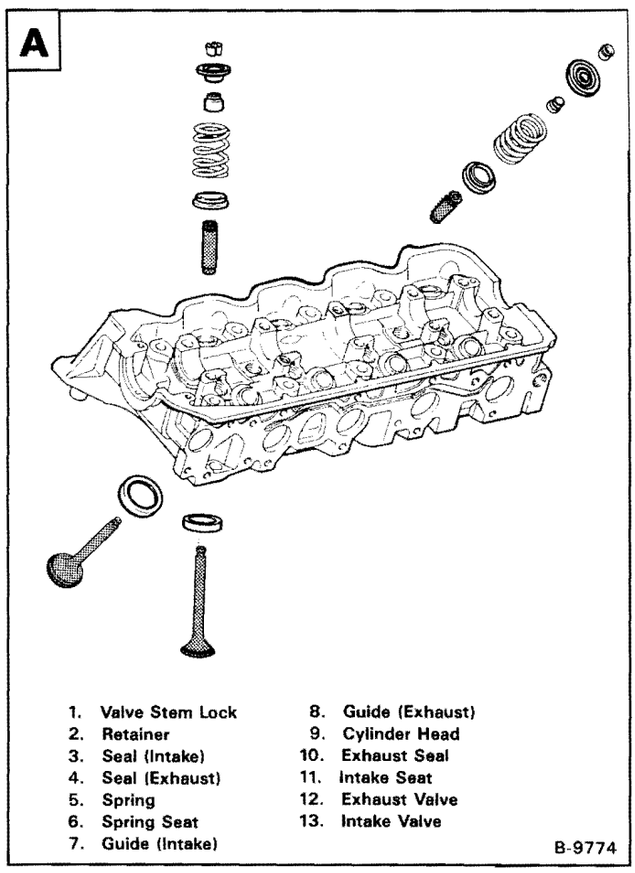
MEL-1296 -- Valve Stem Seal Installation

Remove the cylinder head from the engine block (See Page 7D—31).

Mark the valves so they will be returned to their original position when assembled.

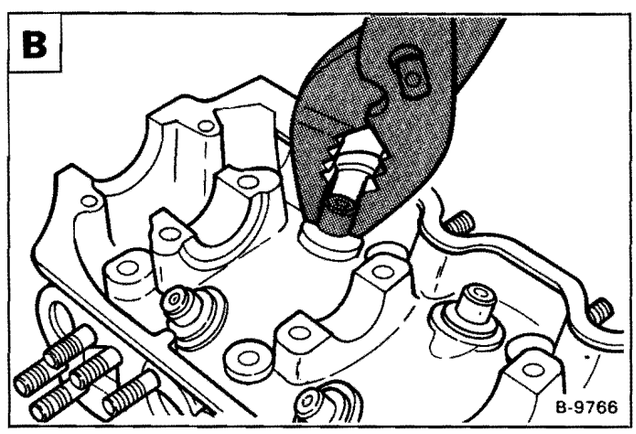
Remove the valve spring locks, using a spring compressor [A].

Remove the spring retainer, spring, spring seat and valve [A].



Remove the valve stem seals with a plier and discard [B].

Before reassembly, check the valves, valve seats and guides.



Installation

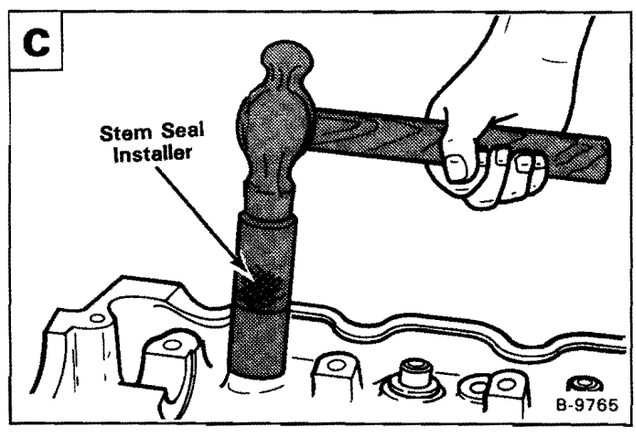
Make sure the cylinder head is clean.

Install the spring seal on the valve guide. Use the special tool, install the valve stem seal into position. DO NOT turn the seal when installing it.

The seal is installed in the specified position by the special tool. Incrorect installation of the seal will affect the seal lip I.D. and eccentricity, resulting in oil leakage down the valve guide.

Put oil on the valve stems and install. Install the valve springs and spring retainer. Use a spring compressor and install the valve spring locks.

Tap the valve stem with a hammer a small amount to seal the valve stem locks.



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VALVES (Cont'd)

Reconditioning the Valve and Valve Seat

Use the correct equipment to grind the valve and valve seats.

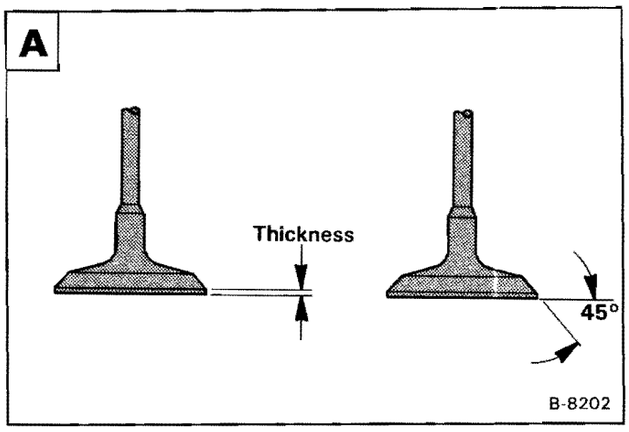
The angle of the intake and exhaust valves is 45° [A].

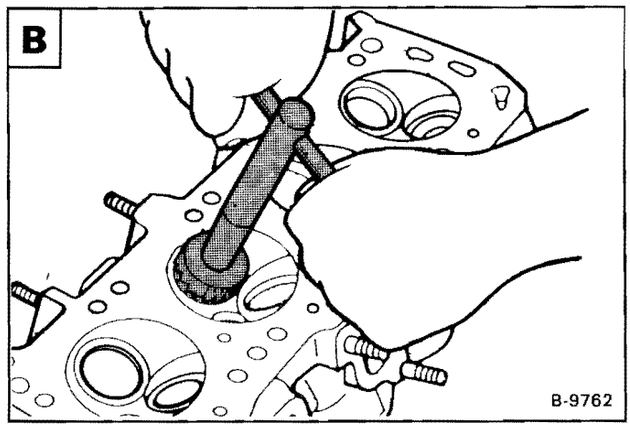
The valve head thickness is as listed [A].

Standard . . . . . 0.059" (1,5 mm)
Service Limit . . . . . 0.039" (1,0 mm)

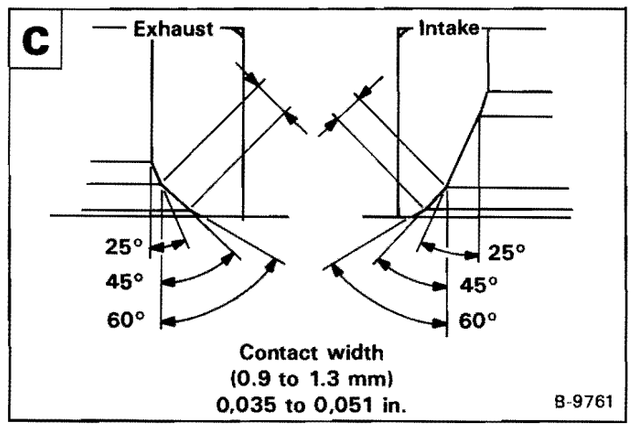
Check the valve stem tip for being pitted, correct the stem tip by grinding. This must be limited to a minimum.

Grind the valve seat, using a valve seat cutter (hand operated) or grinding equipment [B].





Make sure the valve seat has the correct contact width [C].



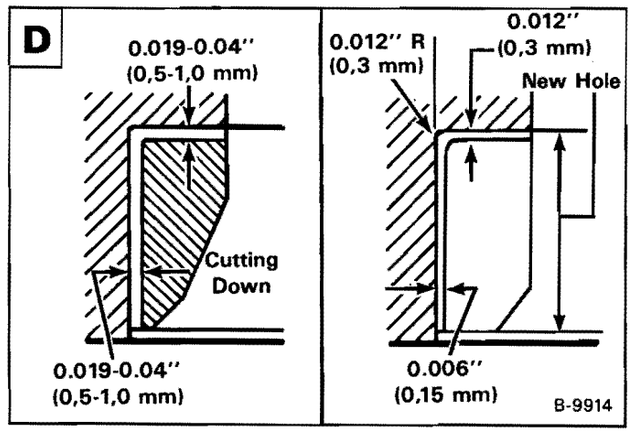
Valve Seat Inserts

Remove the valve seat insert which has been worn out by cutting down its wall thickness with a cutter as shown [D].

Machine the insert hole to the correct oversize with a cutter or reamer as shown [D].

Heat the cylinder head to 120°F. (50°C.) and press fit the oversize insert into the machined hole.

After installation, grind the insert to the correct angle and check the depth of the valve [C].



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VALVES (Cont'd)

Valve Guides

The tool listed will be needed to do the following procedure:

MEL-1298 — Valve Guide Installation & Removal

Check the valve guides for wear with a dial indicator [A].

If the movement is more than listed specifications, replace the valve guide.

Intake:
Standard . . . . . 0.0012 - 0.0024" (0,03 - 0,06 mm)
Service Limit . . . . . 0.004" (0,1 mm)

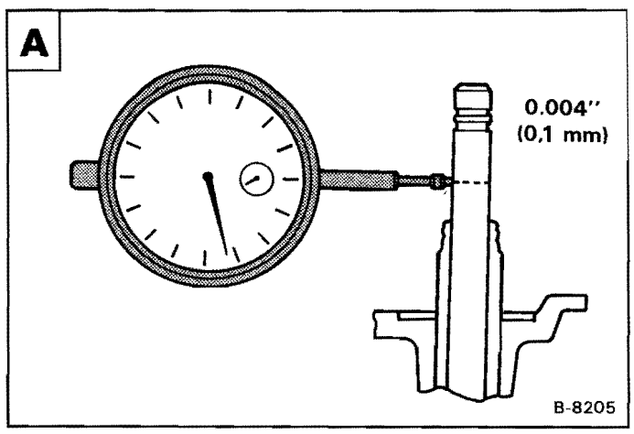
Exhaust:
Standard . . . . . 0.0020 - 0.0035" (0,05 - 0,09 mm)
Service Limit . . . . . 0.006" (0,15 mm)

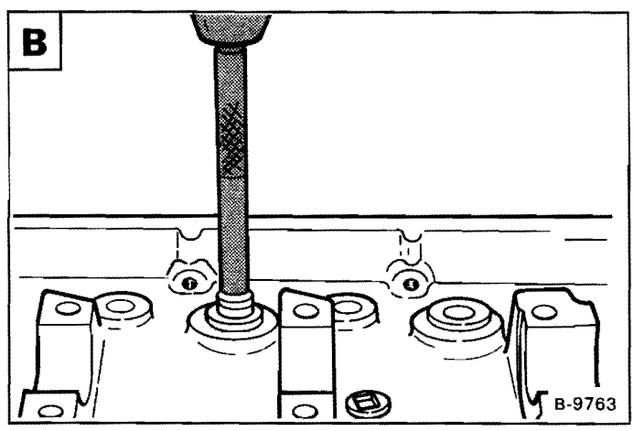
NOTE: Make sure to check the valve stem for wear before replacing the valve guide.

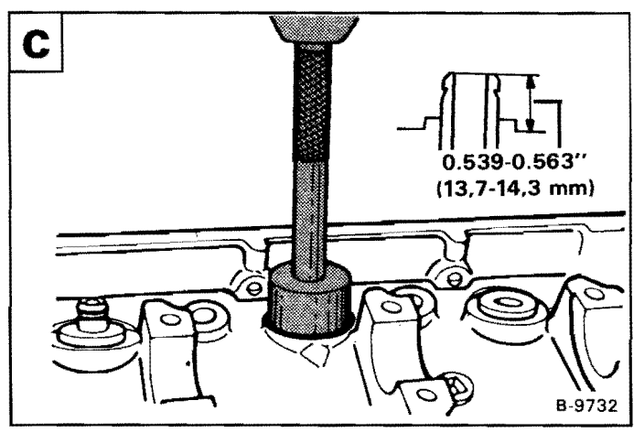
Heat the cylinder head to a temperature of about 480° F. (250° C.). Use the correct tool and press the valve guide out of the cylinder head [B].

Check the specifications, Section 8 for the correct oversize valve guide.

Ream each bore in the cylinder head to the correct size at normal temperature. Heat the cylinder head to about 480° F. (250° C.) and quickly press the valve guide into position using the correct special tool [C]. The correct tool, ensures the guide is pressed in the specified depth.





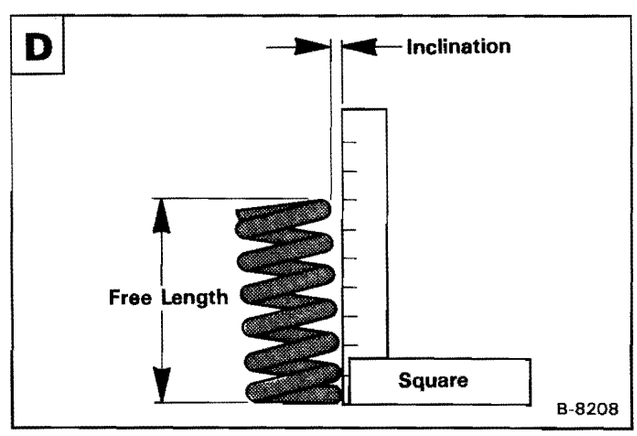


Valve Spring

Check the free length and inclination of the exhaust and intake springs [D].

New Free Length . . . . . 1.811" (46 mm)
Service Limit . . . . . -0.039" (-1,0 mm)

Inclination . . . . . 1.5°
Service Limit . . . . . 3°



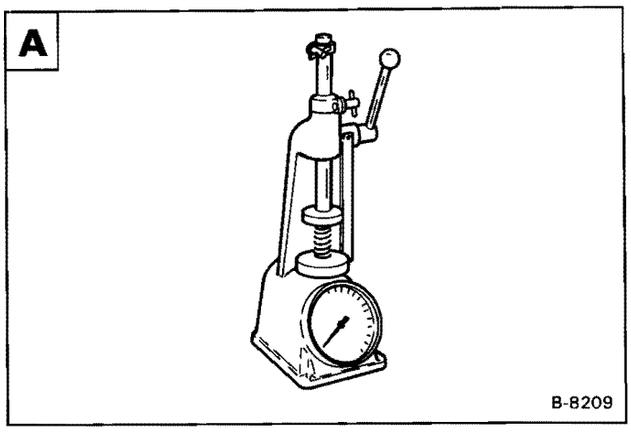
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VALVES (Cont'd)

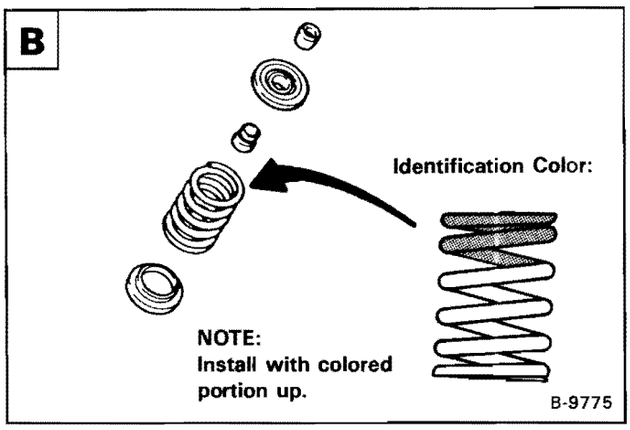
Check the valve spring tension [A].

New Pre-load . . . . . 29 lbs. @ 1.469" (13,2 kg @ 37,3 mm)

Used Pre-load . . . . . 83 lbs. @ 1.106" (38,0 kg @ 28,1 mm)
Service Limit . . . . 76 lbs. @ 1.106" (34,5 kg @ 28,1 mm)



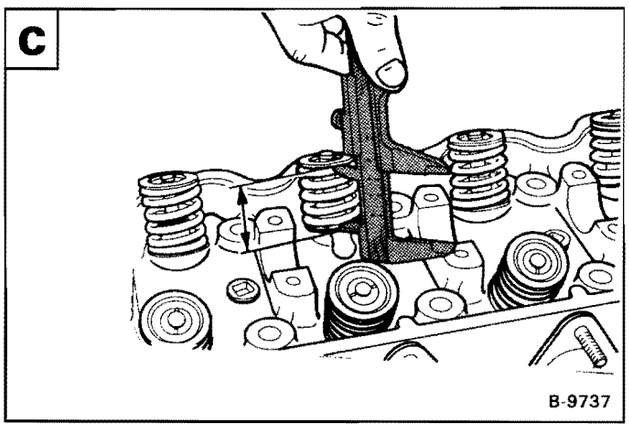
The exhaust and intake valve springs are the same. When installing the spring the colored portion (red or green) is in the up position [B].



Check the valve seat insert depth [C].

If the depth exceed the service limit, replace the valve seat insert.

Installed Height of Spring: Standard . . . . 1.469" (37,3 mm)
Service Limit . . . . . +0.039" (+1,0 mm)



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PISTON AND CONNECTING ROD

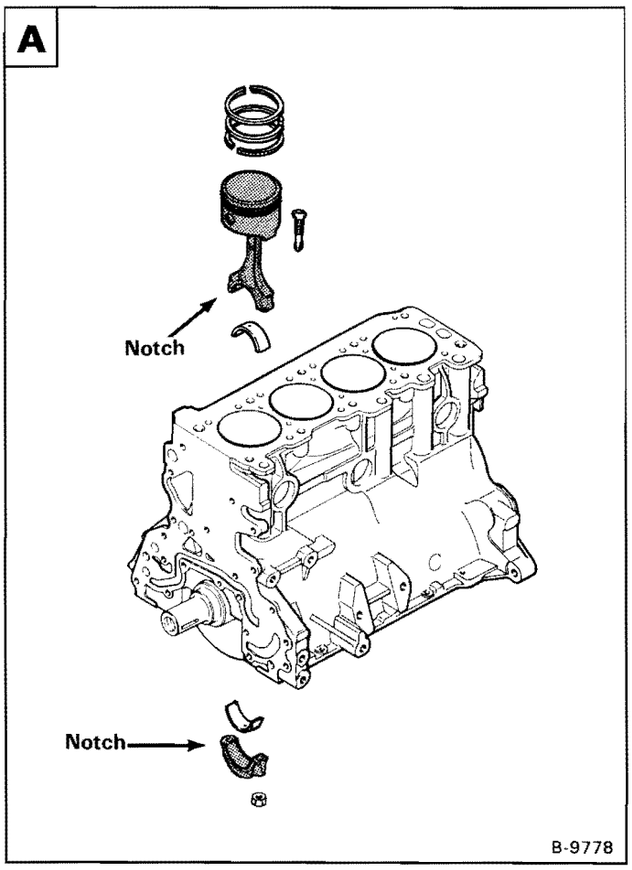
Removal

Remove the cylinder head (See Page 7D—31).

Remove the oil pan (See Page 7D—52).

Remove the ridge and carbon deposits at the top of the cylinder bore with a ridge reamer.

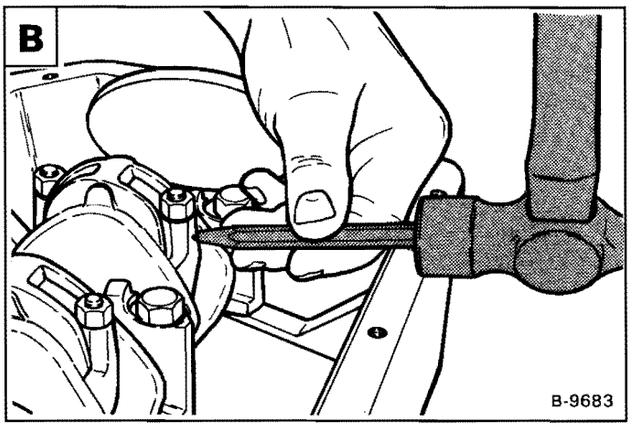
Make sure the piston have identification marks [A].



Rotate the crankshaft until a pair of connecting rods are at B.D.C.. Make sure the connecting rod caps and the rods have identification marks [B].

Remove the nuts and remove the caps.

NOTE: If the bearings are to be used again, they must be marked so they will be returned to their original location.



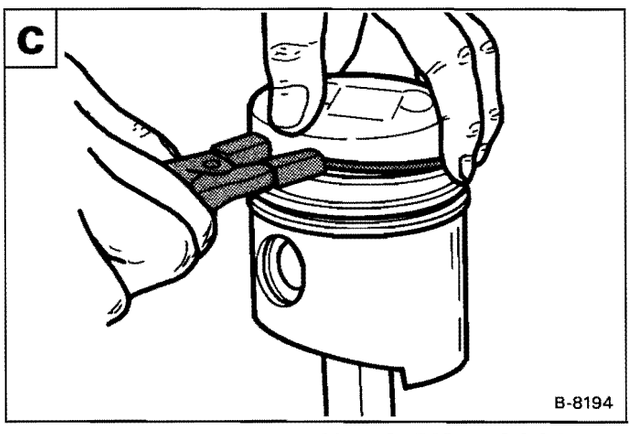
Use a hammer handle, push the piston and rod assembly out of the engine block.

After the pair has been removed, rotate the engine crankshaft and remove the other pair of pistons.

Disassembly

Remove the rings from the pistons [C].

To remove the piston pin from the connecting rod , a special tool is needed, See Page 7D—41 for the correct procedure for disassembly and assembly.



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PISTON AND CONNECTING ROD (Cont'd)

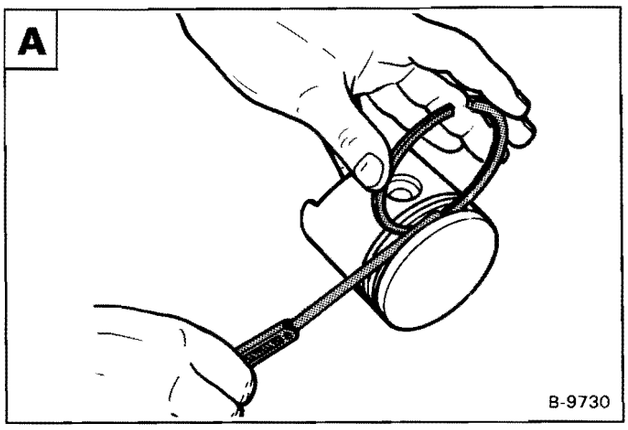
Inspection

Clean all the parts in clean solvent.

Check the clearance of the new rings in the piston grooves [A].

No. 1 Ring:
Standard . . . . . 0.0012 - 0.0028" (0,03 - 0,06 mm)
Service Limit . . . . . 0.004" (0,1 mm)

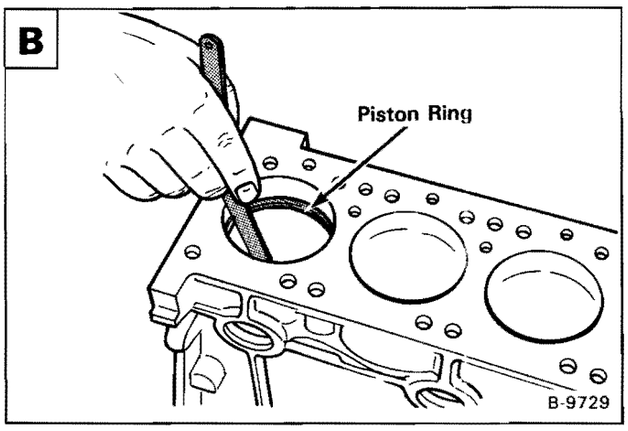
No. 2 Ring:
Standard . . . . . 0.0008 -0.0024" (0,02 - 0,06 mm)
Service Limit . . . . . 0.004" (0,1 mm)



Check the ring gap in the cylinder bore [B].

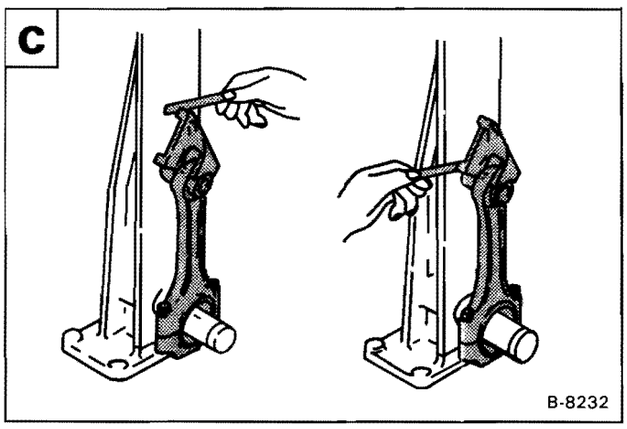
No. 1 & 2 Ring End Gap:
Standard . . . . . 0.008 - 0.16" (0,2 - 0,4 mm)
Service Limit . . . . . 0.039" (1,0 mm)

Oil Ring Side Rail:
Standard . . . . . 0.008 - 0.020" (0,2-0,5 mm)
Service Limit . . . . . 0.39" (1,0 mm)



Check the connecting rod alignment [C].

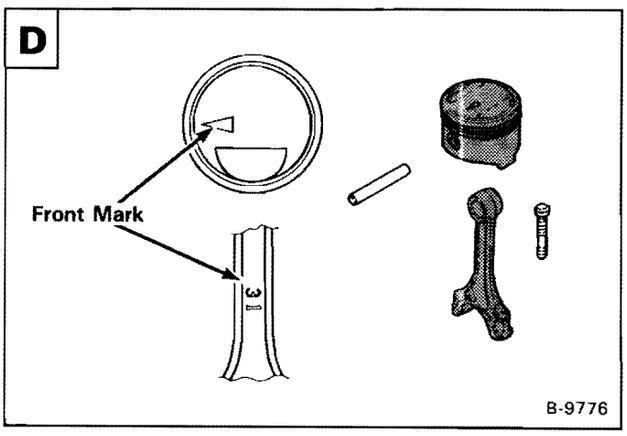
Connecting Rod Bend:
Standard . . . . . 0.0020"/3.937" or less (0,05 mm/100 mm)



Assembly

When assembling the piston and connecting rod, make sure to align the marks on the piston and rod [D].

See Page 7D—41 for the correct procedure to press the piston pin into the connecting rod.

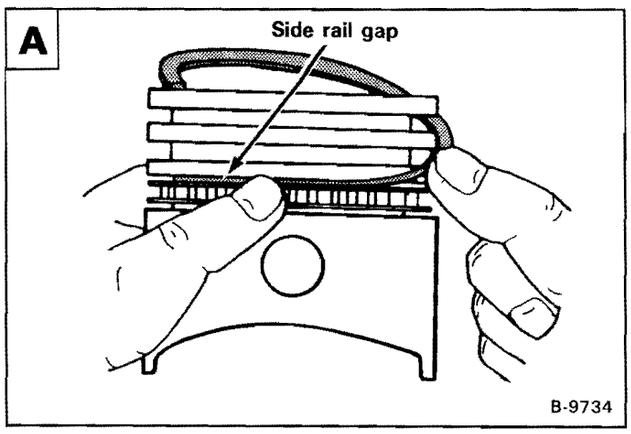


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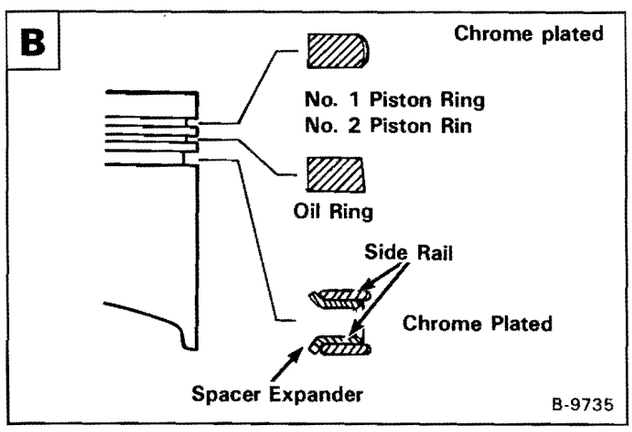
PISTON AND CONNECTING ROD (Cont'd)

Install the piston rings on the piston in the following sequence:

1. Install the three piece oil ring [A].



2. Install the No. 2 ring [B].
3. Install the No. 1 ring [B].



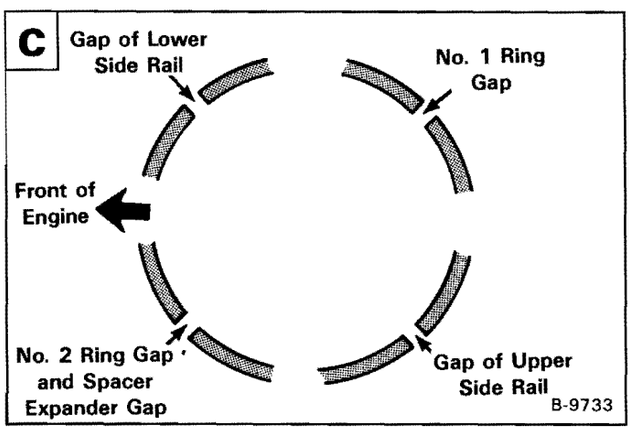
Installation

NOTE: Make sure the piston ring gaps are positioned as illustrated [C].

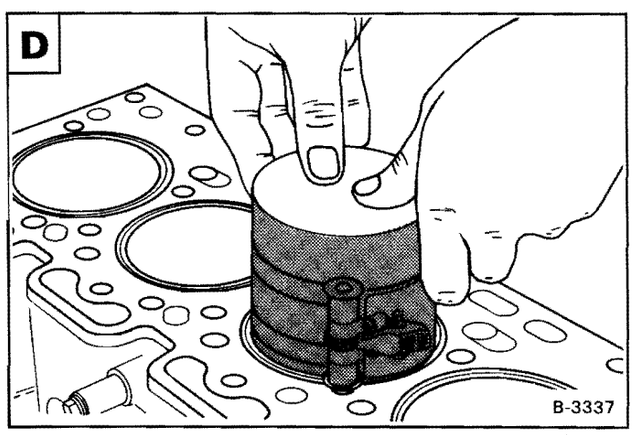
Put oil around the piston and piston rings.

Using a ring compressor tool, compress the rings on the piston.

Make sure the "mark" is toward the front of the engine block.



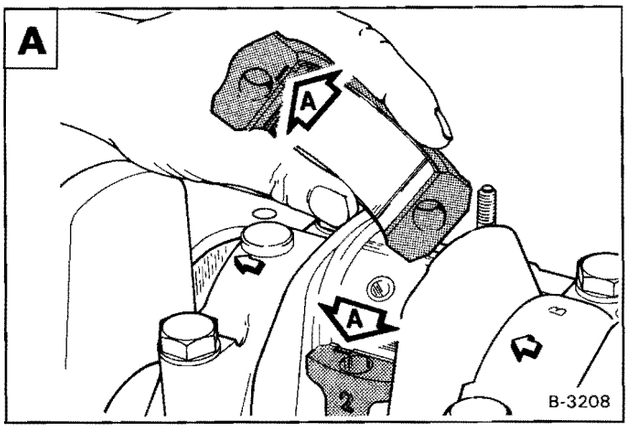
Install the piston and connecting rod assembly [D].



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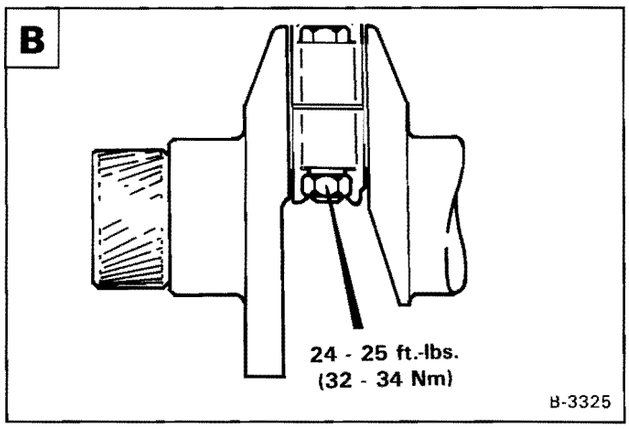
PISTON AND CONNECTING ROD (Cont'd)

Put oil on the bearings. Install the bearing cap [A].



Tighten the nuts to 24 - 25 ft.lbs. (32 - 34 Nm) torque [B].

Rotate the crankshaft to put the other pair of crankpins at the bottom dead center. Repeat the procedure and install the other pair of pistons.



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PISTON PIN

Assembly of the Tool

The tool listed will be needed to do the following procedure:

MEL-1286 — Piston Pin Tool Set

Install the retaining ring (Item 1) on the tube (Item 2) [A] (MEL-1290).

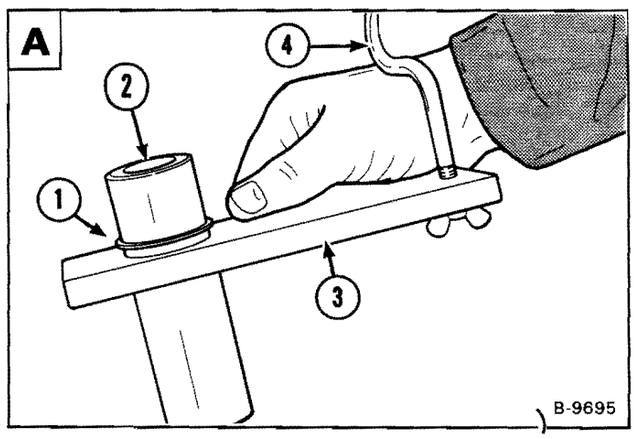
Drive or press the tube into the base (Item 3) [A] (MEL-1291).

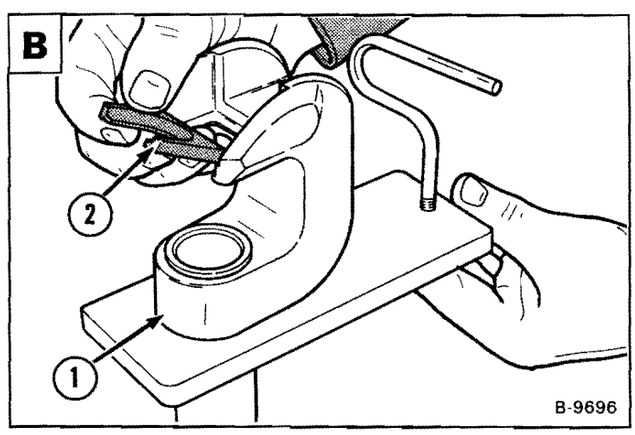
Install the rear support (Item 4) and wing nut [A] (MEL-1289).

NOTE: The rear support will have to be adjusted so the piston and connecting rod assembly are level in the anvil.

Install the anvil (Item 1) on the tube [B] (MEL-1293).

Install the insert (Item 2) into the anvil [B] (MEL-1294-1).

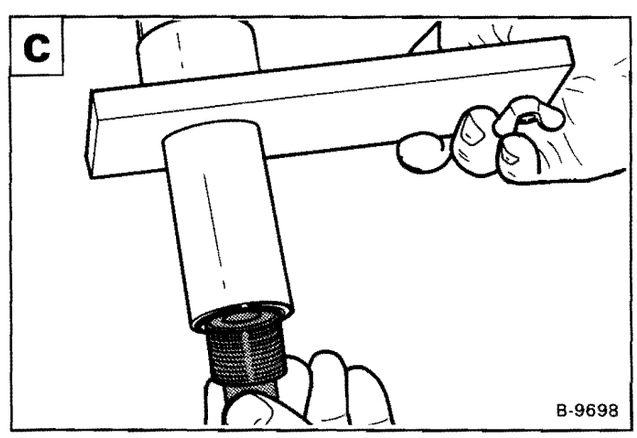




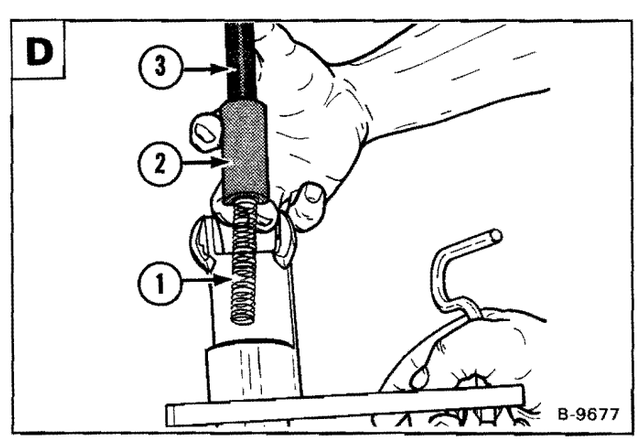
Removal of the Piston Pin

Before pressing the old pin from the piston and connecting rod assembly do the following, this will correctly set up the tool:

1. Install the stop plug (MEL-1287) into the tube [C].



2. Install the spring (MEL-1288) (Item 1), spacer (MEL-1294-3) (Item 2) and pin guide (MEL-1292) (Item 3) into the tube [D].



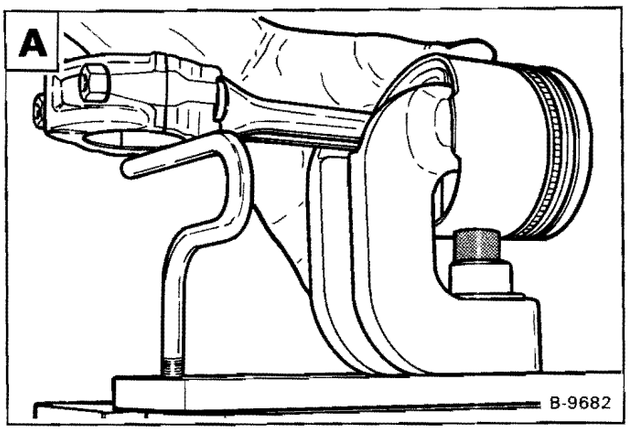
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PISTON PIN (Cont'd)

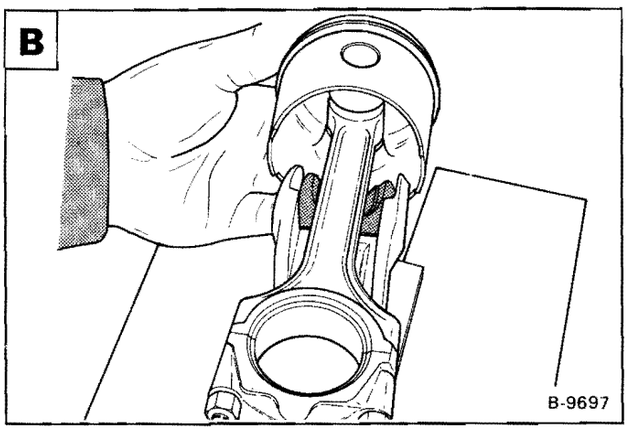
3. Install the old piston and connecting rod assembly on the insert in the anvil. Make sure the insert goes between the rod small end and piston. Hold the piston down against spring pressure.

4. Turn the stop plug inward until the pin guide (Item 1) just begins to lift the piston from the insert [A]. Now the stop plug is set for the correct distance when installing the new piston pins.

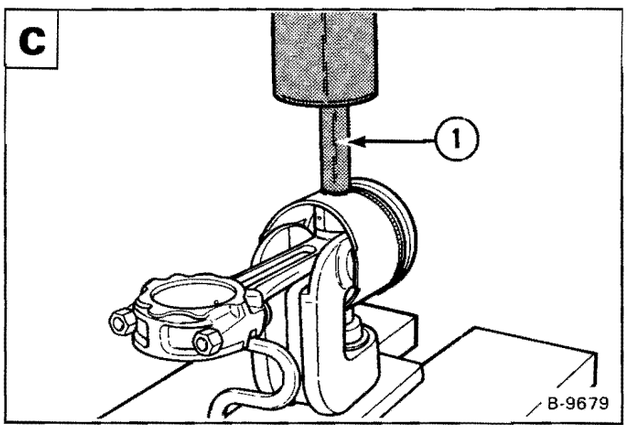
5. Remove the pin guide, spacer and spring from the tube.



Install the piston and connecting rod assembly into the anvil, make sure the insert (MEL-1294-1) goes between the rod small end and the piston [B].



Use the drive tool (MEL-1294-2) (Item 1) and press the pin from the rod and piston [C].

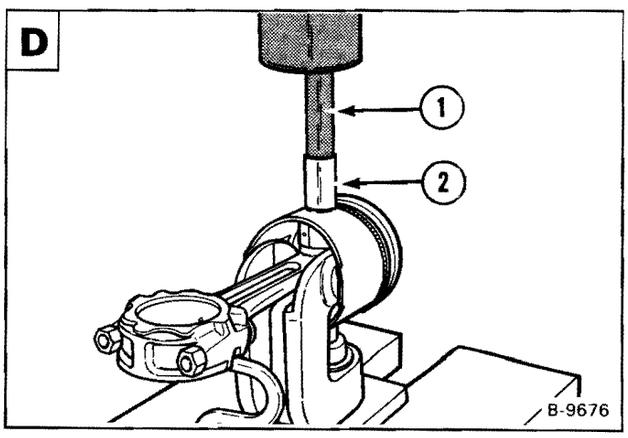


Installation of the Piston Pin

Install the spring, spacer and pin guide into the tube. The pin guide, under spring pressure, will pass up through the rod and piston in line until the new pin is installed.

Put oil on the piston pin before installing it into the piston and rod.

Use the driver tool (MEL-1294-2) (Item 1), press the pin (Item 2) into the piston and connecting rod, until the spacer stops against the plug on the bottom of the tube [D]. Check to see if the pin is centered in the connecting rod. Equal space at both sides of the piston pin.



NOTE: The piston must be free to move while pressing the pin into position, check it several times during installation of the piston pin.

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CYLINDER LINERS

Checking

Check the cylinder bore with an inside micrometer. The checks must be made at parallel and right angles to the center line of the bore [A].

Measuring points are done approximately 0.35" (9 mm), 3.5" (90 mm) and 5.4" (150 mm) below the top of the cylinder bore.

Standard . . . . . 3.0276" (76,9 mm)

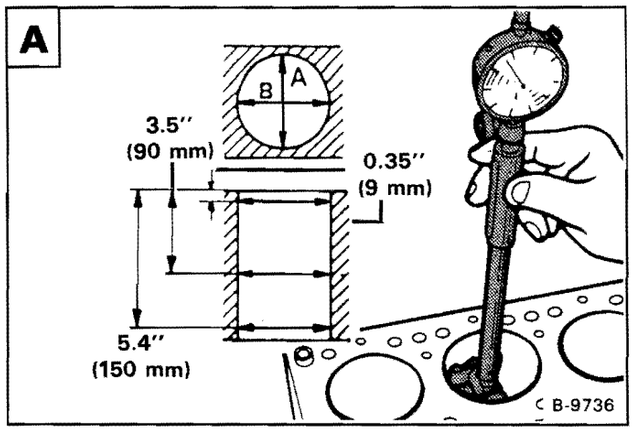
Out-Of-Round and Taper:
Standard . . . . . 0.0008" (0,02 mm) or less

Piston to Cylinder Wall Clearance:
Standard . . . . . 0.0008 - 0.0016" (0,02 - 0,04 mm)

If the cylinder bores show wear more than specified out-of-round or taper or if the bores are badly scuffed or scored, the cylinder block must be re-bored and honed to oversize and O/S pistons fitted.

Piston Service Size:

0.010" (0,25 mm) O.S.
0.020" (0,50 mm) O.S.
0.030" (0,75 mm) O.S.
0.039" (1,00 mm) O.S.



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CRANKSHAFT AND MAIN BEARING

The crankshaft has five main bearings. The end play is controlled by a thrust bearing at the center main bearing.

Each main bearing cap has identification mark in relation to the engine block [A].

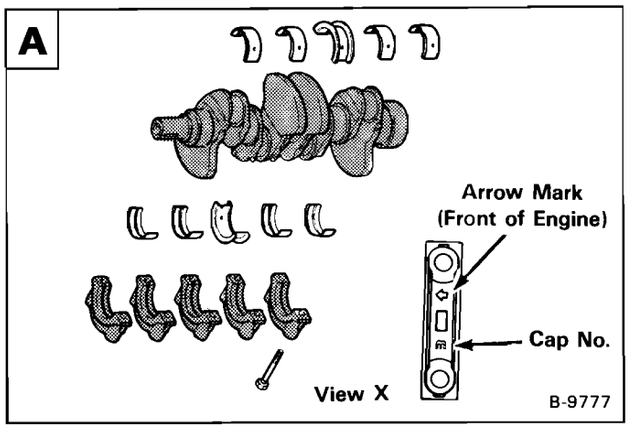
The position of each cap can not be changed from the original location.

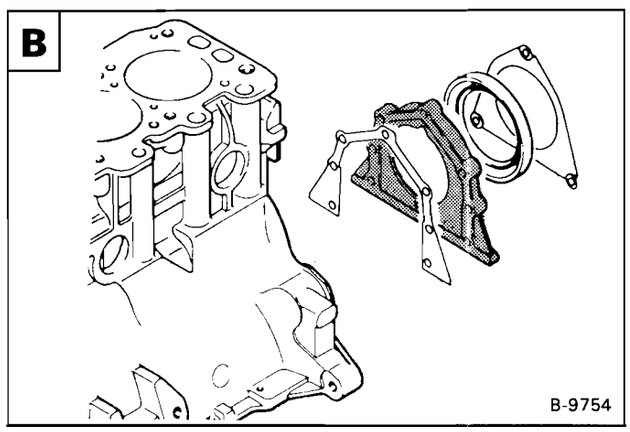
Removal

Remove the timing cover and timing belt (See Page 7D—48).

Remove the oil pan (See Page 7D—52).

Remove the crankshaft rear oil seal and case [B].

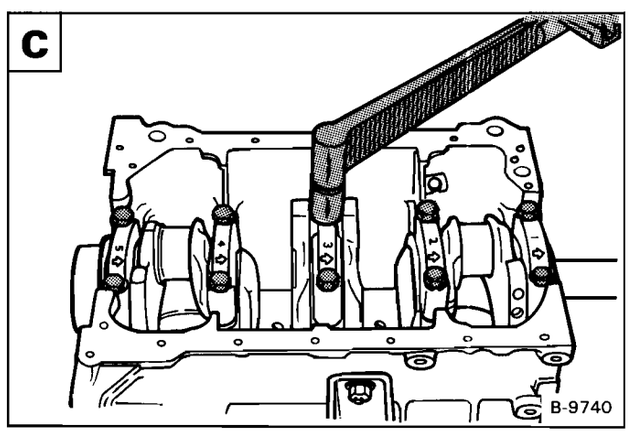




Remove the main bearing caps and bearings [C].

NOTE: If the main bearings are going to be used again, put a mark on them for correct installation.

Remove the crankshaft.



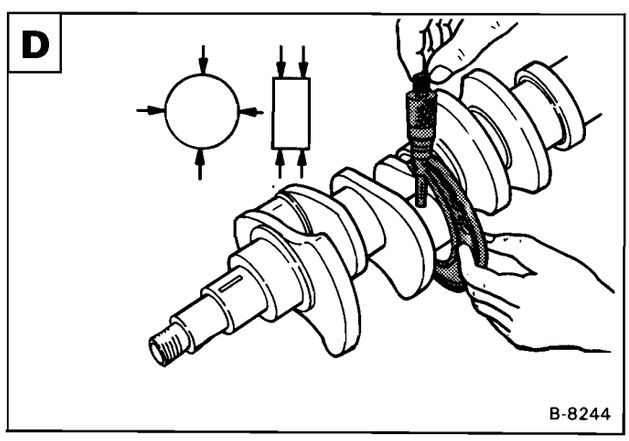
Checking

Check the crankshaft connect rod journals [D]:

Standard . . . . . 1.7717" (45 mm)

Out-of-Round and Taper . . . . . 0.0004" (0,01 mm) or less

Oil Clearance . . . . . 0.0004 - 0.0024" (0,01 - 0,06 mm)



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CRANKSHAFT AND MAIN BEARINGS (Cont'd)

Check the crankshaft main bearing journals [A]:

Standard . . . . . 2.244" (56,99 mm)

Out-of-Round and Taper . . . . . 0.0004" (0,01 mm) or less

Oil Clearance . . . . . 0.0008 - 0.0028" (0,02 - 0,07 mm)

Checking Oil Clearance (Plastic Gauge)

Remove all the oil from the crankshaft bearing journals to be checked.

Cut plastic gauge to the width of the bearing [B].

Install the bearing cap. Tighten the bolts to 37 - 39 ft.lbs. (49 - 53 Nm) torque.

DO NOT turn the crankshaft.

Remove the bearing cap. Measure the width of the plastic gauge [B].

If the clearance exceeds the limit, bearing must be replaced or undersize used.

Installation

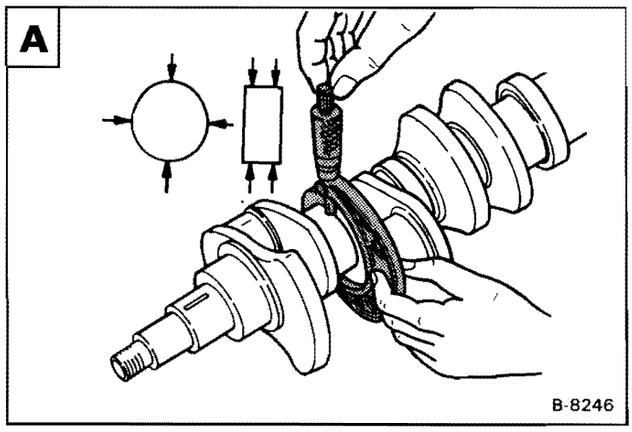
Install the upper bearings in the engine block.

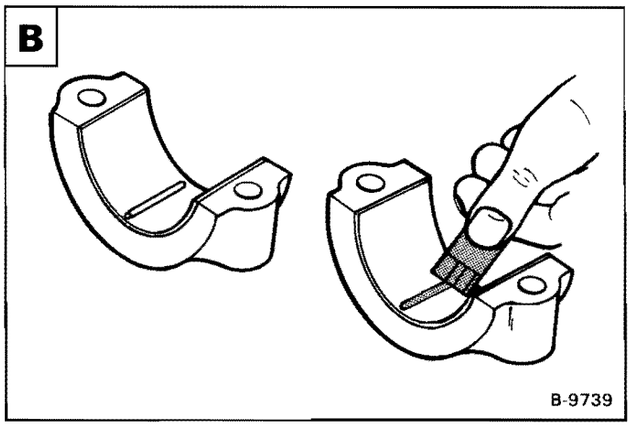
Put oil on the crankshaft journal.

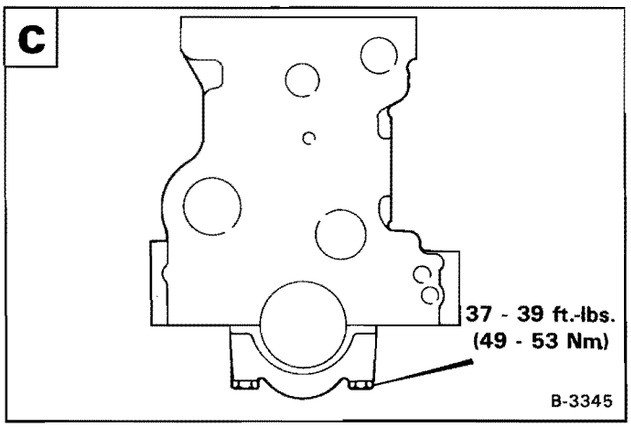
Install the crankshaft.

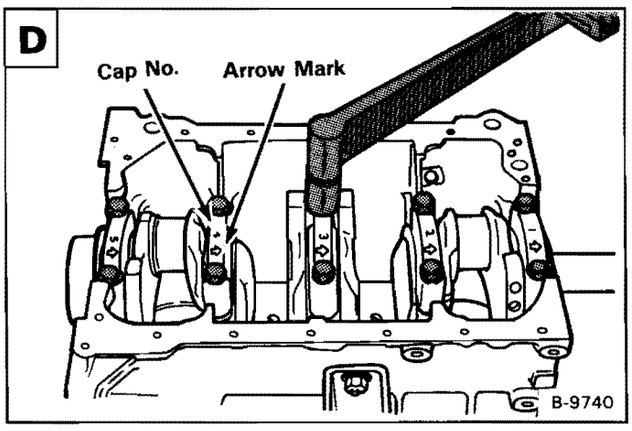
Install the main bearing caps and tighten to specified torque [C].

Starting at the center bearing cap and moving toward each end of the crankshaft [D].









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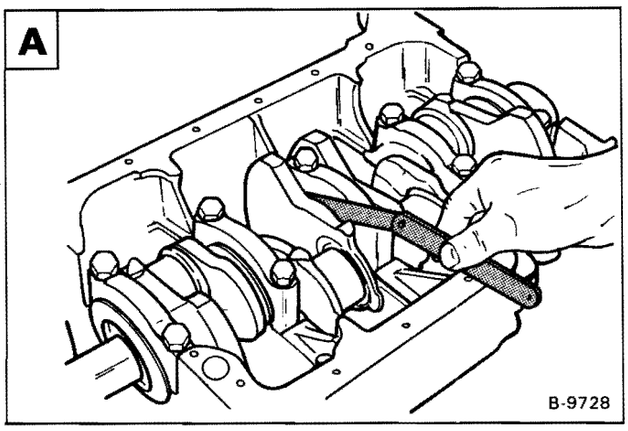
CRANKSHAFT AND MAIN BEARINGS (Cont'd)

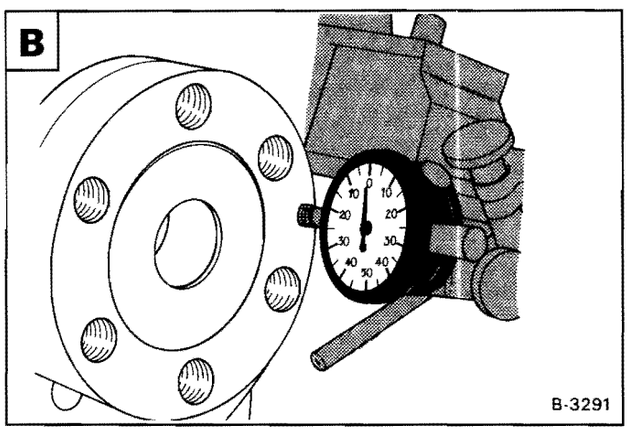
Crankshaft End Play

The end play can be checked by either a feeler gauge [A] or a dial indicator [B].

End Play . . . . . .0.002 - 0.007" (0,05 - 0,18 mm)

The fitting of oversize thrust bearing can be used to correct the end play if it is over specifications.





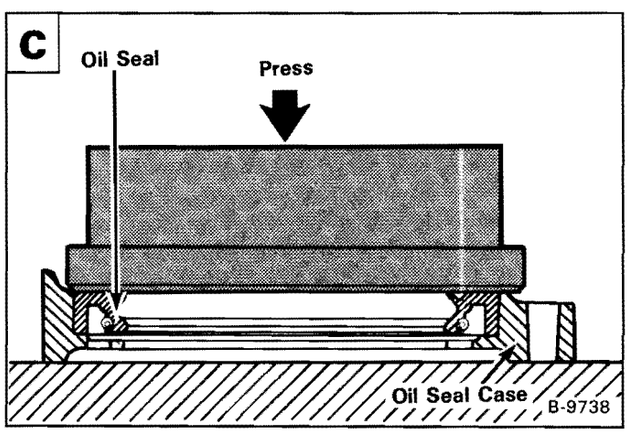
Rear Oil Seal

The tool listed will be needed to do the following procedure:

MEL-1300 — Seal Installation Tool

Press the rear oil seal into the housing using the special tool [C].

Put oil on the seal lip. Install the housing and rear seal on the engine. Install the bolts and tighten.



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TIMING BELT

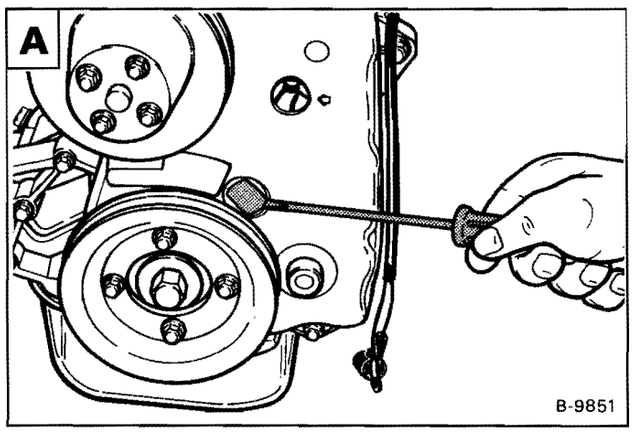
Adjustment

It is not necessary to remove the timing belt covers for adjustment.

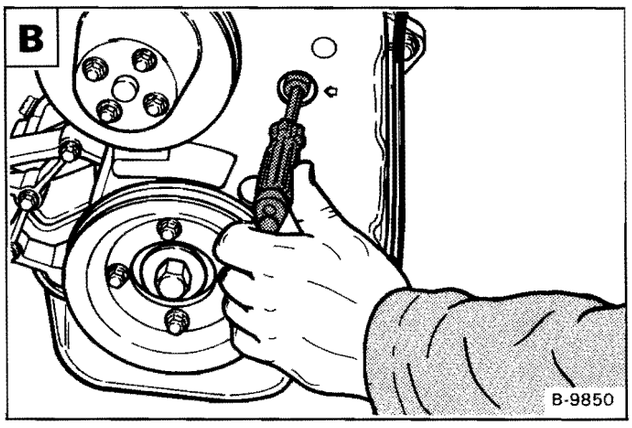
Check and adjust the belt tension every 500 hours of loader operation, use the following procedure:

Remove the shield from the engine.

Remove the plugs (two) in the cover for the timing belt [A].

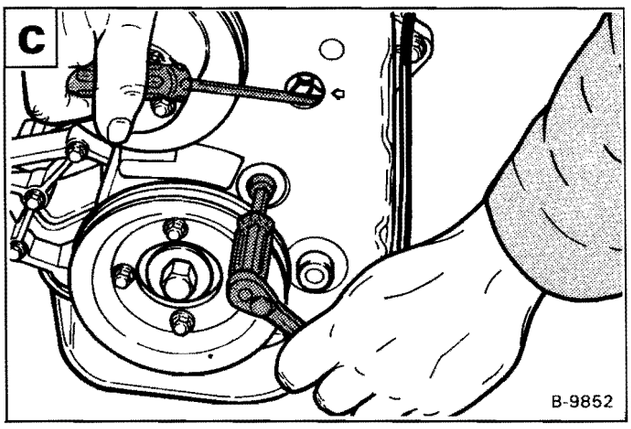


Loosen the top nut and bottom bolt [B].



Put a screwdriver into the top hole and push on the belt tensioner bracket to remove excessive slack from the timing belt [C].

Tighten the bottom bolt after the slack has been removed [C].



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TIMING BELT (Cont'd)

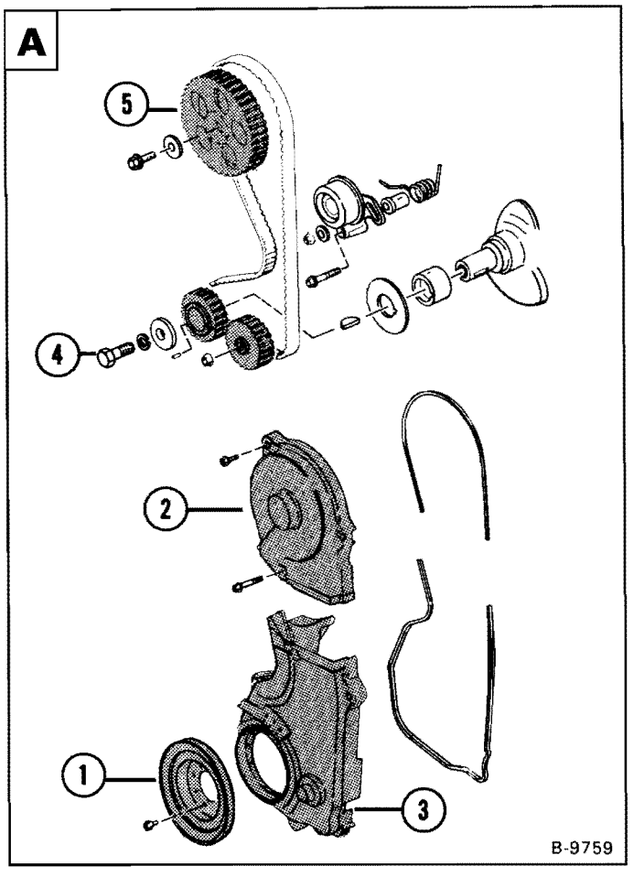
Removal

Remove the crankshaft pulley (Item 1) [A].

Remove the upper timing belt cover (Item 2) [A].

Remove the lower timing belt cover (Item 3) [A].

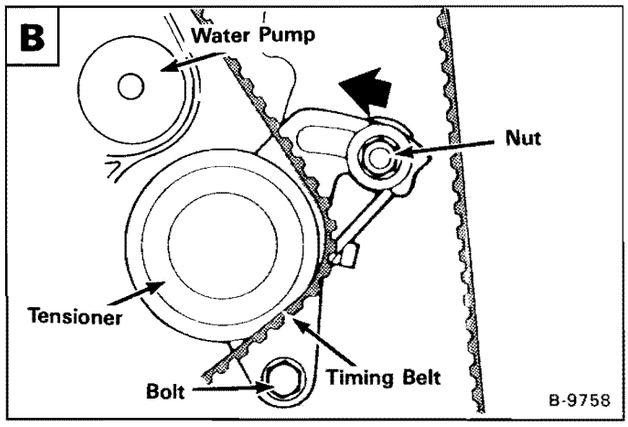
Remove the crankshaft sprocket bolt (Item 4) [A].



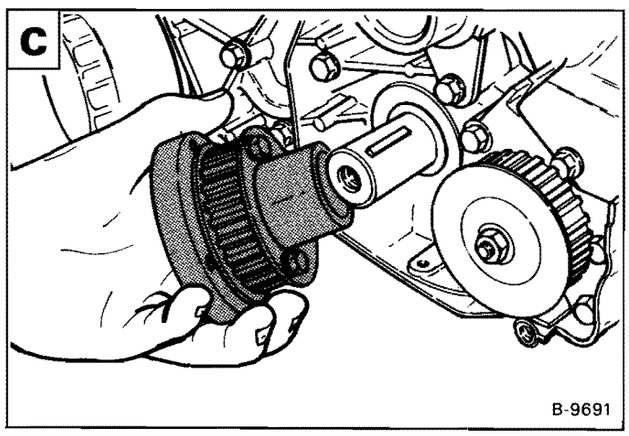
Loosen the belt tensioner mounting nut [B].

Move the belt tensioner to loosen the timing belt [B].

Remove the timing belt from the sprockets.



Remove the crankshaft sprocket [C].



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TIMING BELT (Cont'd)

Inspection

Check the timing belt sprockets and tensioner for wear, cracks or damage.

The surfaces of the oil pump sprocket and camshaft spacer which contact the oil seal must be checked for wear.

Inspect the tensioner for easy and smooth rotation. Check for end play and noise.

Check the belt for oil or dust deposits. The slight deposits must be cleaned with cloth or paper. DO NOT use solvent to clean the timing belt.

Check the timing belt in detail for the following conditions, replace as needed [A].

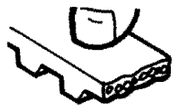
1. Hardened back surface rubber.
2. Cracked back surface rubber.
3. Cracked or exposed canvas.
4. Badly worn teeth (initial stage).
5. Badly worn teeth (last stage).
6. Cracked tooth bottom.
7. Missing tooth.
8. Side of belt badly worn.
9. Side of belt cracked.

A

Flaw Conditions

Back surface glossy. Non-elestic and so hard that even if a finger nail is forced into it, no mark is produced.

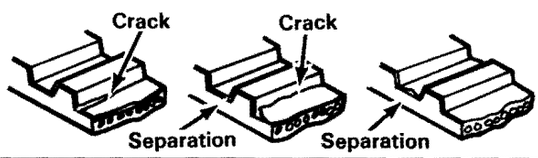
1.



2.



3.



Canvas on load side tooth flank worn (Fluffy canvas fibers, rubber gone and color changed to white, and unclear canvas tecture).

4.

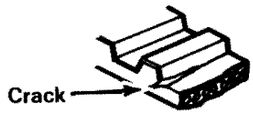


Canvas on load side tooth flank worn down and rubber exposed (tooth width reduced).

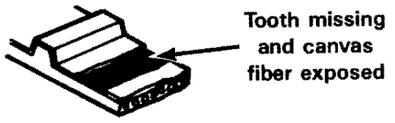
5.



6.

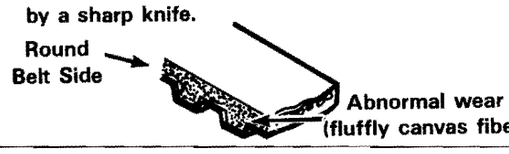


7.

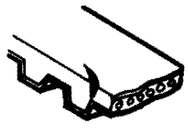


NOTE: Normal belt should have clear-cut sides as if cut by a sharp knife.

8.



9.



B-9751

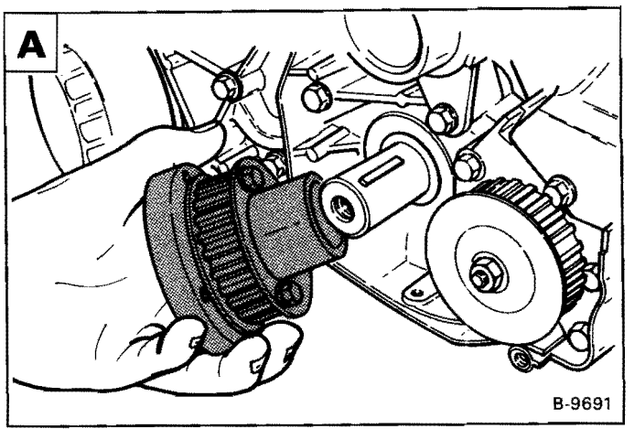
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TIMING BELT (Cont'd)

Assembly

Install the crankshaft sprocket [A].

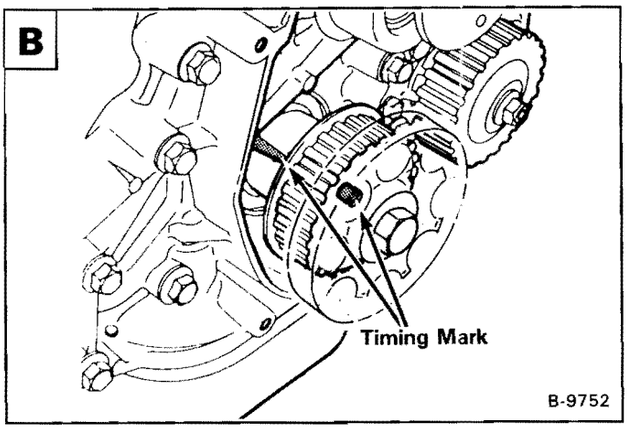
Tighten the bolt to 44 - 50 ft.lbs. (59 -68 Nm) torque.



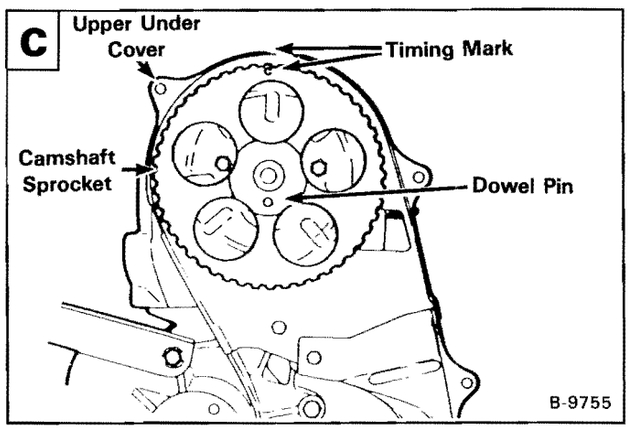
Align timing mark on the crankshaft sprocket with the timing mark on the front case [B].

Put a small amount of oil on the outside of the camshaft spacer and install the spacer on the camshaft.

Install the camshaft sprocket. Tighten the bolt to 44 - 57 ft.lbs. (59 - 78 Nm) torque.



Align the camshaft timing mark with the mark on the upper cover [C].

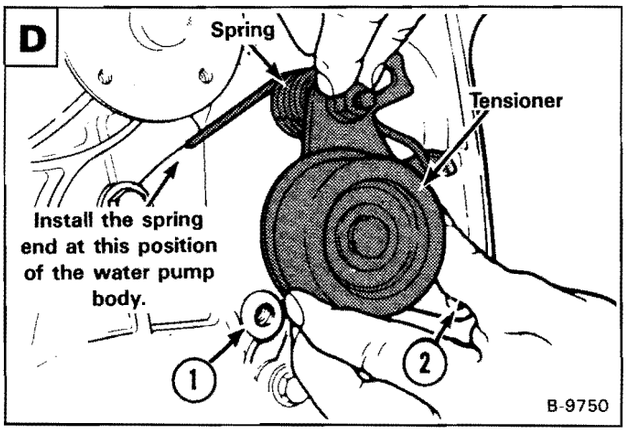


Install the spring and tensioner, and temporarily tighten the nut [D].

Push the flange, located under the tensioner, to make alignment of the holes (Item 1 and 2). Install the bolts into the holes [D].

Install the front end of the spring (bent at right angle) on the projection of the tensioner [D].

Install the other end (straight end) on the water pump body [D].



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TIMING BELT (Cont'd)

Install the timing belt, use the following procedure:

1. Put the belt on the crankshaft sprocket.
2. Install on the oil pump sprocket.
3. Then on the camshaft sprocket.

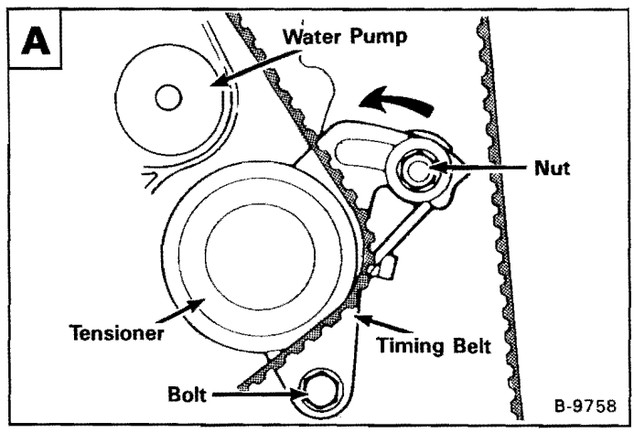
Make sure that all the timing marks are in alignment.

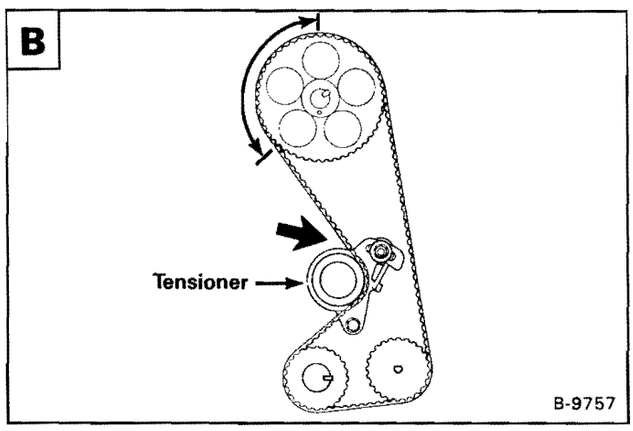
Move the belt tensioner to apply pressure to the belt [A].

NOTE: Do not turn the crankshaft in a reverse direction. DO NOT push or twist the belt or try to test the tension. This will result incorrect belt tension.

Push the tensioner, with your hand a small amount to make sure the belt comes in complete mesh with the sprockets. If this is neglected and the belt tension adjusted with the belt out of mesh with the sprocket (Item 1), the belt tension will not be correct [B].

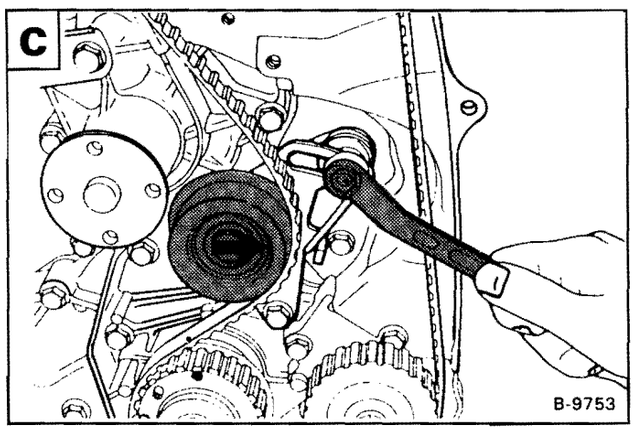
Turn the engine through one revolution in normal direction, to remove all slack at the timing belt.





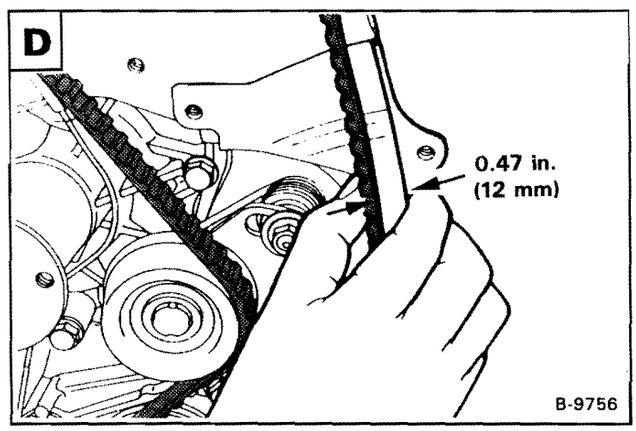
Tighten the tensioner mounting nut first and then the bolt [C].

Tighten the nut and bolt to 16 - 21 ft.lbs. (22 - 29 Nm) torque.



Check the tension side of the timing belt, the clearance between the belt and the seal line is 0.47" (12 mm) [D].

If specifications are not correct, re-adjust the belt.



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FRONT CASE AND OIL PAN

Removal and Installation

The front case contains the oil pump and relief valve and can be removed as an assembly.

Remove the front cover and timing belt (See Page 7D—48).

Remove the engine oil.

Remove the oil pan bolts (Item 1) [A].

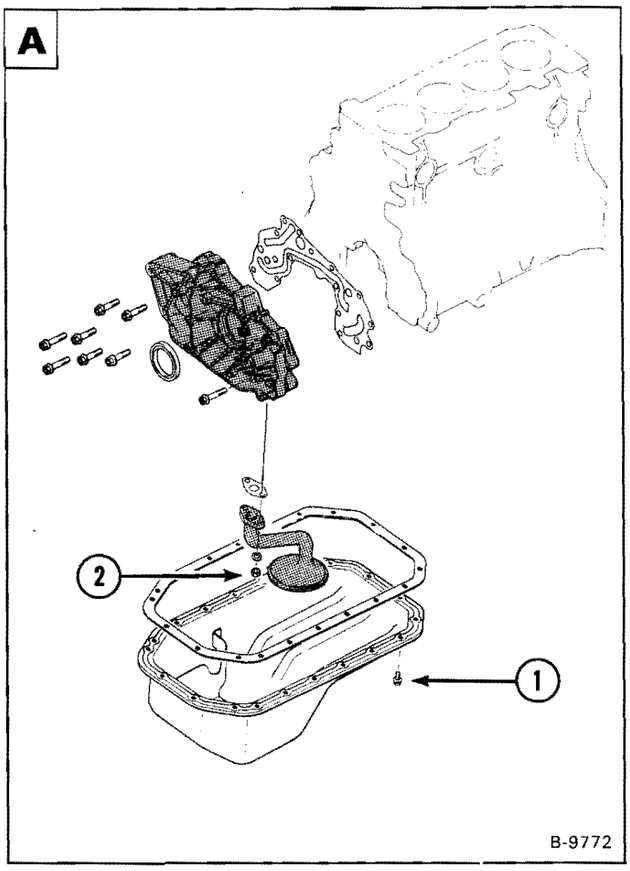
Installation: Tighten the bolts to 4.5 - 5.5 ft.lbs. (6 - 7 Nm) torque.

Remove the oil pan and oil screen.

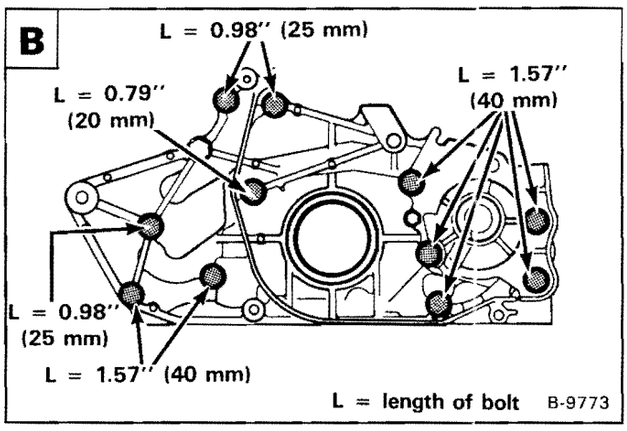
Installation: Tighten the oil screen nuts to 13 - 18 ft.lbs. (18 - 24 Nm) torque (Item 2) [A].

Remove the bolts from the front case [A].

The front case is held closely to the engine block, it may be hard to loosen. Insert a screwdriver into the groove and pry. Avoid prying on the thinner portion of the flange.

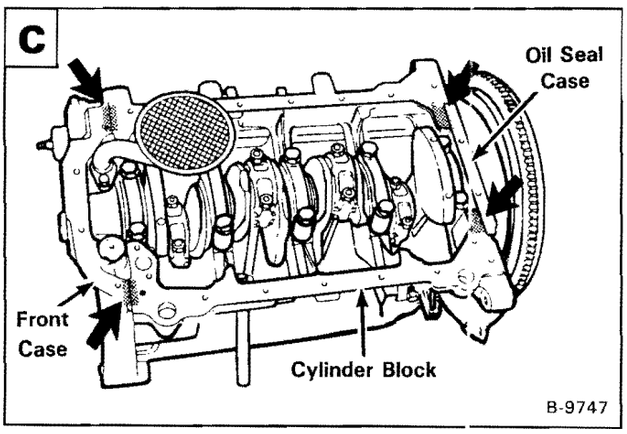


Installation: Install the front case bolts according to the correct length [B]. Tighten the bolts to 11 - 13 ft.lbs. (15 - 17 Nm) torque.



When installing the oil pan, apply sealant to the four areas shown [C].

NOTE: For inspection of the oil pump, See Page 7D—53 for the specifications.



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OIL PUMP

Removal

Remove the timing cover and timing belt (See Page 7D—48).

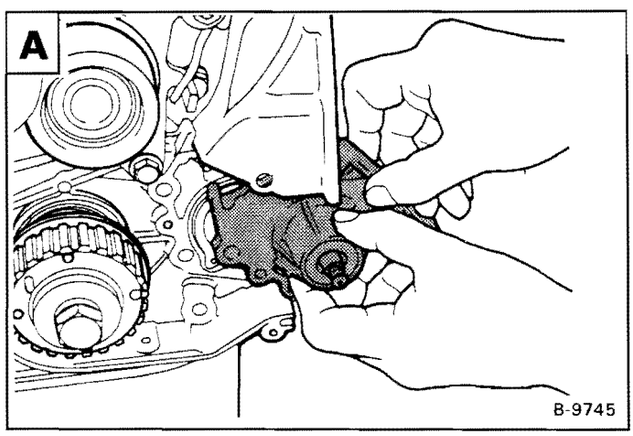
Remove the oil pump sprocket, use the following procedure:

1. Use a old timing belt and put it around the oil pump sprocket to hold it. DO NOT use a screwdriver.
2. Loosen the nut at the sprocket.
3. Remove the timing belt and sprocket.

Remove the pump bolts at the oil pump.

Slide the oil pump assembly away from the front case [A].

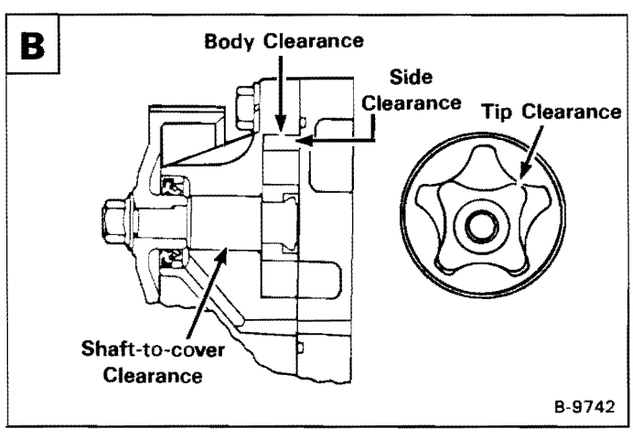
Remove the rotor from the oil pump cover.



Inspection

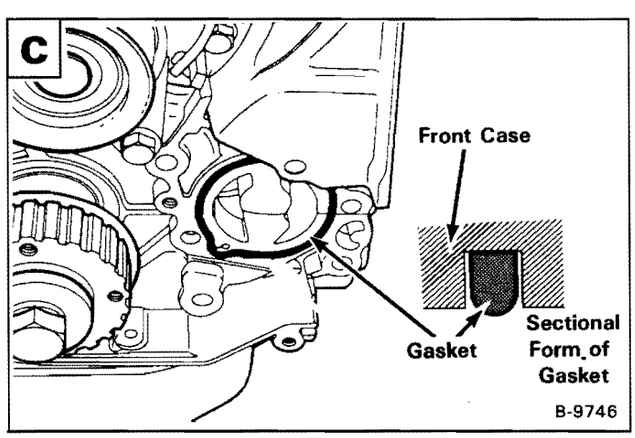
Use a feeler gauge to check the clearances as listed [B]:

Tip Clearance . . . . . 0.0016 - 0.0047" (0,04 - 0,12 mm)
Body Clearance . . . . . 0.0039 - 0.0063" (0,10 - 0,16 mm)
Side Clearance . . . . . 0.0024 - 0.0020" (0,02 - 0,05 mm)
Shaft-to-Cover Clearance . . . . . 0.0008 - 0.0020" (0,02 - 0,05 mm)

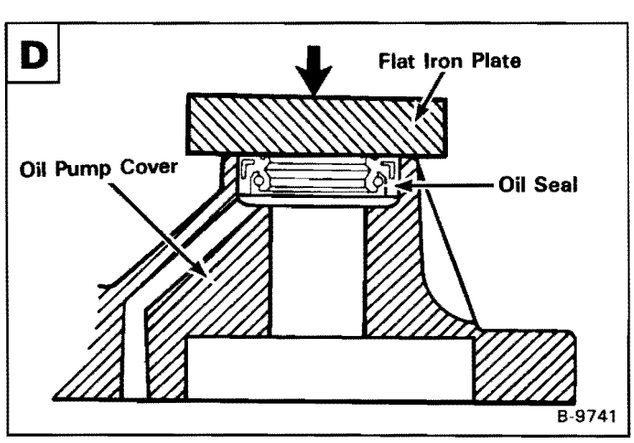


Installation

Install a new cover gasket in the front case [C]. Install the gasket with the round edge toward the oil pump cover.



Use a flat plate, install the oil seal using a press until it is flush with the front edge of the oil pump cover [D].

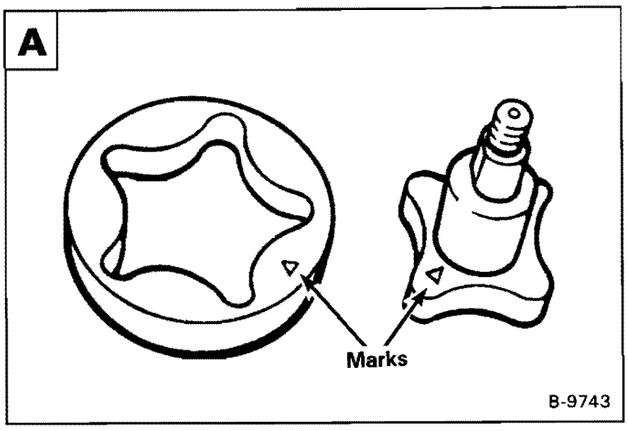


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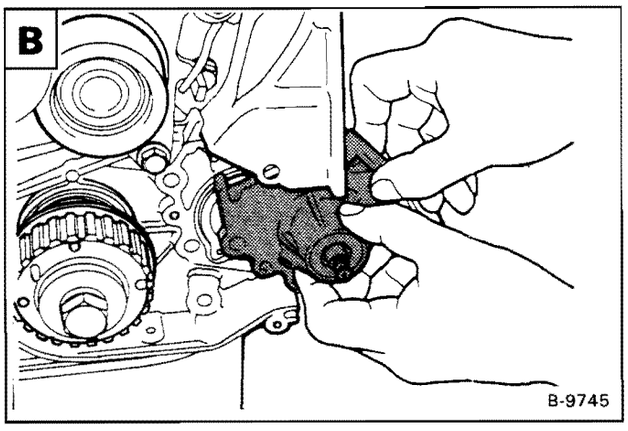
OIL PUMP (Cont'd)

Install the inner and outer rotor in the oil pump cover, after putting oil on the surface of the rotors.

The inner rotor and outer rotor have a mark on them, install the rotors with the marks in the same direction [A].



Slide the oil pump assembly into the front cover [B].



Install the 0.24" (6 mm) diameter bolt (Item 1) first [C].

Install the other bolts and tighten to 11 - 13 ft.lbs. (15 - 17 Nm) torque.

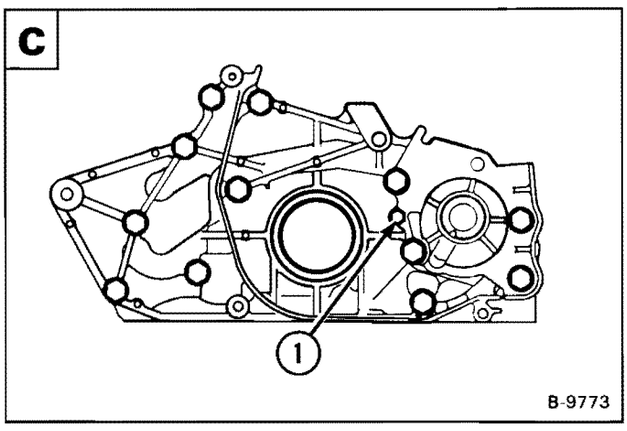
Tighten the bolt (Item 1) to 7.5 - 8.5 ft.lbs. (8 - 11 Nm) torque [C].

Put a small amount of oil on the oil seal.

Install the sprocket for the oil pump.

Put a old timing belt around the sprocket to hold it and tighten the nut to 25 - 28 ft.lbs. (34 - 39 Nm) torque.

Install the timing belt and front cover (See Page 7D—48).



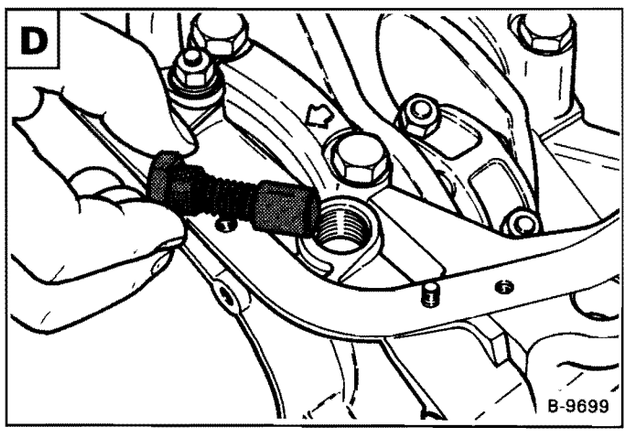
Relief Valve

Remove the oil pressure relief valve [D].

Check the poppet for damage. Check the spring for free length and pre-load as listed below:

Free Length . . . . . 1.850" (47 mm)
Pre-load . . . . . 16 lbs. @ 1.398" (7,1 kg @ 35,5 mm)

If spring is not within specifications, replace the spring.



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FRONT CASE SEAL

Removal and Installation

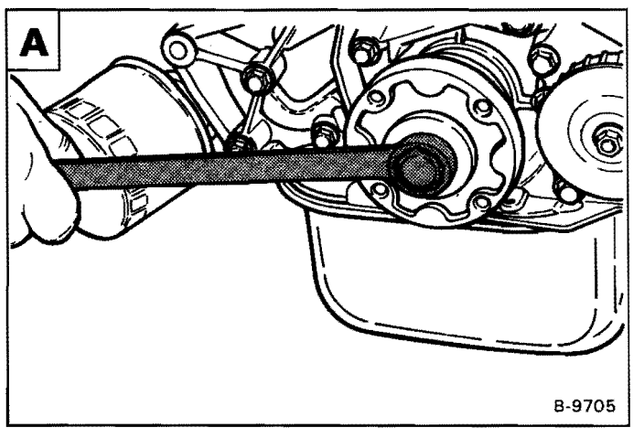
The tool listed will be needed to do the following procedure:

MEL-1301 — Front Crankshaft Seal Installation Tool

Remove the crankshaft pulley, timing belt covers and timing belt (See Page 7D—48).

Remove the bolt at the crankshaft sprocket [A].

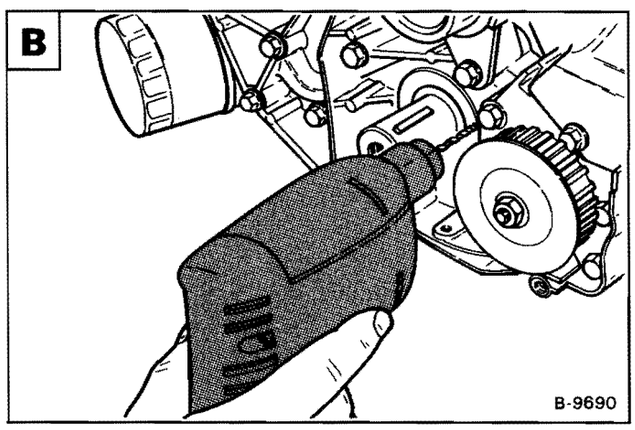
Installation: Tighten the bolt to 36 - 43 ft.lbs. (49 - 58 Nm) torque.



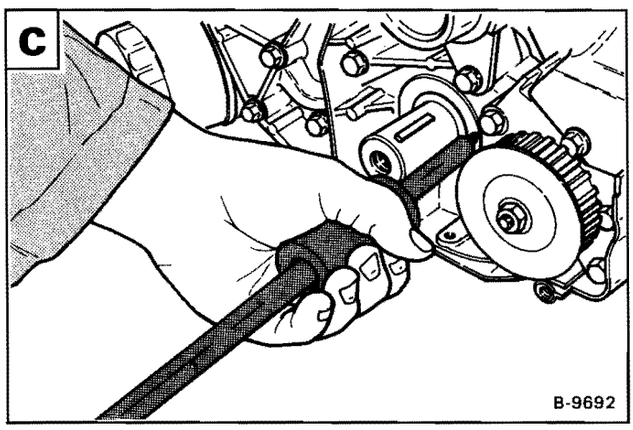
Remove the crankshaft sprocket.

Drill a hole into the front seal [B].

Be careful not to damage the front case surface behind the seal with the drill.

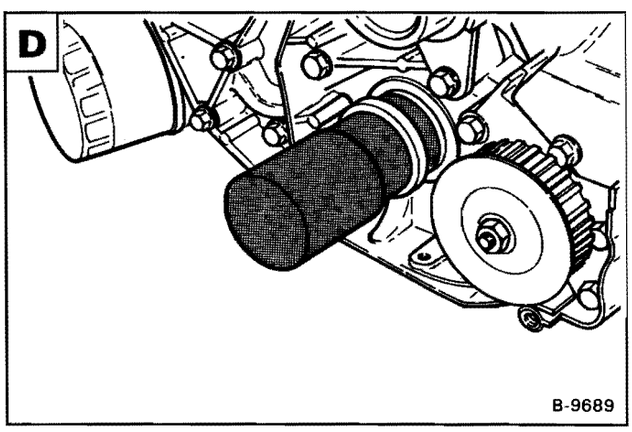


Use a slide hammer puller, remove the front seal [C].



Use the installation tool, install the front seal [D].

1. Install guide over cramshaft and key way (MEL-1301-1).
2. Install seal over the guide.
3. Using the driver, install the seal into the front housing (MEL-1301-2).



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WATER PUMP

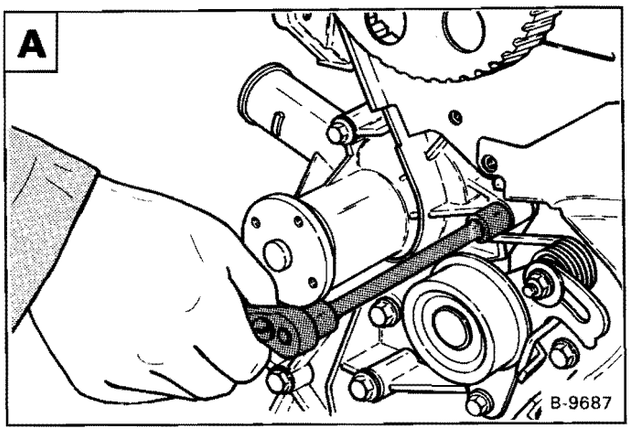
Removal and Installation

Drain the coolant from the cooling system.

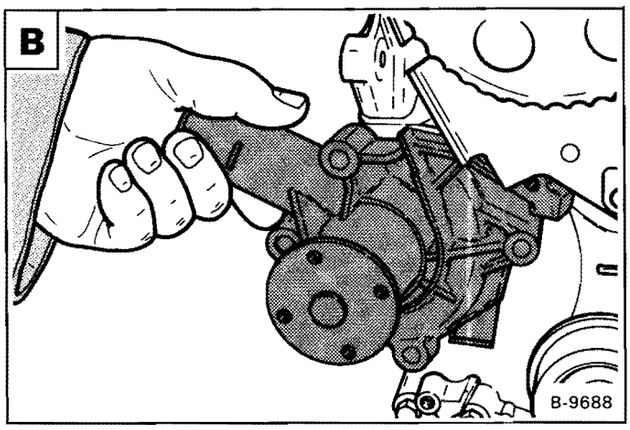
Remove the alternator belt.

Remove the crankshaft pulley, timing belt covers, timing belt, camshaft sprocket and belt tensioner (See Page 7D—48).

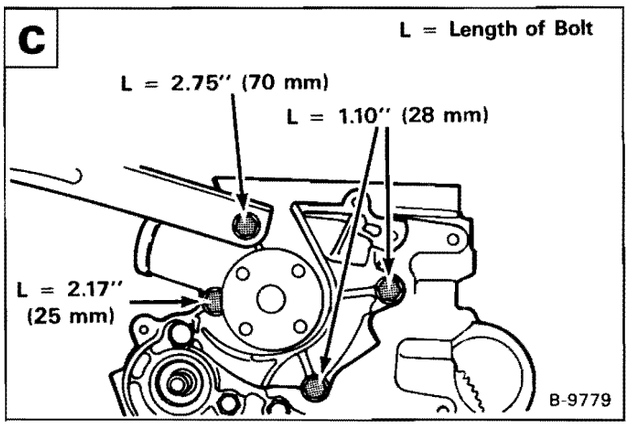
Remove the four water pump bolts [A].



Slide the water pump to the side and remove it from the engine block [B].



Installation: Make sure the correct length bolt is in the correct location [C]. Tighten the bolts to 11 - 13 ft.lbs. (15 - 17 Nm) torque.

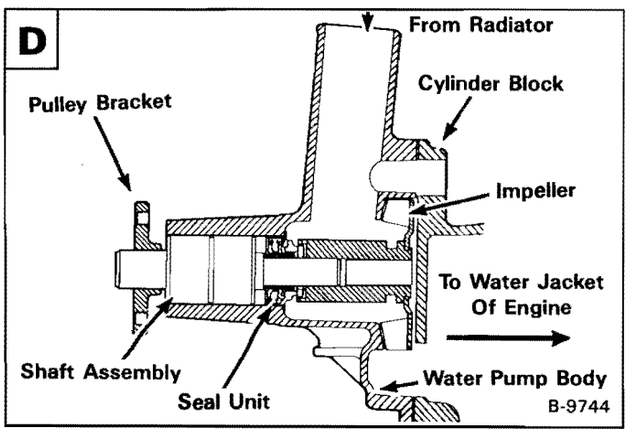


Inspection

Check each part for cracks, damage or wear and replace the water pump assembly if necessary.

Check the bearing for damage, noise and slow rotation [D].

Check the seal for leaks and replace the water pump assembly if necessary.



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THERMOSTAT

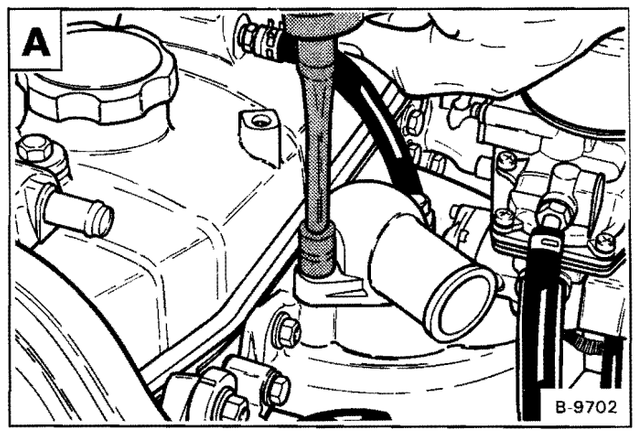
Removal and Installation

The thermostat is of the wax type, valve cracking temperature is not affected by pressure in the water jacket. The jiggle valve removes air from the system during filling the cooling system and to reduce the warm-up time.

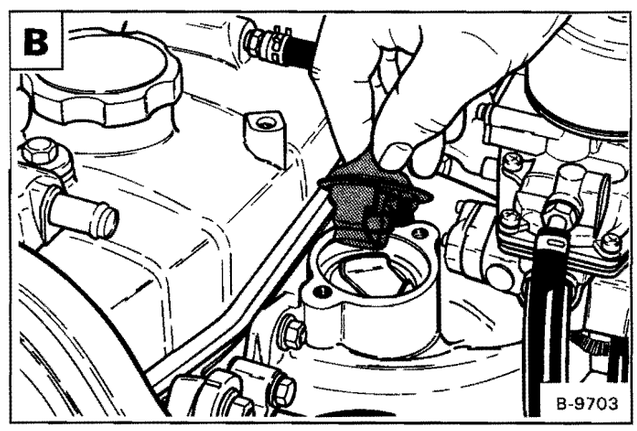
Drain the cooling system.

Remove the radiator hose at the thermostat housing.

Remove the bolts from the housing [A].



Remove the housing and the thermostat [B].



Inspection

Put the thermostat in a container filled with water. Heat the water. Measure the temperature at which the valve cracks and the valve lift is fully open.

Cracking Temperature . . . . . 179° F. (82°C.) 0.315" (8 mm)
Lift Temperature . . . . . 203° F. (95° C.)

If the thermostat is not within specifications, replace the thermostat.

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SPECIFICATIONS

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743 SPECIFICATIONS (Kubota Engine)	8C—1
742 MITSUBISHI	8D—1
TECHNICAL DATA	8E—1

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SPECIFICATIONS (741 Deutz)

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Cylinder, Piston & Connecting Rod	8A—3
Cylinder Head & Valves	8A—3
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Governor, Front Cover & Throttle	8A—3
Lubrication System	8A—4
Torque Specifications	8A—5
LOADER SPECIFICATIONS	
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Hydraulic Cylinders	8A—2
Hydraulic Function Time	8A—2
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Tires	8A—2
Weights	8A—1

741 DEUTZ

⚠ WARNING

Instructions are necessary before operating or servicing machine. Read 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. Failure to follow instructions can cause injury or death.

W-2003-1089

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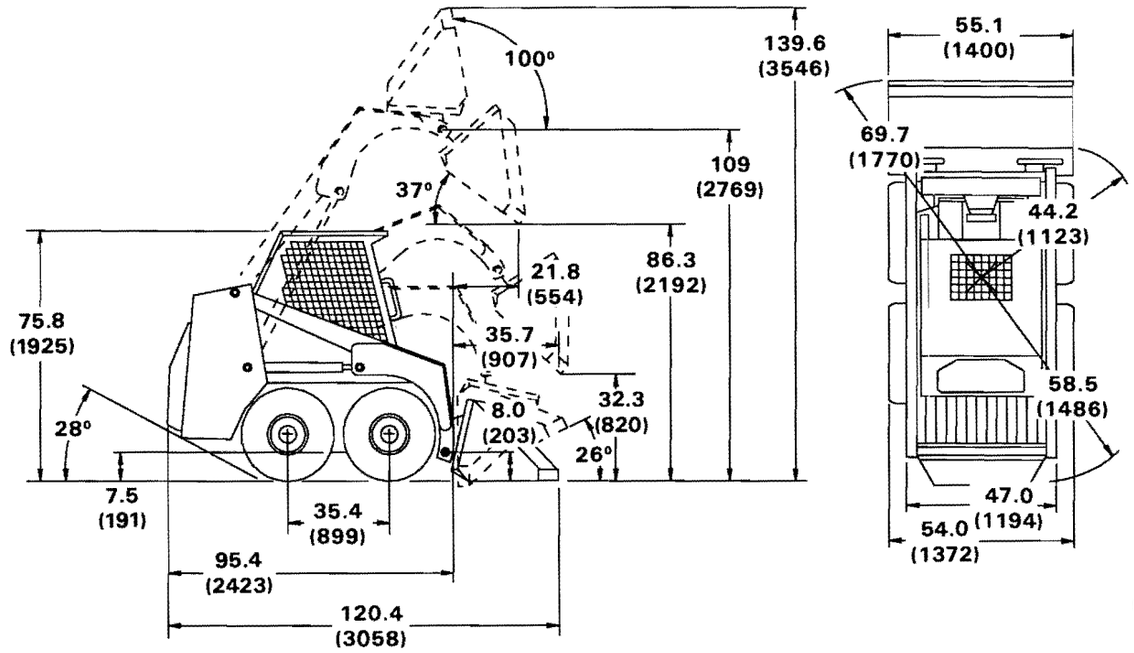


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LOADER SPECIFICATIONS

741 Deutz

- Dimensions are given for loader equipped with standard tires and dirt bucket. Dimensions may vary with other types. All dimensions are shown in inches. Respective metric dimensions are given in millimeters enclosed by parentheses.
- Where applicable, specifications conform to SAE standards and are subject to change without notice.



PI-2206B

This loader was designed without counterweights or ballasts. Changes of structure or weight distribution of the loader can cause changes in control and steering response and can cause failure of the loader parts.

OPERATION & PERFORMANCE	741
Weights	
Operating Weight	4730 lbs. (2145 kg)
Rated Operating Capacity (Melroe)	1300 lbs. (590 kg)
Tipping Load (SAE)	2600 lbs. (1179 kg)
Travel Speed	0.0 to 6.0 MPH (9,7 km/hr.)
Controls	
Vehicle	Direction & speed controlled by two hand operated levers.
Loader Function	Lift, tilt functions controlled by separate foot pedals. Front auxiliary function controlled by the right steering lever. Rear auxiliary function controlled by the left steering lever.
Engine	Hand lever throttle & shutdown; key-type starter switch
Main Drive	Hydrostatic
Brakes (Parking)	Mechanical disc, foot operated pedal.
ENGINE	
Make	Deutz
Model	F2L511
Fuel	Diesel
Horsepower	29.7 HP (22,1 kW)
Maximum Governed RPM	2800 RPM
Torque	64.9 ft.-lbs. (88 Nm) @ 2000 RPM
Number of Cylinders	Two
Bore/Stroke	3.937 (100)/4.14 (105,2)
Displacement	101 cu.-in. (1655 cm^3)
Cooling System	Air
Lubrication	Pressure System W/Filter
Crankcase Ventilation	Open
Air Cleaner	Dry replaceable paper cartridge (With safety element - Diesel Only)
Ignition	Compression-Diesel
Compression (Max.)	N/A
(Min.)	N/A

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LOADER SPECIFICATIONS (Cont'd)	741
LOADER HYDRAULICS	
Pump	Engine driven, vane type
Pump Capacity	11 GPM (42 L/min.) @ 2850 RPM
System Relief Pressure	2200-2400 (15169-16548) PSI @ Quick Couplers
Hydraulic Fluid Filters	Replaceable cartridge #3 micron paper element in the charge line
Type of Fluid	Use Melroe hydraulic/hydrostatic transmission fluid (P/N 6563328). If this fluid is not available, use 10W-30 or 10W-40 SAE motor oil. Use Class SE of SF motor oil (5W-30 at temperatures below 10°F [23°C]).
Hydraulic Cylinders	Doubleacting
Bore Diameter:	
Lift Cylinder (2)	2.00 (50,8)
Tilt Cylinder (1)	3.25 (82,6)
Rod Diameter:	
Lift Cylinder (2)	1.25 (31,8)
Tilt Cylinder (1)	1.50 (38,1)
Stroke:	
Lift Cylinder (2)	25.00 (635)
Tilt Cylinder (1)	14.5 (368)
Control Valve	4-spool, open center series type W/float detent on lift, detent on aux.
Fluid Lines	SAE standard full flow tubes, hoses & fittings
Hydraulic Function Time	
Move Lift Arms to Maximum Height	3.5 Seconds
Lower Lift Arms from Maximum Height	2.7 Seconds
Move Bucket to Dumping Position	2.7 Seconds
Move Bucket to Retracted Position	2.3 Seconds
ELECTRICAL	
Alternator	Belt drive, 55 amps. Open (18 amp. enclosed - 743 DS)
Battery	12 volt, 625 cold crank amps. @ 0°F (-17,8°C) 170 Min. Reserve Capacity
Starter	12 volt, gear drive
DRIVE SYSTEM	
Transmission	Tandem hydro. pumps driving 2 fully reversing hydro. motors
Final Drive	Gear reduction & #80 HS roller chain & sprockets in sealed chaincase with oil lubrication
Total Engine to Wheel Reduction	40:1
CAPACITIES	
Cooling System	Air Cooled
Fuel	13 gals. (49 L)
Engine Lubrication W/Filter	4 qts. (3,8 L)
Hydraulic/Hydrostatic System	6 gals. (22,7 L) (Includes 3.5 gals. [13,2 L] reservoir)
Chaincase Reservoir	32 qts. (30,3 L)
TIRES	
Standard	7:00 - 15, 6-Ply Rating, Nylon W/Bar Lug Tread
MACHINE WEIGHT (without attachment)	
Shipping	4240 lbs. (1923 kg)
Floor Pressure	See Floor Pressure Chart in the Engineering Data Section

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ENGINE SPECIFICATIONS, 741 (Deutz – F2L511)

All dimensions are given in inches. Respective metric dimensions are given in millimeters enclosed by parenthesis.

Displacement	101 cu.in. (1650 cm³)
Bore	3.937 (100 mm)
Stroke	4.134 (105 mm)
Firing Order	2-1
Oil Capacity W/Filter	1 gallon (3,79 liters)
Compression Pressure	426-455 PSI (29-31)

NOTE: The cylinders must be within 35 PSI (241 kPa) of each other.

Fuel System

Pressure of Fuel Lift Pump	4-5 PSI (0,28-0,35 bar)
Make of Fuel Injection Pump	Bosch
Make of Fuel Injection Nozzle	Bosch DLLA 149 S 774
Release Pressure of Injection Nozzle (New)	2604-2720 PSI (180-188 bar)
(Used)	2532-2648 PSI (175-183 bar)
Injection Timing (Start of Injection)	25° B.T.D.C. capillary tube
Distance from Injection Pump Mounting Flange to Camshaft Base Circle (Including gasket and shims)	3.2519-3.2559 (82,6-82,7 mm)

Governor, Front Cover and Throttle

Distance from Governor Bearing Cup To Engine Block	3.370-3.374 (85,6-85,7 mm)
End Play in Throttle Shaft	.008-.043 (0,2-1,1 mm)
Engine High Idle Speed (2950-3000 RPM)	2800 RPM (Under full load)
Engine Low Idle Speed	1050-1150 RPM

Cylinder Head and Valves

I.D. of Valve Guides	.3149-.3156 (8,0-8,015 mm)
I.D. of Bore for Exhaust Valve Seat	1.576 (40,0-40,025)
I.D. of Bore for Intake Valve Seal	1.791-1.792 (45,5-45,525)
Valve Seat Width, Inlet	.059-.0826 (1,5-2,1)
Valve Seat Width, Exhaust	.059-.0826 (1,5-2,1)
Valve Seat Angle, Exhaust and Intake	45°
Valve Stem Diameter, Intake	.3128-.3134 (7,945-7,960)
Valve Stem Diameter, Exhaust	.3118-.3126 (7,92-7,94)
Maximum Distance Valves may be Recessed into Head	.232 (5,9 mm)
Maximum Distance Valves may Protrude from Head	.205 (5,2 mm)
Valve Clearance, Cold, Intake and Exhaust	.006 (0,15 mm)
Minimum Free Length of Valve Springs	2.32 (59 mm)
Length of Head Bolts	7.40-7.42 (188-188,5 mm)

Cylinder, Piston and Connecting Rod

Cylinder Bore (Standard)	3.937-3.9378 (100,000-100,022 mm)
Maximum Wear Limit	.012 (0,3 mm)
Piston Diameter (Standard)	3.9354-3.9358 (99,96-99,969)
Piston Diameter (1st oversize)	3.9551-3.9554 (100,461-100,469 mm)
Piston Diameter (2nd oversize)	3.9748-3.9752 (100,960-100,969 mm)
Wrist Pin Bore	1.3781-1.3783 (35,004-35,010)
Wrist Pin Diameter	1.3777-1.3780 (34,994-35,000)
Piston Ring Side Clearance, Top Compression Ring	.0041-.0057 (0,105-0,145 mm)

NOTES

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ENGINE SPECIFICATIONS, 741 (Deutz — F2L511) (Cont'd)

All dimensions are given in inches. Respective metric dimensions are given in millimeters enclosed by parenthesis.

Piston Ring Side Clearance, Oil Ring	.0015-.0028 (0,040-0,072 mm)
Compression Ring End Gap (Normal)	.0138-.0216 (0,35-0,55 mm)
Slotted Oil Control Ring End Gap (Normal)	.0098-.0157 (0,25-0,40 mm)
Maximum Ring End Gap (All) (Wear Limit)	.079 (2,0 mm)
Piston Crown Clearance (Measure with Lead Wire)	.039-.047 (1,0-1,2)

NOTE: The cylinders must be within 35 PSI (241 kPa) of each other.

I.D. of Bore in Connecting Rod for Wrist Pin Bushing	1.4961-1.4967 (38,000-38,016)
I.D. of Wrist Pin Bushing (Installed)	1.379-1.3811 (35,036-35,080)
I.D. of Bore in Connecting Rod for Connecting Rod Bearing	2.244-2.254 (57,0-57,019 mm)
Connecting Rod Bearing Clearance	.002-.0043 (0,05-0,108 mm)
Connecting Rod Bearing Clearance (Maximum)	.012 (0,3)
Connecting Rod Bearing Side Clearance (End Play)	.007-.011 (0,170-0,271)
Connecting Rod Bearing Side Clearance (Maximum)	.0236 (0,6 mm)

Camshaft, Crankshaft, Bearings

Camshaft End Play	.010-.024 (0,25-0,6 mm)
I.D. of Camshaft Bushing	1.8902-1.8922 (48,01-48,064)
Diameter of Crankpin, Standard	2.046-2.0468 (51,971-51,990)
Diameter of Crankpin, 1st Undersize	2.0263-2.0271 (51,471-51,490)
Diameter of Crankpin, 2nd undersize	2.0066-2.0075 (50,971-50,990)
Diameter of Crankpin, 3rd Undersize	1.987-1.9877 (50,471-50,490)
Width of Crankpin	1.338-1,3401 (34,000-34,039)
Diameter of Crankshaft Main Journals, Standard	2.5185-2.5193 (63,971-63,99)
Diameter of Crankshaft Main Journals, 1st Undersize	2.4888-2.4996 (63,471-63,490)
Diameter of Crankshaft Main Journals, 2nd Undersize	2.4791-2.4799 (62,971-62,990)
Diameter of Crankshaft Main Journals, 3rd Undersize	2.4595-2.4602 (62,471-62,4900)
Crankshaft Center Journal, Standard	2.3611-2.3618 (59,971-59,990)
Crankshaft Center Journal, 1st Undersize	2.3414-2.3421 (59,471-59,490)
Crankshaft Center Journal, 2nd Undersize	2.3217-2.3224 (58,971-58,990)
Crankshaft Center Journal, 3rd Undersize	2.302-2.3028 (58,471-58,490)
Maximum Out-of-Round Tolerance of Journals	.00275 (0,07)
End Play of Crankshaft	.0078-.0157 (0,2-0,4)
Hardness of Journals (Minimum)	50 HRC
Hardness of Journals (Normal)	55-61 HRC

Lubrication System

Oil Pressure Minimum at Low Idle	7.25 PSI (0,5 bar)
Oil Pressure Minimum at 2500 RPM	60-75 PSI (4-5 bar)
End Clearance in Oil Pump Gear	.004 (,1 mm)

Check oil level after every 8 hours of operation. (Check oil every 4 hours on new engine during the first 50 hours of operation).

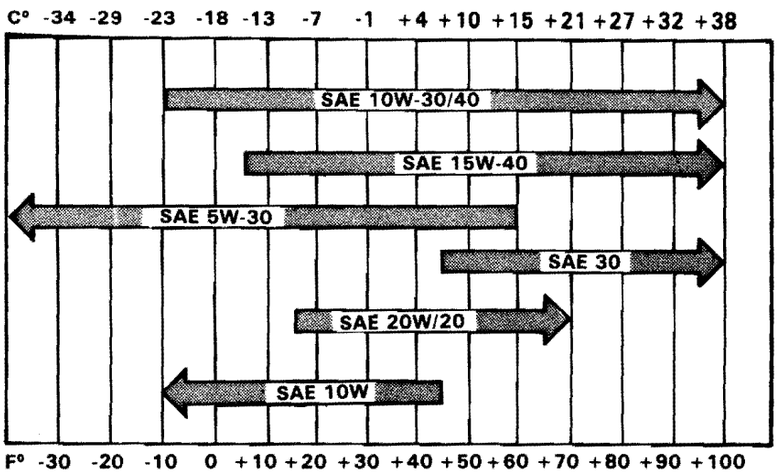
Oil level must be maintained between the "add" and "full" marks on the dipstick. Use a good quality detergent motor oil that meets the API service classification CC or CD.

Use oil of correct SAE viscosity for expected temperature conditions.

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RECOMMENDED SAE VISCOSITY NUMBER
(LUBRICATION OILS FOR ENGINE CRANKCASE)



TEMPERATURE RANGE ANTICIPATED BEFORE NEXT OIL CHANGE
(DIESEL: USE API CLASSIFICATION CC or CD)

Engine Fastener Torque (Deutz Engine)

ITEM	PRELOADING	TIGHTENING	TOTAL
Cylinder Head Bolts	22 ft.-lbs. (30 Nm)	45°45°45°30°	165°
Cylinder Head Brass Plug	59 ft.-lbs. (80 Nm)	– – –	–
Injector Hold-Down	18-22 ft.-lbs. (25-30 Nm)	– – –	–
Connecting Rod	22 ft.-lbs. (30 Nm)	30°30°30°	90°
Main Bearing Support Bracket Bolt (1 Only)	22 ft.-lbs. (30 Nm)	60° – –	60°
Main Bearing Bolts	22 ft.-lbs. (30 Nm)	30°30° –	60°
Blower Mounting Bolts	22 ft.-lbs. (30 Nm)	60° – –	60°
V-Belt Pulley	22 ft.-lbs. (30 Nm)	90° – –	90°
Intake Manifold	11 ft.-lbs. (15 Nm)	– – –	11ft.-lbs. (15 Nm)
Crankshaft Gear	22 ft.-lbs. (30 Nm)	30°30° –	60°
Oil Suction Pipe	–	37 ft.-lbs. (50 Nm)	37 ft.-lbs. (50 Nm)
Flywheel	22 ft.-lbs. (30 Nm)	60°60° –	120°
Rocker Arm Nuts	–	– – –	20 ft.-lbs. (28 Nm)
Counter Balance Weights	22 ft.-lbs. (30 Nm)	30°30° –	60°
Anti-Fatigue Bolt for Cooling Blower	26 ft.-lbs. (35 Nm)	– – –	–

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SPECIFICATIONS (742 Ford)

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⚠ WARNING

Instructions are necessary before operating or servicing machine. Read 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. Failure to follow instructions can cause injury or death.

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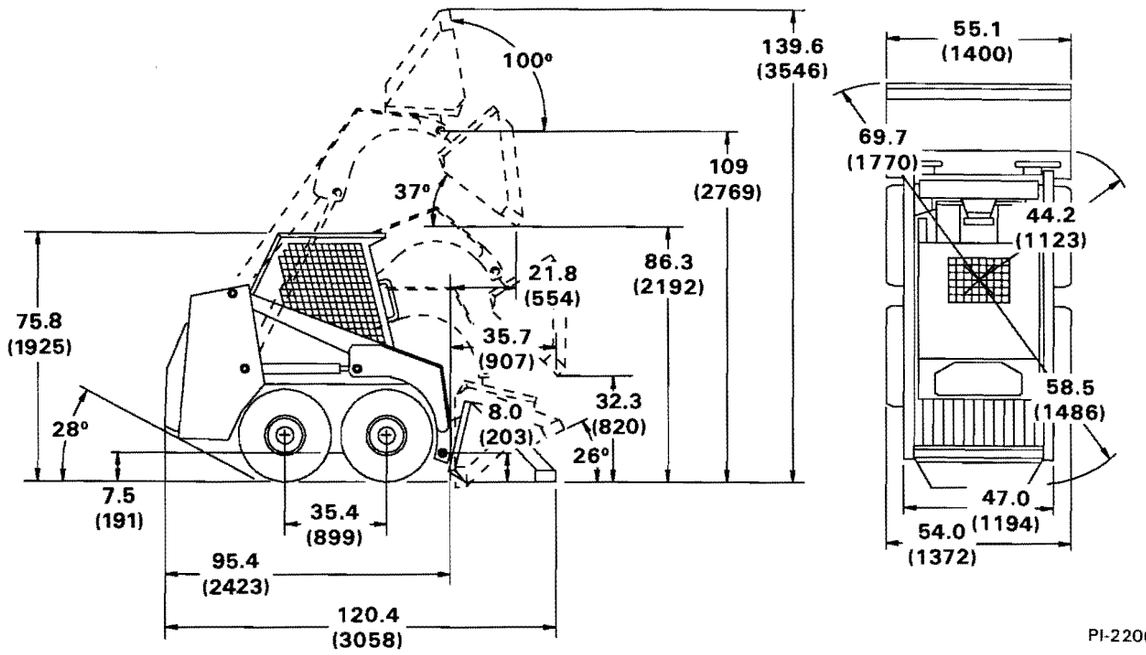


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LOADER SPECIFICATIONS

742

- Dimensions are given for loader equipped with standard tires and dirt bucket. Dimensions may vary with other types. All dimensions are shown in inches. Respective metric dimensions are given in millimeters enclosed by parentheses.
- Where applicable, specifications conform to SAE standards and are subject to change without notice.



PI-2206B

This loader was designed without counterweights or ballasts. Changes of structure or weight distribution of the loader can cause changes in control and steering response and can cause failure of the loader parts.

OPERATION & PERFORMANCE	742 (S/N 20001-22999)
Weights	
Operating Weight	4730 lbs. (2145 kg)
Rated Operating Capacity (Melroe)	1300 lbs. (590 kg)
Tipping Load (SAE)	2600 lbs. (1179 kg)
Travel Speed	0.0 to 6.0 MPH (9,7 km/hr.)
Controls	
Vehicle	Direction & speed controlled by two hand operated levers.
Loader Function	Lift, tilt functions controlled by separate foot pedals. Front auxiliary function controlled by the right steering lever. Rear auxiliary function controlled by the left steering lever.
Engine	Hand lever throttle; pull cable choke; key tupe starter switch
Main Drive	Hydrostatic
Brakes (Parking)	Mechanical disc, foot operated pedal.
ENGINE	
Make	Ford
Model	14.98
Fuel	Gas
Horsepower	34 HP (25,4 kW)
Maximum Governed RPM	2800 RPM
Torque	72.8 ft.-lbs. (98,7 Nm) @ 1600 RPM
Number of Cylinders	Four
Bore/Stroke	3.19 (81)/3.06 (77,6)
Displacement	98 cu.-in. (1606 cm^3)
Cooling System	Liquid
Lubrication	Pressure System W/Filter
Crankcase Ventilation	Open
Air Cleaner	Dry replaceable paper cartridge (With safety element - Diesel Only)
Ignition	12 volt, battery ignition W/breaker points and coil.
Compression (Max.)	N/A
(Min.)	N/A

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LOADER SPECIFICATIONS (Cont'd)	742 (S/N 20001-22999)
LOADER HYDRAULICS	
Pump	Engine driven, vane type
Pump Capacity	11 GPM (42 L/min.) @ 2850 RPM
System Relief Pressure	2200-2400 (15169-16548) PSI @ Quick Couplers
Hydraulic Fluid Filters	Replaceable cartridge #3 micron paper element in the charge line
Type of Fluid	Use Melroe hydraulic/hydrostatic transmission fluid (P/N 6563328). If this fluid is not available, use 10W-30 or 10W-40 SAE motor oil. Use Class SE or SF motor oil (5W-30 at temperatures below 10°F [23°C]).
Hydraulic Cylinders	Doubleacting
Bore Diameter:	
Lift Cylinder (2)	2.00 (50,8)
Tilt Cylinder (1)	3.25 (82,6)
Rod Diameter:	
Lift Cylinder (2)	1.25 (31,8)
Tilt Cylinder (1)	1.50 (38,1)
Stroke:	
Lift Cylinder (2)	25.00 (635)
Tilt Cylinder (1)	14.5 (368)
Control Valve	4-spool, open center series type W/float detent on lift, detent on aux.
Fluid Lines	SAE standard full flow tubes, hoses & fittings
Hydraulic Function Time	
Move Lift Arms to Maximum Height	3.5 Seconds
Lower Lift Arms from Maximum Height	2.7 Seconds
Move Bucket to Dumping Position	2.7 Seconds
Move Bucket to Retracted Position	2.3 Seconds
ELECTRICAL	
Alternator	Belt drive, 55 amps. Open (18 amp. enclosed - 743 DS)
Battery	12 volt, 435 cold crank amps. @ 0°F (-17,8°C) 125 Min. Reserve Capacity
Starter	12 volt, gear drive
DRIVE SYSTEM	
Transmission	Tandem hydro. pumps driving 2 fully reversing hydro. motors
Final Drive	Gear reduction & #80 HS roller chain & sprockets in sealed chaincase with oil lubrication
Total Engine to Wheel Reduction	40:1
CAPACITIES	
Cooling System	11 qts. (10,4 L)
Fuel	13 gals. (49 L)
Engine Lubrication W/Filter	4 qts. (3,8 L)
Hydraulic/Hydrostatic System	6 gals. (22,7 L) (Includes 3.5 gals. [13,2 L] reservoir)
Chaincase Reservoir	32 qts. (30,3 L)
TIRES	
Standard	7:00 - 15, 6-Ply Rating, Nylon W/Bar Lug Tread
MACHINE WEIGHT (without attachment)	
Shipping	4160 lbs. (1887 kg)
Floor Pressure	See Floor Pressure Chart in the Engineering Data Section

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ENGINE SPECIFICATIONS, 742 (Ford)

All dimensions are given in inches. Respective metric dimensions are given in millimeters enclosed by parenthesis.

Displacement	98 CID (1606 cc)
Bore	3.188 (80,98)
Stroke	3.056 (77,62)
Firing Order	1-2-4-3
Oil Capacity with Filter (Approx.)	3.5 Qt. (3,311 liters)
High Idle	2900 - 2975 RPM
Low Idle	850 - 950 RPM

Fuel Specifications

Always use clean fuel. Do not let the tank become empty.

Type of Fuel . . . . . Regular gasoline, 85 - 90 octane.

Fuel System

Float Level	1-1/8" — 1-3/16"
Pump Pressure	3.5-5.0 PSI (4,75-6,78 kPa)

Engine Oil

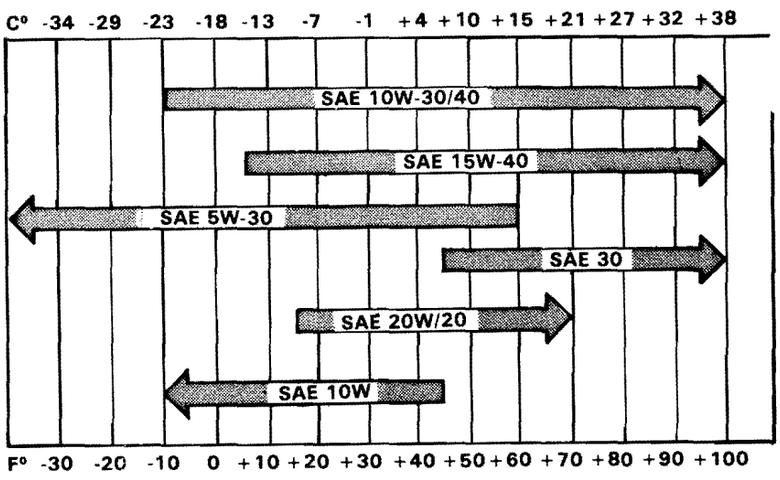
Specifications

Check oil level after every 8 hours of operation. (Check oil every 4 hours on new engine during the first 50 hours of operation.)

Oil level must be between the "add " and "full" mark on the dipstick. Use a good quality detergent motor oil that meets the correct API service classification SF or SE.

Use oil of correct SAE viscosity for expected temperature conditions.

RECOMMENDED SAE VISCOSITY NUMBER
(LUBRICATION OILS FOR ENGINE CRANKCASE)



TEMPERATURE RANGE ANTICIPATED BEFORE NEXT OIL CHANGE
(GASOLINE: USE API CLASSIFICATION SE or SF

IMPORTANT Never overfill the engine crankcase with oil.

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ENGINE SPECIFICATIONS, 742 (Ford) (Cont'd)

All dimensions are given in inches. Respective metric dimensions are given in millimeters enclosed by parenthesis.

Lubrication System

Oil Pressure-Hot @ 2000 RPM	35-40 PSI (47,5-54,2 kPa)
Oil Pump-Rotor Assembly	
End Clearance	.001-.004 (0,025-0,102)
Outer Race to Housing Clearance	.005-.0075 (0,13-0,195)
Clearance Between Inner & Outer Rotors	.006 (0,160)

Cylinder Heads

Gasket Surface Flatness per 12 inches (304,8)	.0015 (0,0375)
Valve Guide Bore Diameter	.3113-.3125 (7,907-7,938)
Valve Guide Replacement Bushing Bore Diameter	.4383-.4391 (11,113-11,153)
Valve Seat Width—Intake	.0625 (1,59)
Exhaust	.0781 (1,98)
Valve Seat Angle	45°

Valve Mechanism

Lash Intake—(Cold)	.008-.010 (0,20-0,25)
Exhaust—(Cold)	.018-.020 (0,45-0,51)
Stem Diameter—Intake	.3098-.3105 (7,868-7,886)
Exhaust	.3098-.3096 (7,846-7,863)
Oversize .003 (0,076) Intake	.3128-.3135 (7,944-7,962)
Exhaust	.3110-.3126 (7,922-7,939)
Oversize .015 (0,38) Intake	.3248-.3255 (8,248-8,266)
Exhaust	.3239-.3246 (8,226-8,243)
Stem to Guide Clearance Intake	.0008-.0027 (0,020-0,068)
Exhaust	.0017-.0036 (0,043-0,091)
Length—All	4.345-4.365 (110,4-110,9)
Head Diameter	
Intake	1.559-1.550 (39,60-39,40)
Exhaust	1.340-1.330 (34,00-33,80)
Seat Angle	44-1/2°-45°
Face Runout-Wear Limit	.002 (0,05)
Spring Free Length	1.48 (37,6)
Spring Assembled Height	
Intake	Red, Yellow, and Blue Stripe
Exhaust	White Stripe
Pad to Retainer	1.263 (32,8)
Spring Load at Assembled Height	44-49 lbs. (19,96-22,23 kg)
Push Rod Diameter	.250-.254 (6,35-6,45)
Length	7.59-7.62 (192,79-193,55)
Max Runout	.012 (0,300)
Tappet-Length	1.85 (47,0)
Stem Diameter	.5120-.5122 (13,004-13,009)
Block Bore	.516-.517 (13,106-13,107)
Clearance to Block	.0005-.002 (0,013-0,05)
Rocker Shaft-Diameter	.623-.624 (15,83-15,85)
Rocker Bore	.625-.6265 (15,88-15,913)
Shaft Clearance in Rocker	.001-.0035 (0,03-0,089)
Rocker Arm Ratio	1.54:1

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ENGINE SPECIFICATIONS, 742 (Ford) (Cont'd)

All dimensions are given in inches. Respective metric dimensions are given in millimeters enclosed by parenthesis.

Camshaft

Journal Diameter	1.5597-1.5605 (39,617-39,637)
Bearing I.D.	1.5615-1.5620 (39,662-39,675)
Length Front & Rear	2.26 (57,4)
Center	2.26 (57,4)
Clearance	.001-.0023 (0,025-0,058) wear limit .003 (0,076)
Bore for Bearing	1.6885-1.6895 (42,888-42,913)
Oversize Bearing O/S on OD Standard ID	.020 (0,513)
End Play	.0024-.075 (0,061-0,192)
Thrust Plate Thickness	.1755-.1775 (4,458-4,509)
Valve Timing —	
Inlet Opens—°BTDC	17-21
Inlet Closes—°ABDC	51-55
Exhaust Opens—°BBDC	51-70
Exhaust Closes—°ATDC	17-22
Inlet Cam Lift	0.2108 (5,3548)-0.2356 (5,9851)
Exhaust Cam Lift	0.2176 (55,5276)-0.2321 (5,8943)

Crankshaft

Main Bearing Journal Diameter	2.1253-2.1261 (53,983-54,003)
Main Bearing Clearance	.0005-.002 (0,013-0,051)
Rod Bearing Journal Diameter	1.9368-1.9376 (49,194-49,215)
Rod Bearing Clearance	.0005-.002 (0,013-0,051)
Main & Rod Bering Journal —	
Max. Taper	.003 (0,008)
Max. Out-of-Round	.0004 (0,010)
Crankshaft End Play	.003-.011 (0,08-0,28)
Bearing Wall Thickness-Standard	.0719-.0722 (1,788-1,796)
For every .002 (0,051) undersized thickness add .001 (0,026) to standard thickness.	
Thrust Washer	0.091-0.0093 (2,31-2,36) Std. 0.002 (0,0508)-0.005 (0,127) 0.007 (0,1778)-0.010 (0,254)

The crankshaft and cylinder block are color-coded for installation of the correct bearing AT THE FACTORY.

Use a micrometer to measure the inside diameter and the outside diameter of the bearing surfaces so that correct replacement bearings can be ordered.

Connecting Rod

Piston Pin Bushing I.D.	.8121-.8125 (20,627-20,638)
Connecting Rod Bearing Bore	2.0825-2.0830 (52,90-52,91)
Connecting Rod Length Center to Center	3.9265-4.9295 (125,133-125,209)
Side Clearance	.004-.010 (0,10-0,25)
Max. Twist or Bend	.004 (0,10)

Pin bushing and crankshaft bearing bore must be parallel and in the same vertical plane within the specified total difference at ends of 8-inch long bar measure 4 inches on each side of rod.

Piston

Diameter	3.1853-3.1877 (80,907-80,967)
Piston to Bore Clearance	.0016-.0025 (0,04064-0,06350) (Measure 90° to pin centerline and at bottom of pin) (Clearance 90° to pin centerline and at bottom of pin)
Clearance between Deck and Piston Crown at TDC	.025-.043 (0,63-1,09)

Piston Pin

Diameter	.8119-.8123 (20,622-20,632)
Interference Fit in Piston	.0001-.0003 (0,003-0,008)
Clearance in Rod Bushing	.0001-.0003 (0,003-0,008)

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ENGINE SPECIFICATIONS, 742 (Ford) (Cont'd)

All dimensions are given in inches. Respective metric dimensions are given in millimeters enclosed by parenthesis.

Piston Rings

Top Compression Ring Width	.615-.0625 (1,56-1,59)
Bottom Compression Ring Width	.077-.078 (0,003-0,008)
Top Clearance Ring Side Clearance	.0016-.0036 (0,041-0,091)
Bottom Compression Ring Side Clearance	.0016-.0036 (0,041-0,091)
Compression Ring Side Clearance-Wear Limit	.006 (0,152)
Oil Ring Width	.155-.156 (3,94-3, 96)
Oil Ring Side Clearance	.0018-.0038 (0,046-0,097)
Oil Ring Side Clearance-Wear Limit	.007 (0,178)
Top Compression Ring-Std. Bore — Ring Gap	.009-.014 (0,23-0,36)
Bottom Compression Ring — Std. Bore-Ring Gap	.009-.014 (0,23-0,36)
Oil Ring-Std. Bore-Ring Gap Width	.009-.014 (0,23-0,36)

Cylinder Block

Cylinder Bore Diameter	3.1869-3.1893 (80,948-81,008)
Cylinder Bore Out-of-Round — Max.	.0015 (0,013)
Taper — Max.	.001 (0,025)
Tappet Bore Diameter	.516-.517 (13,11-13,13)
Main Bearing Bore Diameter	2.2710-2.2715 (57,683-15,696)
Height, Pan Surface to Deck	8.326-8.331 (211,48-211,61)
Gasket Surface Flatness in any 6 inches	.006 (0,152) Max. overall

Ignition System

Distributor Point Gap	.025 (0,64)
Dwell Angle (Under 700 RPM)	48°-52°
Firing Order	1-2-4-3
Rotation	Counterclockwise
Initial Timing-BTC	12°
End Play	Preload
Spark Plug	AGR-22
Plug Gap	.026-.028 (0,66-0,71)
Coil-Primary Resistance (ohms)	1.40-1.54 (75°F)
Secondary Resistance (Ohms)	7600-8800 (75°F)
Primary External Resistor (Ohms)	1.30-1.40 (75°F)
Condenser-(Mitco Farads)	0.21-0.25

DISTRIBUTOR ADVANCE CHARACTERISTICS

ENGINE RPM	CENTRIFUGAL PLUS INITIAL ADVANCE	CENTRIFUGAL PLUS VACUUM PLUS INITIAL ADVANCE (NO LOAD)
500	10-12°	28-36°
1000	10-12°	28-36°
1200	10-12°	28-39°
1400	11-17°	29-41°
1600	13-19°	31-43°
2000	18-24°	36-48°
2600	22-28°	40-52°

* All above values are readings as seen at crankshaft timing marks.

Starter

Solenoid Actuated Starter Motor			Starter Brushes		
Dia. In Inches (Metric)	Current Draw Under Normal Load (Amps.)	Normal Engine Cranking Speed (RPM) @ 70°F	No. Load (Amps.)	Wear Limit In Inches (Metric)	Spring Tension (Ounces Force)
3-1/2 (88.9)	135-250	140-180	65	5/16 (.8)	28

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ENGINE SPECIFICATIONS, 742 (Ford) (Cont'd)

Engine Fastener Torque

Item	Ft.-Lbs.	Nm
Camshaft Sprocket to Camshaft Bolt	12-15	16-20
Camshaft Thrust Plate Bolt	2.5-3.5	3,4-4,7
Connecting Rod Bolts	30-35	41-47
Cylinder Head Bolts	Step 1-20-30 Step 2-50-55 Step 3-65-70	27-41 68-75 88-95
Crankshaft Pulley Bolt	24-48	33-38
Cylinder Front Cover Bolts	5-7	7-9,5
Carburetor Attaching Nuts	12-15	16-20
Chain Tension Support to Cylinder Block	5-7	7-9.5
Distributor to Cylinder Block	5-7	7-9,5
Distributor Clamp	2-3	2,7-4,1
Exhaust Manifold to Cylinder Head Nuts	15-18	20-24
Separator Clamping Bolt	6-9	8-12
Flywheel to Crankshaft Bolts	45-50	62-67
Fuel Pump to Cylinder Block	12-15	16-20
Alternator Mounting to Cylinder Block Bolts	20-25	27-34
Instake Manifold to Cylinder Head Bolts	15-18	20-24
Main Bearing Cap Bolts	65-70	88-95
Oil Pump to Cylinder Block	12-15	16-20
Oil Drain Plug	20-25	27-34
Oil Pan to Cylinder Block Bolts	6-8	8-11
Oil Pump Cover to Oil Pump Bolts	5-7	7-9,5
Rear Oil Seal Retainer to Cylinder Block	12-15	16-20
Rocker Cover to Cylinder Head Screws	2.5-3.5	3,4-4,7
Rocker Shaft Support Bolt	25-30	34-41
Spark Plug to Cylinder Head	22-28	30-38
Water Outlet Connection to Cylinder Head	12-15	16-20
Water Pump to Cylinder Block	5-7	7-9,5
Water Pump to Cylinder Block	12-15	16-20
Oil Filter	1/2 turn after gasket contacts surface	

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SPECIFICATIONS (743 Kubota)

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Tires	8C—2

⚠WARNING

Instructions are necessary before operating or servicing machine. Read 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. Failure to follow instructions can cause injury or death.

W-2003-1089

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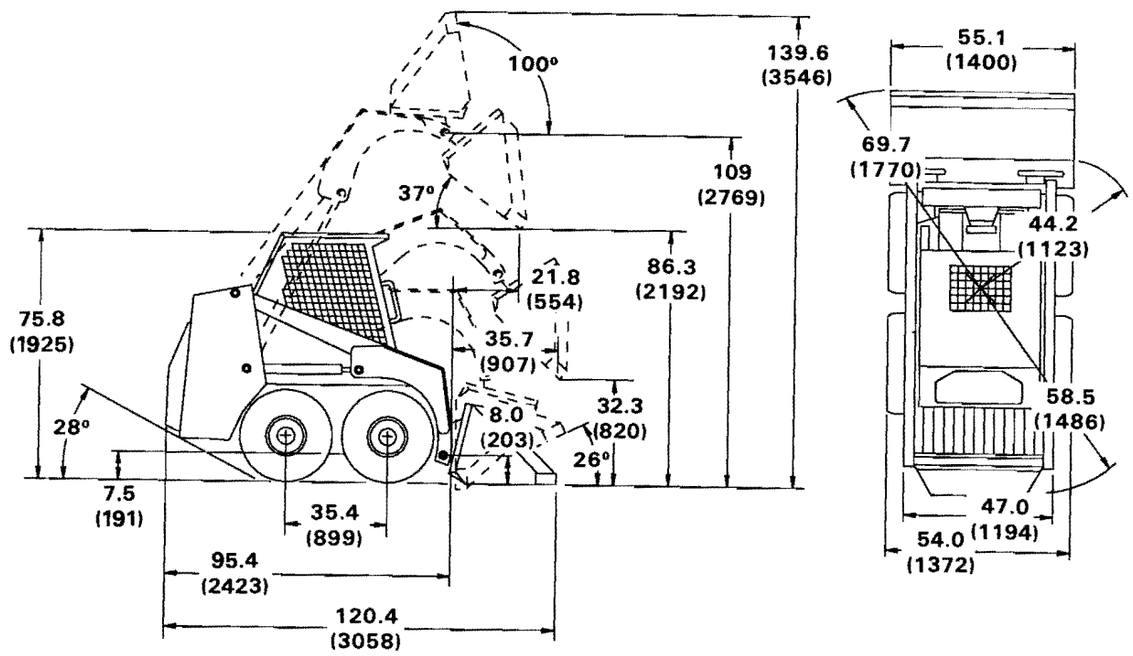


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LOADER SPECIFICATIONS

743 & 743 DS

- Dimensions are given for loader equipped with standard tires and dirt bucket. Dimensions may vary with other types. All dimensions are shown in inches. Respective metric dimensions are given in millimeters enclosed by parentheses.
- Where applicable, specifications conform to SAE standards and are subject to change without notice.



PI-2206B

This loader was designed without counterweights or ballasts. Changes of structure or weight distribution of the loader can cause changes in control and steering response and can cause failure of the loader parts.

OPERATION & PERFORMANCE	743 & 743 DS
Weights	
Operating Weight	4720 lbs. (2141 kg)
Rated Operating Capacity (Melroe)	1300 lbs. (590 kg)
Tipping Load (SAE)	2600 lbs. (1179 kg)
Travel Speed	0.0 to 6.0 MPH (9,7 km/hr.)
Controls	
Vehicle	Direction & speed controlled by two hand operated levers.
Loader Function	Lift, tilt functions controlled by separate foot pedals. Front auxiliary function controlled by the right steering lever. Rear auxiliary function controlled by the left steering lever.
Engine	Hand lever throttle & shutdown; key-type starter switch
Main Drive	Hydrostatic
Brakes (Parking)	Mechanical disc, foot operated pedal.
ENGINE	
Make	Kubota
Model	V1702-BA
Fuel	Diesel
Horsepower	36 HP (26,8 kW)
Maximum Governed RPM	2800 RPM
Torque	80 ft.-lbs. (108 Nm) @ 1600 RPM
Number of Cylinders	Four
Bore/Stroke	3.23 (82)/3.23 (82)
Displacement	105.7 cu.-in. (1732 cm^3)
Cooling System	Liquid
Lubrication	Pressure System W/Filter
Crankcase Ventilation	Open
Air Cleaner	Dry replaceable paper cartridge (With safety element - Diesel Only)
Ignition	Compression-Diesel
Compression (Max.)	427-469 PSI (2944-3234 kPa)
(Min.)	320-352 PSI (2206-2427 kPa)

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LOADER SPECIFICATIONS (Cont'd)	743 & 743 DS
LOADER HYDRAULICS	
Pump	Engine driven, vane type
Pump Capacity	11 GPM (42 L/min.) @ 2850 RPM
System Relief Pressure	2200-2400 (15169-16548) PSI @ Quick Couplers
Hydraulic Fluid Filters	Replaceable cartridge #3 micron paper element in the charge line
Type of Fluid	Use Melroe hydraulic/hydrostatic transmission fluid (P/N 6563328). If this fluid is not available, use 10W-30 or 10W-40 SAE motor oil. Use Class SE of SF motor oil (5W-30 at temperatures below 10°F [23°C]).
Hydraulic Cylinders	Doubleacting
Bore Diameter:	
Lift Cylinder (2)	2.00 (50,8)
Tilt Cylinder (1)	3.25 (82,6)
Rod Diameter:	
Lift Cylinder (2)	1.25 (31,8)
Tilt Cylinder (1)	1.50 (38,1)
Stroke:	
Lift Cylinder (2)	25.00 (635)
Tilt Cylinder (1)	14.5 (368)
Control Valve	4-spool, open center series type W/float detent on lift, detent on aux.
Fluid Lines	SAE standard full flow tubes, hoses & fittings
Hydraulic Function Time	
Move Lift Arms to Maximum Height	3.5 Seconds
Lower Lift Arms from Maximum Height	2.7 Seconds
Move Bucket to Dumping Position	2.7 Seconds
Move Bucket to Retracted Position	2.3 Seconds
ELECTRICAL	
Alternator	Belt drive, 55 amps. Open (18 amp. enclosed - 743 DS)
Battery	12 volt, 625 cold crank amps. @ 0°F (-17,8°C) 170 Min. Reserve Capacity
Starter	12 volt, gear drive
DRIVE SYSTEM	
Transmission	Tandem hydro. pumps driving 2 fully reversing hydro. motors
Final Drive	Gear reduction & #80 HS roller chain & sprockets in sealed chaincase with oil lubrication
Total Engine to Wheel Reduction	40:1
CAPACITIES	
Cooling System	13 qts. (12,3 L)
Fuel	13 gals. (49 L)
Engine Lubrication W/Filter	9 qts. (8,5 L)
Hydraulic/Hydrostatic System	6 gals. (22,7 L) (Includes 3.5 gals. [13,2 L] reservoir)
Chaincase Reservoir	32 qts. (30,3 L)
TIRES	
Standard	7:00 - 15, 6-Ply Rating, Nylon W/Bar Lug Tread
MACHINE WEIGHT (without attachment)	
Shipping	4330 lbs. (1964 kg)
Floor Pressure	See Floor Pressure Chart in the Engineering Data Section

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ENGINE SPECIFICATIONS, 743 (Kubota)

All dimensions are given in inches. Respective metric dimensions are given in millimeters enclosed by parenthesis.

Fuel Injection Nozzles

Opening Pressure	1990-2130 PSI (13721-14686 kPa)
Fuel Tightness Nozzle Seat	Dry Nozzle at 1848-1990 PSI (12742-13721 kPa)

Fuel Injection Pump

Fuel Tightness of Plunger	8 sec.: initial pressure from 8532-7110 PSI (58828-49023 kPa)
Limit Permitted	4 seconds or less
Fuel Tightness of Delivery Valve	10 sec.: initial pressure from 1422-71 PSI (9805-490 kPa)
Limit Permitted	5 seconds or less
Injection Timing	25-26 degrees before TDC
High Idle	2860-3000 RPM
Low Idle	700-1000 RPM

Cylinder Head

Cylinder Head Surface Distortion	0.002 (0,05)
Thickness of Gasket	0.057 (1,45)
Thickness of Gasket Shims	0.0059 or 0.0079 (0,15 or 0,2)
Top Clearance (Piston to Head)	0.0276-0.0354 (0,7-0,9)
Head Bolt Torque	
Flange Head Bolt	65-68 ft.-lbs. (88-92 Nm)
Bolt W/Washer	58-68 ft.-lbs. (79-83 Nm)
Maximum Allowable Milling	0.004 (0,1)

Valves

Valve Seat Width	0.0827 (2,1)
Valve Seat Angle	45 degrees
O.D. of Valve Stems (Intake and Exhaust)	0.3134-0.3140 (7,960-7,975)
I.D. of Valve Guides (Intake and Exhaust)	0.3156-0.3161 (8,015-8,030)
Clearance Between Valve Stem And Guide	0.0016 to 0.0028 (0,04-0,07)
Limit Permitted	0.0039 (0,1)
Depth of Valve	0.0433-0.0512 (1,1-1,3)
Valve Clearance (Cold) (Intake and Exhaust)	0.0071-0.0087 (0,18-0,22)

Valve Springs

Free Length	1.6417-1.6614 (41,7-42,2)
Fitted Length	1.3839 (35,15)
Load to Compressed to Fitted Length	26.5 lbs. (118 N)
Limit Permitted	22.5 lbs. (100 N)

Rocker Arms

O.D. of Rocker Arm Shaft	0.5501-0.5506 (13,973-13,984)
I.D. of Rocker Arm Bushings	0.5513-0.5529 (14,002-14,043)
Clearance Between Rocker Arm and Bushings	0.0004-0.0028 (0,01-0,07)
Limit Permitted	0.0059 (0,15)

Camshaft

O.D. of Camshaft Bearing Journal	1.5722-1.5728 (39,934-39,950)
I.D. of Camshaft Bearing	1.5748-1.5758 (40,0-40,025)
Clearance Between Camshaft Journal and Bearing	0.002-0.0036 (0,50-0,091)
Limit Permitted	0.0059 (0,15)
Alignment of Camshaft	0.0008 (0,02)
Cam Lobe Height (Intake and Exhaust)	1.3134 (33,36)
Limit Permitted	1.3114 (33,31)
Gear Clearance (Backlash)	0.0016-0.0045 (0,041-0,114)
Limited Permitted	0.0118 (0,3)

NOTES

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ENGINE SPECIFICATIONS, 743 (Kubota) (Cont'd)

All dimensions are given in inches. Respective metric dimensions are given in millimeters enclosed by parenthesis.

Cylinders

I.D. of Cylinder Liner (Std.)	3.2283-3.2291 (82,0-82,019)
Oversized Liner I.D. (After Reboring .020 O/S)	3.248-3.2489 (82,499-82,522)
Wear Limit	0.0059 (0,15)

Piston Rings

Ring Gap (Top and 2nd Ring)	0.0118-0.0177 (0,30-0,45)
Limit Permitted	0.0492 (1,25)
Ring Gap (Oil Ring)	0.0098-.0157 (0,25-0,40)
Limit Permitted	0.0492 (1,25)
Side Clearance of Ring Groove	
Top Ring	0 Clearance
Second Ring	0.0037-0.0047 (0,093-0,120)
Oil Ring	0.0008-0.0020 (0,020-0,052)

Pistons

I.D. of Piston Bosses	0.9055-0.9060 (23-23,013)
Limit Permitted	0.9076 (23,053)
O.D. of Piston Pin	0.9056-0.9059 (23,002-23,011)
I.D. of Connect Rod Bushing (Small End, Fitted)	0.9065-0.9071 (23,025-23,04)
Clearance Between Piston Pin And Bushing	0.0006-0.0015 (0,015-0,038)
Service Replacement Part	0.0006-0.0026 (0,015-0,07)
Limit Permitted	.0059 (0,15)
Connecting Rod Alignment	0.0008 (0,02)
Limit Permitted	0.002 (0,05)
Connecting Rod Big End I.D.	(W/O Bearing) 1.850-1.851 (47,0-47,02)

Crankshaft

O.D. Main Bearing Journals	2.0441-2.0449 (51,92-51,94)
I.D. of Crankshaft Main Bearing (No. 1)	2.0465-2.0488 (51,98-52,039)
I.D. of Crankshaft Main Bearing (No. 2)	2.0465-2.0482 (51,98-52,025)
Clearance Between Crankshaft Journal and Bearing	0.0013-0.0042 (0,03-0,11)
Limit Permitted	0.0079 (0,2)
O.D. of Connecting Rod Journals	1.7307-1.7313 (43,959-43,975)
I.D. of Connecting Rod Bearings	1.7327-1.7343 (44,01-44,052)
Clearance Between Connecting Rod Journal and Bearing	0.0014-0.0037 (0,035-0,093)
Limit Permitted	0.0079 (0,2)
End Play of Crankshaft	0.0059-0.08 (0,15-0,21)
Thrust Plate Thickness:	
Standard	0.091-0.093 (2,31-2,36)
Oversize	0.0935-0.0955 (2,37-2,43)
	0.096-0.098 (2,44-2,49)
	0.0985-0.1005 (2,50-2,55)
	0.101-0.103 (2,57-2,62)
Crankshaft Journal U/S (Dia.)	2.0363-2.037 (51,72-51,74)
	2.0284-2.0291 (51,52-51,54)

Oil Pump

Oil Pressure @ rated RPM	42-56 PSI (290-386 kPa)
Limit Permitted	36 PSI (248 kPa)
Rotor Lobe Clearance	0.0039-0.0063 (0,10-0,16)
Limit Permitted	0.0079 (0,20)
Clearance Between Outer Rotor And Pump Body	0.0043-0.0075 (0,11-0,19)
Limit Permitted	0.0098 (0,25)

Engine Oil

Specifications

Check oil level every 8 hours of operation (Check oil every 4 hours on new engine during the first 50 hours of operation).

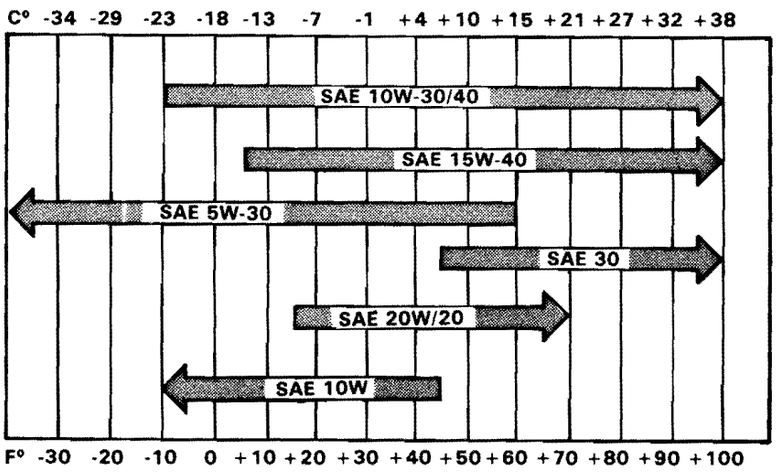
Oil level must be between the "add" and "full" marks on the dipstick. Use a good quality detergent motor oil that meets the correct API service classification (See Chart of Page 8C—5).

Use oil of the correct SAE viscosity for expected temperature conditions.

NOTES

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RECOMMENDED SAE VISCOSITY NUMBER
(LUBRICATION OILS FOR ENGINE CRANKCASE)



TEMPERATURE RANGE ANTICIPATED BEFORE NEXT OIL CHANGE
(DIESEL: USE API CLASSIFICATION CC or CD)

IMPORTANT **Never overfill the engine crankcase with oil.**

ENGINE BOLT TORQUES

Bolt material grades are shown by numbers punched on the bolt heads.

Before tightening, check the numbers shown below:

NOTE: Special bolts are used where required. Please refer to Assembly Section for correct special bolt torque.

	Ft.-Lbs.	Nm
Fuel Injector Pump Mounting Bolts	17-20	23-27
Hydrostatic Pump Adapter Flange to Flywheel	15-17	23-27
Engine Mounting Bolts	65-70	88-95
Oil Pump to Block	5-6	6,8-8,1
Gearcase Cover Bolts	13-15	18-20
Flywheel Housing Cover	25-28	34-38
Hydrostatic Pump to Flywheel Cover	65-70	88-95
Nozzle Holder	22-36	30-49
Flywheel to Crankshaft	72-80	98-108
Pulley to Crankshaft	101-110	137-149
Water Pump Shaft Nut	50-57	68-78
Crankshaft Rear Cover	13-17	17-20
Valve Cover Nuts	5-6	6,8-8,1
Connecting Rod Caps	26-30	35-41
Bearing Case Bolt (1) Through Block	47-50	64-68
Bearing Case Halves 2 Bolts Each	21-25	28-34
Camshaft Mounting Flange	13-15	18-20

NOTES

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ENGINE SPECIFICATIONS, 743 (Kubota) (Cont'd)

BOLT TORQUES			
MATERIAL GRADE	STANDARD BOLT	SPECIAL BOLT	SPECIAL BOLT
NOMINAL DIAMETER	SS42, S20C	S43C, S48C (Refined)	SCR3, SCM3 (Refined)
M 6	5.8 to 6.9 ft.-lbs. (7.8 to 9.3 Nm)	7.2 to 8.3 ft.-lbs. (9.8 to 11.3 Nm)	9.0 to 10.5 ft.-lbs. (12.3 to 14.2 Nm)
M 8	13.0 to 15.2 ft.-lbs. (17.7 to 20.6 Nm)	17.4 to 20.3 ft.-lbs. (23.5 to 27.5 Nm)	21.7 to 25.3 ft.-lbs. (29.4 to 34.3 Nm)
M10	28.9 to 33.3 ft.-lbs. (39.2 to 45.1 Nm)	35.4 to 41.2 ft.-lbs. (48.0 to 11.3 Nm)	44.8 to 52.1 ft.-lbs. (60.8 to 70.6 Nm)
M12	46.3 to 53.5 ft.-lbs. (62.8 to 72.6 Nm)	57.1 to 66.5 ft.-lbs. (77.5 to 90.2 Nm)	75.9 to 86 8 ft.-lbs. (103.0 to 117.7 Nm)
M14	79.6 to 92.6 ft.-lbs. (107.9 to 125.5 Nm)	91.1 to 108.5 ft.-lbs. (123.6 to 147.1 Nm)	123.0 to 144.7 ft.-lbs. (166.7 to 196.1 Nm)
M16	123.0 to 141.0 ft.-lbs. (166.7 to 191.2 Nm)	144.7 to 166.4 ft.-lbs. (196.1 to 225.5 Nm)	191.7 to 224.2 ft.-lbs. (259.9 to 304.0 Nm)
M18	180.8 to 209.8 ft.-lbs. (245.2 to 284.4 Nm)	202.5 to 235.1 ft.-lbs. (274.6 to 318.7 Nm)	253.2 to 296.5 ft.-lbs. (343.2 to 402.0 Nm)
M20	245.9 to 289.3 ft.-lbs. (333.4 to 392.2 Nm)	271.2 to 318.2 ft.-lbs. (367.7 to 431.5 Nm)	361.6 to 419.5 ft.-lbs. (490.3 to 568.7 Nm)

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SPECIFICATIONS (742 Mitsubishi)

	Page Number
ENGINE SPECIFICATIONS	
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Camshaft	8D—4
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Thermostat	8D—6
Valve Guide	8D—5
Valve Spring	8D—5
Valve Train	8D—4
Water Pump	8D—6
LOADER SPECIFICATIONS	
Drive System	8D—2
Electrical	8D—2
Engine	8D—1
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Operation and Performance	8D—1
Tires	8D—2

⚠WARNING

Instructions are necessary before operating or servicing machine. Read 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. Failure to follow instructions can cause injury or death.

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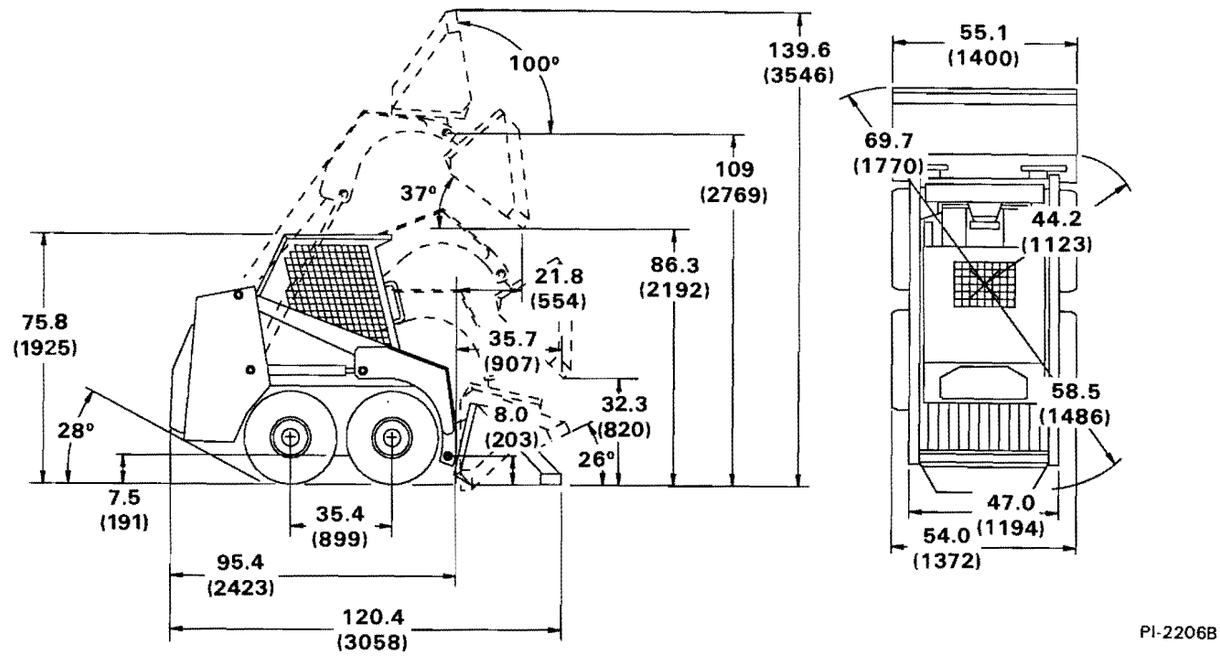
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LOADER SPECIFICATIONS

• Dimensions are given for loader equipped with standard tires and dirt bucket and may vary with other bucket types. All dimensions are shown in inches. Respective metric dimensions are given in millimeters enclosed by parentheses.



PI-2206B

This loader was designed without counterweights or ballasts. Changes of structure or weight distribution of the loader can cause changes in control and steering response and can cause failure of the loader parts.

OPERATION & PERFORMANCE	742 (23000 & Above)
Weights	
Operating Weight	4730 lbs. (2147 kg)
Rated Operating Capacity	1300 lbs. (590 kg)
Tipping Load (SAE)	2600 lbs. (1180 kg)
Travel Speed	Infinitely variable 0 - 6.0 MPH (9,7 km/hr.)
Controls	
Vehicle	Direction & speed controlled by two hand levers.
Loader Function	Lift & Tilt Functions: Controlled by separate foot pedals. Front auxiliary function controlled by the right steering lever. Rear auxiliary function controlled by the left steering lever.
Engine	Hand lever throttle & key type starter switch.
Main Drive	Hydrostatic
Parking Brake	Mechanical disc, foot operated pedal.
ENGINE	
Make	Mitsubishi
Model	4G32
Fuel	Gasoline, leaded or unleaded
Horsepower	35 HP (26,0 Kw)
Maximum Governed RPM	2800 RPM
Torque	73 ft.-lbs. (99 Nm) Maximum @ 2000 RPM
Number of Cylinders	Four
Bore/Stroke	3.03/3.38 (76,9/85,8)
Displacement	95.62 cu. in. (1567 cm^3)
Cooling System	Liquid
Lubrication	Full pressure with full flow filter
Crankcase Ventilation	PCV
Air Cleaner	Dry replacement paper cartridge
Ignition	12 volt, battery ignition W/breaker points & coil
High Idle	2900 - 2975 RPM
Low Idle	850 - 950 RPM

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LOADER SPECIFICATIONS (Cont'd)	742 (23000 & Above)
HYDRAULIC SYSTEM	
Pump	Engine driven, vane type
Pump Capacity	11.0 GPM (42 L/min.) @ 2850 RPM
System Relief Pressure	2200-2400 (15169-16548) PSI @ Quick Couplers
Filter	Replaceable #3 micron paper element in charge line
Hydraulic Cylinders	Doubleacting
Bore Diameter	
Lift Cylinder (2)	2.00 (51)
Tilt Cylinder (1)	3.25 (83)
Rod Diameter	
Lift Cylinder (2)	1.25 (32)
Tilt Cylinder (1)	1.50 (32)
Stroke	
Lift Cylinder (2)	25.00 (635)
Tilt Cylinder (1)	14.5 (368)
Control Valve	4-spool, open center type W/float on lift, detent on auxiliary
Fluid Lines	SAE standard tubes, hose & fittings
Hydraulic Function Time	
Raise Lift Arms to Maximum Height	3.5 Seconds
Lower Lift Arms from Maximum Height	2.7 Seconds
Move Bucket to Dump Position	2.7 Seconds
Move Bucket to Retracted Position	2.3 Seconds
Hydraulic Fluid Type	Bobcat Fluid (P/N 6563328). If fluid is not available, use 10W-30/10W-40 Class SE Motor Oil for temp. above 0°F (-18°C) & 5W-30 for temp. below 0°F (-18°C)
ELECTRICAL	
Alternator	Belt driven, 55 amps, open
Battery	12 volt, 435 cold crank amps. @ 0°F (-17,8°C) 125 min. reserve capacity
Starter	12 volt
DRIVE SYSTEM	
Transmission	Tandem hydro. pumps driving 2 fully reversing hydro. motors
Final Drive	Gear reduction & #80 HS roller chain & sprockets in sealed chaincase with oil lubrication
CAPACITIES	
Cooling System	11 qts. (10,4 L)
Fuel	13 gals. (49 L)
Engine Lubrication W/Filter	4 qts. (3,8 L)
Hydraulic/Hydrostatic System	6 gals. (23 L) (Includes 3.5 gals. (13,2 L) in reservoir)
Chaincase Reservoir	32 qts. (30,3 L)
TIRES	
Standard	7:00 x 15, 6 ply rating
Pressure	45-50 PSI (310-345 kPa)
Flotation	10 x 16.5, 6 ply rating
Pressure	30-35 PSI (207-241 kPa)

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ENGINE SPECIFICATIONS

All dimensions are given in inches. Respective metric dimensions are given in millimeters enclosed by parenthesis.

General

Compression PSI @ 250 RPM	150 PSI (1034 kPa)
Difference between Cylinders	Within 10%
Ignition Timing (BTDC-with Vacuum Line Off)	5° @ 700 - 750 RPM

Cylinder Head

Flatness of Head	0.002 (0,05) or less
Flatness of Manifold Mounting Surface	
Service Limit	0.012 (0,3)
Oversize Valve Seat Hole	
Intake 0.012 (0,3) O.S	1.547 - 1.548 (39,300 - 39,325)
0.024 (0,6) O.S	1.559 - 1.560 (39,600 - 39,625)
Exhaust 0.012 (0,3) O.S	1.350 - 1.351 (34,300 - 34,325)
0.024 (0,6) O.S	1.362 - 1.363 (34,600 - 34,625)
Camshaft cap to Camshaft Clearance	0.002 - 0.004 (0,05 - 0,09)
Service Limit	0.006 (0,15)
Valve Guide Hole Oversize	
(Both Intake & Exhaust)	
0.002 (0,05) O.S	0.5138 - 0.5145 (13,05 - 13,068)
0.010 (0,25) O.S	0.5216 - 0.5224 (13,25 - 13,268)
0.020 (0,50) O.S	0.5315 - 0.5322 (13,50 - 13,518)
Valve Seat Contact Width	0.035 - 0.051 (0,9 - 1,3)
Valve Seat Angle	45°

Cylinder Block

Flatness of Cylinder Block	0.002 (0,05) or less
Cylinder Bore	3.0276 (76,90)
Wear Limit	.008" (.20)
Service Limit (Maximum Oversize)	+0.047 (+1,2)
Cylindrical Within Bore	0.0004 (0,01) or less
Cylinder to Piston Clearance	0.0008 - 0.0016 (0,02 - 0,04)

Piston

Piston O.D. @ Skirt	3.0276 (76,90)
Piston Pin Hole I.D	0.748 (19)
Piston O.S	0.010 (0,25); 0.020 (0,50); 0.030 (0,75); 0.039 (1,0)
Piston Ring to Groove Clearance	
Compression No. 1	0.0011 - 0.0027 (0,03 - 0,07)
Service Limit	0.006 (0,15)
Compression No. 2	0.0008 - 0.0024 (0,02 - 0,06)
Service Limit	0.006 (0,15)
Compression Ring Gap	0.0098 - 0.0177 (0,25 - 0,45)
Service Limit	0.039 (1,0)
Oil Ring Gap	0.0008 - 0.028 (0,2 - 0,7)
Service Limit	0.039 (1,0)
Piston Ring O.S	0.010 (0,25); 0.020 (0,50); 0.030 (0,75); 0.039 (1,0)

Piston Pin

Piston Pin O.D	0.748 (19)
Piston to Piston Pin Clearance	0.00004 - 0.0005 (0,001 - 0,013)
Service Limit	0.0011 (0,03)
Interference to Connecting Rod:	
Press Fit Load (Normal Temp.)	1101 - 3304 lbs. (500 - 1500 kg)

NOTES

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ENGINE SPECIFICATIONS (Cont'd)

All dimensions are given in inches. Respective metric dimensions are given in millimeters enclosed by parenthesis.

Connecting Rod

Bend or Twist of Rod	0.0011 (0,03) or less
End Play of Big End	0.0039 - 0.010 (0,1 - 0,25)
Rod Bearing Oil Clearance	0.00055 - 0.0025 (0,014 - 0,064)
Rod Bearing U.S	0.010 (0,25); 0.020 (0,50); 0.030 (0,75); 0.039 (1,0)

Crankshaft

Crankshaft Journal Oil Clearance	0.0006 - 0.0028 (0,016 - 0,07)
Service Limit	0.006 (0,15)
Crank Pin Oil Clearance	0.0004 - 0.0025 (0,01 - 0,064)
Service Limit	0.004 (0,10)
Crankshaft Bearing U.S	0.010 (0,25); 0.020 (0,50); 0.030 (0,75)
Crankshaft Journal O.D. (Std.)	2.244 (57)
Service Limit	-0.035 (-0,9)
Journal Undersize Machining Size:	
0.010 (0,25) U.S	2.2337 - 2.2343 (56,735 - 56,750)
0.020 (0,50) U.S	2.2238 - 2.2244 (56,485 - 56,500)
0.030 (0,75) U.S	2.2140 - 2.2146 (56,235 - 56,250)
Crank Pin O.D. (Std.)	1.772 (45)
Service Limit	-0.035 (-0,9)
Pin Undersize Machinging Size:	
0.010 (0,25) U.S	1.7612 - 1.7618 (44,735 - 44,750)
0.020 (0,50) U.S	1.7514 - 1.7520 (44,485 - 44,500)
0.030 (0,75) U.S	1.7415 - 1.7421 (44,235 - 44,250)
Bend of Crankshaft	0.0012 (0,03) or less
Cylindrical Within Journal & Pin	0.0002 (0,005) or less
Crankshaft End Play	0.0002 - 0.0069 (0,05 - 0,175)
Service Limit	0.010 (0,25)

Flywheel

Flywheel Run-Out	0.005 (0,13) or less
Service Limit	0.009 (0,2)

Camshaft

Journal O.D	1.3386 (34)
Service Limit	-0.006 (-0,15)
Cylindrical Within Journal	0.00004 (0,001)
Service Limit	-0.006 (-0,15)
Bend	0.0008 (0,02) or less
Height of Cam Lobe	1.4331 (36,4)
Service Limit	-0.020 (-0,5)
Fuel Pump Drive Lobe	1.575 (40)
Service Limit	-0.020 (-0,5)
Camshaft End Play	0.0002 - 0.0069 (0,05 - 0,15)
Service Limit	0.012 (0,3)

Valve Train

Valve Stem O.D.:	
Intake	0.315 (8)
Service Limit	-0.004 (-0,10)
Exhaust	0.315 (8)
Service Limit	-0.006 (-0,15)

NOTES

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ENGINE SPECIFICATIONS (Cont'd)

All dimensions are given in inches. Respective metric dimensions are given in millimeters enclosed by parenthesis.

Valve Train (Cont'd)

Overall Length:	
Intake	4.071 (103,4)
Exhaust	3.937 (100)
Thickness of Head:	
Intake	0.059 (1,5)
Service Limit	-0.020 (-0,5)
Exhaust	0.059 (1,5)
Service Limit	-0.020 (-0,5)
Clearance to Guide:	
Intake	0.0010 - 0.0023 (0,025 - 0,058)
Service Limit	0.004 (0,1)
Exhaust	0.0020 - 0.0034 (0,05 - 0,085)
Service Limit	0.006 (0,15)
Valve Clearance:	
Cold:	
Intake	0.003 (0,08)
Exhaust	0.007 (0,18)
Hot:	
Intake	0.006 (0,15)
Exhaust	0.010 (0,25)

Valve Guide

Valve Guide O.D	0.512 (13)
Valve Guide I.D.:	
Intake	0.315 - 0.317 (8,0 - 8,018)
Service Limit	-0.004 (-0,10)
Exhaust	0.315 - 0.317 (8,0 - 8,018)
Service Limit	-0.006 (-0,15)
Valve Guide Installed Length	0.539 - 0.563 (13,7 - 14,3)
Valve Guide O.S	0.010 (0,05); 0.020 (0,25); 0.030 (0,50)
Valve Seat Ring O.S.:	
Intake	
0.012 (0,3) O.S	1.547 (39,3)
0.024 (0,6) O.S	1.559 (39,6)
Exhaust	
0.012 (0,3) O.S	1.350 (34,3)
0.024 (0,6) O.S	1.362 (34,6)
Height of Ring:	
0.012 (0,3) O.S	0.291 - 0.299 (7,4 - 7,6)
0.024 (0,6) O.S	0.303 - 0.311 (7,7 - 7,9)

Valve Spring

Color Code BLUE:	
New Free Length	1.811 (46)
Service Limit	-0.039 (-1,0)
New Pre-load	82 lbs. @ 1.469 (13,4 kg @ 37,3)
Use Pre-load	83 lbs. @ 1.106 (38,0 kg @ 28,1)
Inclination	1.5°
Service Limit	3°

NOTES

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ENGINE SPECIFICATIONS (Cont'd)

All dimensions are given in inches. Respective metric dimensions are given in millimeters enclosed by parenthesis.

Rocker Arm and Shaft

L.H. Rocker Shaft:	
O.D. X Length	0.744 X 14.035 (18,9 X 356,5)
R.H. Rocker Shaft:	
O.D. X Length	0.744 X 13.780 (18,9 X 350,0)
Bend	0.020 (0,05) or less
Rocker Arm I.D	0.744 (18,9)
Arm to Shaft Clearance	0.0005 - 0.0017 (0,012 - 0,043)
Rocker Shaft Spring:	
Free Length	2.098 (53,3)
Preload	3.7 lbs. @ 1.396 (1,7 kg @ 35,5)

Oil Pump

Relief Valve Opening Pressure	57 - 71 lbs. (26 - 32 kg)
Outer to Inner Rotor Clearance	0.0016 - 0.004 (0,04 - 0,12)
Service Limit	0.010 (0,25)
Pump Body to Outer Rotor Clearance	0.0039 - 0.006 (0,10 - 0,16)
Service Limit	0.012 (0,3)
Rotor Side Clearance	0.0023 - 0.005 (0,06 - 0,12)
Service Limit	0.008 (0,2)
Relief Spring:	
Free Length	1.850 (47)
Preload	16 lbs. @ 1.398 (7,1 kg @ 35,5)

Fuel Pump

Delivery	2.11 qts. (2 L) @ 5000 RPM
Closed Delivery Pressure	3.7 - 5 PSI (25,5 - 34,5 kPa)

Carburetor

Idle RPM	700 - 750 RPM
Type	Downdraft
Model	28-32DIDSA
Main Jet Diameter	0.037 (0,95)
Main Air Jet Diameter	0.035 (0,9)
Pilot Jet Diameter	0.022 (0,55)
Pilot Air Jet Diameter	0.062 (1,6)
Enrichment Jet Diameter	0.023 (0,6)
Needle Valve Seat Diameter	0.078 (2,0)
Fast Idle Opening	18°
Idle Compensator-Fully Open Temperature	131 - 158°F. (55 - 70° C.)

Water Pump

Type	Centrifugal, Impeller Type
Belt Tension	0.276 - 0.394 @ 22 lbs. (7 - 10 @ 10 kg)

Thermostat

Type	Wax Type
Valve Cracking Temperature	180° F. (82° C.)
Valve Lift & Temperature	0.031 (8) @ 203° F. (95° C.)

NOTES

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ENGINE SPECIFICATIONS (Cont'd)

All dimensions are given in inches. Respective metric dimensions are given in millimeters enclosed by parenthesis.

Starter

Type	12 Volt
Direction of Rotation	Clockwise

Alternator

Output Voltage	45 Amps. @ 2600 RPM

Distributor

Timing (With Vacuum Line Off)	5° BTDC @ 700 - 750 RPM
Direction of Rotation	Clockwise
Ignition Firing Order	1-3-4-2
Centrifugal Spark Advance:	
Beginning	0° @ 1000 RPM
End	10° @ 2500 RPM
Vacuum Spark Advance:	
Beginning	0° @ 0.36 in. of mercury
Middle	9° @ 9.84 in. of mercury
End	13° @ 15.8 in. of mercury
Point Gap	0.018 - 0.021 (0,44 - 0,55)
Dwell Angle	52° + 3°
Condenser Capacity	22 uF

Spark Plugs

Plug Gap	0.028 - 0.031 (0,7 - 0,8)

Engine Torque	Ft.-Lbs.	Nm
Cylinder Head Bolts (Cold)	51 - 54	69 - 73
(Hot)	58 - 61	79 - 83
Rocker Cover Mounting Bolts	4 - 5	5 - 6
Intake & Exhaust Manifold Mounting Nuts	11 - 14	15 - 19
Camshaft Bearing Cap Mounting Bolts (M8)	14 - 15	17 - 20
(M6)	7 - 9	9 - 12
Camshaft Sprocket Mounting Bolt	36 - 43	49 - 58
Crankshaft Main Bearing Cap Bolts	36 - 40	49 - 54
Connecting Rod Cap Bolts	23 - 25	31 - 34
Crankshaft Pulley Bolt	80 - 94	113 - 122
Flywheel Bolts	55 - 60	75 - 81
Oil Pan Mounting Bolts	4 - 6	5 - 8
Oil Pan Drain Plug	36 - 43	49 - 58
Oil Pressure Switch	11 - 16	15 - 22
Oil Filter	8 - 9	11 - 12
Oil Pump Sprocket Nut	25 - 29	34 - 39
Spark Plugs	18 - 22	24 - 30
Alternator Support Nut	7 - 9	9 - 12
Alternator Brace Bolt	7 - 9	9 - 12
Starter Mounting Bolts	16 - 23	22 - 31
Crankshaft Pulley Bolts	7.5 - 8.5	10 - 11
Belt Tensioner Mounting Nut	16 - 21	22 - 29
Front Case Bolts	11 - 13	15 - 17
Oil Screen Mounting Nuts	13 - 18	18 - 24
Oil Pump Mounting Bolts	11 - 13	15 - 17
Distributor Holding Nut	15 - 21	20 - 29

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TECHNICAL DATA

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HYDRAULIC/HYDROSTATIC FLUID SPECIFICATIONS

Specifications

Use Melroe hydraulic/hydrostatic transmission fluid (P/N 6563328). If this fluid is not available, use 10W-30 or 10W-40 SAE motor oil.

Use Class SE or SF motor oil (5W-30 at temperatures below 10°F (23°C)).

DO NOT use automatic transmission fluids in the loader or permanent damage to the transmission will result.

Where temperatures below zero are common, the loader should be kept in a warm building. Extra warm-up time must be used each time the loader is started during cold temperature conditions. Cold fluid will not flow easily and it makes action of the hydraulic function slower. Loss of fluid flow to the hydrostatic transmission pump will cause transmission damage in less then 60 seconds time.

IMPORTANT

When the temperature is below -20°F. (-30°C.), hydrostatic oil must be kept warm. The hydrostatic system will not get enough oil at low temperatures and will damage the hydrostatic system. Park the machine in an area where the temperature will be above 0°F. (-18°C.) if possible.

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DECIMAL AND MILLIMETER EQUIVALENTS

FRACTIONS	DECIMALS	MM	FRACTIONS	DECIMALS	MM
1/64	0.015625	0.397	33/64	0.515625	13.097
1/32	0.03125	0.794	17/32	0.53125	13.494
3/64	0.046875	1.191	35/64	0.546875	13.891
1/16	0.0625	1.588	9/16	0.5625	14.288
5/64	0.078125	1.984	37/64	0.578125	14.684
3/32	0.09375	2.381	19/32	0.59375	15.081
7/64	0.109375	2.778	39/64	0.609375	15.478
1/8	0.1250	3.175	**5/8**	0.6250	15.875
9/64	0.140625	3.572	41/64	0.640625	16.272
5/32	0.15625	3.969	21/32	0.65625	16.669
11/64	0.171875	4.366	43/64	0.671875	17.066
3/16	0.1875	4.762	11/16	0.6875	17.462
13/64	0.203125	5.159	45/64	0.703125	17.859
7/32	0.21875	5.556	23/32	0.71875	18.256
15/64	0.234375	5.953	47/64	0.734375	18.653
1/4	0.2500	6.350	**3/4**	0.7500	19.050
17/64	0.265625	6.747	49/64	0.765625	19.447
9/32	0.28125	7.144	25/32	0.78125	19.844
19/64	0.296875	7.541	51/64	0.796875	20.241
5/16	0.3125	7.938	13/16	0.8125	20.638
21/64	0.328125	8.334	53/64	0.828125	21.034
11/32	0.34375	8.731	27/32	0.84375	21.431
23/64	0.359375	9.128	55/64	0.859375	21.828
3/8	0.3750	9.525	**7/8**	0.8750	22.225
25/64	0.390625	9.922	57/64	0.890625	22.622
13/32	0.40625	10.319	29/32	0.90625	23.019
27/64	0.421875	10.716	59/64	0.921875	23.416
7/16	0.4375	11.112	15/16	0.9375	23.812
29/64	0.453125	11.509	61/64	0.953125	24.209
15/32	0.46875	11.906	31/32	0.96875	24.606
31/64	0.484375	12.303	63/64	0.984375	25.003
1/2	0.5000	12.700	**1**	1.000	25.400

1 mm = 0.03937" **0.001" = 0.0254 mm**

U.S. TO METRIC CONVERSION

	TO CONVERT	INTO	MULTIPLY BY
LINEAR MEASUREMENT	Miles	Kilometers	1.609
	Yards	Meters	0.9144
	Feet	Meters	0.3048
	Feet	Centimeters	30.48
	Inches	Meters	0.0254
	Inches	Centimeters	2.54
	Inches	Millimeters	25.4
AREA	Square Miles	Square Kilometers	2.59
	Square Feet	Square Meters	0.0929
	Square Inches	Square Centimeters	6.452
	Acre	Hectare	0.4047
VOLUME	Cubic Yards	Cubic Meters	0.7646
	Cubic Feet	Cubic Meters	0.02832
	Cubic Inches	Cubic Centimeters	16.39
WEIGHT	Tons (Short)	Metric Tons	0.9078
	Pounds	Kilograms	0.4536
	Ounces (Avdp.)	Grams	28.3495
PRESSURE	Pounds/Sq. In.	Kilopascal	6.895
WORK	Foot-pounds	Newton-Metre	1.356
LIQUID VOLUME	Quarts	Liters	0.9463
	Gallons	Liters	3.785
LIQUID FLOW	Gallons/Minute	Liters/Minute	3.785
TEMPERATURE	Fahrenheit	Celsius	1. Subtract 32° 2. Multiply by 5/9

NOTES

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TORQUE FOR GENERAL METRIC BOLTS

Thread Size (Dia. X Pitch)	Material		
	Head Mark 4	Head Mark 7	Head Mark 10
M 5 X 0,8		3-4 ft.-lbs. (4-5 Nm)	
M 6 X 1,0		6-7 ft.-lbs. (8-9 Nm)	6-9 ft.lbs. (8-12 Nm)
M 8 X 1,25	6-9 ft.-lbs. (8-12 Nm)	11-16 ft.-lbs. (15-22 Nm)	18-25 ft.-lbs. (24-34 Nm)
M 10 X 1,25	13-18 ft.-lbs. (18-24 Nm)	22-30 ft.-lbs. (30-41 Nm)	36-50 ft.-lbs. (49-68 Nm)
M 12 X 1,25	22-30 ft.-lbs. (30-41 Nm)	40-54 ft.-lbs. (54-73 Nm)	69-87 ft.-lbs. (94-118 Nm)
M 14 X 1,5	36-50 ft.-lbs. (49-68 Nm)	58-80 ft.-lbs. (79-108 Nm)	116-137 ft.lbs. (157-186 Nm)

NOTES

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STANDARD TORQUE SPECIFICATIONS FOR BOLTS

The following table shows standard torque specifications for bolts with zinc phosphate coating. Bolts purchased from Melroe that have zinc phosphate coating are specified by the letter "H" following the part number.

	THREAD SIZE	SAE GRADE 5	SAE GRADE 8
INCH. LBS. (Nm)	.250	80—90 (9—10)	110—120 (13—14)
	.3125	180—200 (21—23)	215—240 (24—27)
FOOT LBS. (Nm)	.375	25—28 (34—38)	35—40 (48—54)
	.4375	40—45 (54—61)	60—65 (82—88)
	.500	65—70 (88—95)	90—100 (125—135)
	.5625	90—100 (125—135)	125—140 (170—190)
	.625	125—140 (170—190)	175—190 (240—260)
	.750	220—245 (300—330)	300—330 (410—450)
	.875	330—360 (450—490)	475—525 (645—710)
	1.000	475—525 (645—710)	725—800 (985—1085)
	1.125	650—720 (880—975)	1050—1175 (1425—1600)
	1.250	900—1000 (1200—1360)	1475—1625 (2000—2200)
	1.375	1200—1350 (1630—1830)	2000—2200 (2720—2980)
	1.500	1500—1650 (2040—2240)	2600—2850 (3530—3870)
	1.625	2000—2800 (2720—2980)	3450—3800 (4680—5150)
	1.750	2500—2750 (3390—3730)	4300—4800 (5830—6500)
	1.875	3150—3500 (4270—4750)	5500—6100 (7450—8300)
	2.000	3800—4200 (5150—5700)	6500—7200 (8800—9800)

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MELROE COMPANY

bobcat

740—1
Revision Number

11 November 1988
Date

SERVICE MANUAL REVISION

AFFECTING:

Product BOBCAT LOADER

Model 741, 742, 743

Manual No. 6566109 (4-88)

ROUTE TO ATTENTION	
PARTS MANAGER	☐
SERVICE MANAGER	☑
SALES MANAGER	☐
	☐

The attached pages are a revision to the service manual. Please replace existing pages with new pages, as follows.

TAKE OUT	PUT IN
2—7, 2—8	2—7 (Revised Nov. 88), 2—8

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MELROE COMPANY
A BUSINESS UNIT OF CLARK EQUIPMENT COMPANY

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740—2
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SERVICE MANUAL REVISION

AFFECTING:

Product BOBCAT LOADER

Model 741, 742, 743, 743 DS

Manual No. 6566109 (4-88)

ROUTE TO ATTENTION

PARTS MANAGER ☐
SERVICE MANAGER ☑
SALES MANAGER ☐
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TAKE OUT	PUT IN
4—7, 4—8	4—7 (Revised Mar. 89), 4—8
7A—5, 7A—6	7A—5 (Revised Mar. 89), 7A—6 (Revised Mar. 89)
7C—19, 7C—20	7C—19 (Revised Mar. 89), 7C—20

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MELROE COMPANY

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Model 741, 742, 743, 743 DS

Manual No. 6566109 (4-88)

ROUTE TO ATTENTION

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SERVICE MANAGER	☑
SALES MANAGER	☐
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TAKE OUT	PUT IN
7C—25, 7C—26	7C—25, 7C—26 (Revised Apr. 90)

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MELROE COMPANY

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SERVICE MANUAL REVISION

AFFECTING:

Product BOBCAT LOADER

Model 741, 742 (20001-22999), 743, 742 (23000 & Above)

Manual No. 6566109 (7-90)

ROUTE TO ATTENTION

PARTS MANAGER ☐
SERVICE MANAGER ☑
SALES MANAGER ☐
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	TAKE OUT	PUT IN
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Section 2		
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	2—17, 2—18	2—17, 2—18 (Revised Sept. 90)
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	4—13, 4—14	4—13 (Revised Sept. 90), 4—14
	4—17, 4—18	4—17, 4—18 (Revised Sept. 90)
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	743DS Engine Wiring Diagram (P/N 6570758) (Printed April 1988)	743DS Engine Wiring Diagram (P/N 6570758) (Printed September 1990)
		743DS Engine Wiring Diagram (P/N 6720564) (Printed September 1990)
	6—13, 6—14	6—13 (Revised Sept. 90), 6—14
	6—15, 6—16	6—15 (Revised Sept. 90), 6—16 (Revised Sept. 90)
	6—17, 6—18	6—17 (Revised Sept. 90), 6—18 (Revised Sept. 90)
	6—19	6—19 (Revised Sept. 90)
Section 7		
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		Engine Service Tab Page (742 Mitsubishi) (Added Sept. 90)
		7D—1 thru 7D—57 (Added Sept. 90)
Section 8		
	Tab Pages	New Tab Pages and
	All of 8A—1 thru 8D—4	8A—1 thru 8E—4 (Revised Sept. 90)

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740–5
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28 November 1990
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SERVICE MANUAL REVISION

AFFECTING:

Product BOBCAT LOADER

Model 740 SERIES

Manual No. 6566109 (4-88)

ROUTE TO ATTENTION	
PARTS MANAGER	☐
SERVICE MANAGER	☑
SALES MANAGER	☐
	☐

The attached page is a revision to the 740 Series Service Manual (6566109). Take out and put in the revised page as follows:

TAKE OUT	PUT IN
2–39, 2–40	2–39, 2–40 (Revised Nov. 90)

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740—6
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5 June 1991
Date

SERVICE MANUAL REVISION

AFFECTING:

Product BOBCAT LOADER

Model 740 SERIES

Manual No. 6566109 (4-88)

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PARTS MANAGER ☐
SERVICE MANAGER ☑
SALES MANAGER ☐
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TAKE OUT	PUT IN
7C—23 (Revised Sept. 90), 7C—24 (Revised Sept. 90)	7C—23 (Revised Sept. 90), 7C—24 (Revised June 91)
8C—3, 8C—4 (Revised Sept. 90) 8C—5 (Revised Sept. 90)	8C—3 (Revised June 91), 8C—4 (Revised June 91) 8C—5 (Revised June 91), 8C—6 (Added June 91)
TECHNICAL DATE — TAB PAGE (Added Sept. 90) 8E—3 (Added Sept. 90), 8E—4 (Added Sept. 90)	TECHNICAL DATE — TAB PAGE (Revised June 91) 8E—3 (Revised June 91), 8E—4 (Added Sept. 90)

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Product BOBCAT LOADER

Model 740 SERIES

Manual No. 6566109 (4-88)

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PARTS MANAGER ☐
SERVICE MANAGER ☑
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TAKE OUT	PUT IN
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MELROE COMPANY

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Model 740 SERIES

Manual No. 6566109 (4-88)

ROUTE TO ATTENTION

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SERVICE MANAGER ☑
SALES MANAGER ☐
☐

The attached pages are a revision to the 740 Series Service Manual (6566109). Take out and put in the revised pages as follows:

TAKE OUT	PUT IN
	HYDRAULIC/HYDROSTATIC FLOW CHART For Models 742B & 743B (With 3-Spool Melroe Control Valve) Chart #6722141 (Printed January 1992)
	HYDRAULIC/HYDROSTATIC SYSTEM OPERATION To Be Used With HYDRAULIC/HYDROSTATIC FLOW CHART For Models 742B & 743B (With 3-Spool Melroe Control Valve) Chart #6722141 (Printed January 1992)
2—3, 2—4 2—5, 2—6	2—3 (Revised Jan. 92), 2—4 2—5 (Revised Jan. 92), 2—6
7A—5 (Revised Mar. 89), 7A—6 (Revised Mar. 89) 7C—5, 7C—6 7C—31 (Revised Sept. 90), 7C—32 (Revised Sept. 90)	7A—5 (Revised Mar. 89), 7A—6 (Revised Jan. 92) 7C—5 (Revised Jan. 92), 7C—6 (Revised Jan. 92) 7C—31 (Revised Jan. 92), 7C—32 (Revised Sept. 90)
8C—3 (Revised June 91), 8C—4 (Revised June 91)	8C—3 (Revised June 91), 8C—4 (Revised Jan. 92)