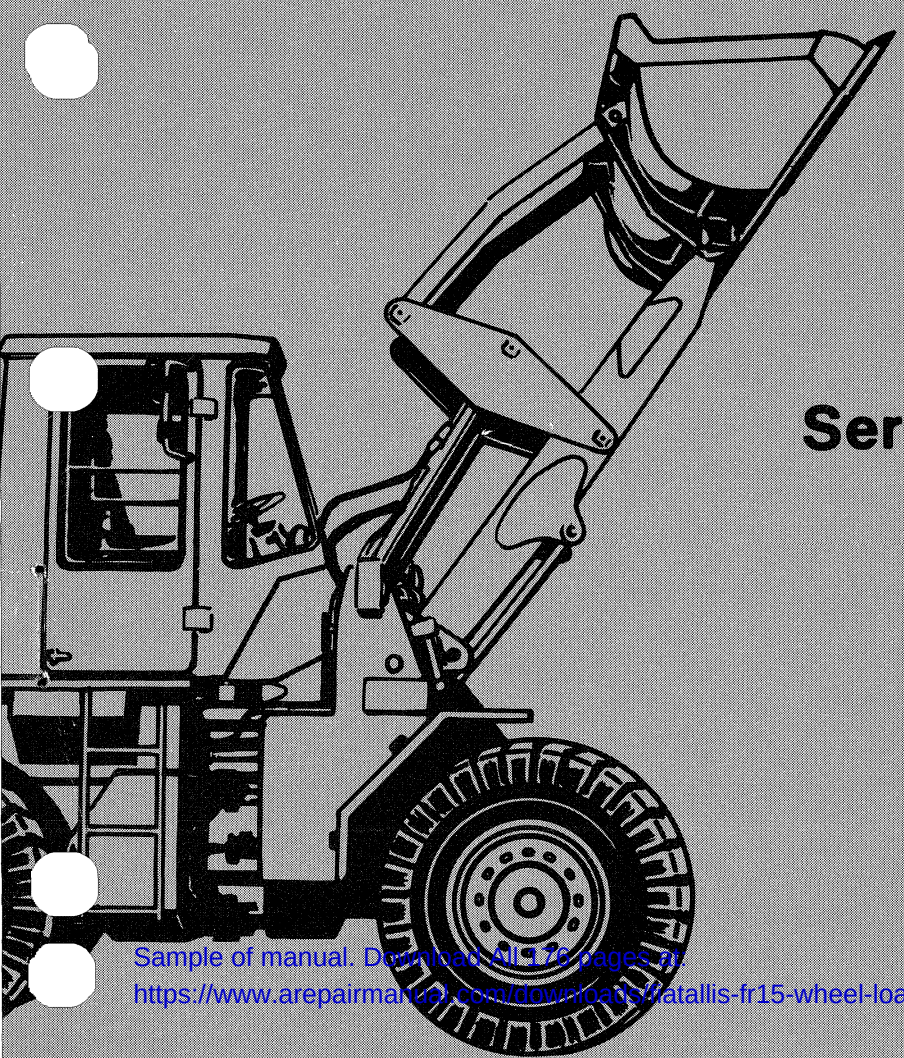
FIATALLIS

FR15



Service information manual

73127735
Reprinted

AVOID ACCIDENTS

Most accidents, whether they occur in industry, on the farm, at home or on the highway, are caused by the failure of some individual to follow simple and fundamental safety rules or precautions. For this reason MOST ACCIDENTS CAN BE PREVENTED by recognizing the real cause and doing something about it before the accident occurs.

Regardless of the care used in the design and construction of any type of equipment there are many conditions that cannot be completely safeguarded against without interfering with reasonable accessibility and efficient operation.

A careful operator is the best insurance against an accident. The complete observance of one simple rule would prevent many thousand serious injuries each year.
That rule is:

Never attempt to clean, oil or adjust a machine while it is in motion.

WARNING

On machines having hydraulically, mechanically, and/or cable controlled equipment (such as shovels, loaders, dozers, scrapers, etc.) be certain the equipment is lowered to the ground before servicing, adjusting and/or repairing. If it is necessary to have the hydraulically, mechanically, and/or cable controlled equipment partially or fully raised to gain access to certain items, be sure the equipment is suitably supported by means other than the hydraulic lift cylinders, cable and/or mechanical devices used for controlling the equipment.

FR15

wheel loader

service information manual

S/N 80U00101-UP

Form 73127735 English

⚠ WARNING

STUDY THE OPERATION AND MAINTENANCE INSTRUCTION MANUAL THROUGH BEFORE STARTING, OPERATING, MAINTAINING, FUELING OR SERVICING THIS MACHINE.

⚠ The Operation and Maintenance Instruction Manual provides the instructions and procedures for starting, operating, maintaining, fueling, shutdown and servicing that are necessary for properly conducting the procedures for overhaul of the related components outlined in this Service Manual.

⚠ This symbol is your safety alert sign. It MEANS ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED.

⚠ Read and heed all safety instructions carrying the signal words WARNING and DANGER.

⚠ Machine mounted safety signs have been color coded yellow with black borders and lettering for warning and red with white borders and lettering for danger points.

SAFETY RULES

GENERAL

Study the Operation and Maintenance Instruction Manual before starting, operating, maintaining, fueling, or servicing machine.

Read and heed all machine-mounted safety signs before start-- ing, operating, maintaining, fueling or servicing machine.

Machine-mounted safety signs have been color coded yellow with black borders and lettering for WARNING and red with white borders and lettering for DANGER points.

Do not allow unauthorized personnel to service or maintain this machine. Do not perform any work on equipment that is not authorized. Follow the Maintenance and Service procedures. Study the Operation and Maintenance Instruction Manual before starting starting, operating, maintaining, fueling or servicing this machine.

Always wear safey glasses with side shields.

Do not wear rings, wrist watches, jewelry, or loose or hanging apparel, such as ties, torn clothing, scarves, unbuttoned, or unzipped jackets that can catch on moving parts. Wear proper safety equipment as authorized for the job. Examples: hard hats, safety shoes, heavy gloves, ear protectors, safety glasses or goggles, reflector vests, or respirators. Consult your employer for specific safety equipment requirements.

Do not use controls or hoses as handholds when climbing on or off machine. Hoses and controls are movable and do not provide a solid support. Controls may also be inadvertently moved causing accidental machine or equipment movement.

Do not jump on or off machine. Keep two hands and one foot, or two feet and one hand, in contact with steps and grab-rails and handrails at all times.

Machine should not be serviced with anyone in the operator's seat unless they are qualified to operate the machine and are assisting in the servicing.

Keep operator's compartment, stepping points, grab-rails and handles clean of foreign objects, oil, grease, mud or snow accumulation to minimize the danger of slipping or stumbling. Clean mud or grease from shoes before attempting to mount or operate the machine.

Never attempt to operate the machine or its tools from any other position than seated in the operator's seat.

Keep operator's compartment clear of loose objects.

Always block with external support any linkage or part on machine that requires work under the raised linkage, parts, or machine per local or national requirements. Never allow anyone to walk under or be near unblocked raised equipment. Avoid working or walking under raised blocked equipment unless you are assured of your safety.

Never place head, body, limbs, fingers, feet or hands into an exposed portion between uncontrolled or unguarded scissor points of machine without first providing secure blocking.

Never leave machine unattended with the engine running.

Never lubricate, service or adjust a machine with the engine running, except as called for in the Operation and Maintenance Instruction Manuals. Do not wear loose clothing or jewelry near moving parts.

When servicing or maintenance requires access to areas that cannot be reached from the ground, use a ladder or step platform that meets local or national requirments to reach the service point. If such ladders or platforms are not available, use the machine handholds and steps as provided. Perform all service or maintenance carefully.

Shop or field service platforms and ladders used to maintain or service machinery should be constructed and maintained according to local or national requirements.

Disconnect batteries and TAG all controls according to local or national requirements to warn that work is in progress. Block the machine and all attachments that must be raised per local or national requirements.

Never check or fill fuel tanks, storage batteries or use starter fluid near lighted smoking materials or open flame due to the presence of flammable fluid.

Brakes are inoperative when manually released for servicing. Provision must be made to maintain control on the machine by blocking or other means.

Always place the fuel nozzle against the side of the filler opening before starting and during fuel flow. To reduce the chance of static electricity spark, keep contact until after fuel flow is shut off.

Use only designated towing or pulling attachments points. Use care in making attachment. Be sure pins and locks as provided are secure before pulling. Stay clear of drawbars, cables or chains under load.

To move a disabled machine, use trailer or low boy truck if available. If towing is necessary, provide warning signs as required by local rules and regulations and follow Operation and Maintenance Instruction Manual recomendations. Load and unload on a level area that gives full support to the trailer wheels. Use ramps of adequate strength, low angle and proper height. Keep trailer bed clean of clay, oil and all materials that become slippery. Tie machine down securely to truck or trailer bed and block tracks(or wheels) as required by the carrier.

Never align holes with fingers or hands. Use the proper aligning tool.

Remove sharp edges and burrs from reworked parts. Use only grounded auxillary power source for heaters, chargers, pumps and similar equipment to reduce hazard of electrical shock.

Lift and handle all heavy parts with lifting device of proper capacity. Be sure parts are supported by proper slings and hooks. Use lifting eyes provided. Watch out for people in vicinity.

Never place gasoline or diesel fuel in an open pan.

Never use gasoline or solvent or other flammable fluid to clean parts. Use authorized commercial, non-flammable, non-toxic solvents.

When using compressed air for cleaning parts use safety glasses with side shields or goggles. Limit the pressure to 207 kPa (30 psi) according to local or national requirements.

Do not smoke or permit any open flame or spark near when refueling, or handling highly flammable materials.

Do not use a open flame as a light source to look for leaks or for inspection anywhere on the machine.

Be sure all mechanic's tools are in good condition DO NOT use tools with mushroomed heads. Always wear safety glasses with side shields.

Move carefully when under, in or near machine implements. Wear required protective equipment such as hard hat, safety glasses, safety shoes, ear protectors.

When making equipment checks that require running of the engine, have an operator in the operator seat at all times with the mechanic in sight. Place the transmission in neutral and set the brakes and lock. Keep hands and clothing away from moving parts. Shut off engine and disengage the Power Take-Off lever, if so equipped, before attempting adjustment service.

Never use the bucket as a man lift.

The articulation point between frames will not clear a person. Stay clear when engine is running. Support, using device provided when servicing. Return support to carry position and secure before moving machine after servicing. See Operation and Maintenance Instruction Manual.

For field service, move machine to level ground if possible and block machine. If work is absolutely necessary on an incline, block machine and its attachments securely. Move the machine to level ground as soon as possible.

Guard against kinking chains or cables. Do not lift or pull through a kinked chain or cable. Always wear gloves when handling chain or cable.

Be sure cables are anchored and the anchor point is strong enough to handle the expected load. Keep exposed personnel clear of anchor point and cable or chain. DO NOT PULL OR TOW UNLESS OPERATOR'S COMPARTMENTS OF MACHINES INVOLVED ARE PROPERLY GUARDED AGAINST ACCIDENTAL CABLE OR CHAIN BACKLASH.

Keep maintenance area CLEAN and DRY. Remove water or oil slicks immediately.

DO NOT pile oily, greasy rags - they are a fire hazard. Store in a closed metal container.

Before starting machine or moving attachment check and adjust and lock operator's seat. Be sure that all personnel in the area are clear before starting or moving machine and any of its attachments. Sound horn.

Rust inhibitors are volatile and flammable. Prepare parts in well-ventilated place. Keep open flame away - DO NOT SMOKE. Store container in a cool well-ventilated place secure against unauthorized personnel.

Do not carry loose objects in pockets that might fall unnoticed into open compartments.

Keep clutches and brakes on machine and attachments such as Power Control Units, winches and master clutches adjusted according to Operation and Maintenance Instruction Manuals of the manufacturer at all times. DO NOT adjust machine with engine running except as specified.

Wear proper protective equipment such as safety goggles or safety glasses with side shields, hard hat, safety shoes, heavy gloves when metal or other particles are apt to fly or fall.

Wear welder's protective equipment such as dark safety glasses, helmets, protective clothing, gloves and safety shoes when welding. Wear dark safety glasses near welding. DO NOT LOOK AT ARC WITHOUT EYE PROTECTION.

Know your jacking equipment and its capacity. Be sure the jacking point used on the machine is appropriate for the load to be applied. Be sure the support for the jack at the machine and under the jack is appropriate and stable. Any equipment up on a jack is dangerous. Transfer load to appropriate blocking as a safety measure before proceeding with service or maintenance work according to local or national requirements.

Wire rope develops steel slivers. Use authorized protective equipment such as heavy gloves, safety glasses when handling.

Handle all parts with extreme care. Keep hands and fingers from between parts. Wear authorized protective equipment such as safety glasses, heavy gloves, safety shoes.

Inspect your seat belt at least twice a year for signs of fraying, wear, or other weakness that could lead to failure.

Where it is necessary to use diesel fuel as lubricant make sure all smoking material and open flames are extinguished or that no sparks are near. Place all parts in a closed container of clean diesel fuel for use as needed.

To minimize dangers of fire and explosion, it is recommended that before any welding is done on a fuel tank, the tank be completely drained of fuel, fuel lines disconnected and the ends closed to protect them, and the tank be steam cleaned. All traces of fuel must be removed before welding is started. Flood the tank with carbon dioxide (CO^2) before and during welding. Caps must be removed and vents and other openings left open during welding.

Dry ice (solid carbon dioxide) is extremely cold and will freeze flesh on contact. Use care to prevent contact with skin, eyes, or other parts of the body to avoid personal injury.

When work is requireed under or between components, block with an external support capable of holding the components in place according to local or national requirements.

During service or repair, tag all starting and operating controls. The tag should be removed only by someone who is aware of the circumstances and who can assure that it is safe to do so.

START UP

Do not run the engine of this machine in closed areas without proper ventilation to remove deadly exhaust gases.

Do not place head, body, limbs, feet, fingers, or hands near a rotating fan or belts. Be especially alert around a pusher fan.

STARTING FLUID IS FLAMMABLE. Follow the recommendations as outlined in the Operation and Maintenance Instruction Manual and as marked on the containers. Store containers in cool, well-ventilated place secure from unauthorized personnel. DO NOT PUNCTURE OR BURN CONTAINERS. Follow the recommendation of the manufacturer for storage and disposal.

ENGINE

Turn radiator cap slowly to relieve pressure before removing. Add coolant only with engine stopped or idling if hot. See Operation and maintenance Instruction Manual.

Do not run engine when refueling and use care if engine is hot due to increased possibility of a fire if fuel is spilled.

Never attempt to check or adjust fan belts when engine is running.

Do not adjust engine fuel pump when the machine is in motion.

Never lubricrate a machine with the engine running.

Avoid running engine with open unprotected air inlets. If such running is unavoidable for service reasons, place protective screen over all inlet openings when servicing engine.

ELECTRICAL

Be sure to connect the booster cables to proper terminals (+ to +) and (− to −) at both ends. Avoid shorting clamps. Follow the Operation and Maintenance Instruction Manual procedure.

Always turn the master switch (key switch if so equipped) to the off position when maintaining or servicing machine.

BATTERY GAS IS HIGHLY FLAMMABLE. Leave battery box open to improve ventilation when charging batteries. Never check charge by placing metal objects across the posts. Keep sparks or open flame away from batteries. Do not smoke near battery to guard against the possibility of an accidental exposion.

Check for fuel or battery electrolyte leaks before starting service or maintenance work. Eliminate leaks before proceeding.

Do not charge batteries in a closed area. Provide proper ventilation to guard against an accidental explosion from an accumulation of explosive gases given off in the charging process.

Disconnect batteries before working on electrical system or repair work of any kind.

HYDRAULIC

Fluid escaping under pressure from a very small hole can almost be invisible and can have sufficient force to penetrate the skin. Use a piece of cardboard or wood to search for suspected pressure leaks. DO NOT USE HANDS. If injured by escaping fluid, see a doctor at once. Serious infection or reaction can develop if proper medical treatment is not administered immediately.

Shut off engine and be sure all pressure in system has been relieved before removing panels, housing, covers, and caps. See Operation and Maintenance Instruction Manual or Service Manual for guidance.

ATTACHMENTS

Keep head, body, limbs, feet, hands and fingers away from blade, bucket or ripper when in raised position. Use authorized blocking as safety measure before proceeding with service or maintenance per local or national requirements.

If movement of an attachment by means of the machine's hydraulic system is required for service or maintenance do not raise or lower attachments from any position other than when seated in the operator's seat. Before starting machine or moving attachments or tools, make sure to set brakes, sound horn and call for an all clear. Raise attachment slowly.

Do not use machine to carry loose objects by means other than attachments for carrying such objects.

Never use any gas other than dry nitrogen to charge accumulators. See Operation and Maintenance Instruction Manual.

TIRES (APPLICABLE MACHINES)

Be sure tires are properly inflated to the manufacturer's specified pressure. Inspect for damage periodically.

Stand to one side when changing inflation of tires.

Check tires only when the machine is empty and tires are cool to avoid underinflation. Do not use reworked wheel parts. Improper welding, heating or brazing weakens them and can cause failure.

Never cut or weld on the rim of an inflated tire. Inflate a spare tire only enough to keep rim parts in place - a fully inflated tire might fly apart when it is installed on a machine.

Use care if you must transport (haul) a fully inflated tire.

When servicing tires block the machine in front and back of all wheels. After jacking up, place blocking under machine to protect from falling per local and national requirements.

Deflate tires before removing objects from the tread.

Never inflate tires with flammable gases. Exlosion and personal injury could result.

FOREWORD

This publication provides the approved Fiatallis procedures for removal, disassembly, reassembly, and installation of major machine components, and connection of diagnostic equipment.

This manual is intended as a workshop guide, and for training of maintenance personnel, and includes descriptions of component functions.

It is not within the scope of this publication to provide assistance with troubleshooting, or diagnosis of systems or components.

The SERVICE SPECIFICATION MANUAL is also required for finding fits, tolerances, dimensions, and specifications.

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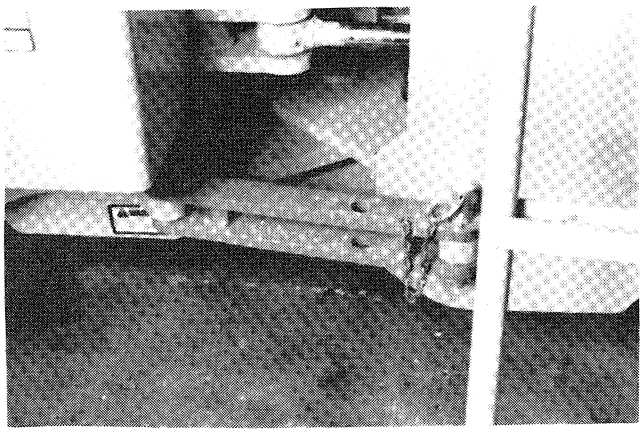
A1001 POSITION MACHINE

POSITION MACHINE AND LOCK THE FRAME LOCK BAR INTO THE STRAIGHT AHEAD POSITION.



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WARNING - SHUT MACHINE DOWN ACCORDING TO MANUAL PROCEDURE BEFORE LUBRICATING OR SERVICING.

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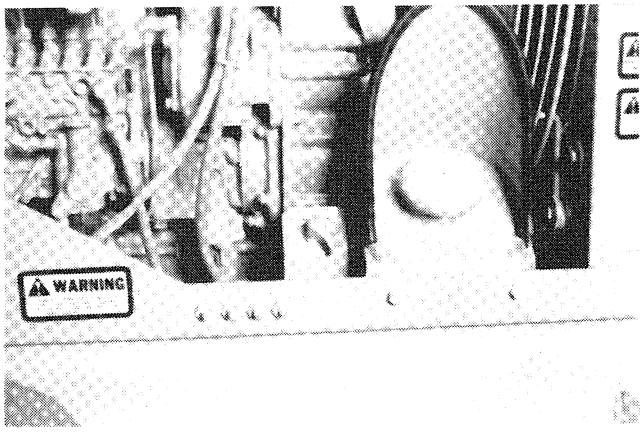
WARNING - ALWAYS WEAR SAFETY GLASSES WITH SIDE SHIELDS WHEN REMOVING, OVERHAULING, CLEANING OR TESTING MACHINE PARTS.

A1002 SHUT OFF MASTER SWITCH



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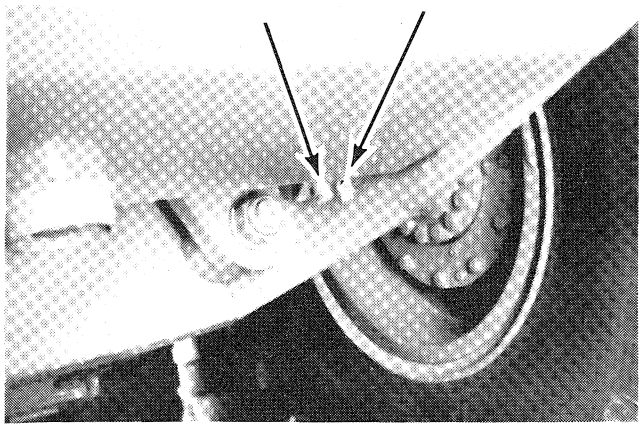
WARNING - ALWAYS TURN THE MASTER SWITCH TO THE OFF POSITION BEFORE CLEANING, REPAIRING, SERVICING OR PARKING THE MACHINE TO PREVENT INJURY.

A1003 DRAIN RADIATOR



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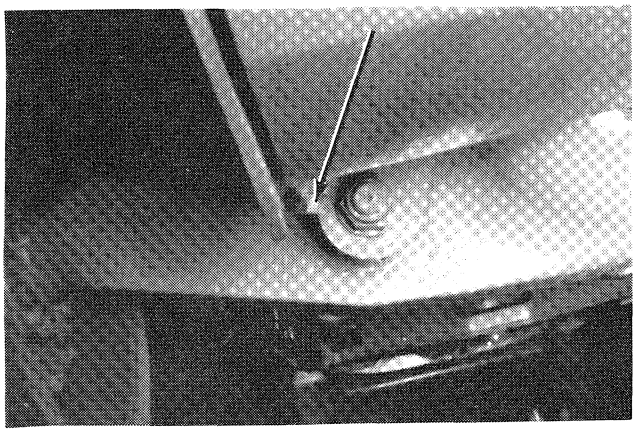
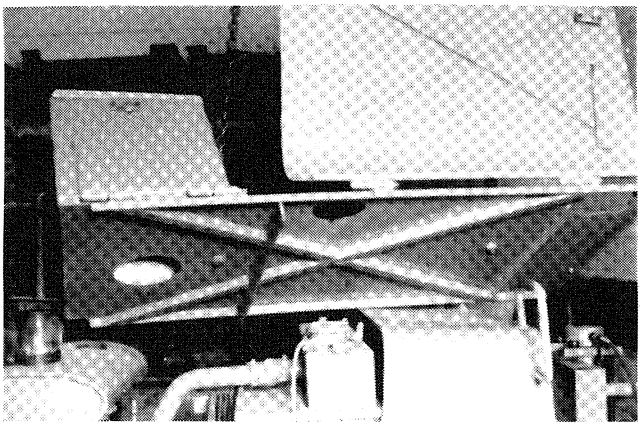
WARNING - FLUID UNDER PRESSURE - TURN CAP OR COVER SLOWLY TO RELIEVE PRESSURE BEFORE REMOVING OR UNTIL PRESSURE HAS BEEN RELIEVED AS COOLANT MAY BOIL OVER AND CAUSE PERSONAL INJURY.

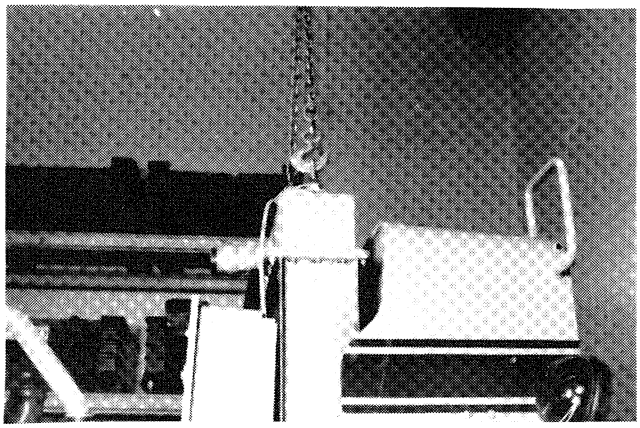
A1004 DRAIN ENGINE OIL





A1005 REMOVE HOOD

REMOVE PIPE AND PRE-CLEANER TO REMOVE THE HOOD. INSTALL TWO EYEBOLTS INTO THE HOOD. REMOVE TEN HOOD ATTACHING BOLTS. THE HOOD WEIGHS 45 KG (100 LBS.) AND IS TOO BULKY TO LIFT BY HAND.



A1006 REMOVE RADIATOR

DISCONNECT RADIATOR HOSES. REMOVE GUARD AND SHROUD. ATTACH CHAIN TO RADIATOR AT LIFT EYES. REMOVE GRILL AND DISCONNECT ELECTRIC WIRE CLAMPS FROM THE RADIATOR. REMOVE RADIATOR MOUNTING CAPSCREWS. LIFT RADIATOR CLEAR OF FAN AND WRAPAROUND.

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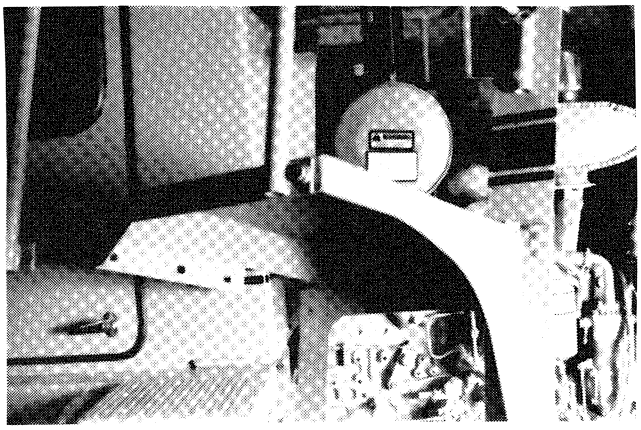
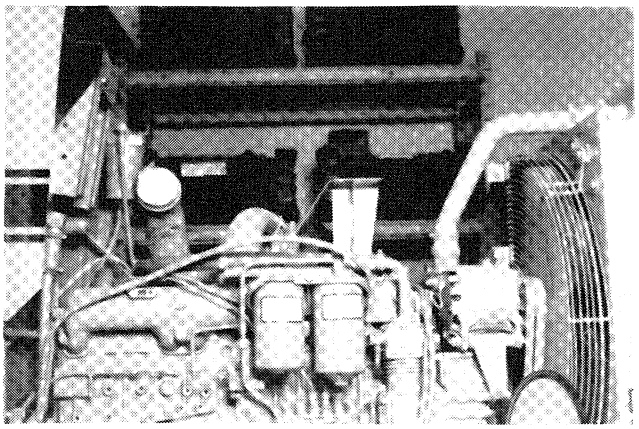
⚠ **WARNING** - LIFT AND HANDLE ALL HEAVY PARTS WITH A LIFTING DEVICE OF PROPER CAPACITY. BE SURE PARTS ARE SUPPORTED BY PROPER SLINGS AND HOOKS. USE LIFTING EYES IF PROVIDED. WATCH OUT FOR PEOPLE IN THE VICINITY.



A1007 REMOVE REAR SERVICE PLATFORMS

REMOVE THE REAR SERVICE PLATFORM AT THE MAIN FRAME, STEP AND PLATFORM. THIS SERVICE PLATFORM WEIGHS APPROXIMATELY 91 KG (200 LBS).



A1008 REMOVE MUFFLER AND AIR CLEANER

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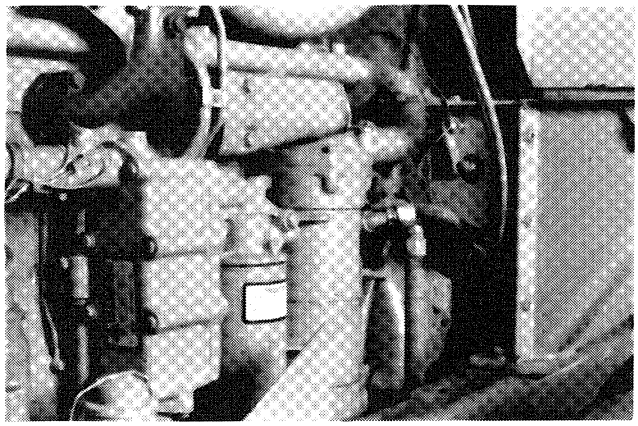
⚠ **WARNING** - LIFT AND HANDLE ALL HEAVY PARTS WITH A LIFTING DEVICE OF PROPER CAPACITY. BE SURE PARTS ARE SUPPORTED BY PROPER SLINGS AND HOOKS. USE LIFTING EYES IF PROVIDED. WATCH OUT FOR PEOPLE IN THE VICINITY.

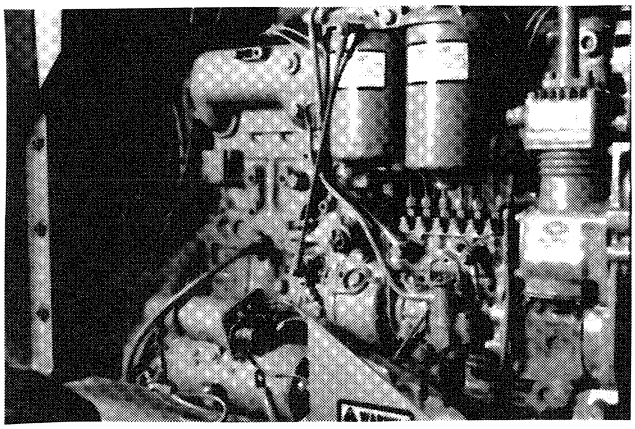
A1009 REMOVE HOSES FROM RIGHT SIDE

REMOVE THE TRANSMISSION HOSES FROM THE HEAT EXCHANGER. REMOVE ENGINE OIL PRESSURE LINE AND ENGINE COOLANT TEMPERATURE SENSING UNIT. THESE TWO SENSING UNITS ARE ON THE FLYWHEEL END OF THE ENGINE. REMOVE THE BRAKE FLUID RESERVOIR FROM THE MAIN FRAME.



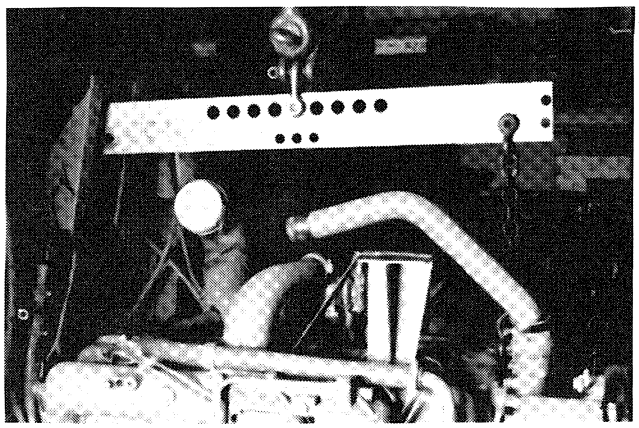
A1010 REMOVE WIRES AND LINKAGE

REMOVE ALL WIRES, LINKAGE AND HOSES WHICH ARE ATTACHED TO THE ENGINE AND FRAME AND TRANSMISSION. THESE INCLUDE THROTTLE CABLE, FUEL SHUTOFF CABLE, AIR HOSE FROM THE COMPRESSOR, FUEL LINES AND ELECTRICAL CABLE FROM THE CRANKING MOTOR AND THE ALTERNATOR.



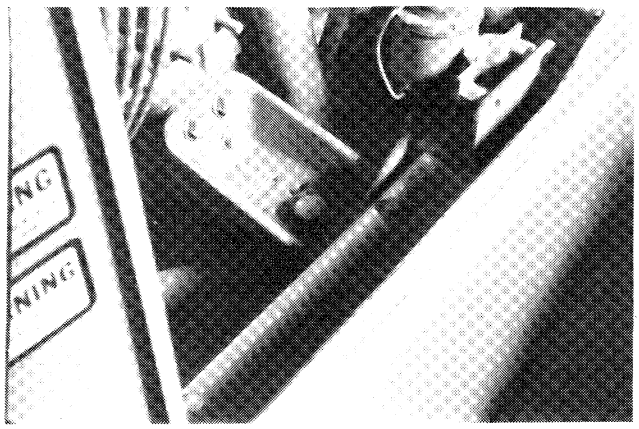
A1011 ATTACH LIFTING BRACKET

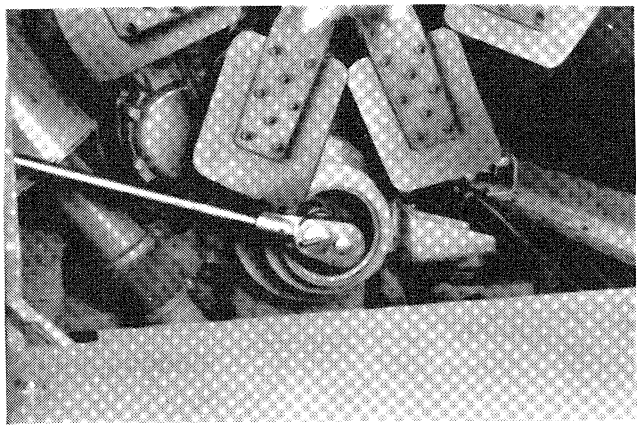
THERE ARE TWO LIFT EYES ON THE ENGINE. THESE EYES ARE FOR LIFTING THE ENGINE ONLY. DO NOT ATTEMPT TO LIFT THE ENGINE AND TRANSMISSION AS AN ASSEMBLY. THE ENGINE WEIGHS APPROXIMATELY 1000 KG (2200 LBS).



A1012 REMOVE TWO ENGINE MOUNT BOLTS

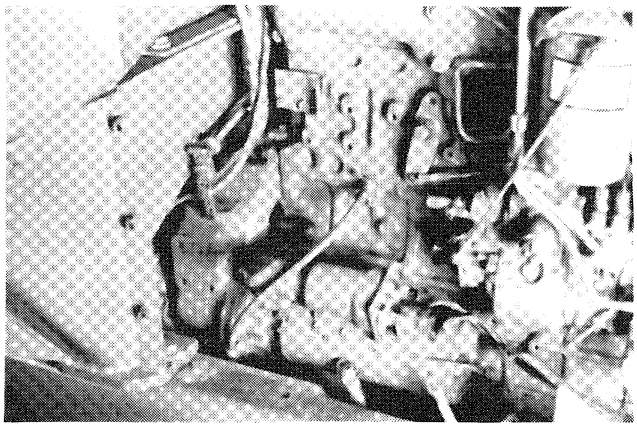
THERE IS ONE ENGINE MOUNTING BRACKET ON EACH SIDE OF THE FRONT END OF THE ENGINE. THERE IS NO MOUNTING BRACKET ON THE REAR AS THE TORQUE CONVERTER AND TRANSMISSION SUPPORT THE ENGINE. REMOVE THE TWO MOUNTING BOLTS. THE MOUNTS CONSIST OF TWO RUBBER RINGS AND THREE STEEL WASHERS.





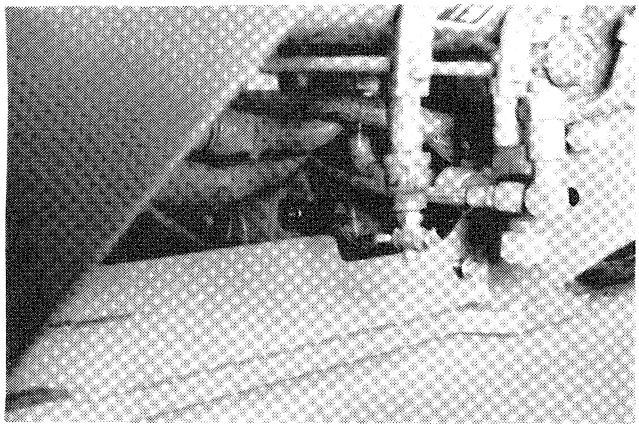
A1013 ROTATE ENGINE CRANKSHAFT

ROTATE THE FLYWHEEL TO GAIN ACCESS TO ALL FLEXPLATE CAPSCREWS.



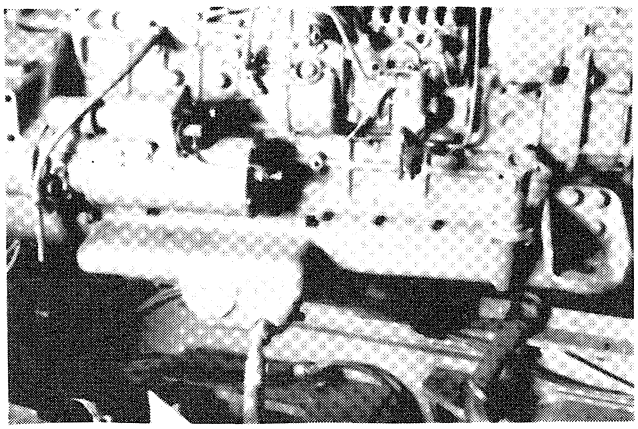
A1014 REMOVE FLEXPLATE COVER

REMOVE CAPSCREWS FROM THE FLYWHEEL AND FLEX-PLATE THROUGH THIS ACCESS HOLE. THE CAPSCREW COUPLES THE FLYWHEEL TO THE CONVERTER TO TRANSMIT POWER.



A1015 REMOVE SIDE COVERS

REMOVE THE LADDERS AND SIDE COVERS TO GAIN ACCESS TO THE TORQUE CONVERTER TO ENGINE FLYWHEEL HOUSING CAPSCREWS. REMOVE THE CAPSCREWS.



A1016 LIFT ENGINE

REMOVE THE FUEL RESERVOIR FILL PIPE AND THE RADIATOR TUBE THAT ATTACHES TO THE WATER PUMP. PULL THE ENGINE TOWARD THE RADIATOR AS THE ENGINE IS LIFTED OFF THE MOUNTS. IF THE ENGINE IS LIFTED TOO HIGH, THE FLYWHEEL HOUSING CAN DAMAGE THE FLEXPLATES. AS THE ENGINE IS LIFTED, FREE THE DRAIN TUBE FROM THE FRAME.

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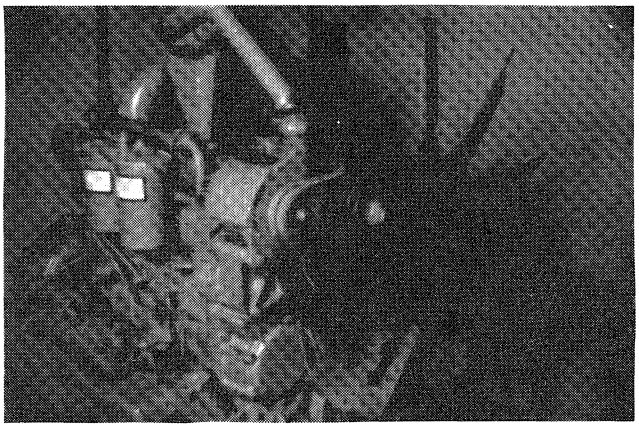
⚠ **WARNING** - LIFT AND HANDLE ALL HEAVY PARTS WITH A LIFTING DEVICE OF PROPER CAPACITY. BE SURE PARTS ARE SUPPORTED BY PROPER SLINGS AND HOOKS. USE LIFTING EYES IF PROVIDED. WATCH OUT FOR PEOPLE IN THE VICINITY.

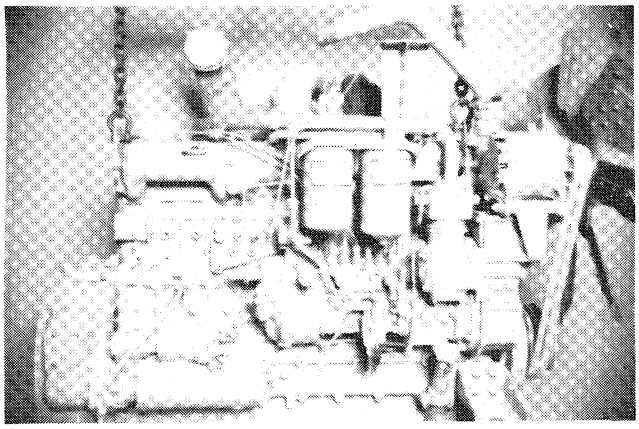
A1017 ENGINE ON HOOK

THE ENGINE DEPICTED IN THE REBUILD SECTION OF THIS COURSE IS A REPRESENTATIVE ENGINE. ALL COMPONENTS MAY OR MAY NOT BE ON YOUR PARTICULAR ENGINE, HOWEVER TEARDOWN PROCEDURE REMAINS THE SAME.



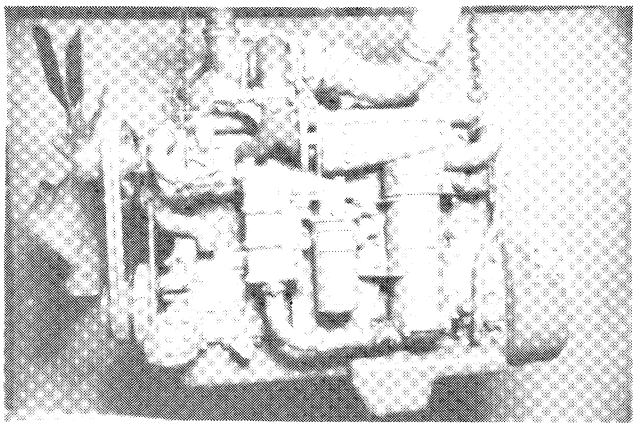
A1018 LEFT SIDE OF ENGINE

ARTICLES ON THE LEFT SIDE OF THE ENGINE ARE CRANKING MOTOR, AIR INTAKE MANIFOLD, FUEL FILTERS, FUEL PUMP, AIR COMPRESSOR, OIL FILL POINT, AND ALTERNATOR. THE FUEL PUMP HAS A SOLENOID WHICH PROVIDES OVERFUEL FOR STARTING AS THE KEY SWITCH IS ACTIVATED TO START THE ENGINE.



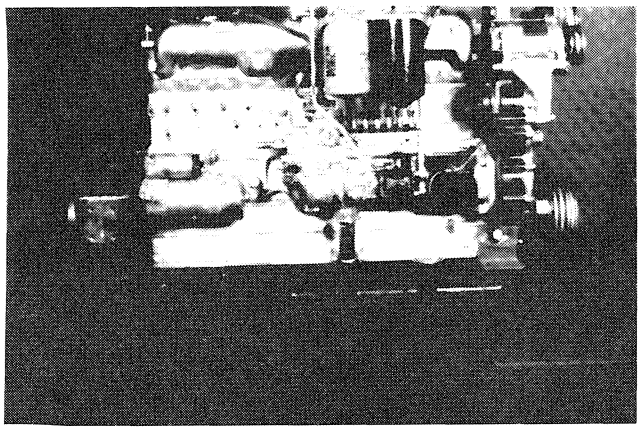
A1019 RIGHT SIDE OF ENGINE

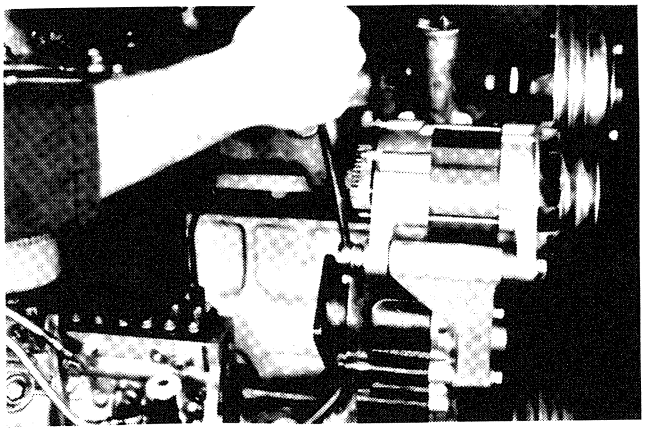
ARTICLES ON THE RIGHT SIDE OF THE ENGINE ARE: WATER PUMP, TURBOCHARGER, ENGINE HEAT EXCHANGER, ENGINE OIL FILTER AND TRANSMISSION HEAT EXCHANGER.



A1020 ENGINE ON STAND

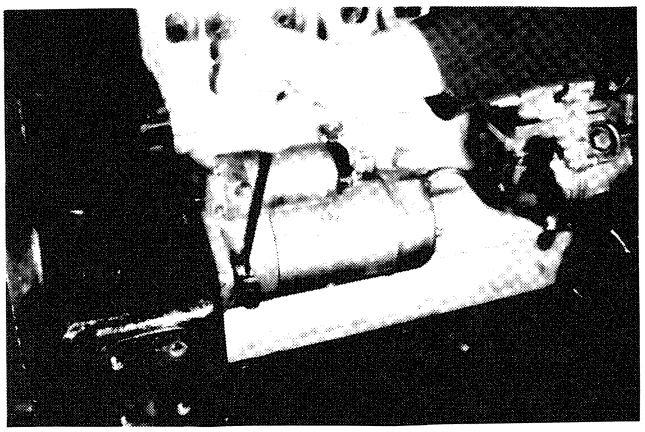
WHEN REBUILDING THE 8365 ENGINE, SUPPORT THE ENGINE IN A SUITABLE TEARDOWN STAND. ACCESSORY COMPONENTS MAY OR MAY NOT BE EXACTLY AS SHOWN ON THIS ENGINE, HOWEVER REMOVAL OF THE COMPONENTS WILL BE SIMILAR.





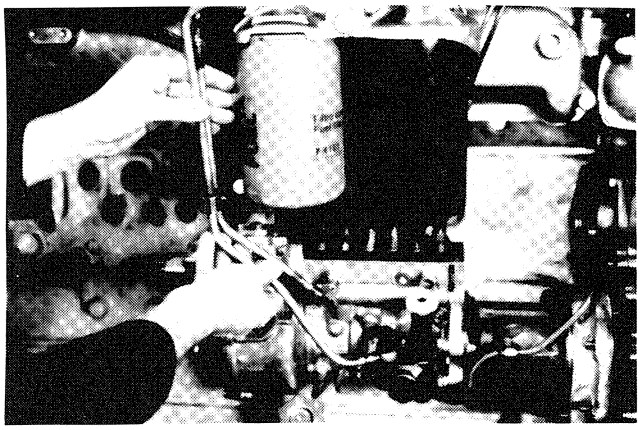
A1021 ALTERNATOR REMOVAL

REMOVE THE ALTERNATOR ADJUSTMENT BRACKET BOLT AND THE ALTERNATOR SUPPORT BOLT.



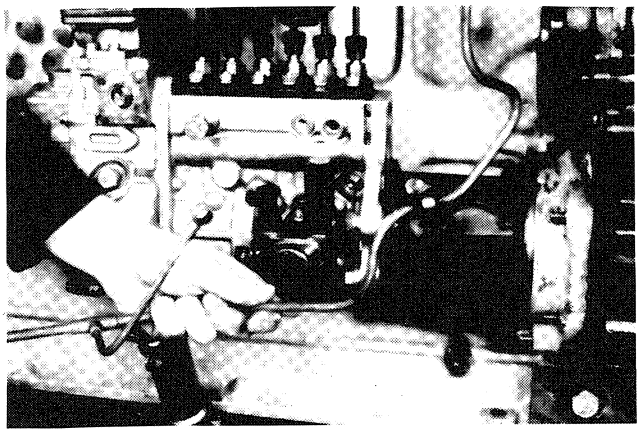
A1022 CRANKING MOTOR REMOVAL

REMOVE THE THREE CAPSCREWS HOLDING THE CRANKING MOTOR TO THE FLYWHEEL HOUSING. SLIP THE MOTOR OUT OF THE HOUSING.



A1023 FUEL FILTER LINES

REMOVE THE FUEL FILTER LINES.

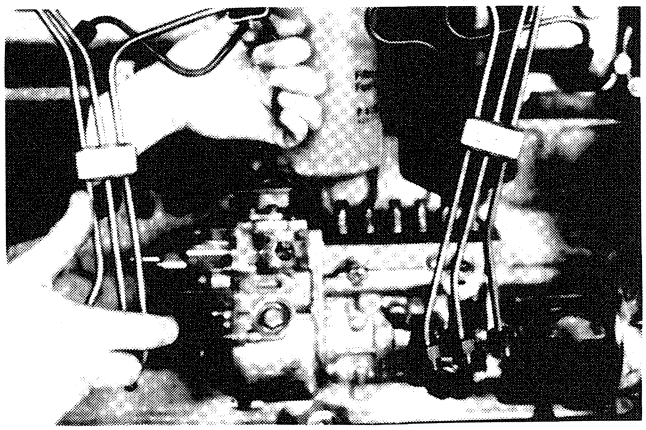


A1024 FUEL PUMP LUBRICATION LINE

REMOVE THE FUEL PUMP LUBRICATION LINE. THIS LINE ALSO LUBRICATES THE ACCESSORY PUMP DRIVE BEARINGS.

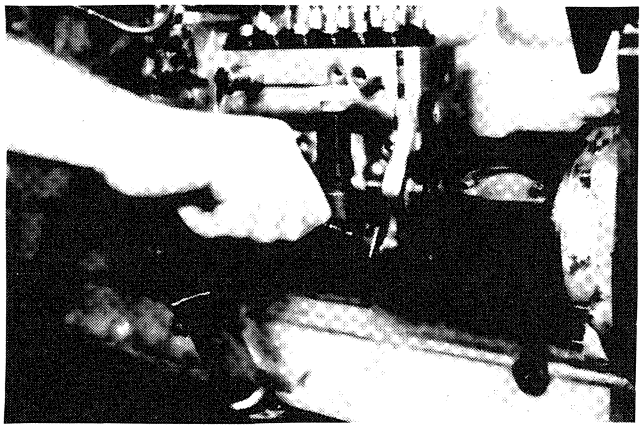
A1025 HIGH PRESSURE FUEL LINES

THE HIGH PRESSURE FUEL LINES SHOULD BE REMOVED FROM BOTH THE NOZZLES AND THE PUMP.



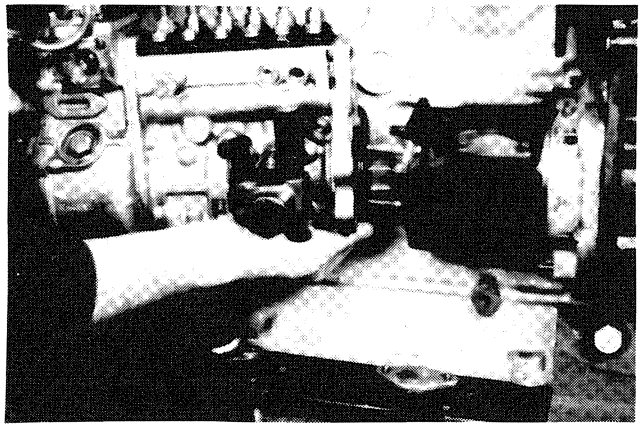
A1026 PUMP CAPSCREW REMOVAL

FOUR STUDS AND NUTS CONNECT THE FUEL PUMP TO THE ADAPTER. THE TWO NUTS NEXT TO THE BLOCK ARE REMOVED USING A SWIVEL TYPE SOCKET. THERE IS VERY LITTLE ROOM FOR NUT REMOVAL.



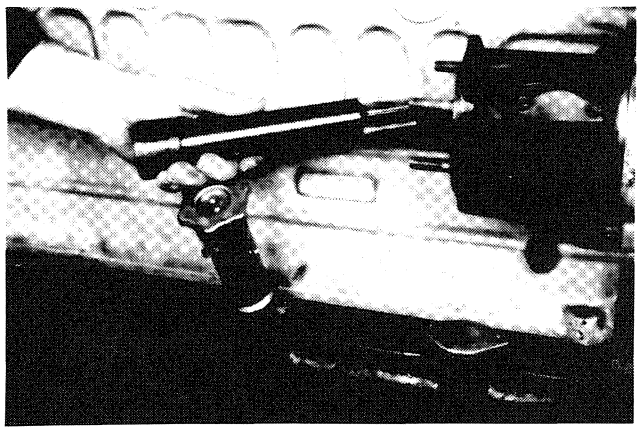
A1027 FUEL PUMP REMOVAL

SLIDE THE FUEL PUMP FROM THE STUDS. NOTICE THAT THE PUMP IS DRIVEN BY A COUPLING.

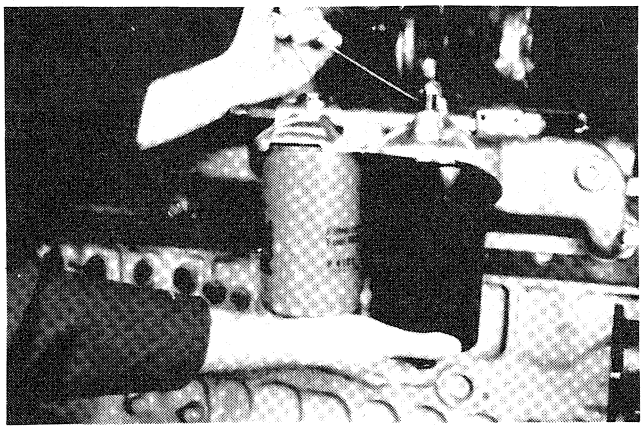


A1028 FUEL PUMP DRIVE COUPLING

THERE IS A DRIVE SHAFT WHICH CONNECTS THE PUMP TO THE DRIVE GEAR. THERE IS A BLIND SPLINE WHICH PREVENTS CONNECTING THE PUMP TO THE GEAR INCORRECTLY.



A1



A1029 FUEL FILTER REMOVAL

THE FUEL FILTERS ARE TWO DIFFERENT STYLES. THE ONE BEING REMOVED IS THE PRIMARY FILTER. THIS FILTER HAS A CLEANABLE ELEMENT. THE RED FILTER CANISTER IS A SPIN-ON DISPOSABLE ELEMENT.

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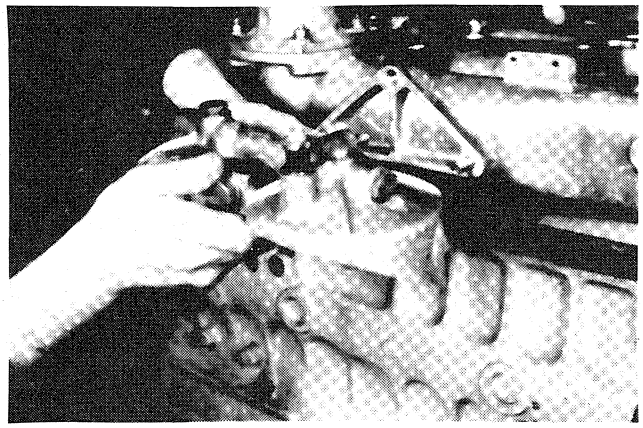
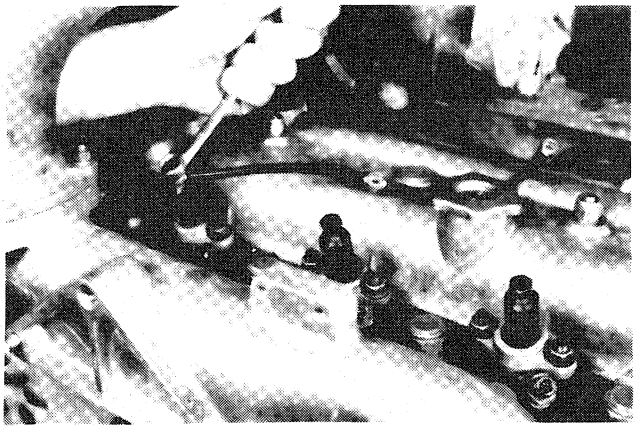
⚠ **WARNING** - NEVER USE GASOLINE SOLVENT OR OTHER FLAMMABLE FLUIDS TO CLEAN ELEMENT. USE AUTHORIZED COMMERCIAL, NON-FLAMMABLE, NON-TOXIC SOLVENTS.



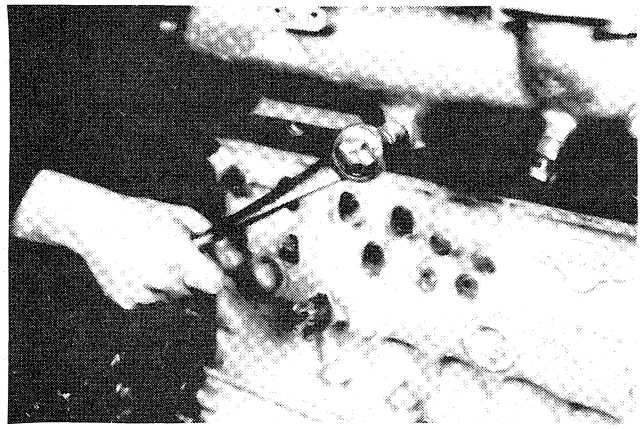
A1030 FUEL FILTER BRACKET

A CAPSCREW AND TWO STUDS HOLD THE BRACKET TO THE AIR INTAKE MANIFOLD.



A1031 FUEL RETURN LINES

THE FUEL RETURN LINES ARE PLASTIC. REMOVE THE LINES FROM THE NOZZLES.

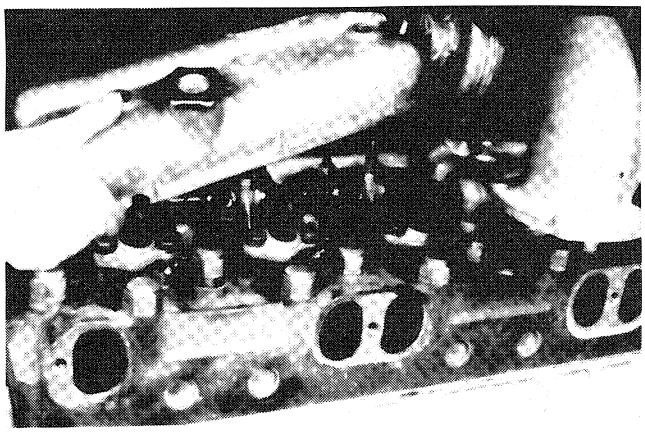


A1032 AIR INTAKE MANIFOLD

REMOVE THE TURBOCHARGER CROSSOVER PIPE NUTS FROM THE MANIFOLD. THEN REMOVE THE MANIFOLD MOUNTING CAPSCREWS AND REMOVE THE MANIFOLD.

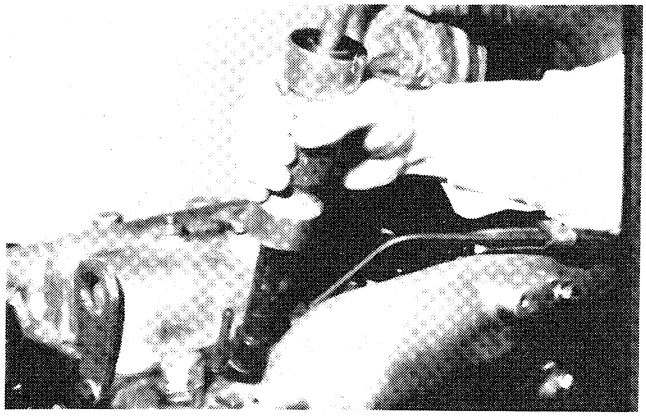
A1033 ROCKER ARM COVER

THERE ARE TWO ROCKER ARM COVERS AND THE SINGLE PIECE HEAD. O-RINGS SEAL THE COVER TO THE HEAD.



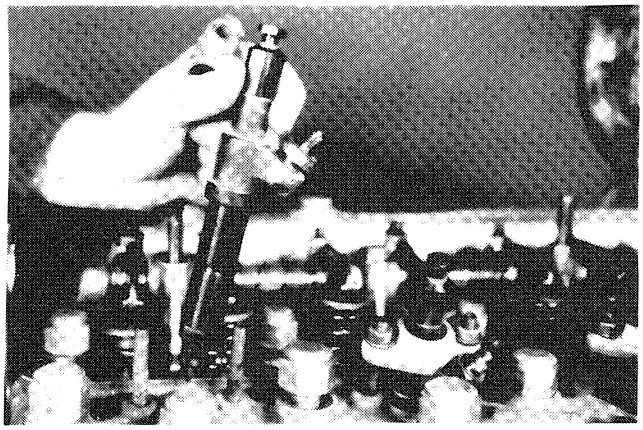
A1034 NOZZLE REMOVAL

A SLIDE HAMMER P/N 75300175 MAY NEED TO BE USED TO REMOVE THE FUEL NOZZLE. AN ADAPTER P/N 75300415 IS USED WITH THE HAMMER.



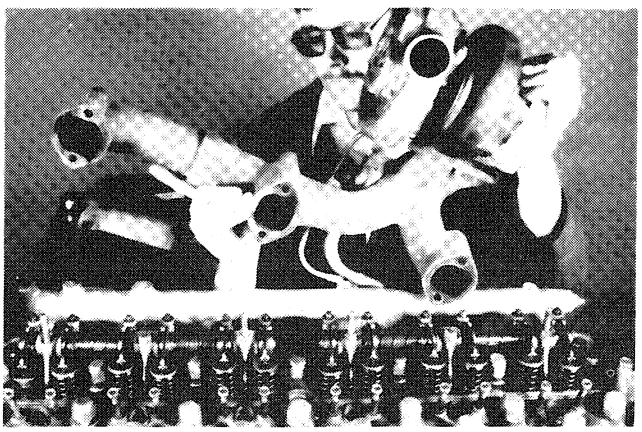
A1035 FUEL NOZZLES

THERE ARE TWO SUPPLIERS FOR THE FUEL NOZZLES ON THIS ENGINE. NOZZLE HOLDERS AND TIPS CAN BE INTERMIXED WITHIN THE ENGINE. THERE IS A DUST SEAL WHICH FITS BETWEEN THE NOZZLE AND THE NOZZLE TUBE.

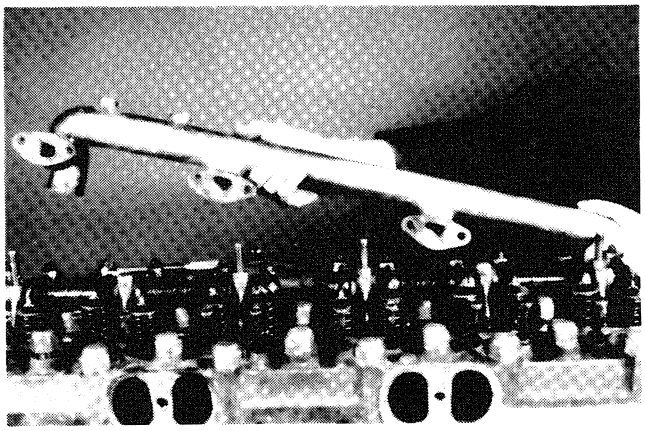


A1036 EXHAUST MANIFOLD

THE EXHAUST MANIFOLD CONSISTS OF TWO PIECES. THE TURBOCHARGER IS MOUNTED TO THE MANIFOLD BY MEANS OF BOLTS. LUBRICATION LINES ARE DIRECTLY BEHIND THE TURBOCHARGER AND MANIFOLD.

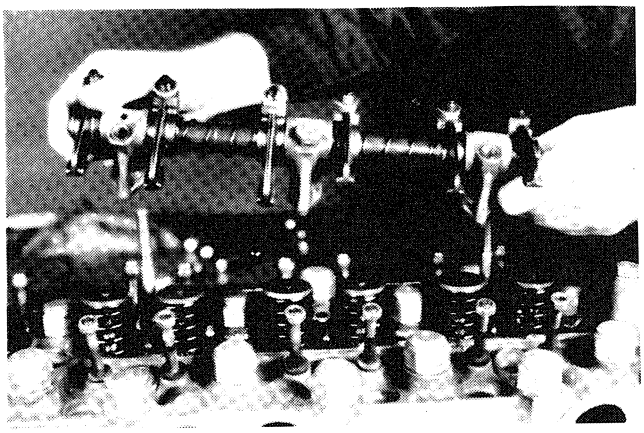


A1



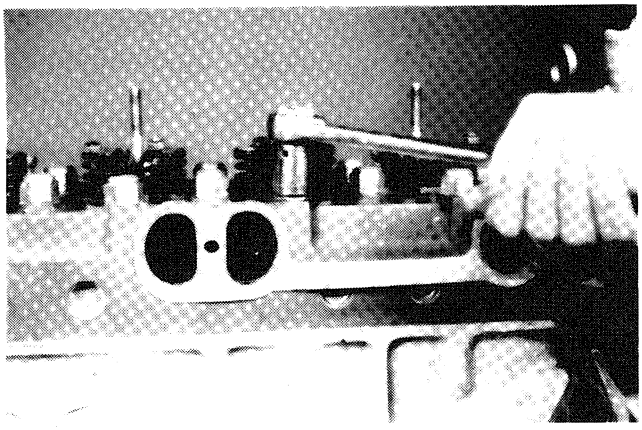
A1037 COOLANT MANIFOLD

DISCONNECT ANY LINES LEADING TO THE MANIFOLD. REMOVE THE COOLANT MANIFOLD FROM THE HEAD.



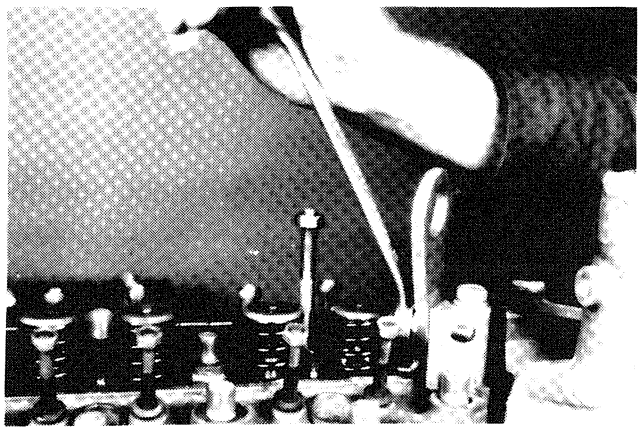
A1038 ROCKER ASSEMBLY

THE ROCKER ASSEMBLY IS MOUNTED TO THE HEAD BY TWO STUDS AND A CAPSCREW. THE ROCKER ASSEMBLIES CAN BE SUBSTITUTED FRONT TO REAR. OIL TO LUBRICATE THE ROCKER COMES THROUGH DOWEL PINS AT THE FRONT AND REAR OF THE HEAD. THE ROCKER SUPPORTS ARE DRILLED TO BE PLACED IN ANY LOCATION.



A1039 HEAD NUT REMOVAL

REMOVE THE HEAD NUTS OFF THEIR STUDS.

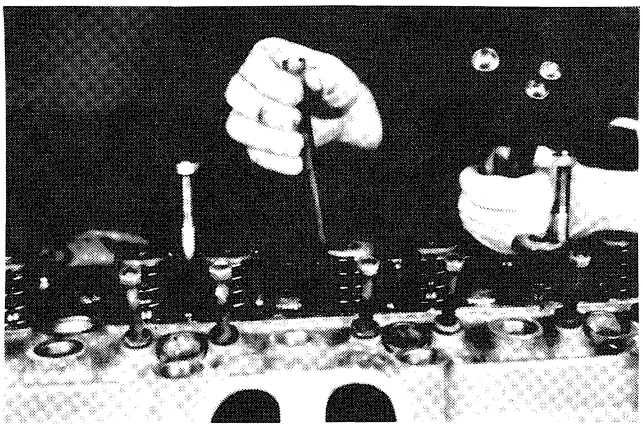


A1040 FRONT LIFT BRACKET

REPOSITION THE FRONT LIFTING BRACKET PRIOR TO LIFTING THE HEAD OFF THE BLOCK. ALL THAT NEEDS TO BE DONE IS TO ROTATE THE MOUNT. THE MOUNT IS CONNECTED TO A PULLEY BRACKET. REMOVE EXTERNAL LUBE LINES FROM THE SIDE OF THE HEAD AND BLOCK.

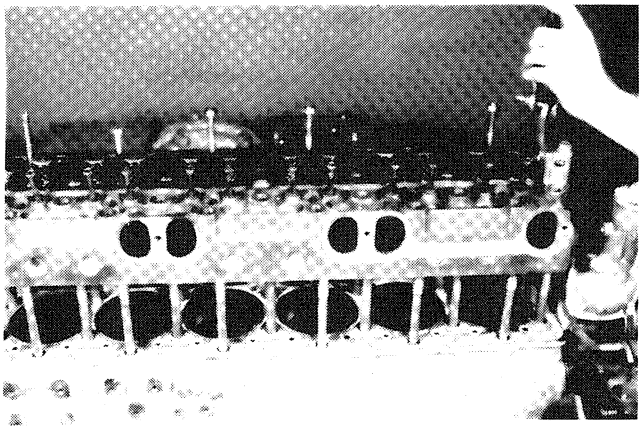
A1041 PUSH RODS

THE PUSH RODS EXTEND ABOVE THE HEAD TO THE ROCKER ASSEMBLY. THE RODS ARE SOLID AND HAVE A CUP ON THE END WHICH FITS AROUND THE ROCKER. THE OPPOSITE END IS SPHERICAL IN SHAPE.



A1042 HEAD REMOVAL

LIFT THE HEAD OFF THE BLOCK. BE CAREFUL TO LIFT EVENLY, OTHERWISE THE HEAD WILL CATCH ON A STUD AND MAY BEND A STUD. THE HEAD WEIGHS APPROXIMATELY 73 KG (160 LBS.).



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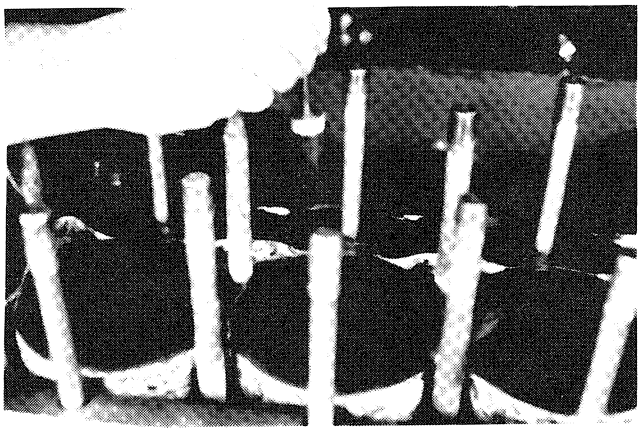
⚠ **WARNING** - LIFT AND HANDLE ALL HEAVY PARTS WITH A LIFTING DEVICE OF PROPER CAPACITY. BE SURE PARTS ARE SUPPORTED BY PROPER SLINGS AND HOOKS. USE LIFTING EYES IF PROVIDED. WATCH OUT FOR PEOPLE IN THE VICINITY.

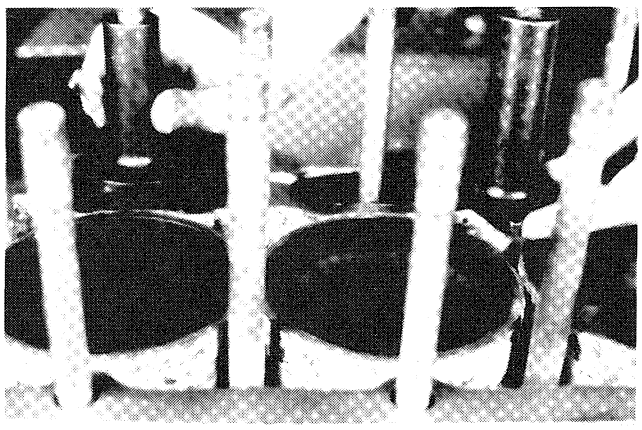
A1043 REMOVE CAM FOLLOWERS

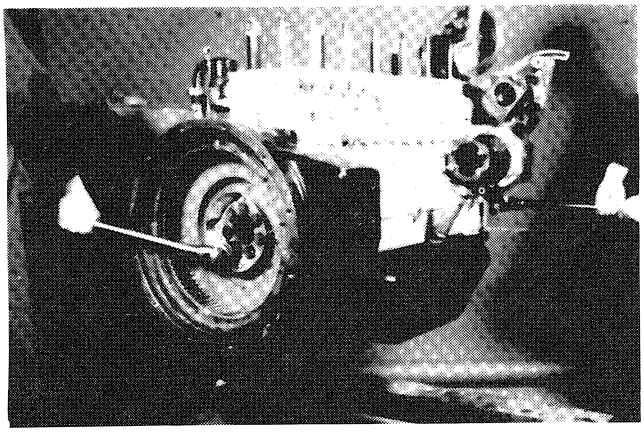
USING TOOL P/N 75290947, REMOVE THE CAMSHAFT FOLLOWERS. THE FOLLOWERS ARE HOLLOW AND CYLINDRICAL. IF THEY ARE NOT REMOVED, THEY WILL FALL OUT AS THE ENGINE IS ROTATED.



A1044 CYLINDER HOLD DOWN

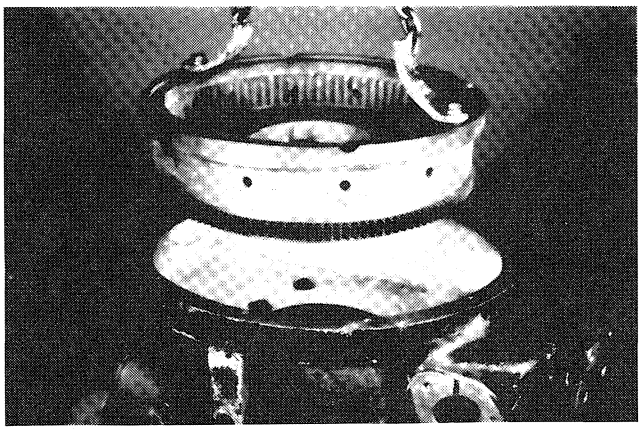
THE CYLINDERS MUST BE HELD IN POSITION AFTER THE HEAD IS REMOVED. THE TOOLS P/N 75290955 AND 75290956 ARE USED IN CONJUNCTION WITH WASHERS AND STUD NUTS. DO NOT ALLOW THE CYLINDERS TO SHIFT IF THE ENGINE IS NOT GOING TO BE TORN DOWN COMPLETELY.





A1045 FLYWHEEL BOLTS

HOLD THE FRONT CRANKSHAFT BOLT TO KEEP THE CRANKSHAFT FROM ROTATING WHILE THE FLYWHEEL CAPSCREWS ARE LOOSENED.



A1046 LIFT FLYWHEEL

REMOVE THE FLYWHEEL FROM THE CRANKSHAFT. IT IS BEST TO ROTATE THE ENGINE AND LIFT THE FLYWHEEL UPWARD. MARK THE FLYWHEEL AND CRANKSHAFT FOR PROPER POSITIONING UPON RE-ASSEMBLY.

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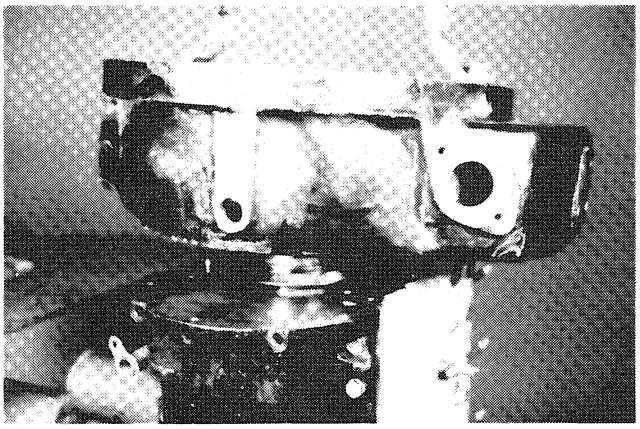
⚠ **WARNING** - LIFT AND HANDLE ALL HEAVY PARTS WITH A LIFTING DEVICE OF PROPER CAPACITY. BE SURE PARTS ARE SUPPORTED BY PROPER SLINGS AND HOOKS. USE LIFTING EYES IF PROVIDED. WATCH OUT FOR PEOPLE IN THE VICINITY.



A1047 HOUSING REMOVAL

REMOVE THE CAPSCREWS HOLDING THE FLYWHEEL HOUSING TO THE BLOCK AND OIL PAN. THERE ARE TWO EXTERNAL SCREWS THAT GO FROM THE BLOCK TO THE HOUSING. AN O-RING SEALS THE HOUSING TO THE BLOCK. THE FLYWHEEL HOUSING IS INDEXED TO THE BLOCK BY TWO DOWELS.

A1048 REAR CRANKSHAFT SEAL 1 OF 2

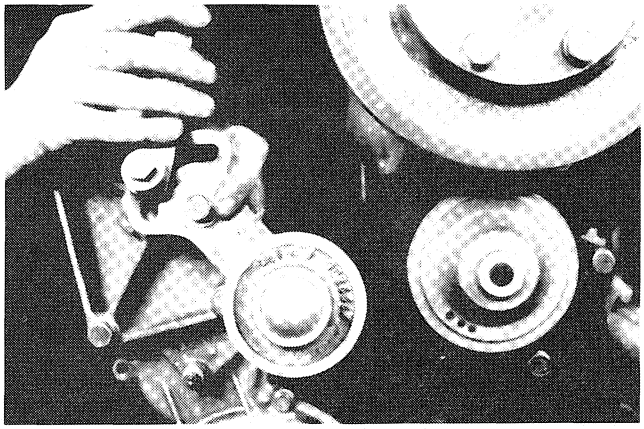
THE REAR CRANKSHAFT SEAL CONSISTS OF A HOOK TYPE SEAL RING. THIS RING REMAINS STATIONARY WHILE THE CRANKSHAFT ROTATES; THEREFORE, IT IS IMPERATIVE TO INSURE THAT THIS RING DOES NOT CATCH ON THE CRANKSHAFT GROOVE. THIS SEAL IS NOT A POSITIVE SEAL. THE HELICAL GROOVED RING SLINGS OIL AWAY FROM THE SEAL RING. VERY LITTLE OIL GETS TO THE SEAL RING AREA WHILE THE CRANKSHAFT IS ROTATING. THIS SLINGER IS REPLACEABLE. CUT THE OLD SLINGER

GEAR OFF THE CRANKSHAFT. HEAT THE NEW SLINGER TO 120 DEGREES C (250 DEGREES F) AND PLACE IN POSITION. BE SURE THE SLINGER IS NOT INSTALLED UPSIDE DOWN.

THE FR15 USES A DOUBLE LIP RUBBER SEAL.

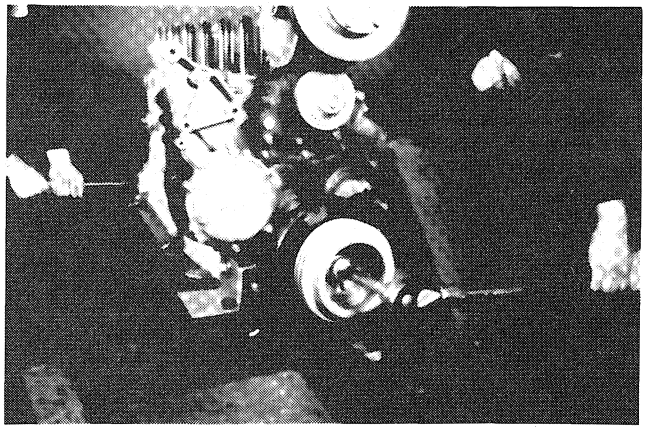
A1049 BELT TENSIONER

REMOVE THE BELT TENSIONER BRACKET. THIS BRACKET IS ATTACHED THROUGH THE WATER PUMP HOUSING TO THE BLOCK.



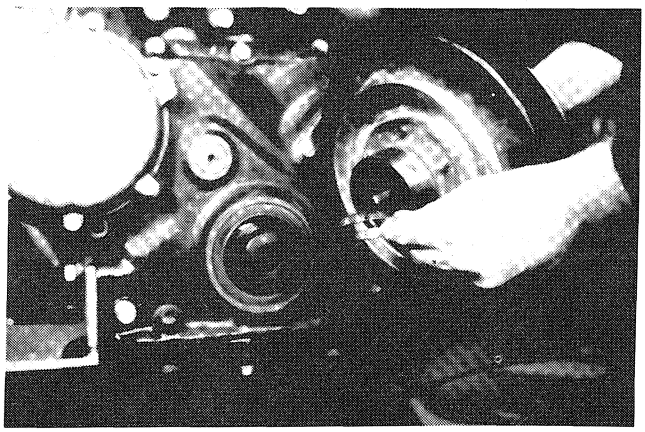
A1050 FRONT CAPSCREW ON CRANKSHAFT

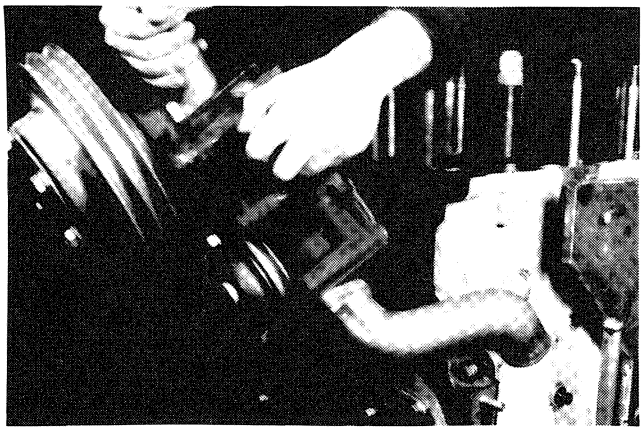
INSTALL TWO CAPSCREWS IN THE FLYWHEEL END OF THE CRANKSHAFT. PLACE A BAR IN POSITION SO THAT THE CRANKSHAFT DOES NOT ROTATE WHILE THE FRONT CAPSCREW IS REMOVED.



A1051 HUB, PULLEY AND DAMPER

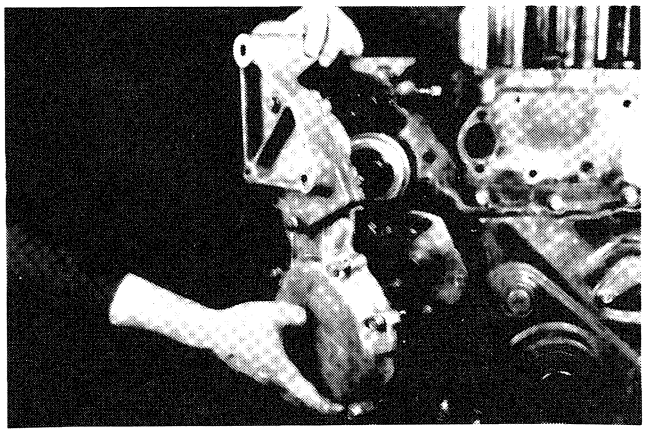
THE CRANKSHAFT IS STRAIGHT WHERE THE DAMPER AND PULLEY ATTACH. A PULLER IS NOT NEEDED TO REMOVE THE ASSEMBLY. A TAPERED ADAPTER RING LOCKS THE HUB TO THE SHAFT. THE FRONT CRANKSHAFT SEAL RIDES AGAINST THE HUB. THIS SEAL IS A LIP TYPE SEAL MOUNTED IN THE FRONT HOUSING.





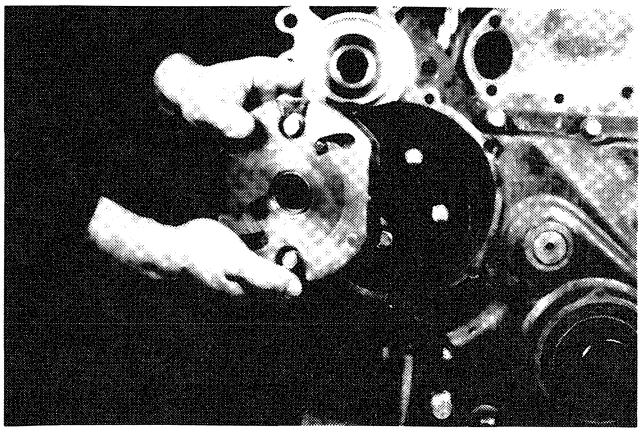
A1052 WATER PUMP HOUSING

REMOVE THE WATER PUMP HOUSING FROM THE BLOCK.



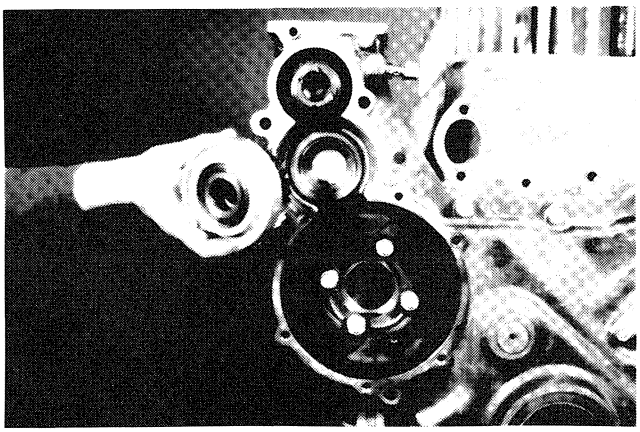
A1053 ACCESSORY DRIVE COVER

REMOVE THE FRONT COVER FROM THE ACCESSORY DRIVE TOWER.



A1054 VARIATOR REMOVAL

THE VARIATOR IS ATTACHED TO THE FUEL PUMP DRIVE GEAR BY TWO CAPSCREWS. THE VARIATOR AUTOMATICALLY CHANGES THE FUEL PUMP ADVANCE DEPENDING UPON THE ENGINE SPEED. AS ENGINE SPEED INCREASES, FUEL PUMP TIMING ADVANCES. WHEN THE VARIATOR IS AT REST, THE ENGINE TO FUEL PUMP TIMING IS RETARDED, WHICH INCREASES COLD WEATHER STARTING ABILITY.

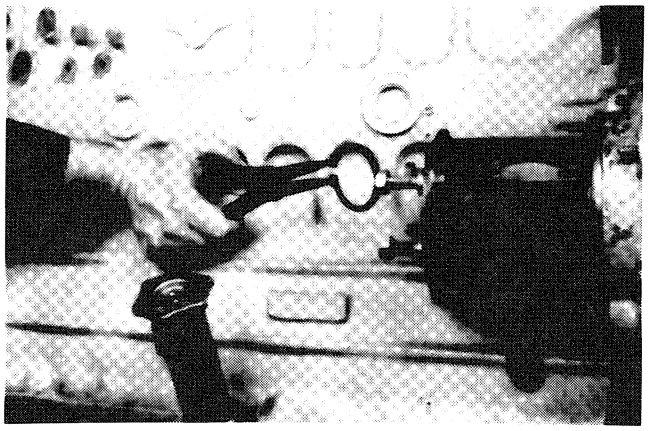


A1055 ACCESSORY DRIVE GEAR

THE ACCESSORY DRIVE GEAR CAN BE REMOVED BY SLIDING THE BUSHING OUT OF THE HOUSING. A SMALL BALL ON THE BUSHING BLOCK FITS INTO THE FRONT HOUSING TO KEEP THE BLOCK FROM TURNING. THE GEARS ARE HELICAL TO REDUCE NOISE AND PROVIDE BETTER GEAR LOADING.

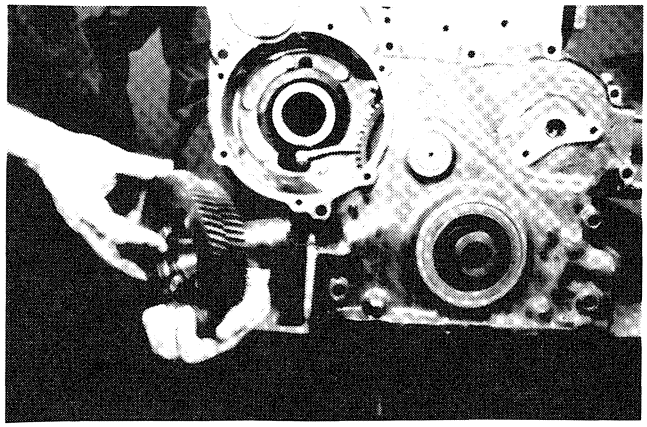
A1056 FUEL PUMP GEAR RETAINER

THE FUEL PUMP GEAR AND THE ACCESSORY GEAR CAN BE REMOVED SEPARATELY BY REMOVING THE CAP-SCREWS HOLDING THE GEARS TOGETHER OR THEY CAN BE REMOVED TOGETHER BY REMOVING THE SNAP RING HOLDING THE GEAR TO THE DRIVE COUPLING HOUSING.



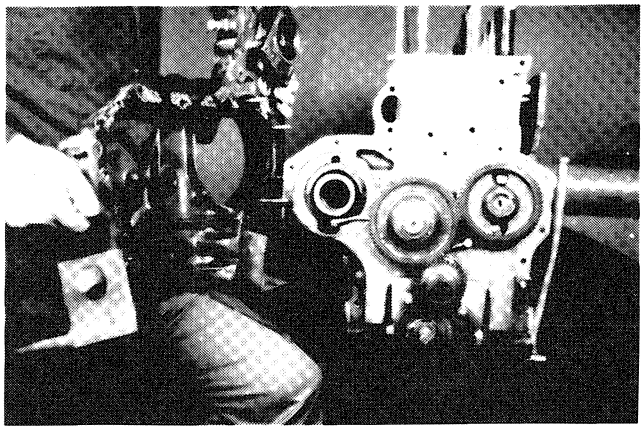
A1057 FUEL PUMP GEAR REMOVAL

THE FUEL PUMP DRIVE GEAR CAN BE SLIPPED FROM THE FRONT OF THE ENGINE.



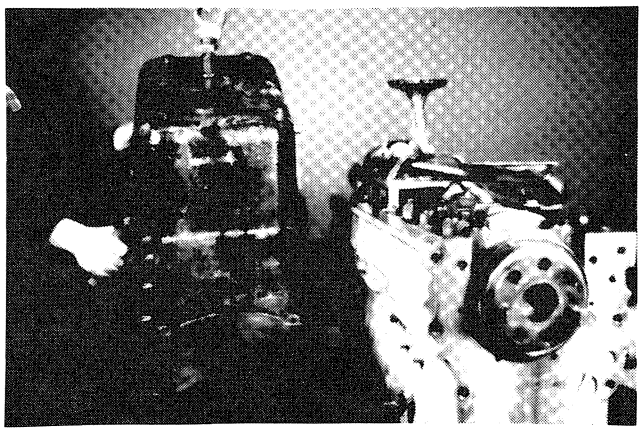
A1058 FRONT GEAR COVER

THE FRONT COVER CAN BE REMOVED WHILE THE OIL PAN IS ON THE ENGINE. THE COVER IS HELD ON A DOWEL PIN ON THE LEFT SIDE AND BY STUDS ON THE RIGHT SIDE. THE COVER MUST BE REMOVED EVENLY OFF THE BLOCK.

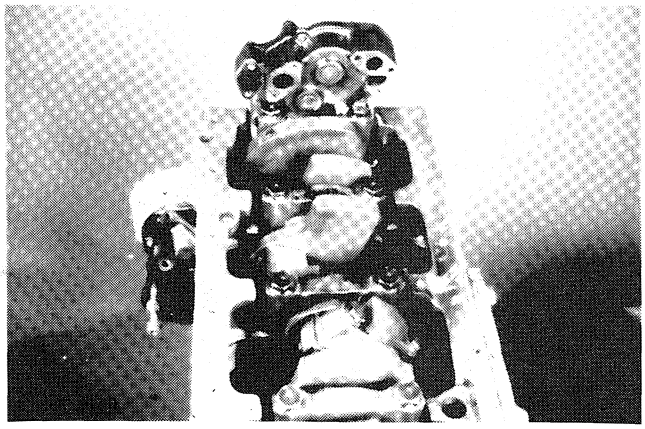


A1059 OIL PAN REMOVAL

ROTATE THE ENGINE. REMOVE ALL THE CAPSCREWS HOLDING THE PAN TO THE BLOCK. THE PAN IS CAST STEEL AND WEIGHS APPROXIMATELY 55 KG. (120 LBS.). THERE ARE TWO OIL PICK-UP TUBES. THE FLAT SCREEN IS FOR THE SCAVENGING SYSTEM WHILE THE TALLER CIRCULAR SCREEN IS THE MAIN OIL PICK-UP.

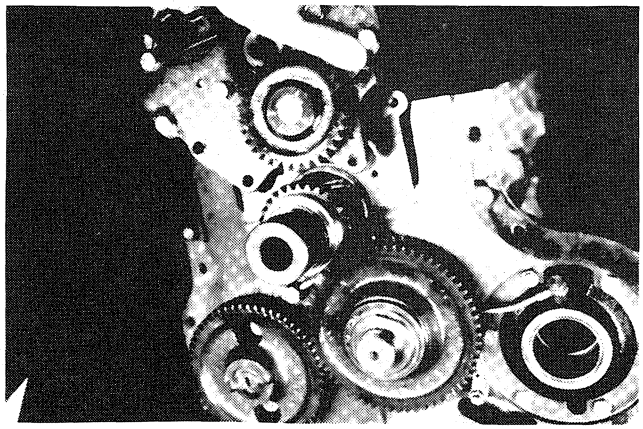


A1



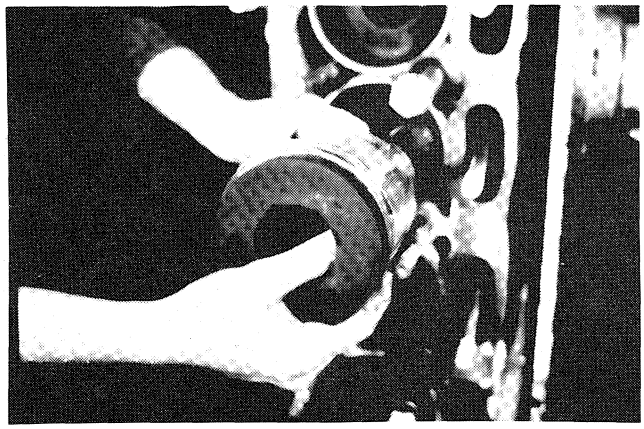
A1060 OIL LINES REMOVED

THE OIL LINES CONNECT TO PUMP AT THE FLANGE LOCATIONS. THE SCAVENGING PUMP DOES NOT HAVE AN OUTLET TUBE. OIL COMES OUT OF THE PUMP AND SPLASHES INTO THE MAIN RESERVOIR. THE MAIN PUMP OUTLET TUBE GOES INTO THE BLOCK AT THE CIRCULAR PASSAGE AT NUMBER FOUR MAIN BEARING.



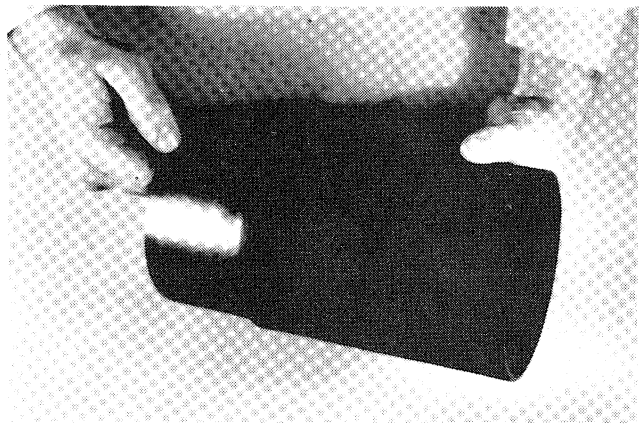
A1061 PUMP REMOVAL

THE OIL PUMP CAN BE REMOVED WITH THE MAIN BEARING CAP, OR IT CAN BE REMOVED FROM THE CAP. THE OIL PUMP IS DRIVEN OFF OF THE CRANKSHAFT. THE CRANKSHAFT HAS TWO GEARS UPON IT. THE LARGER DIAMETER GEAR IS FOR THE OIL PUMP, WHILE THE SMALLER DIAMETER GEAR IS FOR THE GEAR TRAIN.



A1062 PISTON REMOVAL

CLEAN THE CARBON RIDGE FROM THE CYLINDER. REMOVE THE CONNECTING ROD CAPS AND FORCE THE PISTON FROM THE CYLINDER.

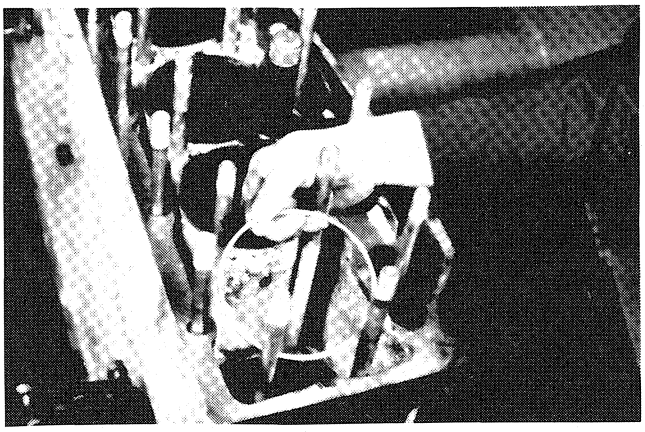


A1063 CYLINDER LINER

REMOVE THE CYLINDER LINER FROM THE BLOCK. NO SPECIAL EQUIPMENT IS NEEDED TO PULL THE CYLINDER LINER.

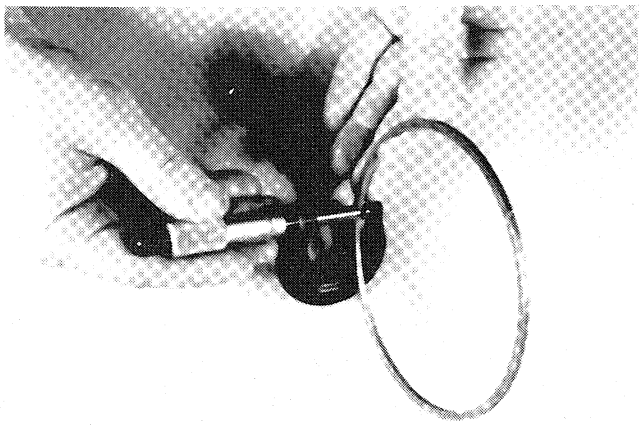
A1064 CYLINDER SPACER/SEAL

A SEAL IS LOCATED IN THE BOTTOM OF THE CYLINDER BORE. THIS PREVENTS OIL FROM GOING INTO THE COOLING SYSTEM OR VICE VERSA. THIS RING ALSO ADJUSTS CYLINDER STANDOUT HEIGHT. THERE ARE SIX HEIGHTS FOR THIS RING.



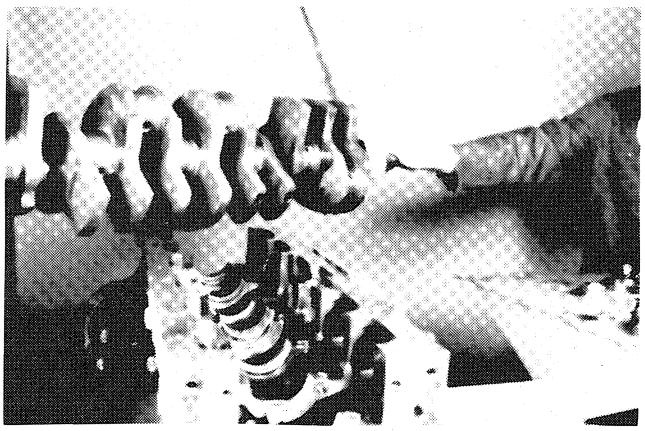
A1065 SEAL RING MEASUREMENT

SEAL RINGS CANNOT BE REUSED. MEASURE THE NEW RING PRIOR TO INSTALLATION TO DETERMINE THE SIZE OF SEAL RING TO USE TO OBTAIN THE SPECIFIED SLEEVE TO BLOCK STANDOUT.



A1066 CRANKSHAFT REMOVAL

REMOVE THE MAIN BEARING CAPS. KEEP THE BEARINGS MATED TO THEIR CAP IF THEY ARE TO BE REUSED. THE CRANKSHAFT IS LIFTED AND ROTATED SLIGHTLY AS IT IS REMOVED.



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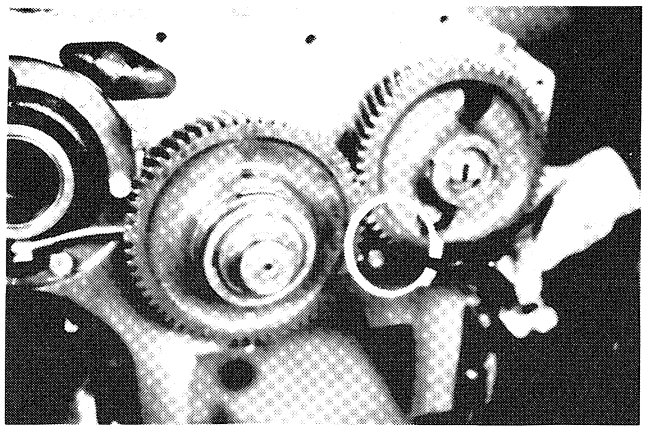
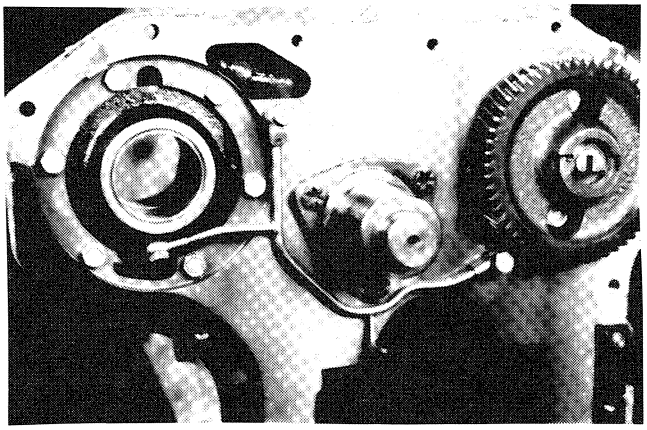
⚠ **WARNING** - LIFT AND HANDLE ALL HEAVY PARTS WITH A LIFTING DEVICE OF PROPER CAPACITY. BE SURE PARTS ARE SUPPORTED BY PROPER SLINGS AND HOOKS. USE LIFTING EYES IF PROVIDED. WATCH OUT FOR PEOPLE IN THE VICINITY.

A1067 IDLER GEAR SNAP RING

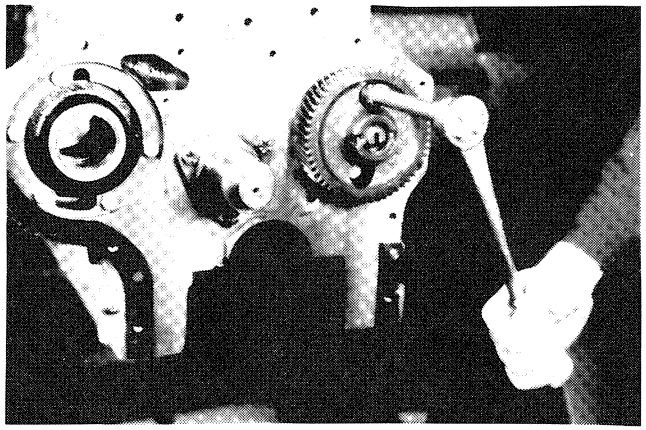
THE IDLER GEAR MUST BE REMOVED AFTER THE CRANKSHAFT IS REMOVED. A SPACER IS BETWEEN THE GEAR AND THE SNAP RING. THE GEAR CANNOT BE REMOVED WHILE THE CRANKSHAFT IS IN POSITION AS THE IDLER GEAR DOES NOT CLEAR THE OIL PUMP DRIVE GEAR.





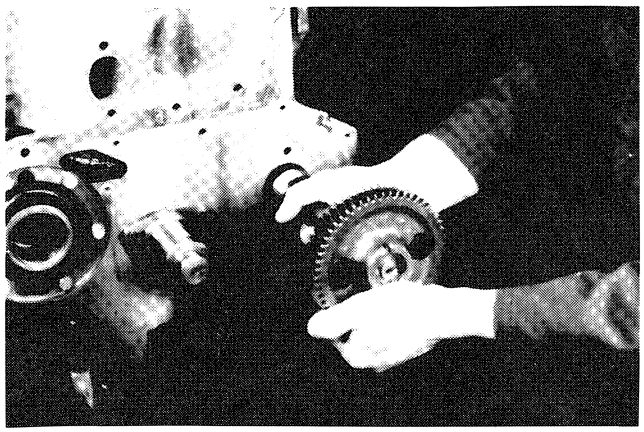
A1068 IDLER GEAR SHAFT

THE IDLER GEAR SHAFT IS BOLTED TO THE BLOCK. THE COPPER COLORED TUBE DIRECTS OIL INTO BUSHING AREAS AND ALSO BETWEEN MATING GEAR TEETH.



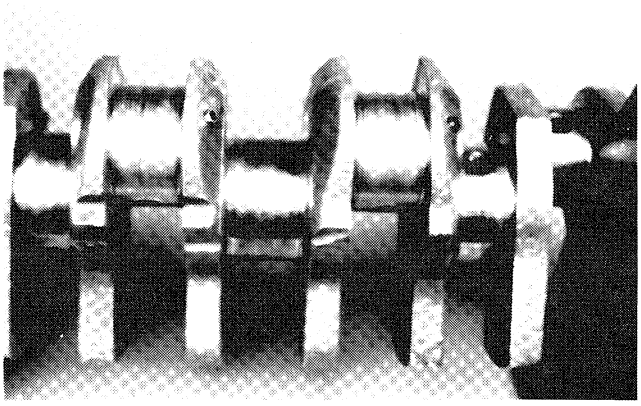
A1069 CAMSHAFT THRUST PLATE CAPSCREWS

ROTATE THE CAMSHAFT GEAR SO THAT THE CAP-SCREWS ARE EXPOSED THROUGH THE HOLES.



A1070 CAMSHAFT REMOVAL

PULL THE CAMSHAFT FROM THE BLOCK. ROTATE THE CAMSHAFT SO THAT THE LOBES AID IN CENTERING THE CAMSHAFT BEARING JOURNALS. DO NOT ALLOW THE CAMSHAFT TO FALL ON THE BEARING SURFACES.

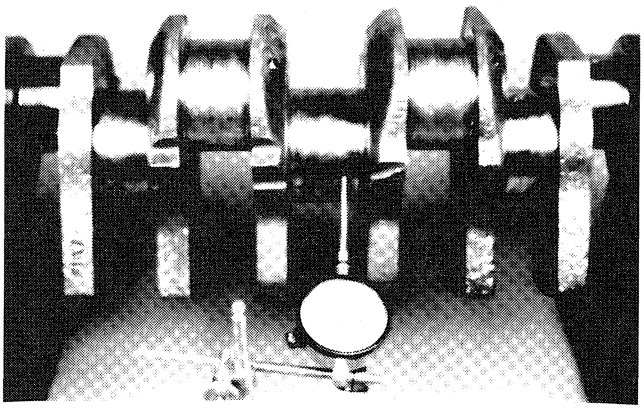


A1071 CRANKSHAFT PASSAGES

THE CRANKSHAFT IS DRILLED FOR LUBRICATION PASSAGES. THE END OF THE PASSAGE IS TAPPED AND BLOCKED BY ALLEN HEAD PLUGS. THE CRANK-SHAFT MAY BE MACHINED. WHEN THE CRANKSHAFT IS MACHINED, THE JOURNAL MUST BE BLENDED TO SPECIFICATIONS. THE LUBRICATING HOLE DI-AMETER MUST ALSO BE BLENDED.

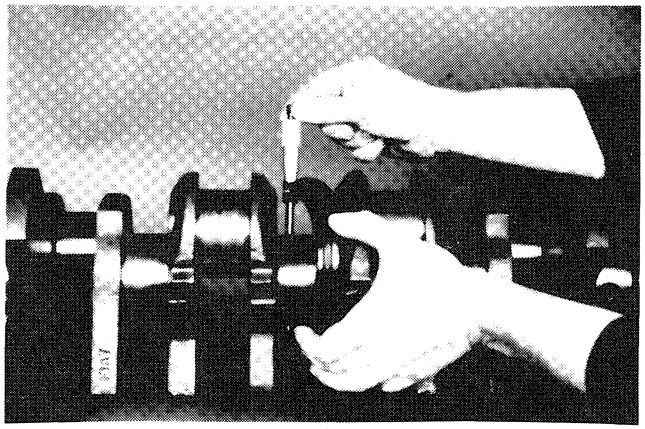
A1072 CRANKSHAFT CONCENTRICITY

THE CRANKSHAFT MUST BE CHECKED FOR CONCENTRICITY. PLACE THE CRANKSHAFT IN A SET OF V-BLOCKS. CONCENTRICITY MUST BE CHECKED AT THE CENTER MAIN AREA. WHEN CHECKING CONCENTRICITY, DO NOT GET THE DIAL INDICATOR PROBE CLOSE TO THE LUBRICATION PASSAGE.



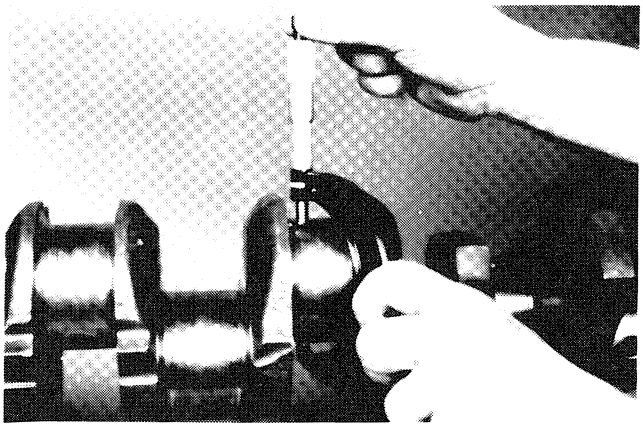
A1073 CRANKSHAFT MEASUREMENT

THE CRANKSHAFT BEARING SURFACES MUST BE MEASURED IF THE CRANKSHAFT IS TO BE REUSED. THE CRANKSHAFT CAN BE GROUND IF NECESSARY. THE RADII OF THE FILLETS MUST BE MAINTAINED.



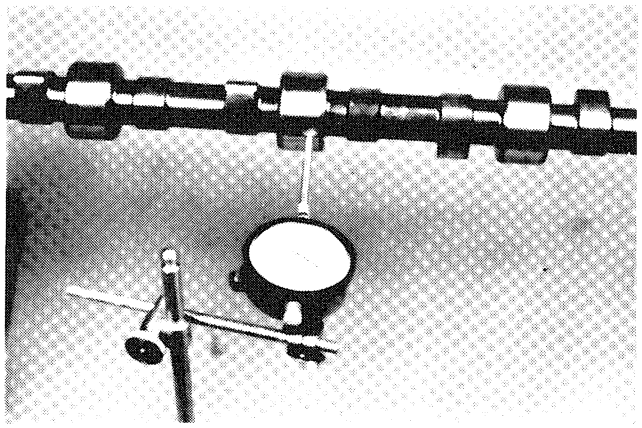
A1074 ROD JOURNAL MEASUREMENT

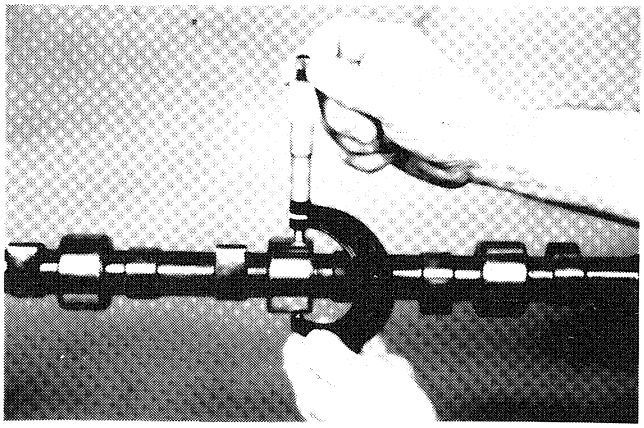
THE ROD JOURNALS MUST BE MEASURED FOR THEIR OUTSIDE DIAMETERS. CHECK THE DIAMETER IN SEVERAL LOCATIONS.



A1075 CAMSHAFT CONCENTRICITY

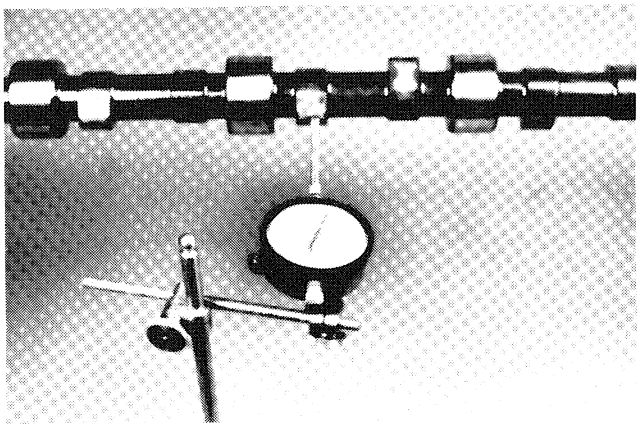
THE CAMSHAFT MUST BE WITHIN SPECIFICATIONS. THE CAMSHAFT IS SET IN V-BLOCKS, AND THE DIAL INDICATOR IS USED TO MEASURE TOTAL SHAFT DEFLECTION.





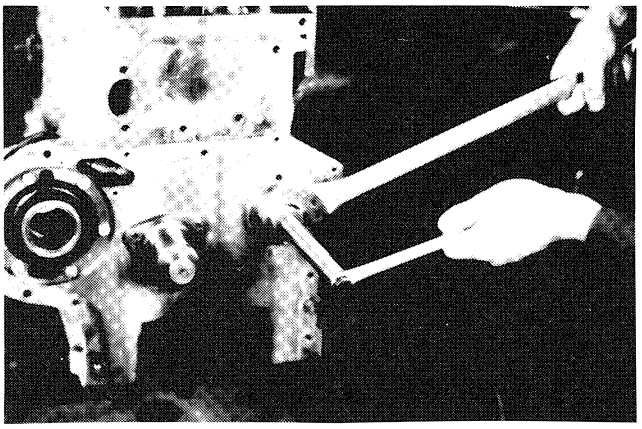
A1076 CAMSHAFT BEARING DIAMETER

BEARING DIAMETERS MUST BE WITHIN SPECIFICATIONS. THERE IS A SPECIFIED DIFFERENCE BETWEEN THE SHAFT AND BEARING. BE SURE THE DIFFERENCE IS WITHIN SPECIFICATIONS. USE P/N 75300837.



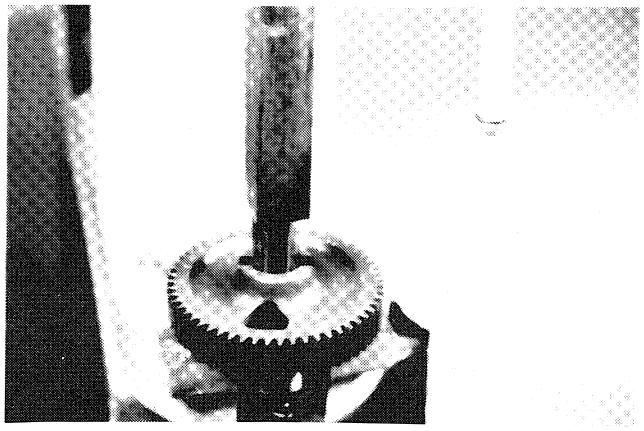
A1077 CAM LOBE WEAR

IT IS ADVISABLE TO INSPECT THE CAM LOBE WEAR. TO DO THIS, MEASURE THE CAM LOBE HEIGHT, INTAKE TO INTAKE. (EXHAUST TO EXHAUST.) THERE SHOULD BE NO DIFFERENCE IN RELATED HEIGHTS. IF THERE ARE DIFFERENCES, THE CAMSHAFT MUST BE REPLACED.



A1078 REMOVE CAMSHAFT BUSHING

CAMSHAFT BUSHINGS ARE REMOVED AND INSTALLED WITH P/N 75294892. REAM THE BUSHING TO SIZE WITH P/N 75295830.

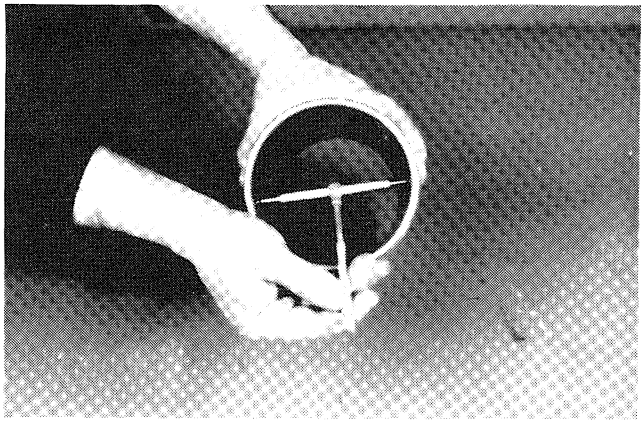


A1079 REMOVE CAM GEAR

THE CAMSHAFT GEAR MUST BE PRESSED FROM THE SHAFT. THE GEAR IS INTERFERENCE FITTED TO THE SHAFT. WHEN REINSTALLING THE GEAR TO THE SHAFT, THE CAMSHAFT MUST BE PLACED IN DRY ICE FOR TWENTY MINUTES. THE GEAR MUST BE HEATED TO 150 DEGREES C (300 DEGREES F). PLACE THE GEAR ON THE SHAFT AND ALIGN THE KEYWAY IN THE GEAR AND THE KEY IN THE SHAFT. THE GEAR AND SHAFT MAY NEED TO BE PRESSED TOGETHER.

A1080 SLEEVE BORE

CYLINDER SLEEVES ARE MEASURED IN THREE LOCATIONS IN THEIR INNER DIAMETER. CHECK THE SPECIFICATION MANUAL FOR THE APPROPRIATE DIMENSIONS AND LOCATIONS. CHECK TO MAKE SURE THE CYLINDER IS NOT OVAL IN SHAPE. ALWAYS STAND THE SLEEVE UPON ITS END TO PREVENT IT BECOMING OVAL. USE TOOL P/N 75300830.

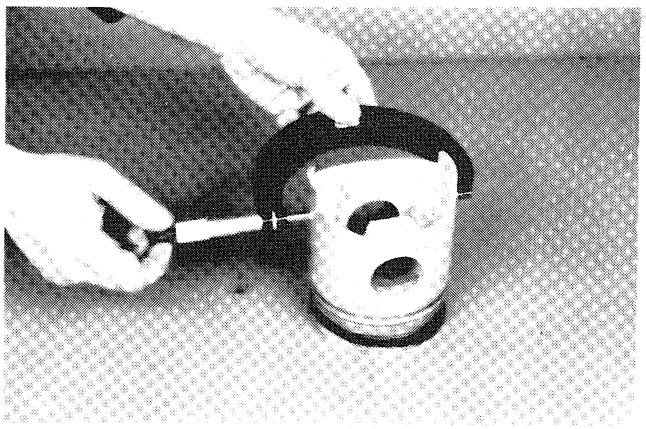


A1081 SLEEVE OUTSIDE DIAMETER

MEASURE THE OUTSIDE DIAMETER OF THE CYLINDER SLEEVE WHERE THE SLEEVE MEETS THE BORE.

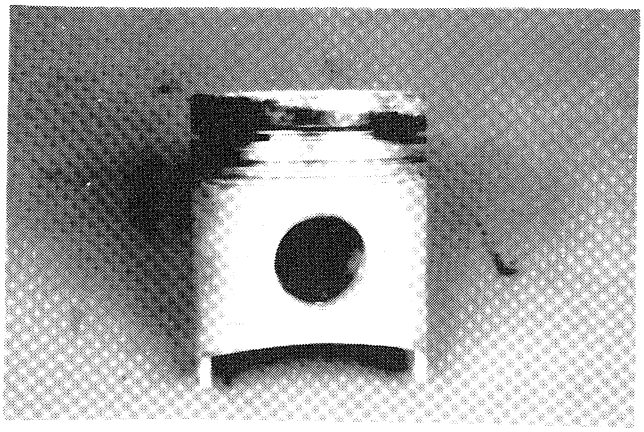
A1082 MEASURING PISTON DIAMETER

IF THE PISTON IS BEING REUSED, MEASURE THE PISTON SKIRT DIAMETER. THERE IS A SPECIFIC LOCATION TO USE WHEN MEASURING. THIS LOCATION IS 90 DEGREES TO THE PISTON WRIST PIN BORE. THE HEIGHT OF THE MEASUREMENT FROM THE BOTTOM OF THE SKIRT VARIES FROM APPLICATION TO APPLICATION. IF THE DIAMETER IS INCORRECT, THE PISTON MAY SLAP THE CYLINDER CAUSING DAMAGE.



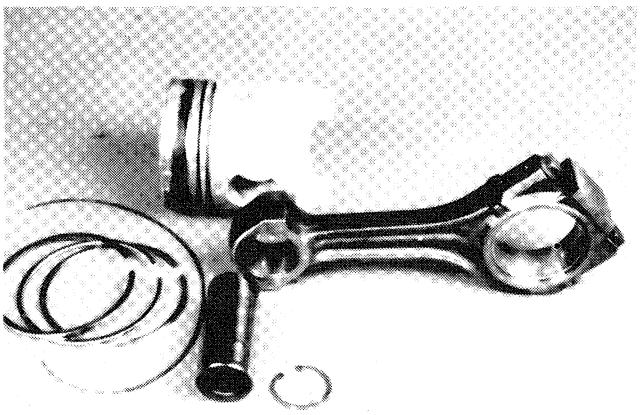
A1083 PISTON

THE PISTON PIN BORE CAN BE REBORED IF NEEDED. THERE IS AN OVERSIZE PISTON PIN FOR USE ON THE PISTON. THE PISTON WEIGHTS MUST BE BALANCED WITHIN PLUS OR MINUS 5 GRAMS (.18 OZ). USE TOOL P/N 75300114 TO WEIGH THE PISTONS.



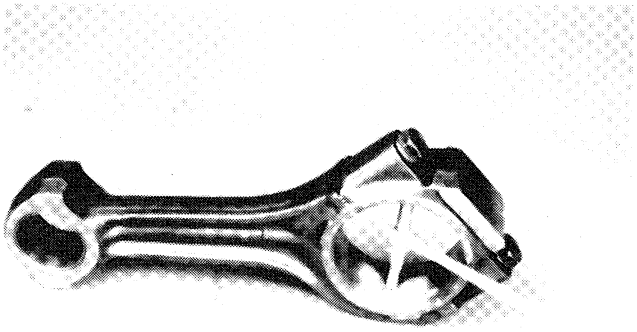
A1084 TOP OF PISTON

THE COMBUSTION CHAMBER IS CENTERED IN THE PISTON. HOWEVER, THERE IS A CORRECT POSITION FOR THE PISTON WHEN PLACED IN THE CYLINDER. ON EACH PISTON IS A NUMBER CORRESPONDING TO THE CYLINDER IN WHICH IT IS PLACED. MATCH THE NUMBER ON THE PISTON WITH THE CONNECTING ROD NUMBERS. IF A REPLACEMENT PISTON IS USED, PLACE THE PISTON ON THE CONNECTING ROD SO THAT THE WORDS "LATO PUNTERIE" FACE AWAY FROM THE CAMSHAFT.



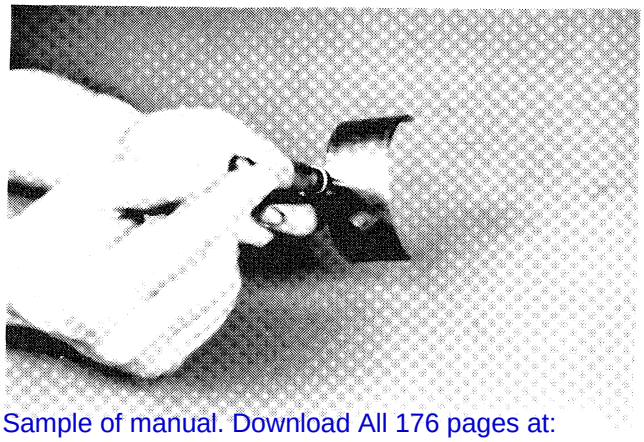
A1085 PISTON AND CONNECTING ROD

THE PISTON PIN FREE FLOATS IN THE PISTON AND CONNECTING ROD. THE PIN IS HELD IN PLACE BY THE SNAP RINGS. THREE RINGS ARE FITTED ONTO THE PISTON. THE CONNECTING ROD IS DRILLED FOR WRIST PIN LUBRICATION.



A1086 MEASURING ROD LARGE BORE

MEASURING THE ROD BORE DIAMETER IN PREPARATION FOR ITS REUSE AIDS IN DETERMINING WHETHER THE ROD IS GOOD. RECORD ALL MEASUREMENTS. THE CONNECTING ROD CAPSCREWS AND NUTS MUST BE TIGHTENED TO SPECIFICATIONS PRIOR TO MEASURING. MEASURE ROD JOURNAL ON THE CRANKSHAFT TO DETERMINE BEARING SIZE.



A1087 MEASURING BEARINGS

THERE ARE FIVE SIZES OF BEARINGS WHICH CAN BE INSTALLED IN ROD. VERIFY SIZE OF BEARING. WHEN MEASURING THE THICKNESS OF THE BEARING, USE A MICROMETER WITH A BALL ON ITS ANVIL.