FIATALLIS®

FL14E

CRAWLER LOADERS

service manual

FORM 73152729 English

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PRINTED 8/91

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.

FL14E SERVICE MANUAL
73152729
SUPPLEMENT #1

4/89

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The following pages are included in this supplement for your inclusion in the manual. Place the pages where indicated by the page numbers.

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SUPPLEMENT INCLUDED IN PRINTING

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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 starting, operating, maintaining, fueling or servicing machine.

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

Never attempt to operate the machine or its tools from any position other than seated in the operator's seat. Keep head, body, limbs, hands and feet inside operator's compartment at all times to reduce exposure to hazards outside the operator's compartment.

Do not allow unauthorized personnel to operate service or maintain this machine.

Always check work area for dangerous features. The following are examples of dangerous work areas: slopes, overhangs, timber, demolitions, fire, high walls, drop off, back fills, rough terrain, ditches, ridges, excavations, heavy traffic, crowded parking, crowded maintenance and closed areas. Use extreme care when in areas such as these.

An operator must know the machine's capabilities. When working on slopes or near drop offs be alert to avoid loose or soft conditions that could cause sudden tipping or loss of control.

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

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 also may be inadvertently moved causing accidental machine or equipment movement.

Keep operator's compartment, stepping points, grab-rails and handles clear 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.

Be careful of slippery conditions on stepping points, hand rails, and on the ground. Wear safety boots or shoes that have a high slip resistant sole material.

For your personal protection, do not attempt to climb on or off machine while machine is in motion.

Never leave the machine unattended with the engine running.

Always lock up machine when leaving it unattended. Return keys to authorized security. Heed all shutdown procedures of the Operation and Maintenance Instruction Manual. Always set the parking brake when leaving the machine for any reason.

Do not wear rings, wrist watches, jewelry, 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 carry loose objects in pockets that might fall unnoticed into open compartments. Do not use machine to carry loose objects by means other than attachments for carrying such objects.

DO NOT CARRY RIDERS unless the machine is equipped for carrying people to reduce personal exposure to being thrown off.

Do not operate machinery in a condition of extreme fatigue or illness. Be especially careful towards the end of the shift.

Roll Over Protective Structures are requires on wheel loaders, dozer tractors, track type loaders, graders and scrapers by local or national requirements. DO NOT operate this machine without a Roll Over Protective Structure.

Do not operate a machine without a falling object protective structure (FOPS).

Do not operate this machine without a rear canopy screen when machine is equipped with rear mounted towing winch.

Seat belts are required to be provided with roll over protective structures or roll protection cabs by local or national regulations. Keep the safety belt fastened around you during operation.

Where noise exposure exceeds 90 dBA for 8 hours, wear authorized ear protective equipment per local or national requirements that apply.

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 manufacturers at all times. DO NOT adjust machine with engine running except as specified.

Do not operate a machine with brakes out of adjustment. See the Operation and Maintenance Instruction manual.

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

To move a disabled machine, use a trailer or low boy truck if available. If towing is necessary, provide warning signals as required by local rules and regulations and follow Operation and Maintenance Instruction Manual recommendations. 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.

To prevent entrapment in cabs or mounted enclosures, observe and know the mechanics of alternate exit routes.

On machines equipped with suction radiator fans, be sure to periodically check all engine exhaust parts for leaks as exhaust gases are dangerous to the operator. Keep a vent open to outside air at all times when operating within a closed cab.

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 recommendations of the manufacturer for storage and disposal.

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

OPERATION

Before starting machine, check, adjust and lock the operator's seat for maximum comfort and control of the machine.

DO NOT START OR OPERATE AN UNSAFE MACHINE. Before working the machine, be sure that any unsafe condition has been satisfactorily remedied. Check brakes, steering and attachment controls before moving. Advise the proper maintenance authority of any malfunctioning part or system. Be sure all protective guards or panels are in place, and all safety devices provided are in place and in good operating condition.

Check instruments at start-up and frequently during operation.

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

Be sure exposed personnel in the area of operation are clear of the machine before moving the machine or its attachments. WALK COMPLETELY AROUND machine before mounting. Sound horn. Obey flag man, safety signals and signs.

Know the principles of cross steering of crawler tractors. Read section in Operation and Maintenance Instruction Manual on cross steering.

Keep engine exhaust system and exhaust manifolds clear of combustible material. Equip machine with screens and guards when working under conditions of flying combustible material.

If engine has a tendency to stall for any reason under load or idle, report this for adjustment to a proper maintenance authority immediately. Do not continue to operate machine until condition has been corrected.

Never use bucket as a man-lift.

Use recommended bucket for machine and material loadability and heaping characteristics of material, terrain, and other pertinent job conditions.

Avoid abrupt starts and stops when transporting a loaded bucket.

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

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

When pulling or towing through a cable or chain, do not start suddenly at full throttle. Take up slack carefully. Guard against kinking chains or cables. Inspect carefully for flaws before using. Do not pull through a kinked chain or cable due to the high stresses and possibility of failure of the kinked area. Always wear heavy 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 COMPARTMENT OF MACHINES INVOLVED ARE PROPERLY GUARDED AGAINST POTENTIAL CABLE OR CHAIN BACKLASH.

During operation always carry ripper in full raised position when not in use and lowered to ground when parked.

When counterweights have been provided, do not work machine if they have been removed unless their equivalent weight has been replaced. See the Operation and Maintenance Instruction Manual.

When operating a machine know what clearances will be encountered, overhead doors, wires, pipes, aisles, roadways; also the weight limitations of ground, floor, and ramps.

Know bridge and culvert load limits and do not exceed them. Know machine's height, width, and weight. Use a signal person when clearance is close.

Be sure that the exact location of gas lines, utility lines, sewers, overhead and buried power lines, and other obstructions or hazards are known. Such locations should be precisely marked by the proper authorities to reduce the risk of accidents. Obtain shut-down or relocation of any such facilities before starting work, if necessary.'
Be certain to comply with all local, state, and federal regulations regarding working in the vicinity of power lines.

When roading find out what conditions are likely to be met - clearances, congestion, type of surface, etc. Be aware of fog, smoke or dust element that obscure visibility.

When backing, always look to where the machine is to be moved. Be alert to the position of exposed personnel. DO NOT OPERATE if exposed personnel enter the immediate work area.

Never travel a machine on a job site, in a congested area, or around people without a signal person to guide the operator.

In darkness, check area of operation carefully before moving in with machine. Use all lights provided. Do not move into area of restricted visibility.

Maintain clear vision of all areas of travel or work. Keep cab windows clean and repaired. Carry blade low for maximum visibility while traveling. Obtain and use fan blast deflectors where tractors are used a pusher tractors in tandem.

Transport a loaded bucket with the bucket as far tipped back and in as low a position as possible for maximum visibility, stability, and safest transport of the machine. Carry it at a proper speed for the load and ground conditions.

Carry the bucket low when traveling with a load.

SAFETY RULES

Maintain a safe distance from other machines. Provide sufficient clearance for ground and visibility conditions. Yield right-of-way to loaded machines.

Avoid going over obstacles such as rough terrain, rocks, logs, curbs, ditches ridges, and railroad tracks whenever possible. when obstructions must be crossed, do so with extreme care at an angle if possible. Reduce speed - down-shift. Ease up to the break over point - pass the balance point slowly on the obstruction and ease down on the other side.

Cross gullies or ditches at an angle with reduced speed after insuring ground conditions will permit a safe traverse.

Be alert to soft ground conditions close to newly constructed walls. The fill material and weight of machine may cause the wall to collapse under the machine.

Operate at speeds slow enough to insure complete control at all times. Travel slowly over rough ground, on slopes or near drop offs, in congested areas or on ice or slippery surfaces.

be alert to avoid changes in traction conditions that could cause loss of control. DO NOT drive on ice or frozen ground conditions when working the machine on steep slopes or near drop offs.

Keep the machine well back from the edge of an excavation.

Be especially careful when traveling up or down slopes. Position the bucket in such a way as to provide a possible anchorage on the ground in case of a slide.

When proceeding across a hillside proceed slowly. Never turn sharply uphill or downhill.

Avoid side hill travel whenever possible. Drive up and down the slope. Should the machine start slipping sideways on a grade, turn it immediately downhill.

In steep downhill operation, do not allow engine to over speed. Select proper gear before starting downgrade.

There is no substitute for good judgement when working on slopes.

The grade of slope you should attempt will be limited by such factors as condition of the ground, load being handled, the type of machine, speed of machine and visibility.

NEVER COAST the machine down grades and slopes with the transmission in neutral on power shift machines, or clutch disengaged on manually shifted machines.

To reduce the danger of an uncontrolled machine, choose a gear speed before proceeding down grade that will hold machine to proper speeds for conditions.

Operating in virgin rough terrain that includes previously mentioned hazards is called pioneering. Be sure you know how this is done. Danger from falling branches and upturning roots is acute in these areas.

When pushing over trees, the machine must be equipped with proper overhead guarding. Never allow a machine to climb up on the root structure particularly while the tree is being felled. Use extreme care when pushing over any tree with dead branches.

Avoid brush piles, logs or rocks. DO NOT DRIVE THE MACHINE ONTO BRUSH PILES, LOGS, LARGE ROCKS or other surface irregularities that break traction with the ground especially when on slopes or near drop offs.

Avoid operating equipment too close to an overhang or high wall either above or below the machine. Be on the lookout for caving edges, falling objects and slides. Beware of concealment by brush and undergrowth of these dangers.

Park in a non-operating and non-traffic area or as instructed. Park on firm level ground if possible. Where not possible, position machine at a right angle to the slope, making sure there is no danger of uncontrolled sliding movement. Set the parking brake.

Never park on an incline without carefully blocking the machine to prevent movement.

If parking in traffic lanes cannot be avoided, provide appropriate flags, barriers, flares and warning signals as required. Also provide advance warning signals in the traffic lane of approaching traffic.

Move the machine away from pits, trenches, overhangs and overhead power lines before shutting down for the day.

When stopping operation of the machine for any reason, always return the transmission or hydrostatic drive control to neutral and engage the control lock to secure the machine for a safe start up. Set parking brake, if so equipped.

Never lower attachments or tools from any position other than seated in operator's seat. Sound the horn. Make sure the area near the attachment is clear. Lower the attachment slowly. DO NOT USE float position to lower hydraulic equipment.

Always before leaving the operator's seat and after making certain all people are clear of the machine, slowly lower the attachments or tools flat to the ground in a positive ground support position. Move any multi purpose tool to positive closed position. Return the controls to hold. Place transmission control in neutral and move engine controls to off position. Engage all control locks, set parking brake, and open and lock the master (key, if so equipped) switch. Consult Operation and Maintenance Instruction Manual.

Always follow the shut-down instructions as outlined in the Operation and Maintenance Instruction Manual.

MAINTENANCE

Do not perform any work on equipment that is not authorized. Follow the Maintenance or Service Manual Procedures.

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.

shut off engine and disengage the Power Take Off lever if so equipped before attempting adjustments or service.

Always turn the master switch (key switch if so equipped) to the off position before cleaning, repairing, or servicing and when parking machine to forestall unintended or unauthorized starting.

SAFETY RULES

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 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.

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

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

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

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

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

When making equipment checks that require running of the engine, have an operator in the operator's 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.

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

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

Keep head, body, limbs, feet, hands, and fingers away from bucket, blade or ripper when in raised position.

If movement of an attachment by means of machine's hydraulic system or winches 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, set brakes, sound horn and call for an all clear. Raise attachments slowly.

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 align holes with fingers or hands - Use the proper aligning tool.

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

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

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 explosion.

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.

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

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

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

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

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

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

Never place gasoline or diesel fuel in an open pan.

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

Do not remove hoses or check valves in the hydraulic system without first removing load and relieving pressure on the supporting cylinders. 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.

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 card board 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.

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

When making pressure checks use the correct gauge for expected pressure. See the Operation and Maintenance Instruction Manual or Service Manual for guidance.

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.

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

Block all wheels before bleeding or disconnecting any brake system lines and cylinders.

SAFETY RULES

Never use makeshift jacks when adjusting track tension. Follow the Undercarriage Service Manual.

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 of 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.

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.

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 requirements to reach the service point. If such ladders or platforms are not available, use the machine hand holds 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.

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.

In lifting and handling heavy parts, slings must be of adequate strength for the purpose intended and must be in good condition.

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.

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.

Wear welders protective equipment such as dark safety glasses, helmets, protective clothing, gloves and safety shoes when welding or burning. Wear dark safety glasses near welding. DO NOT LOOK AT ARC WITHOUT PROPER EYE PROTECTION.

Replace seat belts every two years on open canopy units and every three years on machines with cabs or at change of ownership.

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.

Use only grounded auxiliary power source for heaters, chargers, pumps and similar equipment to reduce the hazards of electrical shock.

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

Remove sharp edges and burrs from reworked parts.

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

Do not strike hardened steel parts with anything other than a soft iron or non-ferrous hammer.

Do not rush. Walk, do not run.

Know and use the hand signals used on particular jobs and know who has the responsibility for signaling.

Face the access system when climbing up and down.

Apply the parking device and place the transmission in neutral before starting the machine.

Do not bypass the starter safety switch. Repair the starter safety controls if they malfunction.

Fasten seat belt before operating.

Steering should be checked to both right and left. Brakes should be tested against engine power. Clutch and transmission controls should be moved through or to neutral positions to assure disengagement. Operate all controls to insure proper operation. If any malfunctions are found, park machine, shut off engine, report and repair before using machine.

If the power steering or the engine ceases operating, stop the machine motion as quickly as possible. Lower equipment, set parking device and keep machine securely parked until the malfunction is corrected or the machine can be safety towed. Never lift loads in excess of capacity.

Should the machine become stuck or frozen to the ground, back out to avoid roll over.

Know and understand the job site traffic flow patterns.

Keep the machine in the same gear going down hill as used for going up hill.

When roading a machine, know and use the signaling devices required on the machine. Provide an escort for roading where required.

Always use the recommended transport devices when roading the machine.

Do not attempt repairs unless proper training has been provided.

Use extreme caution when removing radiator caps, drain plugs, grease fittings or pressure taps. Park the machine and let it cool down before opening a pressurized compartment.

Release all pressure before working on systems which have an accumulator.

When necessary to two the machine, do not exceed the recommended towing speed, be sure the towing machine has sufficient braking capacity to stop the towed load. If the towed machine cannot be brakes, a tow bar must be used or two towing machines must be used - one in front pulling and one in the rear to retard. Avoid towing over long distances.

Observe proper maintenance and repair of all pivot pins, hydraulic cylinders, hoses, snap rings and main attaching bolts.

Always keep the brakes and steering systems in good operating condition.

Replace all missing, illegible or damaged safety signs. Keep all safety signs clean.

Do not fill the fuel tank to capacity. Allow room for expansion.

Wipe up spilled fuel immediately.

Always tighten the fuel tank cap securely. Should the fuel cap be lost, replace it only with the original manufacturers approved cap. Use of a non-approved cap may result in overpressurization of the tank.

Never drive the machine near open fires.

Use the correct fuel grade for the operating season.

MACHINE THEFT AND VANDALISM

ACTIONS TO DISCOURAGE THEFT AND VANDALISM

Immediately upon receipt of a new machine, record the serial numbers of the machine and of all major components and attachments. Keep this list up-to-date as components are replaced or exchanged on the machine. File these numbers in a safe location for fast retrieval.

Report all model, machine and component serial numbers to the insurance company at the time of purchase. If the numbers are noted on the insurance policy, make certain that the numbers are correct.

Remove keys from unattended machines.

Attach, secure, and lock all anti-vandalism and anti-theft devices on the machine.

Lock doors of cabs when not in use.

Immobilize machine by lowering the blade, bucket, or boom to the ground, removing the battery or removing a critical electrical or starting system component.

Discourage the thief! Inspect the gates and fences of the machinery storage yard or construction site. If possible, keep machines in well-lighted areas. Ask the law enforcement agency having local jurisdiction to make frequent checks around the storage or work sites, especially at night, during weekends, or on holidays.

Establish liaison with neighbors and ask them to watch equipment left at job sites and report suspicious activities to the applicable law enforcement agency.

Make frequent inventories of machines to promptly detect losses and vandalism.

ACTIONS TO AID IN RECOVERY OF STOLEN MACHINES

Take photographs of the machine for identification purposes.

In the event of theft, immediately notify the law enforcement agency having jurisdiction. Provide the investigating officer with brand name, type of equipment, and serial numbers of the machine and of major attachments and components. It is helpful to show the investigating officer an operator's manual, photographs, and advertising to familiarize him with the appearance of the machine.

Report the theft to the insurance company. Provide the model and all serial numbers.

Report the model and serial numbers of the stolen machine to a dealer handling the respective line of equipment. Request that the dealer forward this same information to the equipment manufacturer.

Ask the dealer to post a description of the stolen machine, including serial numbers, and to inform his sales and service personnel.

1.16 STANDARD PART CLASSIFICATION TO DETERMINE TORQUE DATA

IMPORTANT: When a specific torque is not given the FIAT STANDARD TORQUE CHART should be used after fully indentifying the part.

Part may only be fully identified by the eight-digit code number, as follows:

l / a b c d e / f g

l - Standard part code
Always represented by figure 1. Such a number indicates that the part can be produced in various versions which differ in material and coating.

a-b-c-d-e-Standard part basic number

It always consists in five figures to identify the part in its dimensional characteristics.

f - Material code number
This number represents the material provided for a specific part. Its meaning is indicated in the table below.

g - Coating code number
This number represents the coating provided for a specific part.

1.17 FIAT STANDARD TORQUE CHARTS

When a specific fastener torque is not given, the following charts may be used:

IMPORTANT
- Fasteners with nominal diameter up to 24 mm to be lubricated with engine oil, major diameter fasteners with tallow.

- Torques for cadmium plated fasteners are valid also for not coated parts.

- Nominal torque tolerance is ±5%

- R80, R100, R120 strength classes are to be considered as follows:

10.9 replaces R100
12.9 replaces R120 bolts & screws

10 replaces R80
12 replaces R100 nuts

- Coating abreviation meaning:

CDT = Cadmium plated
FOSF = Phosphatized
ZNT = Zinc plated

Material code (f)	FIAT	Strength class and type of material				
		UNI	DIN	SAE	BSI	BNA
0	R40	4D - 4S - 4A		1	A	42
1	R50	5S - 6S		3	P	56
2	R80	8G		5	T	80
3	R100	100	10K	8	V	100
4	Ottone	Ottone	Messing	Brass	Brass	Laiton
5	Alluminio	Alluminio	Aluminium	Aluminium	Aluminium	Aluminium
6	Rame	Rame	Kupfer	Copper	Copper	Cuivre
7	open to other metallic material					

BOLT AND SCREW TORQUE CHART

Diameter and width of thread mm	Strength class: 10.9				Strength class: 12.9	
	standard ZNT daNm (*/**) lbs ft (°/°°)	self locking ZNT daNm (*/**) lbs ft (°/°°)	standard CDT daNm (*/**) lbs ft(°/°°)	self locking CDT daNm (*/**) lbs ft (°/°°)	standard FOSF daNm (*/**) lbs ft (°/°°)	self locking FOSF daNm (*/**) lbs ft (°/°°)
M6 x 1	1.3 (9.5/6.5) 9.6 (0.37/0.25)	-	-	-	1.4 (12/8) 10 (0.47/0.31)	-
M8 x 1.25	3.2 (12.5/9) 23 (0.5/0.35)	3.5 (12/8) 26 (0.47/0.31)	-	3 (13.5/9.5) 22(0.53/.037)	3.5 (16.5/11) 26 (0.65/0.43)	3.8 (16.5/11) 28 (0.65/0.43)
M10 x 1.25	-	7.9 (18/12.5) 58 (0.70/0.50)	-	6.5 (18/12.5) 48 (0.70/0.50)	-	-
M10 x 1.5	6.5 (16/11) 48 (0.63/0.43)	7 (15.5/10.5) 52 (0.61/0.41)	-	6 (17/11.5) 44 (0.66/0.45)	7 (21/14) 52 (0.82/0.55)	7.8 (21/14.5) 57 (0.82/0.57)
M12 X 1.25	-	13.9 (23/15.5) 102 (0.90/0.61)	-	11.4 (23/15.5) 84 (0.90/0.61)	-	-
M12 X 1.75	11 (19.5/13.5) 81 (0.76/0.53)	12 (18.5/12.5) 88 (0.73/0.50)	-	10.1 (20.5/14) 74 (0.80/0.55)	12 (26/17.5) 88 (1.02/0.68)	13 (26/17.5) 96 (1.02/0.68)
M14 X 1.5	-	22 (26.25/18) 162 (1.04/0.70)	-	18 (26.5/18) 132 (1.04/0.70)	-	-
M14 X 2	18 (23/16) 133 (0.90/0.62)	19 (22/15) 140 (0.86/0.59)	-	16.2 (24/16.5) 119 (0.94/0.65)	19 (30/20) 140 (1.18/0.78)	21 (30/20) 155 (1.18/0.78)
M16 X 1.5	30 (30/20) 221(1.18/0.78)	33 (29/19.5) 243 (1.14/0.76)	25 (31/21) 184 (1.22/0.82)	27 (31/21) 199 (1.22/0.82)	33 (40/26.5) 243 (1.57/1.04)	36 (40/26.5) 265 (1.57/1.04)
M16 X 2	-	-	23 (28.5/19.5) 170 (1.12/0.76)	24.8 (28/19.5) 183 (1.10/0.76)	-	-
M18 X 1.5	45 (34/23) 332 (1.34/0.91)	48 (33.5/22) 354 (1.21/0.86)	36 (35.5/24) 265 (1.39/0.76)	39 (35.5/24) 288 (1.39/0.94)	48 (46/30.5) 354 (1.81/1.20)	52 (46.5/30.5) 383 (1.83/1.20)
M18 X 2.5	-	-	31 (30.5/21) 229 (1.20/0.82)	33.5 (30.5/21) 247 (1.20/0.82)	-	-
M20 X 1.5	60 (38/25.5) 412 (1.50/1.00)	65 (38/25) 479 (1.50/0.98)	50 (39.5/26.5) 369 (1.55/1.04)	-	65 (52.5/34.5) 479 (2.06/1.35)	70 (53/35) 516 (2.08/1.37)
M20 X 2.5	-	-	44 (35/44) 324 (1.37/1.73)	-	-	-
M22 X 1.5	80 (42/28) 590 (1.65/1.10)	90 (42.5/28) 664 (1.67/1.10)	66 (44/29.5) 487 (1.73/1.16)	-	90 (59/38.5) 664 (2.32/1.51)	95 (59.5/39) 700 (2.34/2.32)
M22 X 2.5	-	-	59 (39/26.5) 435 (1.53/1.04)	-	-	-
M24 X 2	100 (44/29.5) 737 (1.73/1.16)	110 (44.5/29.5) 811 (1.75/1.16)	83 (45.5/31) 612 (1.79/1.22)	-	110 (62/40.5) 811 (2.44/1.59)	120 (62/41) 885 (2.44/1.61)
M24 X 3	-	-	74 (41/28) 545 (1.61/1.10)	-	-	-
M27 X 2	100 (54/36) 737 (2.12/1.41)	-	-	-	100 (75/50) 811 (2.95/1.96)	-
M30 X 2	140 (61/40.5) 1032 (2.40/1.60	-	-	-	150 (85/56) 1106 (3.34/2.20)	-
M33 X 2	190 (68/45) 1401 (2.67/1.77	-	-	-	200 (95/63) 1475 (3.74/2.48)	-
M36 X 3	240 (71/47) 1770 (2.80/1.85	-	-	-	250 (97/65) 1844 (3.81/2.55)	-

(*/) Minimum thread length in mm, specified for cast iron with 255 N/mm^2 tensile strength- (/**)Minimum thread length in mm, specificed for steel with 510 N/^{2} tensile strength - (°/)Minimum tread length in inches, specified for cast iron with 37,000 psi tensile strength- (/°°)Minimum tread length in inches, specifiod for steel with 74,000 psi tensile strength.

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NUTS TORQUE CHART - Unit of measure daNm (lbs ft)

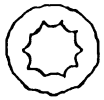
Diameter and width of thread mm	Strength class: 10 (RBO)					Strength class 12 (R100)
	standard ZNT	standard CDT	jam type	with polyamide ring		standard FOSF
				standard	jam type	
M6 x 1	1.3 (96)	-	-	-	-	1.4 (10)
M8 x 1.25	3.2 (23)	-	*2.6 (19)	*3.9 (19)	*3.2 (23)	3.5 (26)
M10 x 1.25	-	-	*5.2 (38)	*8.2 (60)	*6.2 (48)	-
M10 x 1.5	6.5 (48)	7.2 (53)	*5 (37)	*7.7 (57)	*6 (44)	7 (52)
M12 X 1.25	-	13 (96)	*8.7 (64)	*14.5 (107)	*10.2 (75)	-
M12 X 1.75	11 (81)	-	*8.1 (60)	*12.9 (95)	*9.6 (71)	12 (88)
M14 X 1.5	-	19.5 (144)	*13 (96)	*21.6 (159)	*15 (110)	-
M14 X 2	18 (133)	-	*12.5 (92)	*20 (147)	*14.6 (107)	19 (140)
M16 X 1.5	30 (221)	23.5 (173)	°13 (96)	°26.8 (198)	°16 (118)	30 (221)
M16 X 2	-	23 (170)	°12.5 (92)	°26.5 (195)	°16 (118)	-
M18 X 1.5	45 (332)	34.5 (254)	°19 (140)	°39 (236)	°23.5 (173)	45 (332)
3 X 2.5	-	32 (236)	°17.5 (129)	°36.5 (269)	°22 (162)	-
M20 X 1.5	60 (442)	46 (339)	°23.5 (173)	°51.7 (381)	°29 (214)	60 (442)
M20 X 2.5	-	44.5 (328)	°21.5 (158)	°50 (369)	°27 (199)	-
M22 X 1.5	80(590)	62 (457)	°32 (236)	-	-	80 (590)
M22 X 2.5	-	61 (450)	°29.5 (217)	-	-	-
M24 X 2	100 (737)	78 (575)	°37 (273)	°85.8 (633)	°45 (332)	100 (737)
M24 X 3	-	76 (560)	°33 (243)	°84 (619)	°41 (302)	-
M27 X 2	95 (700)	-	-	-	-	95 (700)
M30 X 2	130 (959)	-	-	-	-	130 (959)
M33 X 2	170 (1254)	-	-	-	-	160 (1180)
M36 X 3	220 (1622)	-	-	-	-	220 (1622)

*ZNT (Zinc plated) °CDT(Cadmium plated)

Revised 4/89

X

CAPSCREW AND TORQUE VALUES

Capscrew Head Markings	SAE Grade Number	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1
Manufacturer's marks may vary		Capscrew Size									
		Threads per inch									
		20	18	16	14	13	12	11	10	9	8
		28	24	24	20	20	18	18	16	14	14
	1 or 2	Torque Ft-Lb									
		5	11	18	28	39	51	83	105	160	235
		6	13	20	30	41	55	95	115	175	250
	5	8	17	31	49	75	110	150	270	395	590
		10	19	35	55	85	120	170	295	435	660
	6 or 7	10	19	34	55	85	120	167	280	440	660
		12	21	38	61	95	130	187	300	480	730
 	8	12	24	44	70	105	155	210	375	605	910
		14	27	49	78	120	170	240	420	675	990

Notes:

1. Always use the torque values listed above when specific torque values are not available.
2. Do not use above values in place of those specified in other sections of this manual; special attention should be observed.
3. The above is based on use of clean, dry threads.
4. Reduce torque by 10% when engine oil is used as a lubricant.
5. Reduce torque by 20% if new plated capscrews are used.
6. Capscrews threaded into aluminum may require reductions in torque of 30% of more of Grade 5 capscrews torque and must attain two capscrew diameters of thread engagement.

CAUTION:
If replacement capscrews are of a higher grade than originally supplied, adhere to torque specifications for that replacement.

FOREWORD

Always furnish serial number if making an inquiry to dealer or factory about this machine.

Many equipment owners employ the Dealer Service Department for all work other than routine lubrication and minor service. This practice is encouraged, as our Dealers are well informed and equipped to render efficient service by factory trained mechanics.

Illustrations show standard and optional items.

IMPORTANT

The information in this manual was current at the time of publication. It is our policy to constantly improve our product and to make available additional items. These changes may affect procedures outlined in this manual. If variances are observed, verify the information through your Dealer.

Fiatallis is not responsible for any liability arising from any damage resulting from defects caused by parts and/or components not approved by Fiatallis for use in maintaining and/or repairing products manufactured or merchandized by Fiatallis.

In any case, no warranty of any kind is made or shall be imposed with respect to products manufactured or merchandized by Fiatallis when failures are caused by the use of parts and/or components not approved by Fiatallis.

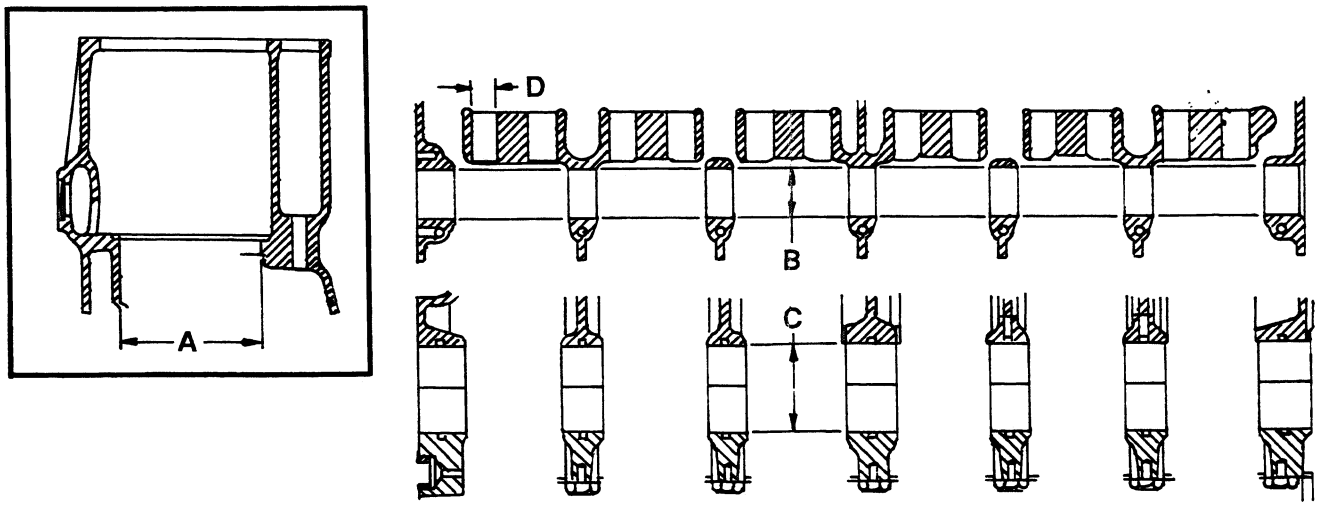
1.6 SPECIFICATIONS

1.6.2 BLOCK

Type	Replaceable Cylinder Sleeves
A. Bore for Cylinder Sleeves	122.00 - 122.04 mm (4.803 - 4.805")
B. Bore for Cam Bushings	52.00 - 52.025 mm (2.047 - 2.048")
C. Bore for Main Bearings	84.21 - 84.23 mm (3.315 - 3.316")
D. Bore for Valve Lifters (standard)	27.00 - 27.03 mm (1.063 - 1.064")

- Cylinder Head Stud Thread diameter

Blue stripe	15.005 - 15.045 (0.591 - 0.592)
No stripe	15.053 - 15.116 (0.593 - 0.595)
Red stripe	15.124 - 15.164 (0.595 - 0.597)

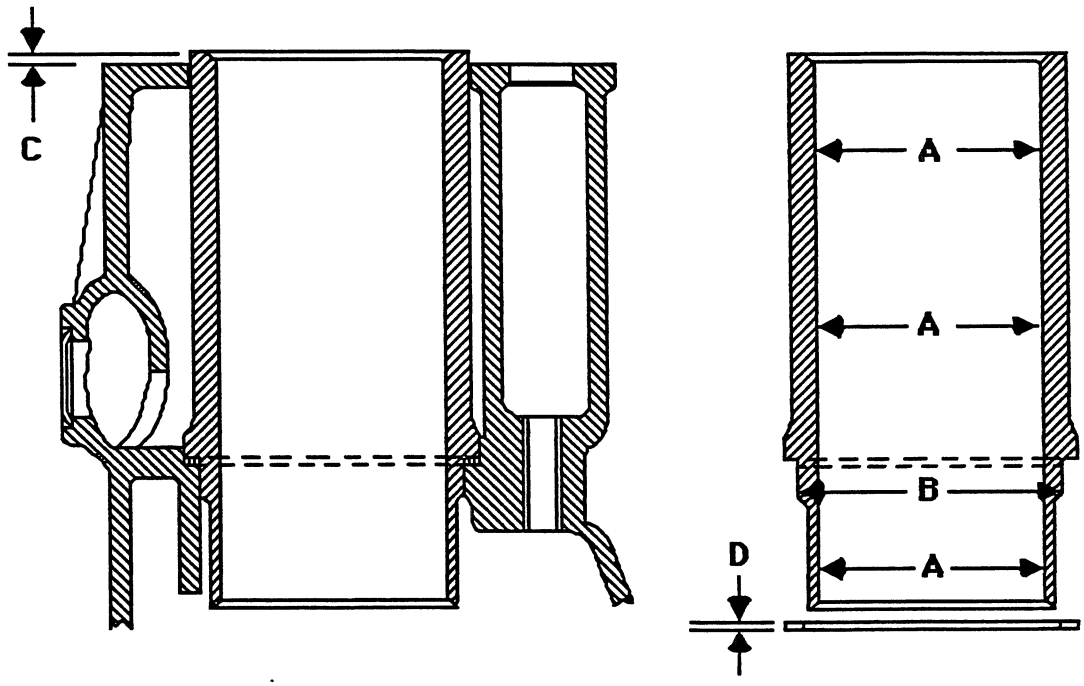


T-85729

1.6.3 CYLINDER SLEEVE

A.*I.D.	115.00 - 115.022 mm (4.5275 - 4.5284")
I.D. machined for oversize piston	115.60 - 115.622 mm (4.551 - 4.552")
- Taper (maximum)	0.15 mm (0.006")
- Out-of-round (maximum)	0.15 mm (0.006")
B. O.D.	121.92 - 121.97 mm (4.800 - 4.802")
- Sleeve to block clearance	0.03 - 0.12 mm (0.001 - 0.005")
C. Sleeve protrusion above block deck	0.13 - 0.17 mm (0.005 - 0.007")
- Protrusion variation between sleeves (max)	0.03 mm (0.001")
D. Sleeve protrusion adjusting rings available	21 sizes, 3.10 mm to 3.50 mm (0.122 to 0.138") in 0.02 mm (0.0008") increments

* Cylinder sleeve I.D. must be measured at the top, center and bottom as shown. At each of these points, measurements must be made perpendicular to and parallel with the engine centerline.

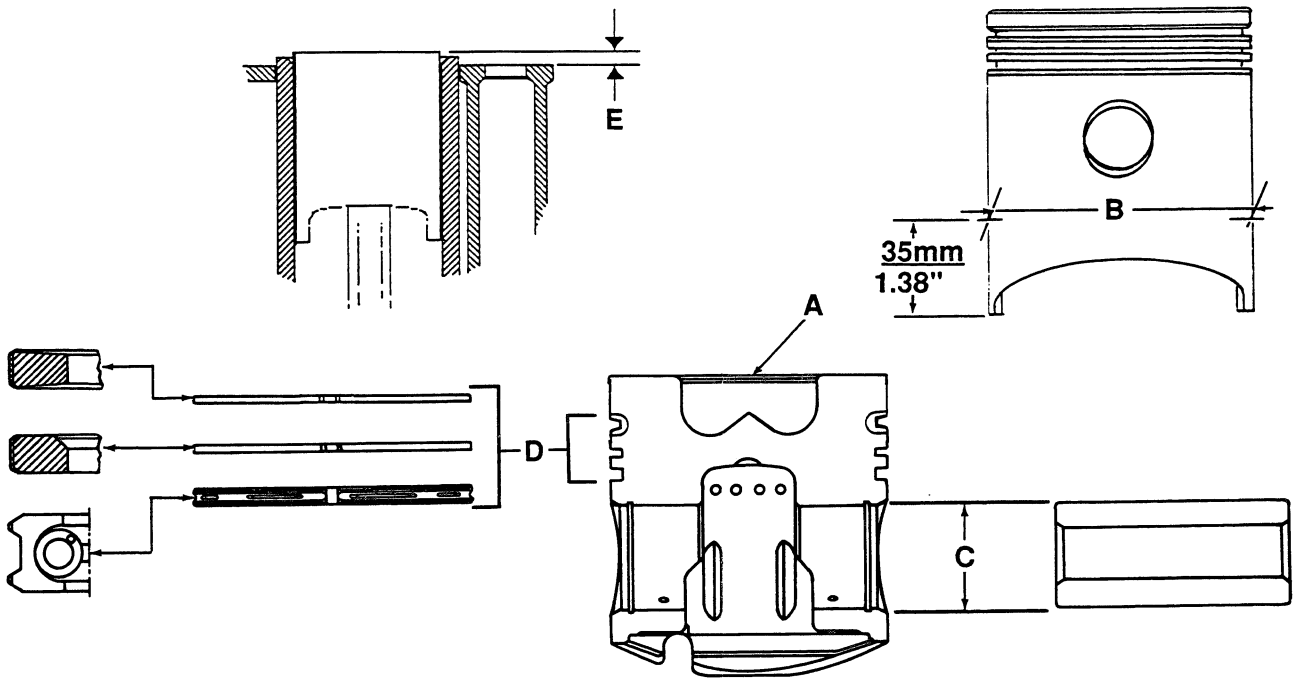


T-85730

1.6 SPECIFICATIONS

1.6.4 PISTONS, RINGS, PISTON PIN

A. Weight (standard)	1725 - 1755 grams (60.8 - 61.9 oz)
B. O.D. (measure 35mm [1.38"] from bottom of piston & 90° from pin bore)	
Standard	114.813 - 114.827 mm (4.5202 - 4.5207")
Oversize	115.413 - 115.427 (4.5438 - 4.5444")
- Piston to sleeve clearance	0.173 - 0.209 mm (0.0068 - 0.0082")
C. Pin Bore	42.013 - 42.019 mm (1.6541 - 1.6543")
- Pin O.D.	
Standard	42.000 - 42.006 mm (1.6535 - 1.6538)
Oversize	42.200 - 42.206 mm (1.6614 - 1.6617)
- Pin to piston bore clearance	0.007 - 0.019 mm (0.0003 - 0.0008")
- Pin to rod bushing clearance	0.019 - 0.035 mm (0.0007 - 0.0014")
D. Width of ring grooves	
Top - tapered from	3.0 - 2.58 mm (0.118 - 0.102")
Intermediate	2.55 - 2.57 mm (0.1004 - 0.1012")
Bottom	4.03 - 4.05 mm (0.1587 - 0.1594")
- Thickness of rings	
Top (tapered)	3.0 mm (0.118")
Intermediate	2.478 - 2.490 mm (0.0976 - 0.0980")
Bottom	3.978 - 3.990 mm (0.1566 - 0.1571")
- Ring side clearance	
Top	Cannot be checked due to bevel design
Intermediate	0.06 - 0.092 mm (0.0024 - 0.0036")
Bottom	0.04 - 0.072 mm (0.0016 - 0.0028")
- Ring end gap	
Top	0.40 - 0.65 mm (0.016 - 0.026")
Intermediate	0.40 - 0.60 mm (0.016 - 0.024")
Bottom	0.30 - 0.45 mm (0.012 - 0.018")
E. Piston TDC position relative to block	0.614 mm (0.024") protrusion to 0.298 mm (0.012") inset

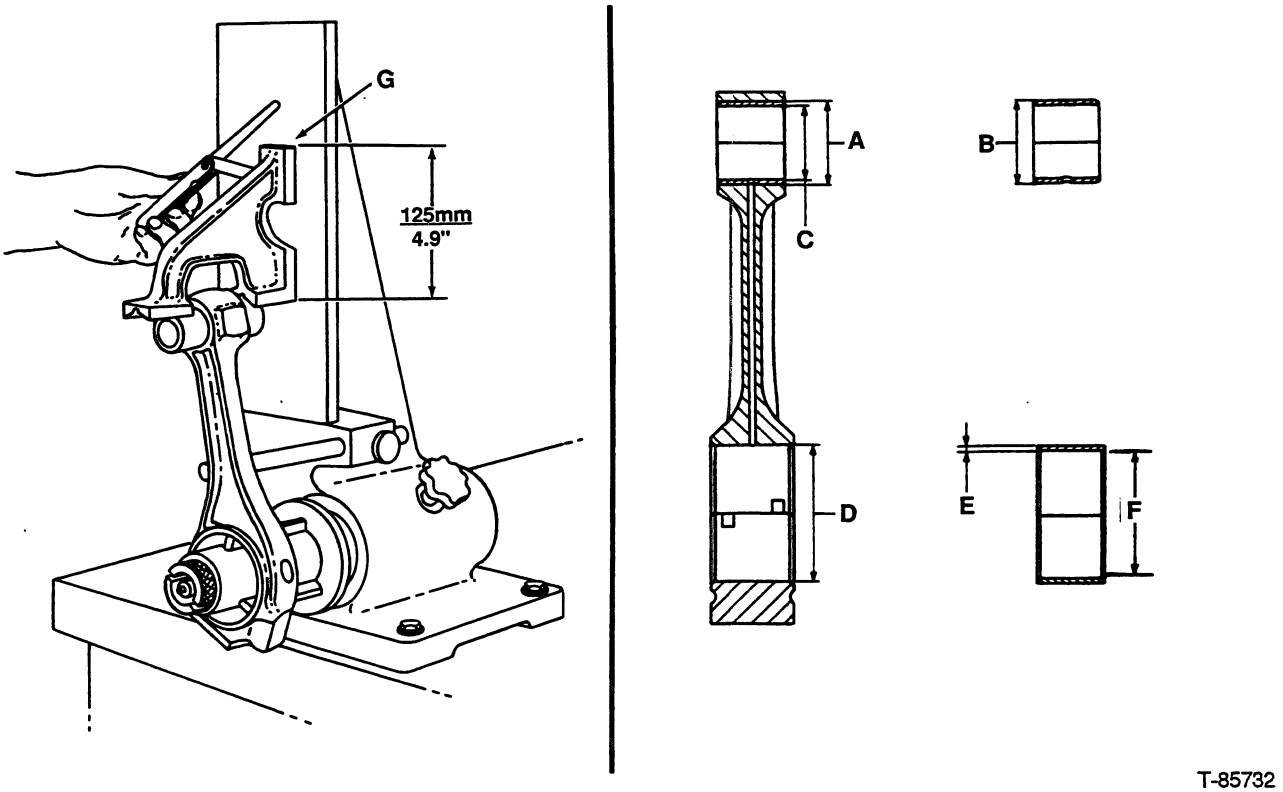


T-82361

1.6 SPECIFICATIONS

1.6.5 CONNECTING ROD

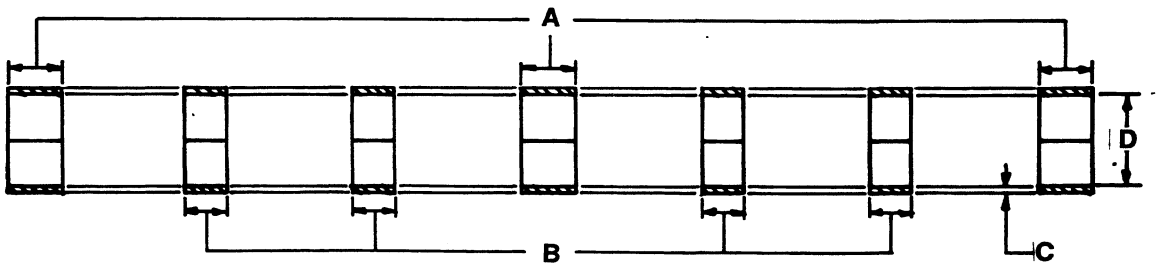
- Weight	2960 - 3000 grams (104 - 106 oz)
A. I.D. pin bushing bore	45.95 - 45.97 mm (1.809 - 1.810")
B. O.D. pin bushing	46.07 - 46.12 mm (1.814 - 1.816")
- Bushing to rod interference fit	0.10 - 0.17 mm (0.004 - 0.007")
C. I.D. pin bushing installed (ream to size)	42.020 - 42.035 mm (1.6543 - 1.6549")
D. I.D. half bearing bore	76.698 - 76.718 mm (3.0196 - 3.0204")
E. Standard bearing wall thickness	2.060 - 2.070 mm (0.0811 - 0.0815")
- Bearings available for undersize crankshaft journals	0.127, 0.254, 0.508, 0.762, 1.016 mm (0.005, 0.010, 0.020, 0.030, 0.040")
F. I.D.(standard size, installed)	72.558 - 72.593 mm (2.8566 - 2.858")
- Bearing to crankshaft clearance	0.058 - 0.116 mm (0.0023 - 0.0046")
G. Bore alignment - Bores must be in line and parallel within (measured 125 mm [4.9"] from pin)	0.05 mm (0.002")



T-85732

1.6.6 MAIN BEARINGS

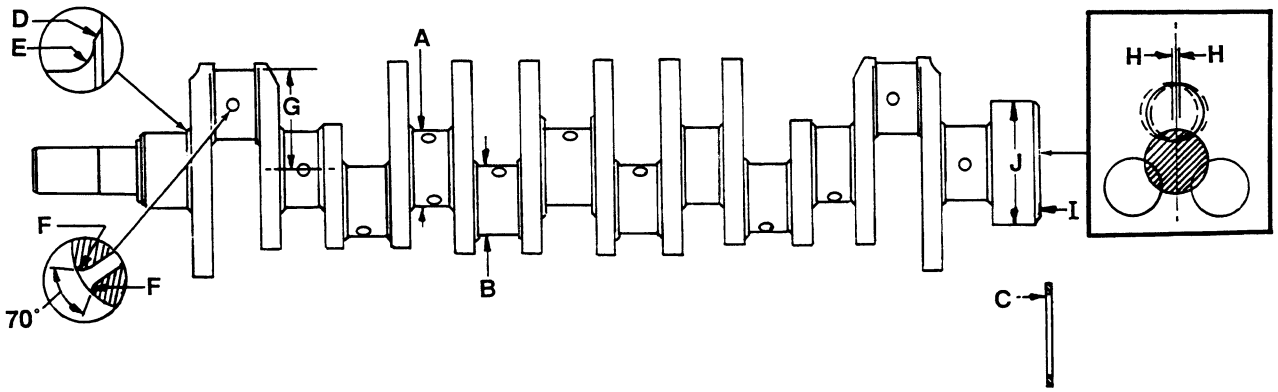
A. Width - 1,4,7	42.110 - 42.500 mm (1.658 - 1.673")
B. Width - 2,3,5,6	32.100 - 32.500 mm (1.264 - 1.280")
C. Standard bearing wall thickness	2.169 - 2.178 mm (0.0854 - 0.0857")
- Bearings available for undersize crankshaft journals	0.127, 0.254, 0.508, 0.762, 1.016 mm (0.005, 0.010, 0.020, 0.030, 0.040")
- Bearing to crankshaft clearance	0.054 - 0.115 mm (0.0021 - 0.0045")
D. I.D. (standard size, installed)	79.854 - 79.892 mm (3.1439 - 3.1453")



T-85723

1.6.7 CRANKSHAFT

A. Journal diameter for main bearings	79.777 - 79.800 mm (3.1408 - 3.1417")
- Journal out-of-round (maximum)	
Wear limit	0.05 mm (0.002")
After regrind	0.005 mm (0.0002")
- Journal taper (maximum)	
Wear limit	0.05 mm (0.002")
After regrind	0.01 mm (0.0004")
- Journal misalignment after regrind (max)	0.05 mm (0.002")
B. Jounral diameter for rod bearings	72.477 - 72.500 mm (2.8534 - 2.8543")
- Journal out-of-round (maximum)	
Wear limit	0.05 mm (0.002")
After regrind	0.005 mm (0.0002")
- Journal taper (maximum)	
Wear limit	0.05 mm (0.002")
After regrind	0.01 mm (0.0004")
C. Thrust ring thickness (standard)	3.378 - 3.429 mm (0.113 - 0.135")
- Oversize thrust rings available	0.127, 0.254, 0.508 mm (0.005, 0.010, 0.020")
- End play	0.068 - 0.270 mm (0.003 - 0.011")
D. Radius	5 mm (0.197")
E. Radius	3.5 - 3.8 mm (0.138 - 0.150")
F. Radius	2 mm (0.079")
G. Distance from center to each rod journal outer surface must be equal within	0.2 mm (0.008")
H. Rod journals must be perpendicular to main journals (max either side)	0.25 mm (0.010")
I. Runout measured at 119 mm (4.68") diameter (max)	0.025 mm (0.001")
- Runout measured at outer edge of flywheel face (max)	0.05 mm (0.002")
- Flywheel to flywheel housing runout(max)	
J. Pilot diameter	124.96 - 125.00 mm (4.920 - 4.921")



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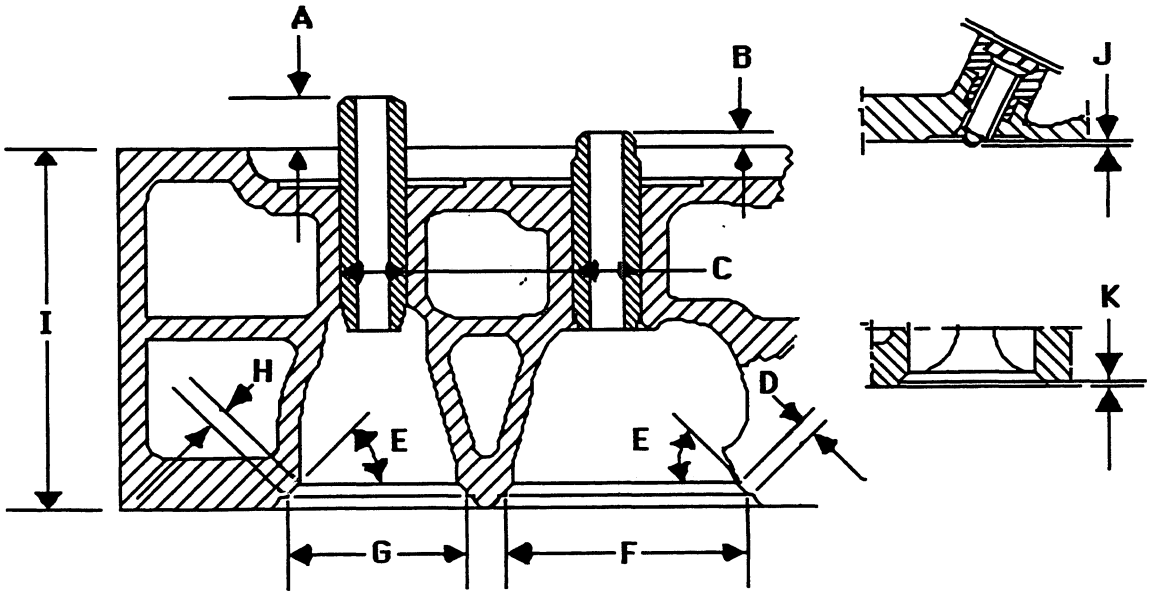
1.6.8 CYINDER HEAD

A. Exhaust valve guide protrusion	9 mm (0.35")
B. Intake valve guide protrusion	2 mm (0.08")
C. I.D. valve guide bore	14.00 - 14.02 mm (0.551 - 0.552")
D. Intake valve seat width	2.2 - 2.7 mm (0.09 - 0.11")
E. Valve seat angle	45° +/- 5'
F. Intake valve seat outer diameter	47.8 - 48.0 mm (1.88 - 1.89")
G. Exhaust valve seat outer diameter	40.3 - 40.5 mm (1.58 - 1.59")
H. Exhaust valve seat width	2.9 - 3.4 mm (0.11 - 0.13")
I. Height	99.78 - 100.00 mm (3.928 - 3.937")
Allowable warpage (max)	0.15 mm (0.006")
Maximum height can be machined to correct warpage	0.50 mm (0.020")
J. Injector nozzle protrusion (from bottom deck)	2.85 - 3.55 mm (0.112 - 0.140")
K. Valve inset (from bottom deck)	
Intake	0.1 - 0.5 mm (0.004 - 0.020")
Exhaust	04. - 0.8 mm (0.016 - 0.031")

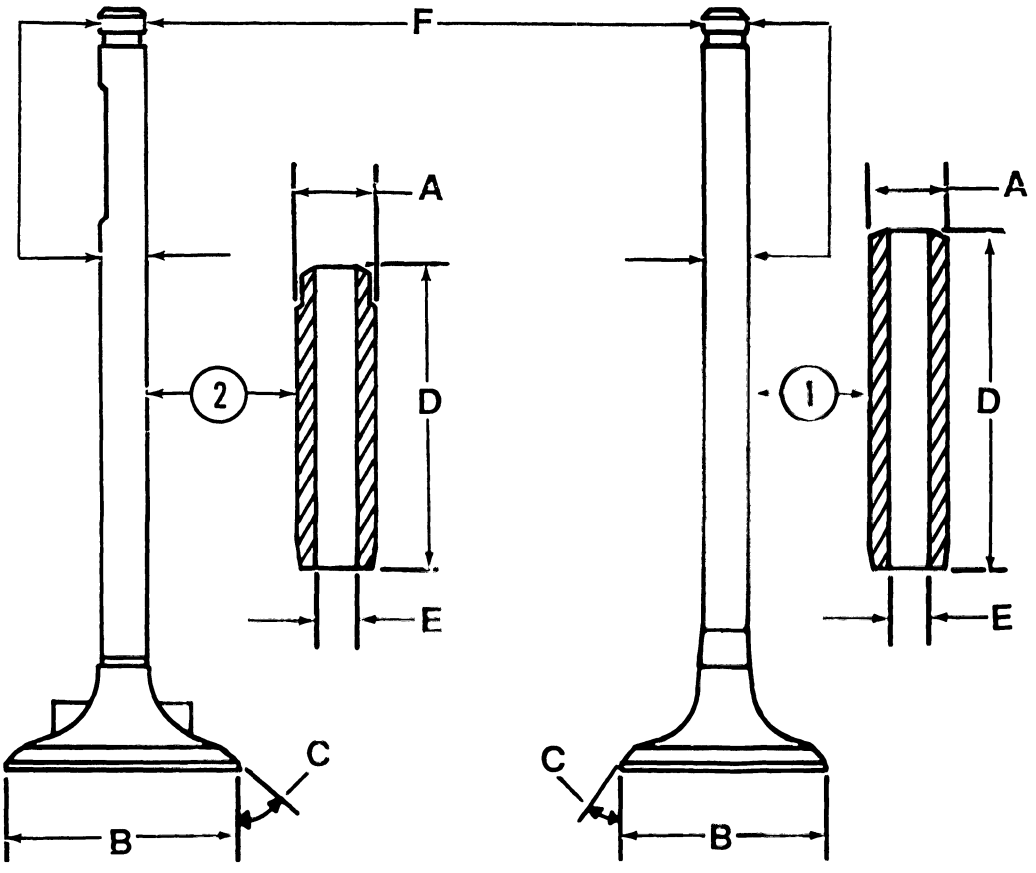


T-85731

1.6 SPECIFICATIONS

1.6.9 VALVES & GUIDES

A. O.D. of guide	
Standard	14.028 - 14.039 mm (0.5523 - 0.5527")
Oversize available	0.04, 0.2, 0.4 mm (0.0016, 0.008, 0.016")
- Guide to cylinder head interference fit	0.010 - 0.039 mm (0.0004 - 0.0015")
B. O.D. of head	
Intake	48.20 - 48.50 (1.898 - 1.909")
Exhaust	40.70 - 41.00 (1.602 - 1.614")
C. Face angle of valve	45°15' - 45°20'
D. Length of guide	
Intake	55 mm (2.165")
Exhaust	62 mm (2.441")
E. I.D. of guide, installed (ream to size)	7.987 - 8.012 mm (0.3144 - 0.3154")
F. O.D. of stem	7.945 - 7.960 mm (0.3128 - 0.3134")
- Valve stem to guide clearance	0.027 - 0.067 mm (0.0011 - 0.0026")



1. Exhaust

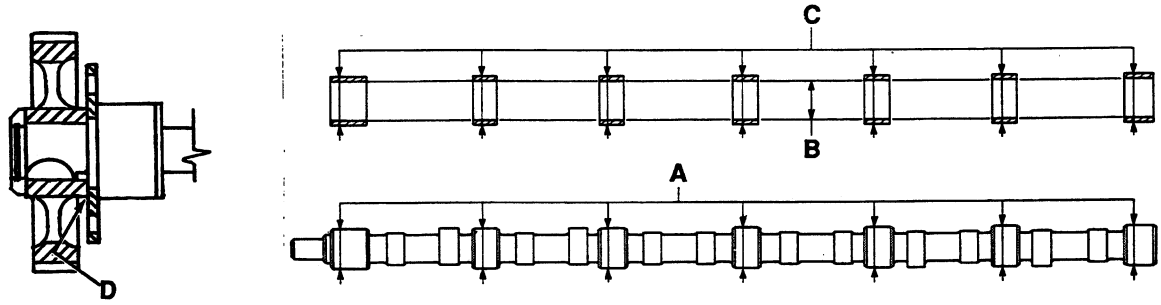
2. Intake

T 82793

1.6 SPECIFICATIONS

1.6.10 CAMSHAFT

A. O.D. journals	48.95 - 48.975 mm (1.927 - 1.928")
- Journals must be concentric within	0.20 mm (0.008")
B. I.D. bushings (ream to size)	49.055 - 49.09 mm (1.931 - 1.933")
- Camshaft to bushing clearance	0.08 - 0.14 mm (0.003 - 0.006")
Wear limit	0.25 mm (0.010")
C. O.D. bushings	52.10 - 52.14 mm (2.051 - 2.053")
- Bushing to block interference fit	0.07 - 0.14 mm (0.003 - 0.006")
D. End play	0.06 - 0.11 mm (0.002 - 0.004")



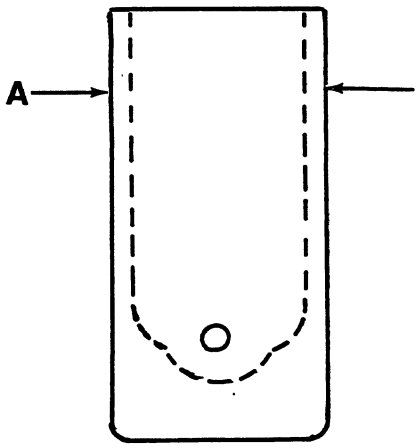
T-82772

1.6.11 VALVE SPRINGS

Free length	49.3 mm (1.941")
Load when compressed to 42mm (1.654")	22.5 - 24.9 kg (49.6 - 54.9 lbs)
Load when compressed to 29.5 mm (1.161")	61.1 - 67.5 kg (134.7 - 148.8 lbs)

1.6.12 VALVE LIFTERS

A. O.D.(measured 17.5 mm [0.689"] from top)	
Standard	26.94 - 26.96 mm (1.0605 - 1.0615")
Oversize available	0.3, 0.4, 0.5 mm (0.012, 0.016, 0.020")
- Lifter to block clearance	0.04 - 0.09 mm (0.0015 - 0.0035")
Wear limit	0.10 mm (0.004")



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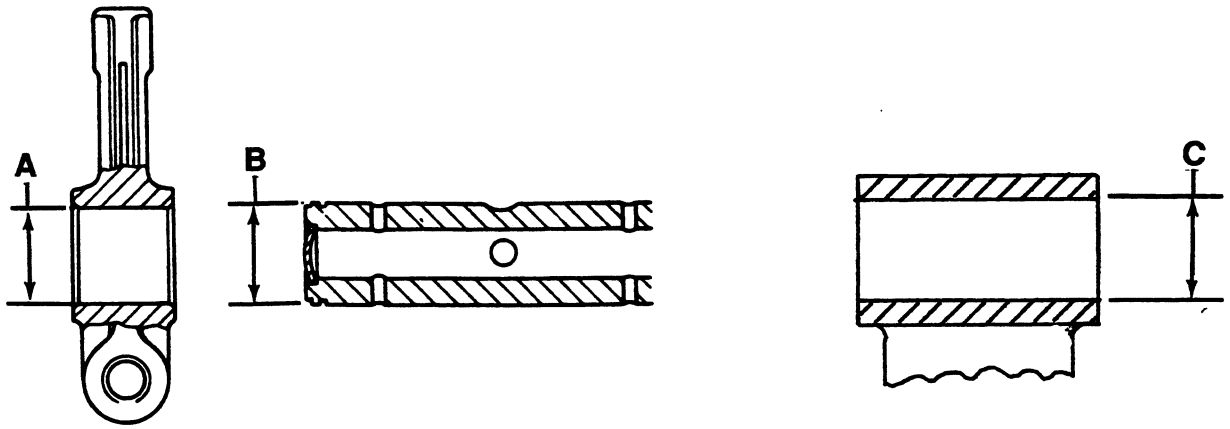
1.6.13 ROCKER ARMS

A. I.D. rocker arm	21.05 - 21.08 mm (0.829 - 0.830")
- Rocket arm to shaft clearance	0.01 - 0.065 mm (0.0004 - 0.003")
B. O.D. shaft	21.015 - 21.04 mm (0.827 - 0.828")
C. I.D. rocker arm support	21.04 - 21.06 mm (0.828 - 0.829")
- Support to shaft clearance	0 - 0.045 mm (0 - 0.002")



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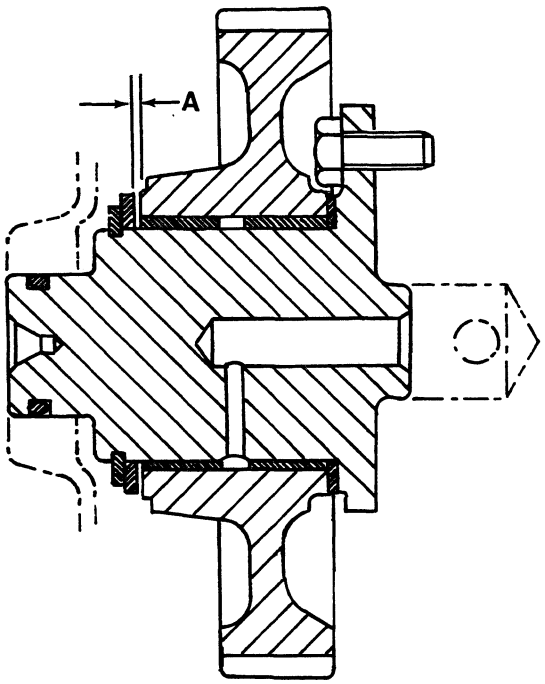
1.6.14 TIMING GEARS

A. Idler gear end play ..... 0.05 - 0.31 mm (0.002 - 0.012")

B. Timing marks
#1 - Crankshaft gear to idler gear
#2 - Idler gear to injection pump gear
#3 - Idler gear to camshaft gear



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1.6.15 FUEL INJECTION

Nozzle opening pressure	200 - 208 bar (2900 - 3015 psi)
Injection pump	Weber-Altecna Model PES 6P 110
Governor	RQV
Injection timing (static)	23° BTDC

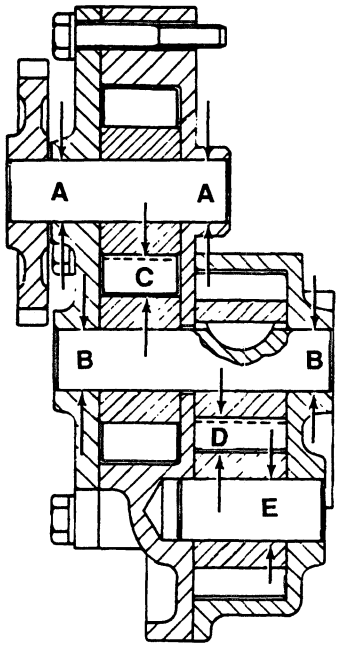
1.6.16 OIL PUMP

- Type: Dual gears, main pressure and scavenging

- Pressure at 80°C (175°F)

Low idle	1.5 bar (21 psi) min
High idle	5 - 8 bar (71 - 114 psi)

A.	Bore I.D.	20.02 - 20.04 mm (0.788 - 0.789")
	Shaft O.D.	19.99 - 20.00 mm (0.787 - 0.7874")
B.	Bore I.D.	20.02 - 20.04 mm (0.788 - 0.789")
	Shaft O.D.	19.99 - 20.00 mm (0.787 - 0.7874")
C.	Backlash	0.08 mm (0.003")
D.	Backlash	0.17 - 0.2 mm (0.007 - 0.008")
E.	Gear I.D.	19.94 - 19.96 mm (0.785 - 0.786")
	Shaft O.D.	19.90 - 19.91 mm (0.7835 - 0.7839")



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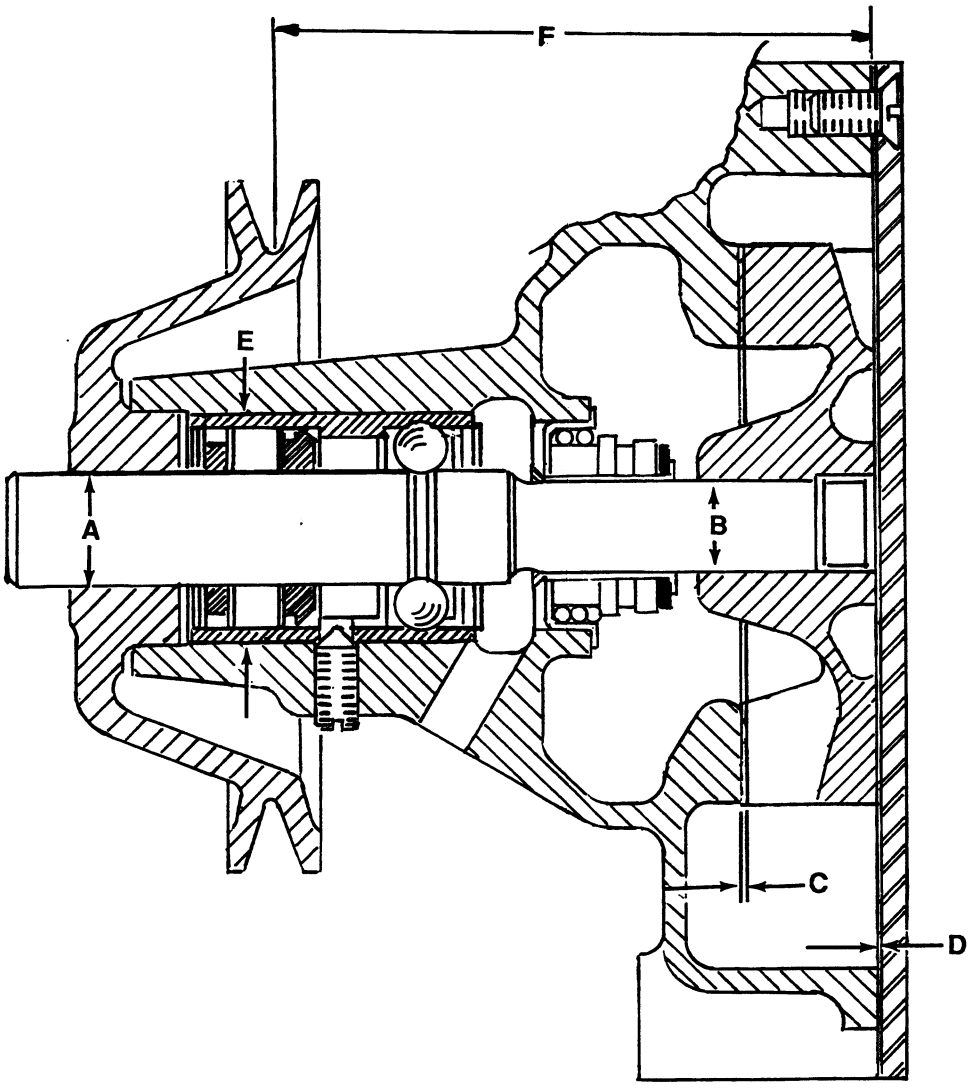
1.6.17 WATER PUMP

A.	I.D. pulley	19.95 - 19.97 (0.785 - 0.786")
	O.D. pulley shaft	19.99 - 20.00 (0.787 - 0.7874")
B.	I.D. Impeller	15.94 - 15.96 mm (0.627 - 0.628")
	O.D. Impeller shaft	15.99 - 16.00 (0.6295 - 0.630")
C.	Impeller to body clearance	0.5 - 1.0 mm (0.020 - 0.040")
D.	Impeller to cover clearance	0.2 - 0.5 mm (0.008 - 0.020")
E.	I.D. of bearing bore in body	39.99 - 40.01 mm (1.574 - 1.575")
	O.D. of bearing	39.99 - 40.00 mm (1.574 - 1.5748")
F.	Pulley groove to pump body	104.5 - 105.3 (4.114 - 4.146")
	- Pressure check seal after rebuild at	1.1 - 1.2 bar (16 - 17 psi)
	- Torque required to turn pump after rebuild	50 Nm (37 lbs. ft)



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