FD30C

CRAWLER DOZER

Service Manual

Print n. 604.02.251 English

FD30C

CRAWLER DOZER

Service Manual

Print n. 604.02.251 English

THIS ALERT SYMBOL SIGNALS IMPORTANT MESSAGES INVOLVING YOUR SAFETY.

Read and heed carefully the safety instructions listed and follow the precautions recommended to avoid potential risks and to safeguard your health and your safety.

You will find this symbol in the text of this Manual referred to the following key words:

***WARNING* - Cautions directed to avoid improper repair interventions involving potential consequences for the operator's safety.**

***DANGER* - These warnings qualify specifically potential dangers for the safety of the operator or other persons directly or indirectly involved.**

IMPORTANT NOTICE

All maintenance and repair interventions explained in this Manual **must be performed exclusively by the Service Organization of the Manufacturer,** observing strictly the instructions explained using, whenever necessary, the recommended specific tools.
Whoever performs the operations reported without exactly the precautions is responsible on his own, for the damages that may result.

Neither the Factory nor any Organisations in its Distribution Network, including but not limited to national, regional or local distributors, are responsible for any liability arising from any damage resulting from defects caused by parts and/or components not approved by the Factory for use in maintaining and/or repairing products manufactured or merchandized by the Factory.
In any case, no warranty of any kind is made or shall be imposed with the respect to products manufactured or merchandized by the Factory, when failures are caused by the use of parts and/or components not approved by the Factory.

AVOID ACCIDENTS

Most accidents and injuries occurring in industry, on the farm, at home or on the road, are caused by the failure of some individual to follow simple and fundamental safety rules and precautions. For this reason, MOST ACCIDENTS CAN BE PREVENTED by recognizing the real cause and taking the necessary precautions, before the accident occurs.

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

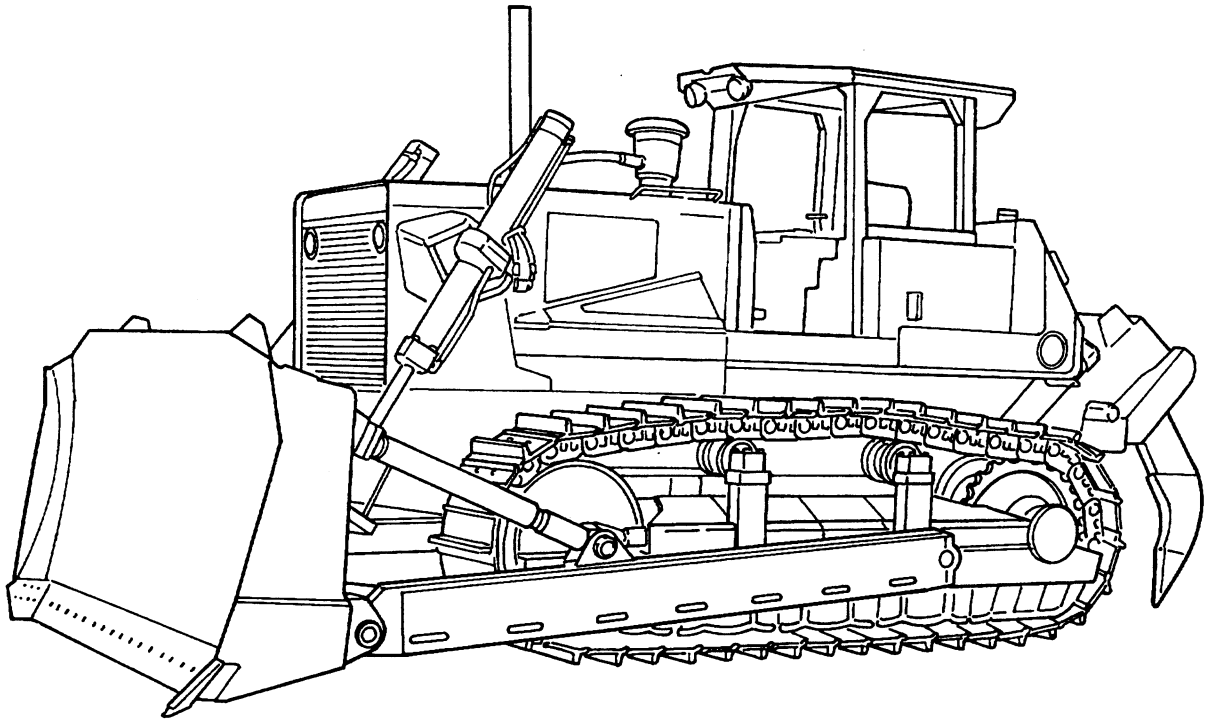
A careful operator is the best insurance against accidents. The complete observance of one simple rule would prevent many thousands serious injuries each year.

This rule is: Never attempt to clean, lubricate or adjust a machine while it is in motion.

WARNING

On machines having hydraulically, mechanically and/or cable controlled equipment (such as showels, 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 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 device used for controlling the equipment.



Crawler dozer FD30C - side view

SUMMARY

SAFETY RULES

⚠ WARNING

Study this Manual before starting, operating, maintaining, fuelling or servicing the machine.

Read and heed all safety rules before any intervention.

GENERALITIES

- Before operating or performing any intervention on the machine:
  - read carefully all the rules contained by this Manual;
  - read and obey all safety related plates and instructions located on the machine.
- Do not allow unauthorized personnel to operate service or maintain this machine.
- Do not wear rings, wrist watches, jewellery, loose or hanging apparels, such as ties, torn clothing, scarves, unbottoned or unzipped jackets that can catch on moving parts. Wear proper safety equipment as recommended for the job. Examples: hard hat, heavy gloves, ear protection, safety glasses or goggles, reflector vests, respirator. Consult your employer for specific safety equipment requirements.
- Keep operator's compartment, stepping points, grabrails 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.
- Do not jump on or off the machine. Keep two hands and one foot, or two feet and one hand in contact with step grab rails and handless at all times.
- Do not use controls or hoses as hand holds when climbing on or machine. Hoses and controls are movable and do not provide a solid support. Controls also may be advertently moved causing accidental machine or equipment movement.
- 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.
- 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.
- Do not leave the machine until it is completely stopped.
- Check the seat safety belt at least twice a year. If there are signs of wear or fraying or other signs of weakness that could lead to failure, replace it.

STARTING

- NEVER START OR OPERATE AN UNSAFE MACHINE. Before operating a machine, always ensure 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 conditions.
- Be sure exposed personnel in the area of operation are clear of the machine before moving it or its attachments. WALK COMPLETELY AROUND the machine before mounting. Sound horn. Obey flag man, safety signals and signs.
- Before starting machine, check, adjust and lock the operator's seat for maximum comfort and control of the machine.
- Fasten your seat belt (when provided).
- Obey all flag signals and signs.
- Due to the presence on the machine of flammable fluids, never check or fill fuel reservoirs or bat-

teries near open flames, smoking materials or sparks.

- REMEMBER THAT STARTING FLUID IS FLAMMABLE. Follow recommendations printed on containers and in the Operation and Maintenance Manual.

- DO NOT PUNCTURE OR BURN CONTAINERS.

- Containers must be stored in fresh, well ventilated places, out of reach of unauthorised persons. Follow strictly the instructions provided by the Manufacturer.

- Never use these preducts near open flames, smoking materials or sparks.

OPERATION

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

- Roll Over Protective Structures are required on loaders, dozers, graders, excavators. NEVER OPERATE machines without ROPS.

- Make sure the Operator's compartement is free of foreign objects, especially if firmly secured. Never use the machine to transport objects, unless proper securing points are provided.

- Check monitoring instruments at start-up and frequently during operation if the pressure gauge sugnals a pressure lower than the minimum operative value, stop immediately the machine.

- DO NOT CARRY RIDERS ON MACHINE

- Study and familiarize with escape routes alternate to normal exit routes.

- Seat belts are required to be provided with Roll Over Protection Structures or cabs.
  Keep safety belts fastened around you during operation.

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

- Make sure that exposed persons in the area of operation are clear of the machine, before starting the engine and operating the equipment. Obey all indications provided by flags and signals.

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

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

- Do not operate machine with brakes out of adjustement.

- Operate the machine at speeds slow enough to ensure complete control at all times.

- Travel slowly over rough terrain, on slopes or near drop-off, in congested areas or on ice or slippery surfaces.

- 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. STOP THE MACHINE.

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

- Maintain clear vision of areas of travel or work. Keep cab windows cleans and repaired.

- When machines are operating in tandem, the pusher (rear) must be equipped with the appropriate deflectors to protect the unit in front from the air stream coming from the radiator.

- When pulling or towing through a cable or chain, do not start suddenly at full throttle; take-up slack carefully. Inspect carefully for flaws or troubles before using.

- Use only designated towing or attaching points. Use care in making attachments. Make sure pins and/or locks are secure before pulling. Stay clear of drawbars, cables or chains under load.

- Avoid kinking chains or cables. Do not pull through a kinked chain or cable to the high stresses and possibility of failure of the kinked area. Always wear heavy gloves when handling chains or cables.

- Be sure chains and cables are anchored and the anchor points are strong enough to handle the expected load. Keep exposed personnel clear of anchor points and cables or chains.

- DO NOT PULL UNLESS OPERATOR's COMPARTMENT OF MACHINES INVOLVED ARE

PROPERLY GUARDED AGAINST POTENTIAL CABLE OR CHAIN BACKLASH.

- Be alert to soft ground conditions close to newly constructed walls. The fill material and weight of the machine may cause the wall collapse under the machine.
- In darkness, check area of operation carefully before moving in with machine. Use all lights provided. Do not move into area of restricted visibility.
- If engine has a tendency to stall for any reason under load or idle, report this for adjustment to proper maintenance authority immediately. Do not continue to operate machine, until condition has been corrected.
- On machines supplied with suction radiator fans, be sure to periodically check engine exhaust parts for leaks, as exhaust fumes are dangerous to the operator.
- In case of enclosed cabs, always let open a discharge to the outside, to ensure air circulation.
- Operators must know thoroughly the performance of the machine they are operating. When working on slopes or near sudden level drops of the terrain, avoid areas where ground is loose or soft since rolling-over or loss of control of machine could result.
- Where noise exposure exceeds 90 dBA for 8 hours, wear approved ear protection .
- When counterweights are provided, do not work machine if they have been removed.
- Overtaking manoeuvres must be performed only when absolutely necessary and unavoidable. Beware of possible uneven terrains, poor visibility conditions, the presence of other machinery or persons out of sight.
- Operate the machine at a speed adequate to the working conditions in the site and slow enough to ensure complete control at all times.
- Check monitoring istruments at start-up and frequently during operations. In case of abnormal condition warnings, stop immediately the machine.
- Be alert of the people in the operating area of the machine, know what clearances, will be encountered, overhead doors, cables, pipes, bearings, load limitations of ground, bridges, floor or ramps.
- When roading, find-out what conditions are likely to be encounterd, clearances, traffic congestion, type of road surfacing, etc. Beware of fog, smoke or dust elements that obscure visibility.
- When crossing guilles or ditches, move at an angle with reduced speed after ensuring ground conditions will permit a safe traverse.
- Explore the working area to identify potential risks such as: slopes, overhangs, pits, demolition rubble, fires, ravines, ditches, soft terrain, heavy traffic, crowded parking areas, closed ambients. In such conditions, proceed with extreme care.
- Whenever possible, aviod going over obstacles such as rough terrain, rocks, logs higly irregular gound, steps, ditches, railroad tracks. When obstructions must be crossed, do so with extreme care at an angle, if possible. Reduce speed, shift-down. Ease up to the break over point, pass the balance point slowly on the obstruction and ease down on the other side.
- In step down-hill operation, do not allow engine to over-speed. Select proper gear before starting down grade.
- Avoid side hill travel, whenever possible. Drive up and down the slope. Should the machine slipping sideways, turn it immediatly downhill.
- The grade of slope you should attempt will be limited by factors such as conditions of the ground, load being handled, type of machine, speed of machine and visibility.
- There is no substitute for good judgement when working on slopes.
- Avoid operating equipment too close to an overhang or high wall, either above or below the machine. Be on the look-out for caving edges, falling objects and slides. Beware of concealment by brush and undergrouwth of these danger.
- 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. NEVER DRIVE OVER THEM or other surface irregularities that brake traction with the ground, especially when on slopes or near drop-offs.

- Be alert 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.
- Working in virgin and rough terrains is characterized by the presence of all the perils and risks listed above. In these conditions, it is emphasised the danger represented by large tree limbs (possibly falling on the machine), large roots (acting as a leverage under the machine when up-rooted causing the roll-over of the unit) etc..

STOPPING

- When the machine is stopped for whatever reason, follow the instructions of chapters **"Stopping the machine"** and **"Stopping the engine"** of the Operation and Maintenance Instruction Manual.
- Always remember to position the transmission drive control in neutral and engage the control lock to secure the machine.
- Set parking brake.
- NEVER LEAVE THE MACHINE UNATTENTED with the engine running.
- Always before leaving tha operator's seat and after making sure that all people are clear of the machine, slowly lower the attachments or tools flat to the ground in a positive ground support position.
- Return the controls in neutral position. Place the gearshift lever in neutral and shut-off the engine. Lock the gearshift lever, switch-off and lock the starter switch.
- Park in a non-operating and no traffic area or as instructed. Park on firm level is ground is possible. Where not possible, the machine at right angle to the slope, making sure there is no danger of uncontrolled sliding movements. Set parking brake.
- If parking in traffic leans cannot be avoided, provide appropriate flags, barriers, flares and signal as required. Also provide advance warning signals in the traffic lane of approaching traffic.
- Keep head, body, limbs, hands, and feet away from blade, arms, bucket or ripper when in raised position. Always disconnect the master switch before any intervention (i.e. cleaning, repairing, maintaining refuelling etc.). Do not same when parking for prolonged periods of time to avoid accidental or unauthorized starting.
- Never lower attachments or tools other than seated in operator's seat. Sound horn. Make sure area near the attachment is clear. Lower the attachment slowly. DO NOT USE FLOAT POSITION of hydraulic system.
- Securely block the machine and lock it every time you leave it unattended. Return keys to authorized security. Heed all shut-down operations of the Operation and Maintenance Instruction Manual are followed. Every time you leave the machine, engage parking brake (if equipping unit).

MAINTENANCE

- When maintenance operations require moving hydraulically operated attachments by means of machine's hydraulic system remember that all manoeuvres must be made only when seated in the operator's seat. Before starting machine or moving attachment or tools, set brakes, sound horn and call for an all clear. Raise attachment slowly.
- Always block with external supports any linkage or part on machine that requires work under the raised linkage, part or machine. Never allow anyone to walk under or be near unblocked raised equipment. Unless you are positively sure that total safe condition exist, avoid stayng under raised equipment, even if blocked.
- Never place head, body, limbs, fingers, feet or hands into exposed portions between uncontrolled or unguarded scissor points of the machine without first providing secure blocking.
- Never perform interventions with engine running, except as called for in a Manual. Do not wear loose clothing or jewellery near moving parts.
- When servicing or maintenance require access to areas that cannot be reached from the ground, use a ladder or step platform that meet local and national regulations, to reach the service point. If such ladder or platform are not available, use the machine hand holds and steps as provided. Perform all service or maintenance carefully.
- Shop and/or field service platforms or ladders must be constructed and maintained with local and national regulations.
- Disconnected batteries and TAG all controls according to current regulations to warn that work

is in progress. Block machine and all attachments that must be raised according to current regulations. Due to the presence of flammable fluids, never check or fill fuel tanks, batteries, not use starting fluid near lighted smoking materials or open flames.

- BRAKES ARE INOPERATIVE when manually released for servicing. Provisions must be made to maintain control of the machine by blocking or other means.
- The fuel filling nose must be kept costantly inside the filling neck. Keep this contact from the beginning to the end of the fuelling operation to avoid the possibility that sparks due to static electricity are generated.
- To move a disabled machine, use a trailer or a low-boy, if available. In case towing is need, use all necessary signals required by local and national regulations, and follow the directions provided in this Manual.
- To load/unload a machine from transporter, choose a level surface ensuring firm support to the wheels of truck or trailer. Use strong access ramps, with adequate height and angle. Keep surface free of mud, oil or slippery materials.
- Anchor the machine securely to the bed of truck or trailer and block wheels or tracks with appropriate wedges.
- Never align holes with fingers or hands; always use appropriate aligning tools.
- Eliminate all sharp edges and burrs from reworked parts.
- Use only approved grounded auxiliary power sources for heaters, chargers , pumps and similar equipment to reduce the hazards of electrical shocks.
- Lift and handle heavy parts with a lifting device of proper capacity. Be sure parts are supported by proper slings and hooks. Use lifting if provided. Watch-out for peaple in the vicinity.
- Never pour gasoline or diesel fuel into open, wide and low containers. Never use gasoline, solvent or other flammable fluid to clean parts. Use exclusively qualified, non-flammable, non-toxic commercial solvents.
- When using compressed air for cleaning parts, use safety glasses with side shields or goggles. Limit pressure to 2 bar, in accordance with local and national regulations.
- Do not run the engine in closed areas without proper ventilation to remove deadly exhaust fumes.
- Do not smoke or permit any open flames or spark near when re-fuelling or handling flammable materials.
- Do not use an open flame as a light source to look for leaks or for inspection anywhere on the machine.
- Make sure that all mechanic's tools are in good conditions. NEVER USE tools with mushroomed heads or frayed. Always wear eye protections.
- Move with extreme care when working under the machine, its attachments and or on or near them. Always wear protective safety equipment as required, such as hard hat, goggles, safety shoes, ear plugs.
- When performing operations requiring running of the engine, have a qualified operator in the operator's seat at all times with the mechanic on sight. Place the transmission in neutral and set the brakes and safety lock. KEEP HANDS AND CLOTHING AWAY FROM MOVING PARTS.
- For field service, move machine to level ground, if possible, and block it. If work on an incline is absolutely necessary, first block machine and its attachments securely, than move it to level ground as soon as possible.
- Do not trust worn and/or kinked chains and cables: do not use them for lifting or pulling operations. To handle them, always use heavy gloves.
- Avoid kinking chains or cables. Do not pull through a kinked chain or cable to the high stresses and possibility of failure of the kinked area. Always wear heavy gloves when handling chains or cables.
- Be sure chains and cable are anchored and the anchor points are strong enough to handle the expected load.
- Keep exposed personnel clear of anchor points and cables or chains.
- Keep the area where the maintenance operations are performed CLEAN and DRY. Eliminate immediatly all water and oil spillages.
- Do not pile oily or greasy rags; they represent a fire hazard. Store in closed metal container.

- Before starting machine, check, adjust and lock the operator's seat for maximum comfort and control of the machine. Be sure exposed personnel in the area of operation are clear of the machine before moving it or its attachments. Sound horn.

- Rust inhibitors are volatile and flammable. Use only in well ventilated areas. Keep open flames away - DO NOT SMOKE - Store containers in a cool well ventilated place, secure against unauthorised personnel.

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

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

- Wear protective equipment such as dark safety glasses, helmets, protective clothing, gloves and safety shoes, when welding or burning. Wear dark safety glasses near welding zones. DO NOT LOOK AT ARC WITHOUT PROPER 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 of the jack at the machine and under jack is appropriate and stable.

  Loads lifted by hydraulic jacks are always dangerous. Transfer load to appropriate blocking as a safety measure, before proceeding with service or maintenance work, according to local or national regulations.

- Handle all parts carefully. Keep hands and fingers away from structures, gears or moving parts. Use and wear always the appropriate protections.

- Compressed air systems can have water deposits created by moisture condensation due to changes of atmospheric conditions. If required, discharge deposits, as instructed.

ENGINE

- Loosen the radiator cap very slowly, to release pressure from the system, before removing it. All coolant level top-ups must be performed with engine OFF.

- Avoid that flammable materials touch exhaust parts. Should this be possible, provide the necessary protections.

- Do not run engine when refuelling and use care if the engine is hot due to the 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 machine is moving.

- Do not lubricate the machine with engine running.

- Do not run the engine with air intakes, door or protections open.

ELECTRICAL SYSTEM

- Always disconnect batteries prior to any intervention on machine or electrical system (cleaning, repair, maintenance).

- Should booster batteries be used, remember to connect both ends of the booster cables in the proper manner (+) with (+) and (-) with (-). Avoid short-circuits of the terminals. Follow thoroughly the instructions of this Manual.

- Before any intervention, make sure that the main switch is OFF.

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

- Before any intervention, make sure that there are no fuel or electrolyte leakages; eliminate them before proceeding with further work. Do not charge batteries in closed areas: ensure enough ventilation to prevent the possibility of accidental explosions due to accumulation of gases generated during the recharging.

HYDRAULIC SYSTEM

- Fluid escaping under pressure from a very small hole can be almost invisible and can have sufficient force to penetrate the skin. Use a piece of a

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.

- Stop the engine and release all pressures in the system before removing panels, housings, plugs or covers.
- In case pressures must be measured, use instruments of adequate capacity. Always follow the recommended procedures.

TOOLS

- Keep head, body, limbs, feet, fingers or hands away from bucket, blade or ripper when in raised position.
- Prior to any intervention, install all safety devices according to current rules and regulations. In case equipment on the machine must be operated by hydraulic systems, remember to proceed only after seating in the operator's compartment. Make sure that there are no persons in the operating area of the machine. Alert people before operating using the horn and by voice. Move the equipment very carefully.
- Do not use machine to transport loose objects, unless proper devices for this purpose are provided.
- Clutches and brakes of this machine and eventual auxiliary equipment and attachments (such as operating cylinder or winches control valves) must always be properly adjusted in accordance with the instructions provided by the Manuals of the Manifacturer. Never perform adjustments with engine running, except when called for by the above instructions.
- Do not proceed with adjustments with engine running, unless required by prescribed procedures.
- When changing work shifts, check that there are no screws and/or mounting brackets loose. If required tighten as instructed in this publication.

WARNING

On machine having hydraulically, mechanically, and/or cable controlled equipment (such as shovels, loaders, dozers, excavators 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.

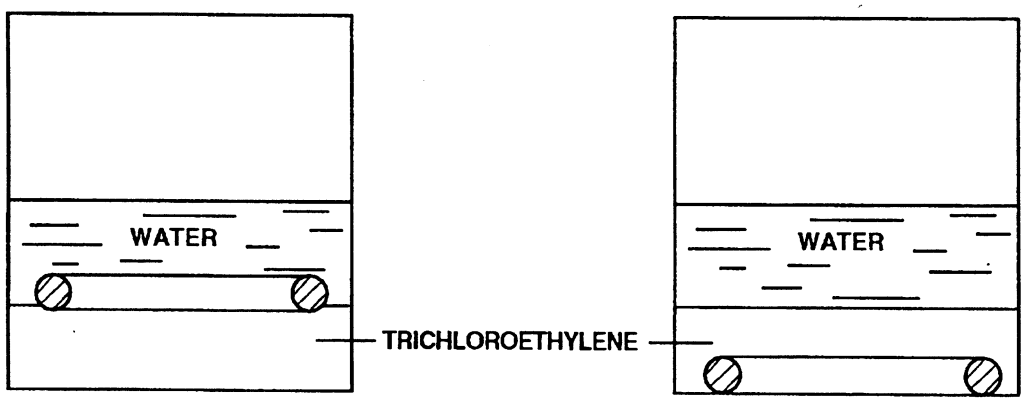
SAFETY RULES FOR SEALS

VITON SEALS (fluoro - elastomer)

Seals, especially Viton made O-rings Normally coloured red) are used in systems operating at high temperatures, considering the resistance of this material to the effects of heat. However, should this material be subject to temperatures exceeding 315°C (600°F) - in practice only in case of a fire or subject to the flame of an oxyacetylene torch - hydrofluoric acid is generated. **This acid is highly corrosive and cause severe burns** if in contact with the skin.
Every time is necessary to intervene on components equipped with Viton rings, and there is the suspicion that they have been exposed to excessive temperatures the following procedures must be applied:

1) inspect visually, without touching them, all seals that appear to be damaged by excessive heat. They appear black and stickly;
2) check the type of material of the seals to identify if they are made with Viton, performing the test illustrated in the enclosure, on spare parts;
3) if it was found or there is a reasonable doubt that Viton made components are involved, the contaminated area MUST be decontaminated prior to proceeding with further operations;
4) wear neoprene or PVC gloves and protective glasses or face shield, wash accurately the contaminated area with a solution of a water lime (available at tile stores) dissolved in water until a milky looking liquid is obtained. Rinse accurately with steam or running water;
5) eliminate the materials removed and the protective gloves in safe manner avoiding burning them.

TEST TO DISTINGUISH RUBBER MATERIAL (BUNA N) FROM "VITON" (FLUORO ELASTOMER)



NITRIL RUBBER / BUNA N

FLOATS

"VITON"
FLUORO ELASTOMER

SINKS

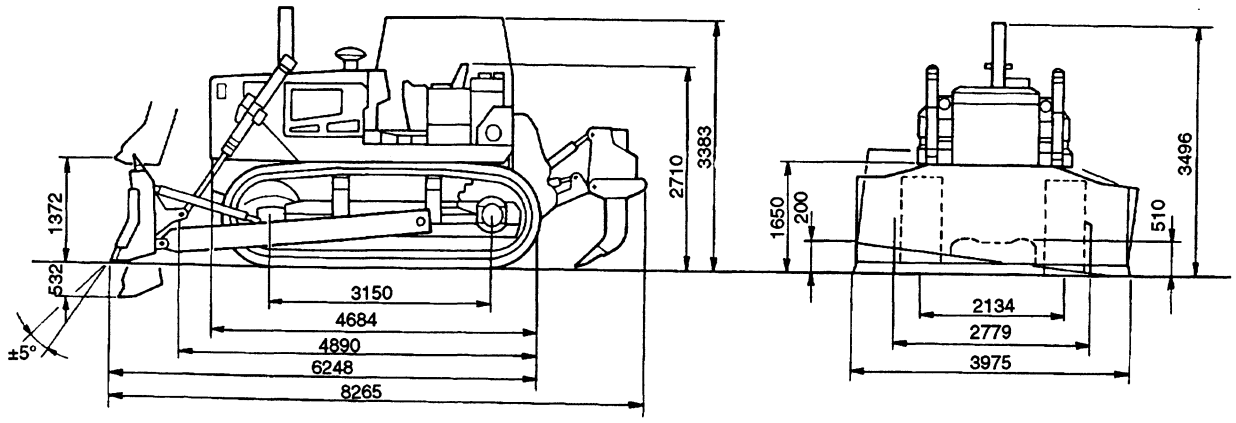
SECTION 1

TECHNICAL DATA AND GENERALITIES

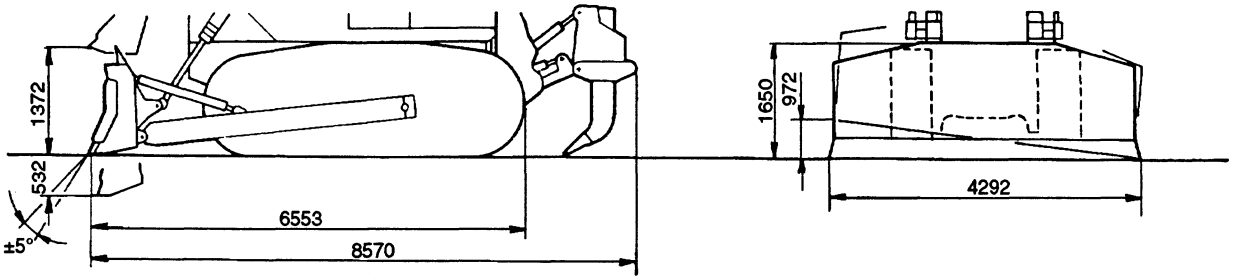
TABLE OF CONTENTS

1.1 TECHNICAL DATA

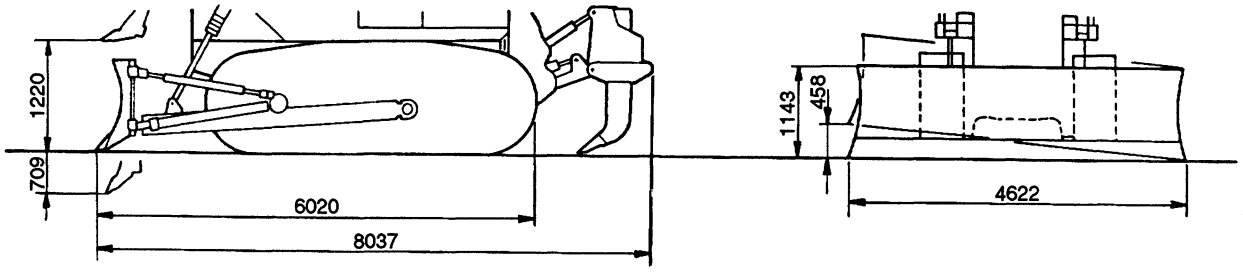
BULLDOZER HSU



BULLDOZER HU



ANGLEDOZER



Note: - Machine in operating conditions
- Height of grousers: 76,4 mm
- The figure includes optional tools

Fig. 1-1 Tractor dimensions

DIMENSIONS	Overall lenght (bare tractor)	mm	4890
	Overall lenght (with semi-U blade)	mm	6248
	Overall lenght (with U blade)	mm	6553
	Overall lenght (with angledozer blade)	mm	6020
	Overall width (bare tractor)	mm	2779
	Overall width (with semi-U blade)	mm	3975
	Overall width (with U blade)	mm	4292
	Overall width (with angledozer blade)	mm	4622
	Overall height (to tip of exhaust pipe)	mm	3496
	Overall height (with ROPS canopy)	mm	3383
	Track gauge	mm	2134
	Minimum distance from ground	mm	510
	Lenght of track on ground	mm	3150
	Track shoe width (standard)	mm	559
MASS	Shipping weight (including ROPS canopy, blade lift cylinders, lubricants, coolant, 10% fuel)	kg	28610
PERFORMANCE	SPEEDS		
	Fwd 1st	km/h	3.96
	Fwd 2nd	km/h	6.49
	Fwd 3rd	km/h	9.93
	Rev 1st	km/h	4.66
	Rev 2nd	km/h	7.56
	Rev 3rd	km/h	11.53

1.1.1 ENGINE

IVECO engine 8285 22 014

Cycle Diesel, stroke, direct injection, supercharged
Number of cylinder 8
Arrangement ..... 90°V
Bore ..... 145 mm (5.71")
Stroke ..... 130 mm (5.12")
Total piston displacement:
..... 17.174cc (1048 cu. in.)
Compression ratio ..... 15.5 to 1
Max power output speed rating ..... 2000 RPM
Max torque speed rating ..... 1200 RPM
Converter stall speed rating ..... 1680 to 1780 RPM
Full stall speed rating ..... 1400 to 1500 RPM
Pressure value at TDC (*) ..... 24 bar (348 psi)
Minimum allowable TDC pressure
rating (*) ..... 20 bar (290 psi)

(*) The pressure rating is determinated by crancking the engine with starting motor alone, with oil temperature at 40-50°C (100-120°F) and injection pump under stop conditions.

Valve timing:
Intake - starts BTDC ..... 8° 42"
- ends ABDC ..... 43° 6"

Exhaust - starts BBDC ..... 45° 42"
- end ATDC ..... 6° 6"

Rockers-to-brackets clearance for
timing checks ..... 0.25 mm (0.010")
Rockers to brackets clearance for normal operation, cold:
- Intake ..... 0.24 mm (0.008")
- Exhaust ..... 0.46 mm (0.016")

Fuel system:

Fuel feed by piston pump.
Cartridge filter.
Injection pump PE 8P 120A with mechanical governor and automatic advance variator.

Injection pump setting to engine:
At beginning of delivery, minimum advance, in the compression stroke 20° BTDC

Fuel injection into high-turbolence combustion chambers, in piston tops, by nozzle holders.
Type ..... DLL 150 S 67F
Firing sequence 1-3-7-2-6-5-4-8
Injection order 1-5-6-3-4-2-7-8
Injection release pressure ..... 200 bar (2900 psi)

Centrifugal weights speed governor, incorporated with the injection pump.

Supercharging:

By two exhaust gas-driven centrifugal turbochargers.

Lubrification system:

Forced, by crankshaft-driven gear pump.

Full, continuous oil decontamination through three cartridge filters.

Oil pressure with engine warm:
- Idle speed ..... 2.5-3.5 bar (36-50 psi)
- Full power speed ..... 4.5-6 bar (65-87 psi)

Water-oil Heat exchanger provided with safety valve.

Cooling system:

Water circulated by centrifugal pump.
Two-parallel-mounted thermostats on engine coolant outlet line.
Radiator cooling fan.

1.1.2 POWER TRAIN

TORQUE CONVERTER. Single stage hydraulic torque converter with stall torque ratio of 2.32:1.

TRANSMISSION. Countershaft, full power shift, with hydraulic control, 3 forward and 3 reverse speeds. Transmission, torque converter is cooled by engine mounted heat exchanger.

Brake aided system (B.A.S.) unit which cuses the brakes to apply during direction reversals.

Single power shift hand lever to the open pattern type (which hydraulic lock of the selected gear) on LH side of Operator's seat.

Travel speeds	1st	2nd	3rd
FWD mph	2.6	4.4	6.9
(km/h)	(3.96)	(6.49)	(9.93)
Rev mph	3.0	5.1	7.8
(km/h)	(4.66)	(7.56)	(11.53)

Safety lever with two positions:
In locked: Power shift hand lever inactive through exclusion of its control oil flow (brakes locked).

In unlocked: Engine starting inhibited (brakes unlocked).

Converter/transmission 3-section hydraulic control pump:

	Flow rate L/min (gpm)	Pressure bar (psi)
Trans. section	96.5 (25.5)	14-15 (203-217)
Conv. section	85 (22.4)	3.5 (50)
Trans. scavenge	217 (57.3)	1 (14.5)

Converter oil scavenge obtained through Venturi ejector.
Oil cooling by heat exchanger mounted on engine.
Oil filtering through:
- Gauze strainer in pump suction intake line.
- Paper cartridge filter on pump delivery side (RH fender).
- Magnetic filter on scavenge pump intake.

All filter are full-flow and accessible from the exterior.

PTO shaft integral with transmission input shaft. Drive is taken inside the drive housing. Rotation: counter-clock wise.

PTO shaft data
- O.D. ..... 63.68 mm (2.5")
- Number of splines 24
- Pitch ..... 2.58 mm (.102")

CENTRAL BEVEL GEAR SET

Bevel drive pinion on support independent of transmision.
Reduction ratio ..... 3.583 to 1

SIDE FINAL DRIVES AND SPROCKETS

Double reduction spur gear side final drives. Splash lubrification.
- reduction ratio ..... 9.320 to 1

1.1.3 STEERING CLUTCHES/BRAKES

Steering clutches are multi-disc, oil bath, hydraulically controlled with two levers located to the left of the operator.

The brakes are oil bath single wrap, band type, hydraulically controlled spring applied. Brakes are applied either with hand steering controls or foot pedal. Tractor automatic parking brake with engine shut down; when brake is manually applied, transmission returns to neutral.

Steering control:
- Drum diameter ..... 470 mm (18.5")
- Band width ..... 152.4 mm (6.0")
- Brake band segments ..... three

Steering/Brakes control pump, converter-driven, mounted on converter cover.

- Delivery rate ..... 62 L/min. (16.4 gpm)
- Pressure { Steering ..... 34.5 bar (500 psi); Brakes ..... 17.5 bar (254 psi)

Oil filtration:
- On intake: gauze strainer.
- On return: paper cartridge filter.

Locking of brakes for parking by a lever mounted in cab.

1.1.4 UNDERCARRIAGE

Track carrier frames connected at front through a swinging crossbeam and pivoted at rear through the sprocket drive shaft and rear drive housing. Track frame swing total travel 481 mm (18.9").

Each track frame is provided with 7 track rollers (2 double- and 5 single- flanged) and 2 carrier rollers. Track roller and idle wheel lubrication through long-life seals. Idler wheels provided with hydraulic track tension adjuster. Sprocket wheels made up to three replaceable segments each.

- Pitch circle dia. ..... 995 mm (39.17")
- Sprocket width ..... 108 mm (4.25")
- No. of sprocket teeth 27
- No. of track shoes 41
- Track shoe width (std) ..... 559 mm (26")

1.1.5 FRAME

Load-bearing, welded steel sheet boxed section structure, connected at front to the suspension cross-beam resting on track carrier frames.

Engine and transmission have no load bearing function.

1.1.6 HYDRAULIC SYSTEM

Double drive pump for:
- Main power;
- pilot system power.

Pump driven by the torque converter:

- Delivery main section ..... 346 L/min
- Delivery pilot section ..... 27.6 L/min

Monoblock control valve with 3 spools for eventual rear mounted attachment, blade lifting and bulldozer blade tilt.
Control valve controlled by pilot valve.

Location: special support mounted, on RH fender.
Valve pressure ratings:

- Pressure relief, main ..... 160 bar (2320 psi)
- Overload relief valves ..... 180 bar (2610 psi)
- Power assist ..... 30 bar (406 psi)
- Low pressure relief valve ..... 15 bar (210 psi)

Blade raise cylinders with travel limiter valves:

- Barrel bore ..... 140 mm
- Piston stroke ..... 1295.5 mm

1.1.7 ANGLE DOZER EQUIPMENT

Welded sheet steel boxed section C-frame.

- Max width ..... 3404 mm

Multi-box section moldboard with ribbed bottom section supporting one central cutting edge an two end bits all of heat treated steel; cutting edge is reversible.
- Blade width ..... 4622 mm
- Blade height ..... 1143 mm
- Blade surface area ..... 5.27 m^2

Two differentblade settings are obtainable manually:

- Horizontally (angling) ..... ± 25°
- Laterally (tilting) ..... 381 mm

STANDARD AND RENFORCED SEMI-U (SEVERE SERVICE) BLADE EQUIPMENT

Welded, sheet steel, boxed section push beams.

- Beam length ..... 3658 mm
- Beam height ..... 305 mm
- Barrel bore ..... 200 mm
- Piston stroke ..... 180 mm

Two different blade settings are obtainaible:

- laterally (tilting) ..... 458 mm
- frontally (pitch) ..... ± 5°

Semi- U blade: multi-box section with reinforced ribbings at bottom supporting:

- Central, heat treated steel cutting edge (reversible) and end bits.
- Blade width ..... 3975 mm
- Blade height ..... 1650 mm
- Blade surface area ..... 6.16 m^2

Fully-U blade: Multi-box section with reinforced ribbings at bottom supporting:

- Central, heat-treated steel cutting edge (reversible) and end bits.
- Blade width ..... 4292 mm
- Blade height ..... 1650 mm
- Blade surface area ..... 6.81 m^2

1.1.8 RIPPER

Optional ripper:

- Single-tooth, parallelogram type with hydraulically adjustable obtained by a hydraulic power cylinder actuated from a button switch on ripper liftcontrol hand lever.

1.1.9 ELECTRICAL SYSTEM

Tension ..... 24 V

Number of batteries 4

Specifications ..... 12 V-85 Ah or 12 V-100 Ah

Batteries are of the maintenace free type.

Alternator with incorporated electronic voltage regulator.

- Tension ..... 24 V
- Output ..... 50 A

10 kw starter motor.
Four headlamps and two rear work lamps.
Master switch, battery cut-out and back-up alarm.
Instruments and visual warning indicators:

- Engine oil pressure gauge.
- Transmission oil pressure gauge.
- Headlamps ON indicator
- Work lamps ON indicator
- Transmission oil temperature gauge.
- Hourmeter.
- Engine coolant temperature gauge.
- Battery charge indicator.
- Air cleaner restriction indicator.

1.1.10 NOTES FOR SPARES

To ensure optimum machine service, only original parts should be used for replacements.

When ordering spares, specify:

- tractor Serial No. and type;
- engine Serial No. and type;
- catalog part No. of the part requested.

When equipment parts are ordered, also indicate type and number of the equipment.

For the unit identification data see the "Operation and Maintenance Instruction Manual".

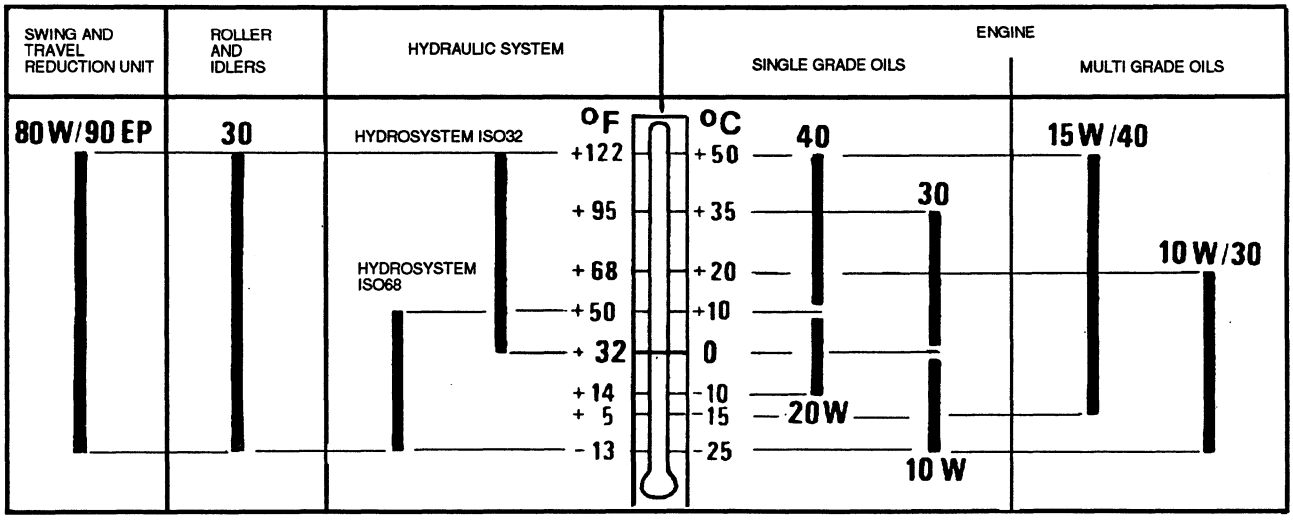
1.1.11 COOLANT AND LUBRIFICANTS

ITEM	Q.TY Liter	FIAT PRODUCT		REFIL (International classification)
		Marchio	Product	
Cooling System	91	PARAFLU	PARAFLU11	Mixture of water and anti-freeze with anti oxidation, anti corrosion, anti scaling and anti foaming protection
Fuel Tank	700	-	-	Diesel fuel ASTM 2-D Grade TT of reputable quality and make
Engine	30	AMBRA	SUPER GOLD	Engine oil to MIL-L-2104 E or API-CF4/SG Service spec.s
Bevel gear, Steering Clutches Brakes	168			
Track idlers and rollers	13.5			
Final drivers (each)	51	AMBRA	HYPOIDE 90	Oil for mechanical transmission to MIL-L-2105 D or API GL5 Service spec.s
Final drives external bearings(each)	1			
Converter and transmission	68	AMBRA	HYDROPOWER	ATF Type A - Suffix A
Hydraulic circuit -with ripper	145 + 34	AMBRA	HYDROSYSTEM	DIN 51524 PART 2
Grease fittings		AMBRA	GR9	Grease, multi purpose, lithium soap base, water resistant, high-wear resistant, NI GI1 grade

The quantities of oil indicated are those required for periodic changes, in accordance with the draining and refilling instructions described in detail for each group.

(*) For all seasons.

SAE VISCOSITY TO OUTDOOR TEMPERATURE RELATIONSHIP FOR OIL GRADE SELECTION



1.2 GENERALITIES

INSTALLING FLOATING RING SEALS

Thoroughly inspect metal rings M (Fig.1-2) ensuring that their sealing surfaces are free from score marks, dents or signs of wear due to misalignment of flatness errors.

Both metal rings M, with rubber seals G (Fig. 1-2) should be renewed even if only one is found to be defective.

Do not pair new and worn metal rings together, nor used rings of different pairs.

To install seals procead as follows:

- remove all sharp corners and burrs and thoroughly clean rubber seal housings;
- thoroughly clean the rubber seals;
- couple each metal ring M to the associated rubber seal G as shown in detail a (Fig. 1-2), pushing as indicated by the arrows;
- ensure that each metal ring is correctly seated. Dimension I (detail b, Fig. 1-2), should be equal all round;
- place each seal assembly in position by manually pressing the rubber seal as shown in detail c (Fig. 1-2);
- before pairing the seal assemblies (see detail d, Fig. 1-2) clean sealing surface F using a lint-free cloth and smear a light film of thin oil on the contact surfaces.

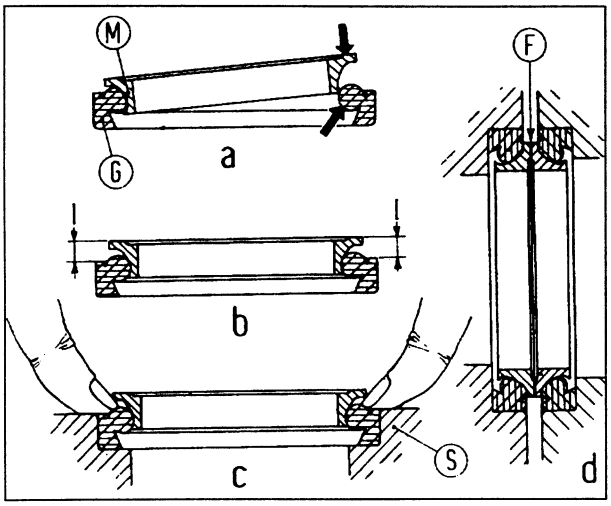


Fig. 1-2 Installing floating ring seals

INSTALLATION OF SHAFT SEALS

Follow these cautions:

- prior to installation, soak the seals for at least half an hour in the same oil in which they will operate;
- thoroughly clean the shaft and ensure that the contact surface is undamaged;
- position seal lip toward the fluid; if thrower lip type, position the grooves so that during shaft rotation the fluid is thrown back;
- smear the sealing lip with a thin film of lubrificant (oil is better than grease);
- install the seal into its seat by pressing or using a flat ended punch; on no account use hammers;
- avoid pushing the seal into its seat in a tilted position. After installation, ensure that the seal is pressed fully home;
- to prevent sealing lip damage during installation, use some sort of protection between seal and shaft.

INSTALLATION OF O-RINGS

Lubricate O-rings before installation and do not twist them installing, otherwise leakages will occur.

REMOVAL/INSTALLATION OF FACE SEALING RINGS

To remove, proceed as follows:

- press one end of the ring into its seat (Fig. 1-3);
- hold ring in position and insert a scriber point beneath the other side to separate the interlocking ends, as shown in figure (Fig. 1-3);

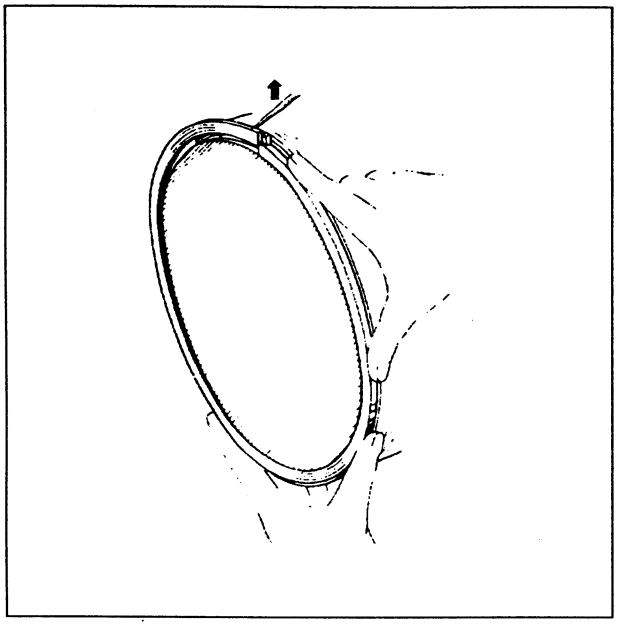


Fig. 1-3 **Removal face sealing rings.**

To install, proceed as follows:

- press one end of ring against the inner face of the seat (Fig. 1-4);
- hold ring in this position and lift the free end lift the free end (Fig. 1-4) until the two teeth lock correctly (Fig. 1-5).

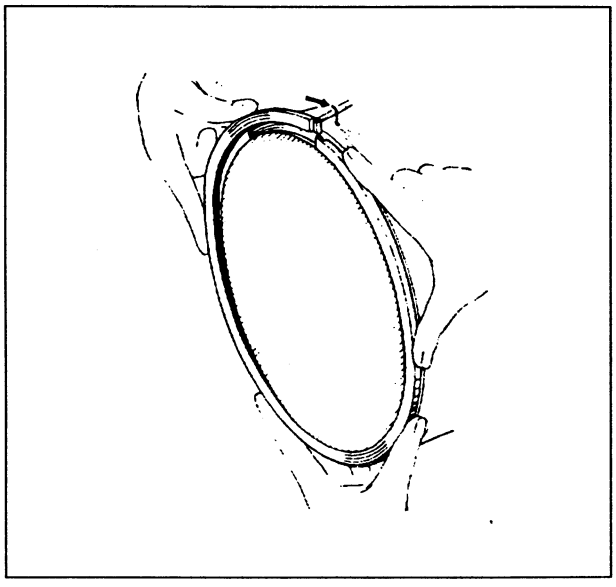


Fig. 1-4 Installation seal rings

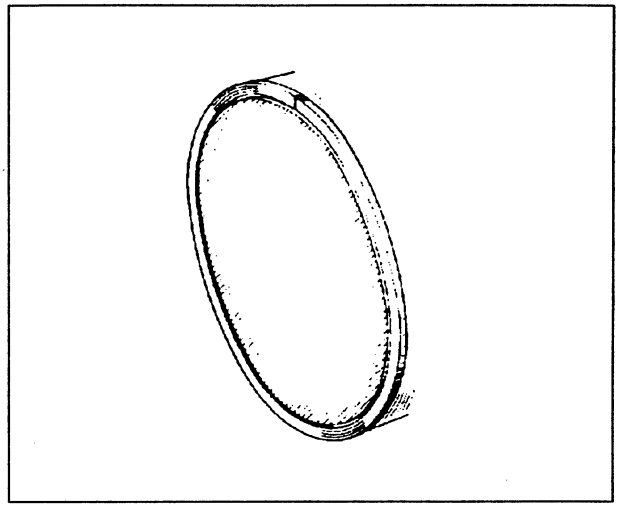


Fig. 1-5 Installation seal rings

ADVICE FOR DISASSEMBLY AND REASSEMBLY OF GROUPS

The following general information is aimed at facilitating disassembly and reassembly of groups.

Read with attention and follow when performing repair operations .

CLEANING

After disconnecting the electrical system, thoroughly clean the parts to be disassembled with a jet of steam.

Many repair and service shops use caustic compounds to remove grease, dirt, paint or remains of gaskets etc. from components. These compounds are extremely useful and effective if used correctly, but may cause considerable damages to certain materials.

Materials such as alluminium, rubber, fibres, sintered bronze and binding agents, are particulary sensitive to all high-concentration caustic compounds.

Certain heat exchangers have aluminum fins. To clean both inside outside of these parts, we recommend the use of solvents that do not react with aluminum.

DISASSEMBLY

When operating on the engine or on other units removed from machine, always use appropriate stands.

Place small items removed from machine in appropriate containers. Be careful not to damage the machine surfaces of components and rest them, after removing them, on shelves or on wood blocks.

When removing alike components, such as valves, tappets etc., place them in suitable containers to avoid incorrect re-reassembly.

ASSEMBLY

Carefully clean all parts to be refitted as described in the Manual.
The use of special tools as specified is recommended.

NOTE - For the application of adhesive sealing compounds, refer to the instructions of the different commercial products.

FIAT-HITACHI EXCAVATORS S.p.A recommends, if not otherwise indicated, the following adhesive seals: VIT Type C, or RHODORSIL CAF 1, or LOCTITE 510.

Whenever possible, drive bushings in to their correct position using a press. If if necessary to use a hammer to install the bushing, employ a suitable punch to prevent any damage.

Lubricate ball bearings before assembly and bushings prior to installing them. Lubricate the sealing lip on seals before installation (see chapter 1.5).

Whenever possible, use new seals. Cylinder head gaskets must always be renewed.

Use screws with dimensions and specifications indicated, making reference to part numbers in the Parts Catalog.

Where shown, use safety washers, cotter pins, locking wires etc.

Respect specified torque loads as indicated in the appropriate section of this Manual, using suitable torque wrenches.

Self-locking nuts should be replaced every time aa disassembly operation is performed, to ensure a good tightening.

HIGH PRESSURE PIPING, FITTINGS, HOSES AND PIPES

This section contains recommendations and procedures to be followed for the installation of pipings and fittings.

- Keep all inside threads clean.
- Remove the plugs just before connecting the piping and close immediately all free openings.

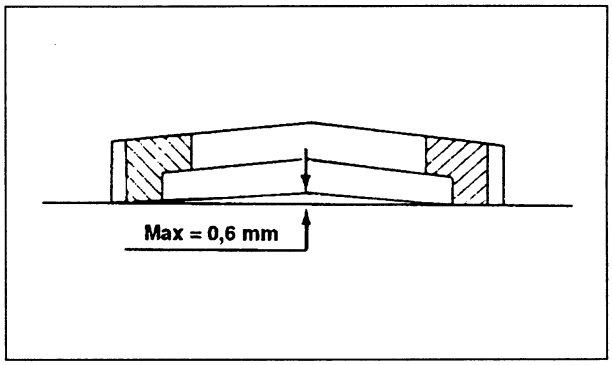


Fig. 1-6 Maximum deformation of half flange

- Never use or re-use half-flanges out-of-shape more than .6 mm (.023 in) in the center (see Fig. 1-6).
- Check that the O-Ring seats are not damaged.
- Lubricate the O-rings.
- Check that the O-rings are placed in their seats.
- Tighten in a uniform way, to avoid bending or damages to O-rings.
- Install pipings and supporting clamps letting them slightly loosen (tighten the clamps after tightening the connections).
- Check that pipings can match the part to be connected, without forcing into position.
- If pipe or hose is mounted straight, allow enough space to absorb constractions caused by pressure.

- Pipings shall not be twisted (see Fig. 1-7) or touch each other or other parts, especially moving parts.

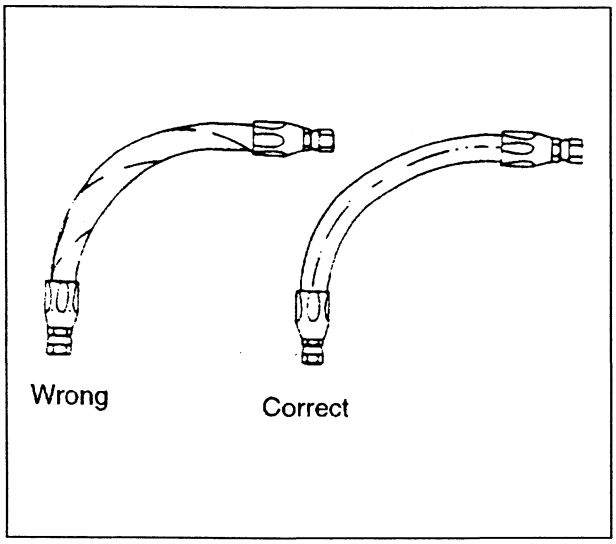


Fig. 1-7 Wrong and correct installation of piping
Position 1 - Pipe twisted on itself
Position 2 - Pipe correctly installed

- Check that clamp sizes are correct by referring to the diameter of the pipe to be fastened, to avoid possible wear (see Fig. 1-8).

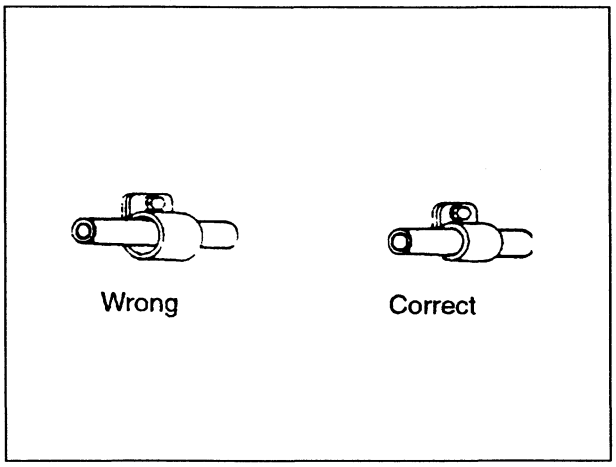


Fig. 1-8 Wrong and correct installation of clamps

- Do not mount clamps on a curve with a minimum radious (under pressure, possible efforts arise in the pipe; see Fig. 1-9 - the dashed lines indicate thecontraction that is caused by pressure).

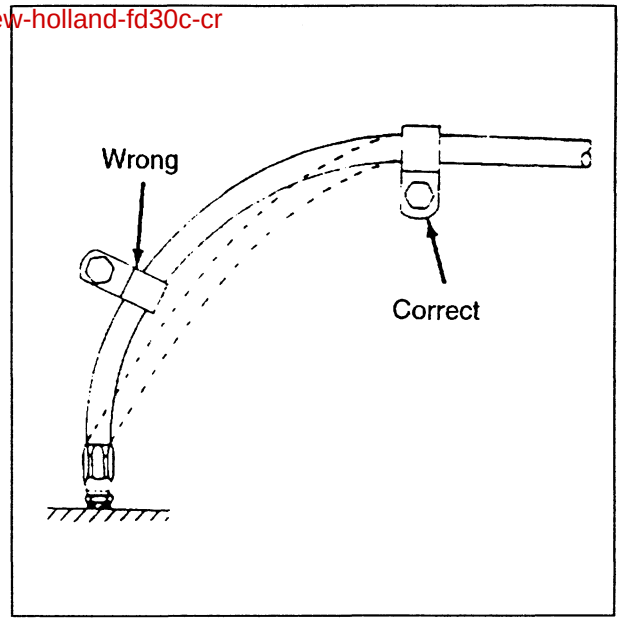


Fig. 1-9 Correct installation of piping bend

- Ensure that clamps are fitted in the correct position, to keep pipings away from contacts (see Fig. 1-10).

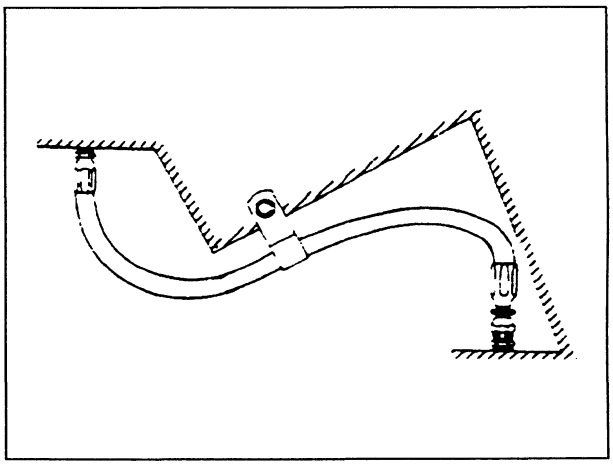


Fig. 1-10 Correct installation of piping