FIATALLIS®

FR 70
wheel loader

Service Manual

Stampato N°. 604.02.201

English

AVOID ACCIDENTS

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

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

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

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

WARNING

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

CALIFORNIA

Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

FR 70

wheel loader

Service Manual

Form 604.02.201 English

⚠ WARNING

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

⚠ 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;

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SAFETY RULES

GENERAL

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

Read and heed all machine-mounted safety signs before starting, operating, maintaining, fuelling or servicing machine.

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

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

Do not wear rings, wrist watches, jewellery, 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.

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 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.

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.

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

Check safety belt of the seat twice a year at least. If the belt is torn or damaged, which could cause a breaking down, change it.

START

DO NOT START 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 in good operating condition.

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.

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

Fasten seat belts (where needed).

Obey flag man, safety signals and signs.

Because of the presence of flammable liquid on board, never check or fuel the tanks, batteries and accumulators near fire, free flame or sparks.

STARTING FLUID IS FLAMMABLE. Follow the recommendations as outlined in the Operation and Maintenance Instruction Manual and as marked on the containers.

DO NOT PUNCTURE OR BURN CONTAINERS.

Store containers in cold, well-ventilated place secure from unauthorized personnel. Follow the Manufacturer's instructions.

Never use these products near fire, free flame or sparks.

OPERATION

Check wheels and bead wires clamps before starting your shift. Clamp, if necessary, acording to instructions.

SAFETY RULES

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 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 (ROPS).

Check instruments at start-up and frequently during operation. If brake pressure gauge shows a pressure below the minimum service pressure, stop machine immediately.

Always keep the operator's area clear of any object, especially if it is not fastened. Do not use machine for object transport, if the objects do not dispose of suitable fastening connections.

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

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

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

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

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.

Do not operate machine downhill with idle gear. Choose and insert the most suitable speed to maintain the speed necessary to avoid any control lost.

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

Do not operate a machine with brakes out of adjustment.

Operate the machine at a sufficiently low speed, to ensure a maximum control in any case.

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.

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.

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 all areas of travel or work. Keep back windows clean and repaired. Carry blade low for maximum visibility while travelling.

Obtain and use fan blast deflectors where tractors are used a pusher tractors in tandem.

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 the 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 OPERATORS 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 machine may cause the wall to collapse under the machine.

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

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.

SAFETY RULES

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 all times when operating within a closed cab.

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

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

Never operate machines equipped with counterweights when these have been removed, unless their equivalent weight has been replaced. See the Operation and Maintenance Instruction Manual.

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.

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.Carry the bucket low when traveling with a load.

Overtaking operations are possible only if they are absolutely necessary. Pay attention to possible ground obstacles and bad visibility, the presence of other machines or personnel hidden to the view.

Operate at speeds slow enough to insure complete control at all times.

At the beginning and often during work, check instruments: if the brake gauge indicates a pressure value lower than normal, then stop the machine immediately.

Never use bucket as a man-lift.

Never operate the machine as a working platform or support, nor for any other unsuitable operation (such as pushing of wagons, trucks or machines).

Be sure exposed personnel in the area of operation are clear of the machine. Whenever is possible, load lorries on the drive side.

Always check work area for dangerous features. The following are examples of dangerous working 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.

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.

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

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 brake over point - pass the balance point slowly on the obstruction and ease down on the other side.

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

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.

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.

When working on slopes, no rule is better than the operator's experience and common sense.

Do not operate machine too close to slopes, below and over the machine. Be alert because of falling walls, object falling and earth movements. Remember that these dangers are often invisible (bushes, grass, etc.).

When attachments are used to fell trees, the machine always must have its top covers. Do not move machine until the roots during tree felling.

When pushing over trees, the machine must be equipped with a 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 a 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 off.

Be alert because of possible adherence variations, that may cause you to loose the control on the machine. On hills and slopes avoid frozen areas.

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.

STOP

Every time you want to stop the machine, always remember to bring the gear or steering control to idle position, and to insert the control lock lever, for machine safety. Insert the parking brake (if present).

Never leave the machine unattended with the engine running.

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.

Return the controls to hold. Place transmission control in neutral and move engine controls to off position. Consult Operation and Maintenance Instruction Manual.

Park in 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 or uncontrolled sliding movement. Set the parking brake.

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.

Keep head, body, limbs, hands and feet clear of the dozer, arms, bucket or ripper in lifted position. Always turn the master switch to the off position before cleaning, repairing or servicing, and when parking machine to prevent unintended or unauthorized starting.

Never attempt to operate the machine or its tools from any position other than seated in the operator's seat. Sound horn. Be sure that no personnel is present in the operating area. The lowering must be made slowly, if the control is a hydraulic one. DO NOT USE THE SWIMMING POSITION.

Lock and close the machine each time it is left unattended. Give the keys to the corresponding controller. Be sure that all operations according to the Operation and Maintenance Instruction Manual have been made.

MAINTENANCE

GENERAL

Before any use or intervention on the machine:
- read carefully all instructions of this Manual
- read and head all plates and instructions referring to safety, that are present on the machine.

Do not allow unauthorized personnel to operate, service or maintain the machine. Do not make any intervention without authorization. Follow the procedures for maintenance and service.

Keep always the operation section clear of any loose object.

Do not wear rings, wrist watches, jewellery, loose or hanging apparels, 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.

SAFETY RULES

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.

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.

Never perform a maintenance operation on the machine if there are people on the seat, unless they are authorized and help in this operation.

The operator's area, the step surfaces and handles must be clean, and clear of any object, or oil, grease, mud or snow, to reduce any skidding or similar danger.

Clean your shoes from mud or grease before entering or operating the machine.

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

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

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 the machine or moving attachments or tools, set brakes, sound horn and call for an all clear. Raise attachments slowly.

Always lock by means of outside devices the machine arms or parts that must be lifted for intervention, while your are below. Do not allow to anybody to pass near or even below the lifted, and not locked device. If you are not absolutely sure about your safety, do not stay below the lifted device, even if it is locked.

Do not place head, body, limbs, feet, hands and fingers near rotating fans or belts, or cutting parts of the machine, unless they are suitably and safely locked.

Do not perform any intervention on the machine with running engine, unless it is prescribed so. Do not wear loose clothes, chains, etc. near the moving parts.

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

Ladders and service platforms must meet with the current accident prevention standards.

Disconnect batteries and tag all controls for indicating that an intervention is being made. Lock machine and any device that must be lifted.

Do not check or fuel the tanks, batteries and accumulators, nor use the starting liquid if you smoke or near open flames. These fluids are flammable!

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

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

While towing the machine, use always the corresponding towing points. Make the connections careful: ensure that pins a/or locks are fastened before tension is applied. Do not stay near the towing bars, ropes or chains under load.

For transporting the machine, use a low-table truck, if available. If towing is necessary, follow the specific instructions.

For loading and unloading the machine, choose a flat surface, that offers a sure support to the truck wheels. Use heavy-duty access ramps, with a suitable height and angle. The truck surface must be clear of earth, oil or similar materials.

Anchor the machine to the loading surface of the truck and lock the tracks according to your need.

Never align holes with your fingers; but only with an appropriate centering tool.

Remove any trace of burr from the processed pieces.

For electric heaters, battery loaders, pumps and similar, use only auxiliary supply sources, with a suitable ground, to avoid possible electric unloadings.

SAFETY RULES

If heavy pieces are to be lifted or transported, use suitable hoists. Check that slinging is made in the proper way. Use hoist eyes, if foresee. Keep personnel clear of the machine.

Never pour gasoline or oil into open, large and low containers.

Never use gasoline, oil or other flammable liquids for cleaning, but only authorize commercial solvents, that are non flammable and non toxic.

If compressed air is used for cleaning parts, always use protective glasses, with side protections. Limit pressure up to 2 atm (1.9 bar), according to the current standards.

Do not operate the engine in closed rooms, with suitable ventilation, to eliminate deadly exhaust gases.

Do not smoke, do not use any open flame, or cause sparks when filling in fuel, or handling highly flammable materials.

Do not use an open flame as a light source to look for leaks or for inspection anywhere on the machine.
Check that all tools are always in a good condition. NEVER USE tools with machined heads. Carry always protection glasses.

Be very careful while operating below the machine or its attachments, and near them. Use always the protective devices: helmets, glasses, shoes, ear protections.

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.

If an intervention must be made outside the workshop, position the machine on a flat surface, and lock. If the intervention must be made on a slope, lock machine and attachments previously. Replace in a horizontal position as soon as possible.

Stay clear of draw bars, cables or chain under load. Always carry heavy-duty gloves.

Be sure cables are anchored an the anchor point is strong enough to handle the expected load. Keep exposed personnel clear of anchor point and cable or chain.

DO NOT PULL OR TOW UNLESS OPERATOR'S COMPARTMENTS OF MACHINES INVOLVED ARE PROPERLY GUARDED AGAINST POTENTIAL CABLE OR CHAIN BACKLASH.

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

Remove cloths damped with grease and oil: fire danger! Put them always into a closed metal container.

Before starting machine, check, adjust and lock the operator's seat for maximum comfort and control of the machine. Be sure that the operating area of machine and attachments is clear of personnel. Give a horn signal.

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

Do not carry in your pockets any object that can fall, not seen, into open sections of machine.

If there is a possibility of injures because of projection of metal parts, always use safety glasses with side protection, hard hats, special shoes and gloves.

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.

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.

Metal ropes can become worn. Handle always with care and protection devices (gloves, glasses, etc.).

Handle any part with great care. Keep your hands and fingers far away from slots, wheels and similar. Always use the approved tools and protective devices.

The pneumatic systems can contain water deposits, because of the moisture condensation following to the atmospheric variations. Unload these deposits if necessary, according to the Instructions.

Before any maintenance operation, lock the machine frame articulation by the corresponding safety device, that must be taken away, and inserted after operation.

For interventions below the articulation boom, apply the safety support (if foreseen), by salvaging it after the operation. In this case, never use unsuitable supports.

The attachment must be empty, as it is supported by safety devices. Moreover, the boom must be locked by an outer support suitable to support the weight, and according to the valid regulations. Take the support away, and assure the boom according to the instructions. Finally, the outer one.

If the machine disposes of a hydraulic brake, be sure that the tank is always supplied with the proper fluid, at the right level.

Lock always all wheels, before the brake system is purge or pipings or cylinders are disassembled.

Before every working shift check the condition of the heads of the steering control tie-rods.

START

Avoid running engine in closed areas that do not dispose of a suitable ventilation, to eliminate deadly exhaust gases.

Keep head, body, limbs, feet, hands and fingers away from rotating fans or belts. Be especially alert around a pusher fan.

STARTING FLUID IS FLAMMABLE. Follow the recommendations as outlined in the Operations 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.

ENGINE

Turn off the radiator cap very slowly, to let the pressure out, before removing it. Fill in coolant with stopped engine only. See instructions.

Avoid that flammable materials can come into contact with the engine outlet system. If this is not possible, supply the machine with the necessary protection grids or covers.

Never fill in fuel with running engine, particularly if this is hot, to avoid any burning danger.

Do not check or adjust the fan belts tension with running engine.

Do not adjust the fuel pump with running engine. Do not lubricate the machine with running engine.

Do not lubricate the machine while the engine is running.

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.

ELECTRICALS

Shut down the machine and disconnect batteries before any intervention on the electrical system (cleaning, repair, maintenance).

If auxiliary batteries must be used, remember to connect properly cables and clamps: (+ to +)and (- to -). Avoid shorting clamps. Consult this Operation and Maintenance Instruction Manual.

Before any type of intervention, be sure the main switch is off.

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

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

Do not charge batteries in closed environments: be sure ventilation is good so to avoid accidental explosions due to gas accumulation during charge operations.

HYDRAULICS

A fluid leaking out of a very small hole can be almost invisible, and be strong enough to penetrate the skin. When you must look for leakages, always use a piece of strong paper of wood. NEVER USE YOUR HANDS! If fluid comes into contact with your skin, ask for a doctor immediately. Otherwise you could suffer from serious infections and skin damage.

Turn the engine off and be sure all inside circuit pressures have been discharged before removing covers, boxes, caps, etc.

If you must check pressures, use an instrument with a suitable scale end reading. Always follow the instructions.

TOOLS

Hold always your head, body, feet and hands far away from the dozer or ripper, if these are lifted. Before any intervention, apply the corresponding safety devices according to standards.

If you must operate a tool by means of the hydraulic system, remember that the operation must be performed only when you are sitting on driver's place. Be sure that nobody is within the operating area. Signal your operation by the horn and the voice. Lift tool slowly.

Do not use the machine to transport loose objects, if you do not dispose of suitable devices.

To reload the pressure accumulators, do not use any gas but dry nitrogen. See Instructions.

Clutches, brakes and possible auxiliary tools and devices (such as cylinder distribution groups and winches) must always be well adjusted according to the instructions given by the Manufacturer.

Do not make any adjustment with turning engine, if this is not prescribed expressly.

TYRES AND WHEELS

Be sure that the tire pressure is the right one. Check periodically.

If pressure must be changed, perform the operation standing near the machine, at a suitable distance.

Pressure check must always be made with an unloaden machine, in cold condition. Never use reconditioned wheel discs, because possible weldings and therimic treatments can weakent the wheel and lead to later troubles and damages.

Do not perform cutting or welding processes on rims, with mounted and blown tires. The spare tire must be blown up as far it is necessary to hold the rim parts together. Remeber that the tire can explode when it is not mounted on the disc.

Be careful in the case of displacements, if the tire has its maximum pressure.

If you must work on the tires, first of all lock all front and rear wheels. After lifting the machine by means of the jacks, inhibit a falling down by inserting the inlets, according to the Safety Instructions.

Before you extract possible objects contained in the tire, let air out of the tire.

Do not use any flammable gas. This could cause explosions and heavy injuries.

When changing work shifts, check that there are no loosen screws and/or brackets. If necessary, tighten according to the instructions.

SECTION 0
GENERAL
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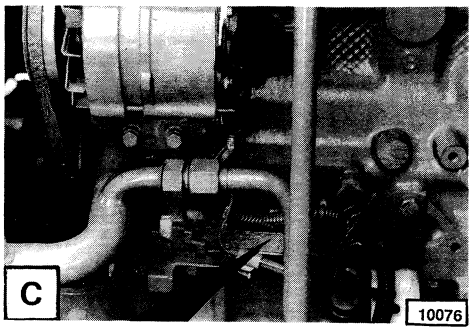
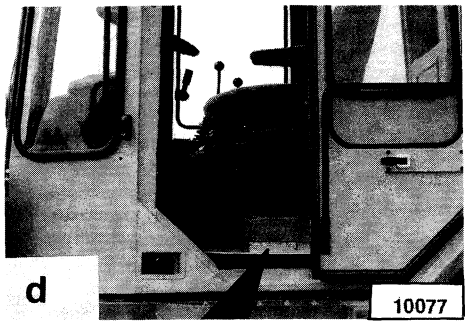
TECHNICAL DATA





a. Loader and engine identification data plate (right)
b. Loader type and serial number (right)
c. Engine type and serial number (right)
d. Cab safety structure plate (left)

SPECIFICATIONS

ENGINE

Make and model: 8045.05.395
Type: Direct injection 4-stroke Diesel
Number of cylinders: 4
Cylinder diameter: 104 mm
Stroke: 115 mm
Total Piston Displacement: 3908 cm^3
Compression ratio: 17 to 1
Governor speed rate: 2500 rpm
Rated speed at max. torque: 1500 rpm

Lubrication System

Type: force-feed by gear pump. Oil filters: throwaway, paper cartridge on delivery line.
Low oil pressure warning light in Data Monitor Panel.

Engine Valves

Overhead valve, pushrod operation.
- Intake:
. start B.T.D.C.: 8°
. end A.B.D.C. : 23°
- Exhaust:
. start B.B.D.C.: 48°30'
. end A.T.D.C.: 6°

Valve clearance, for setting up: 0.45 mm

Valve clearance for normal operation:
- intake: 0.25 mm
- exhaust: 0.35 mm

Fuel System

Feed pump, rotary distributor injection pump, integral all-speed governor and automatic advance variator.

Pump timing to engine:
0° B.T.D.C. with cylinder 1 in compression stroke (start of delivery).
Firing order: 1-3-4-2-
Injector rating: 230 ÷ 238 bar
Throwaway cartridge fuel filter.
Paper-cartridge dry air cleaner, with centrifugal pre-filter.
Restriction warning light in Data Monitor panel.

Cooling System

Water cooling, with forced circulation by means of centrifugal pump.
Radiator: 5 tube row core.
Fan: 7 blade pusher.
Coolant circulation between engine and radiator governed by thermostate.
Low coolant level warning light in Data Monitor panel.

Start

By electric motor.

DRIVE TRAIN

Engine to Converter

Flexible plate coupling.

Transmission to Axles

Direct drive at front, consisting of two U-joint shafts with central bearing.
The first shaft between transmission and transfer is sliding; the second, between transfer and axle, is rigid.
Double U-joint drive shaft at rear axle.

Converter-transmission
Hydraulic torque converter with integral transmission, maximum conversion ratio at stall 2.6:1.
Transmission: Powershift, 3 speeds forward and 3 speeds reverse, electro-hydraulic control, acting on 5 clutches.
Gearshift lever safety lock in neutral (starter inhibited).
Oil cooling through heat exhanger with coolant recirculated from radiator.
Oil filtration: full-flow filter on control pump delivery line and metal strainer on suction intake.

BRAKE SYSTEM

Service

One-disk, in oil bath, on 4 wheels.
Hydraulically controlled through master pump for dual brake circuit.
The master pump is activated by pedal on operator left side. The same pedal actuates the transmission de-clutch through preliminar actuation of a panel switch.

Parking

Drum brake on transmission output shaft.
Manual control by lever.

AXLES

Front

Rigid, full-floating, complete with central bevel gear set, differential and planetary final drives.
Total reduction ratio 1:21,273

Rear

Swinging, full-floating, complete with central bevel gear set, differential and planetary.
Total swinging angle of axle 22°
Total reduction ratio: 1:21,273

WHEELS

- Rim size: **12.00 x 25**
- Tyre standard size: **15.5 x 25**
- Wheel tightening torque: 47 daNm

STEERING SYSTEM

Hydraulically controlled by steering wheel and power assisted through a gear pump (also provides hydraulic system control).
Two double-acting power cylinders.
As the steering wheel is turned, one cylinder exerts a contracting force and the other one an extending force; this causes the loader to pivot (articulate) on its axis.

LOADER FRAME

Articulated, consisting of fore and aft sections coupled through ball joints. Both sections are made up of welded sheet steel box sections, carrying the different operational units.

HYDRAULIC SYSTEM

Hydraulic oil tank with oil level indicator visible from outside.
Dual stage gear supply pump: one section for implement control and one for steering control.
Oil filtering is assured by means of one metal net filter on pump aspirator, and a paper filter with bypass safety valve in the event of clogging, on the return oil line to tank.
Two-drawer distributor, with overpressure valve and safety and reflow valves.
Lever control for:
- boom raise/lower and float
- bucket dump and roll back.

A locking lever is provided to retain the implement control levers in hold position to prevent accidental engagement.
Four hydraulic double acting cylinders operate the implement: two for the boom and two for bucket rotation.

Automatic bucket positioner and boom lifting limit, electro-magnetic operated, adjustable.

ELECTRICAL SYSTEM

Voltage 24 V.

Alternator
With incorporated electronic voltage regulator.

Starter Motor
Automatic pinion engagement by solenoid.

Batteries
Two 12 V, series connected.

CAB

Modular cab, elastic suspended by means of elastic inlets; ROPS cab for maximum protection of operator in the case of rollover.
The cab ensures top interior comfort whatever the outdoor climatic conditions are.

WEIGHT AND SPEED

Operating weight (standard tyres and bucket, ROPS cab and operator, tyres **15.5 x 25**, bucket for normal operation **1.1** m^3 : **6934** kg.
Max speeds with standard tyres:

Gear	I	II	III
- FWD	5.6km/h	12.5km/h	34.8km/h
- REV	5.6km/h	12.5km/h	34.7km/h

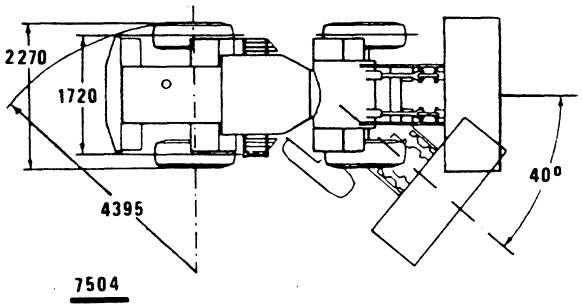
Max speeds with standard tyres:

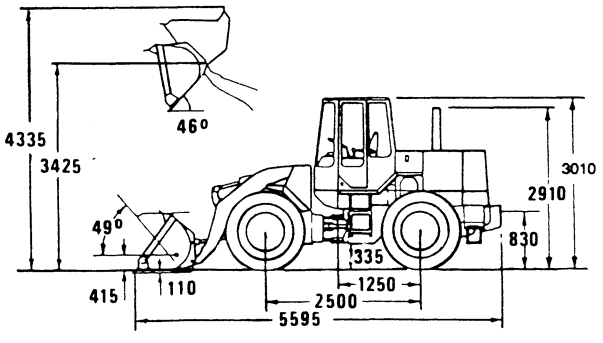
Gear	I	II	III
- FWD	5.9km/h	13.3km/h	36.8km/h
- REV	5.9km/h	13.3km/h	36.7km/h

ACCESSORY EQUIPMENT

Some of the equipment items described and illustrated are supplied to certain markets to meet specific requirements.
Other special devices and attachments are also available as optional equipment in agreement with the Sales Organization.

DIMENSIONAL DATA (mm)





Specifications and data for machine setting-up

Engine	Fiat Iveco 8045.05.395
RPM:	
min. idle	900 - 950 rpm
max. idle	2750 - 2790 rpm
converter stall	2490 - 2590 rpm
implement stall	2530 - 2650 rpm
converter/implement stall	1880 - 2030 rpm
Standard lubricant pressure motor on min. and warm oil	0.70 bar
Clearance of valves with cold engine:	
intake	0.25 mm
exhaust	0.35 mm
Injector rating	172 - 175 bar
Drive Shaft	
Converter	Clark - PA 256 single-stage/single-phase
Conversion ratio at stall	2.89 : 1
Gearbox speed	3 fwd - 3 rev
Main pressure, engine with max. RPM	12.6 - 15.6 bar
Pressure on converter outlet with max. RPM	4.83 bar
Flow rate of gearbox pump at 2500 rpm	75 l/min
Steering - Brakes	
Rating of main steering valve	140 bar
Flow rate of steering section pump (at 2500 rpm with 7 bar pressure)	62.5 l/min
Rating of brake control valve	approx. 30 bar
Implement	
Setting of overpressure valve	190 ± 5 bar
Pump delivery of implement section at 2500 rpm and pressure 7 bar	95 l/min
Setting of safety valve for: bucket tilt	210 bar
Setting of safety valve for: bucket reverse	120 bar
Setting of safety valve for: boom lifting	230 bar
General Data	
Pressure of front tyres:	
operation	3 bar
transfer	2.0 bar
Pressure of rear tyres:	
operation	1.5 bar
transfer	2.0 bar

GENERAL INSTRUCTIONS

INSTALLING ROTARY SHAFT SEALS

To install rotary shaft seals proceed as follows:

- prior to installation soak the seals for at least half an hour in the same oil as that in which they will operate;

- thoroughly clean the shaft and ensure that the contact surface is free from damage;

- turn sealing lip towards the fluid; if of the thrower lip type, turn the grooves so that during shaft rotation the fluid is thrown back;

- smear the sealing lip with a thin film of lubricant (oil is better than grease);

- install the seal into the housing by pressing or using a flat ended punch; on no accounts use a hammer;

- avoid entry of the seal into the recess 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.

INSTALLING O-RINGS

Lubricate O-rings before installation and do not twist them when installing, otherwise leakage will result.

REMOVING/INSTALLING FACE SEALING RINGS

To remove proceed as follows:

- press one end of the ring into its seat (see a);

- hold ring in position and insert a scriber point beneath the other end to separate the interlocking ends as shown (a);

To install proceed as follows:

- press one end of the seal into the seat (b);

- hold in position and lift the free end (b) to lock the two ends together (c).

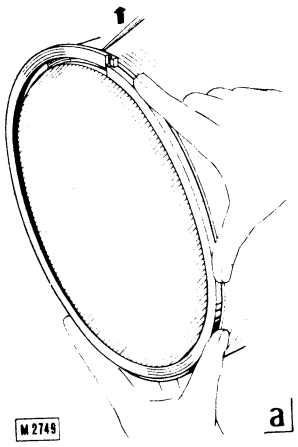
ADVICE FOR DISASSEMBLY AND REASSEMBLY OF UNITS

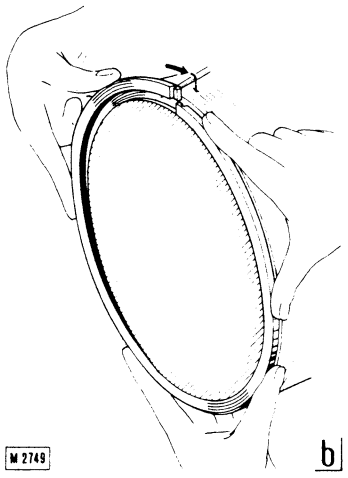
The following general information is aimed at helping disassembly and reassembly of units. Read it attentively and bear it in mind when carrying out the work.

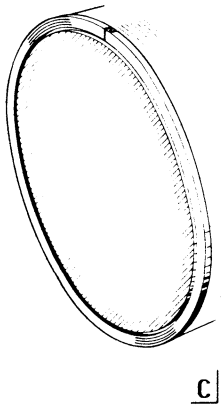
CLEANING

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

Many repair or service shops use caustic compounds to remove traces of grease, dirt, paint and remains of gaskets, etc. Such compounds are extremely useful and effective if employed correctly, but may cause considerable damage to certain materials.







Materials such as aluminum, rubber, fibers, sintered bronze and binding agents are particularly sensitive to all high-concentration caustic compounds.

Certain heat exchangers have aluminum fins. To clean both inside and 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 the machine always use stands.

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

When dismantling alike components, such as valves, valve lifters, etc., place them in suitable containers to avoid incorrect reassembly.

ASSEMBLY

Carefully clean all parts to be refitted as described in the Manual.

We recommend to use the special tools illustrated.

Whenever possible, drive in bushing to their correct position using a press. If it is 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 their pins. Lubricate the sealing lip on all seals before installing (see section 1.5).

Whenever is possible, use new seals. Cylinder head gaskets should always be new.

Use screws with the dimensions and characteristics indicated, making reference to part numbers in the Spare Parts Catalogue.

Where indicated, use safety washers, cotter pins, locking wire, etc.

Respect specified torque loadings as indicated in the appropriate section of this Manual, using a suitable torque wrench.

Self-locking nuts should be replaced every time a disassembly operation is carried out, so as to guarantee a constantly good seal.

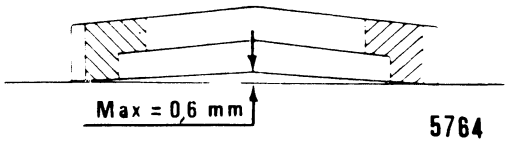
HIGH PRESSURE PIPINGS, FITTINGS, HOLES AND PIPES

This section contains advices and procedures to be followed for assembly of pipings and fittings.

- Keep all inside threads clean.

- Remove the plugs immediately before connecting and shut immediately all free openings.

- Never use or re-use deformed half-flanges over 0.6 mm at the center (see figure).



NOTE: For the application of adhesive seals refer to the modalities of the different commercial products.

FIAT-HITACHI EXCAVATORS recommends - if not otherwise indicated - the following adhesive seals: VIT TIPO C, or RHODORSIL CAF 1 or LOCTITE 510

- Check that the O-ring seat is not damaged.

- Lubricate the O-rings.

- Check that the O-rings are in their places.

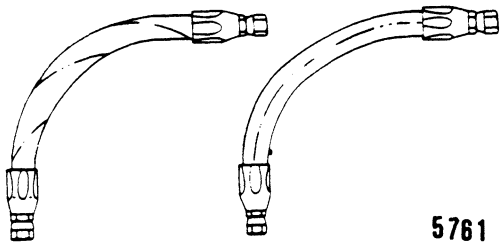
- Tighten in a uniform way, to avoid bending or damage to the O-rings.

- Mount pipings and supporting clamps, by letting these a little loosen (tighten the clamp after fitting tightening).

- Check that pipings can reach the part to be connected, without forced positions.

- If a pipe or hose is mounted straight away, let a sufficient space to absorb the contractions caused by pressure.

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



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WRONG CORRECT

- Check that the clamp size is correct by referring to the diameter of the pipe to be fastened, to avoid possibile wearings (see figure).

WRONG CORRECT

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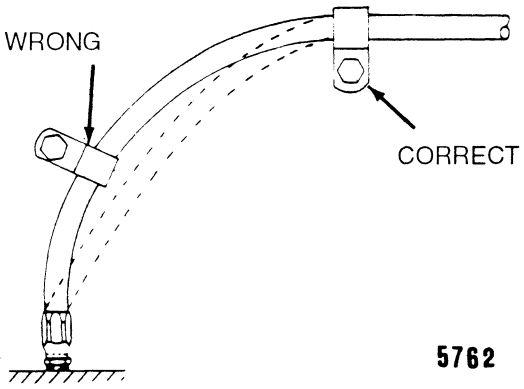
- Do not mount the clamp on a curve with a minimum radius (under pressure, possible efforts arise in the pipe; see figure: the dashed line indicates the contraction that is caused by pressure).



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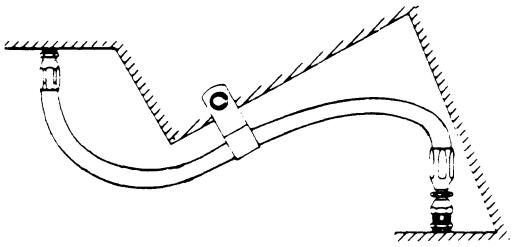
- Be sure that the clamps are mounted in the right position, to keep the hose far away from obstacles (see figure).



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DIAGNOSTIC CHECKS

GENERAL

For a quick trouble diagnosis, we recommend the following rules:

a) Knowledge of the machine

It is not possible to look for the causes and formulate a diagnosis of the trouble without a good knowledge of the machine. We recommend to read carefully the descriptions contained in the repair manual, about the composition and operation of the various groups.

b) Check with the operator

Many troubles are caused by a wrong use or maintenance. Check with the operator whether the machine had similar troubles previously and whether the interventions have been performed with suitable tools and original spare parts. Check the ambient conditions of the machine and check how standard service is performed.

c) Control of the machine.

The best way to check the machine conditions is to test it in real working conditions. Check:
- correct operation of the control instruments;
- performance of the machine;
- possible overheating smells or signs;
- abnormal noise; check its origin and the working conditions in which it takes place.

d) Machine inspection.
After check c), stop the machine and perform a visual check. Check for possible leakages, loosen screws, defects or deformations.

e) Diagnosis.

Once the trouble has been detected, make a list of the possible causes, with the help of the corresponding section, and find the right one by means of practical tests, beginning from the most probable ones, and the easiest to be performed.

UNITS OF MEASURE

The units of measure of this Manual are those of the International System, and substitute the former ones of the M.K.S. System.

Force: decanewton (daN) substitutes kilogram (kg)

Pressure: bar substitutes kg/cm^2

Torque: decanewton x meter (daN.m) substitutes kg.m

Units of measure conversion table:

	multiply	by	to obtain
Force	kg	0.9807	daN
Pressure	kg/cm^2	0.9807	bar
Torque	kg .m	0.9807	daN.m

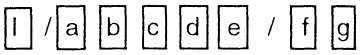
Note - For common repair use, the following correspondence is valid: kg = daN; kg/cm^2 = bar; kg.m = daN.m

CLASSIFICATION OF UNIFIED PARTS FOR TORQUE DETERMINATION

Note - If in the different sections the torque value is not indicated, see table "TORQUES" after identifying the part exactly.

The part is identified by a code number (8 figures).

Example:



l - Normal index number

Always with "1". This number means that the part can be produced in various versions, that differ because of material and coating.

a - b - c - d - e - Normal base number

Always with five figures indicating the part in its dimensional features.

f - Material index number

This number indicates the material that is foreseen for a certain part. The meaning is explained in the following table.

g - Coating index number

This number indicates the coating that is foreseen for a certain part.

Material index (f)	FIAT	Resistance class and 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	Culvre
7		Free for other metallic materials				

WARNING

— Grease screws and nuts by motor oil until 24 mm dia., for larger diameters use grease.

— Tolerance on tightening torque: ± 5%

— Resistance classes R8O, R100, R120 must be understood as follows:

10.9 substitutes R100
12.9 " R120 — for screws

10 substitutes R80
12 " R100 — for nuts

CDT = cadmed; FOSF = phosphated; ZNT = galvanized

TORQUE TABLES

If the corresponding torque is not indicated, the following tables can help you for this purpose.

NUTS (ZNT)					SCREWS (ZNT/DEIDR)		
Resistance class: 10 (R80)					Resistance class: 10.9 (R100)		
Diameter and step mm	Normal daNm	Low type daNm	with polyamide ring		Diameter and step mm	Normal ZNT daNm	Selflocking ZNT daNm
			normal da Nm	low type daNm			
M6x1	1.3	1.2	-	-	M6x1	1.3	-
M8x1.25	3.2	2.6	3.9	3.2	M8x1.25	1.3	3.5
M10x1.25	7.2	5.2	8.2	6.2	M10x1.25	7.1	7.9
M10x1.5	6.5	5	7.7	6	M10x1.5	6.5	7
M12x1.25	13	8.7	14.5	10.2	M12x1.25	12.7	13.9
M12x1.75	11	8.1	12.9	9.6	M12x1.75	11	12
M14x1.5	19.5	13	21.6	15	M14x1.5	20	22
M14x2	18	12.5	20	14.6	M14x2	18	19
M16x1.5	30	17	34	20	M16x1.5	30	33
M16x2	-	-	-	-	M16x2	-	-
M18x1.5	45	25	50	29	M18x1.5	45	48
M18x2.5	-	-	-	-	M18x2.5	-	-
M20x1.5	60	30.5	64.5	35	M20x1.5	60	65
M20x2.5	-	-	-	-	M20x2.5	-	-
M22x1.5	80	41	-	-	M22x1.5	80	90
M22x2.5	-	-	-	-	M22x2.5	-	-
M24x2	100	47	108	52.5	M24x2	100	110
M24x3	-	-	-	-	M24x3	-	-
M27x2	95	40.1	-	-	M27x2	100	-
M30x2	130	49.4	-	-	M30x2	140	-
M33x2	170	-	-	-	M33x2	190	-
M36x3	220	-	-	-	M36x3	240	-

LUBRICANTS

Filling	Lubricant	International Classification	Viscosity	Ambient Temperature
COOLING SYSTEM	FIAT LUBRIFICANTI PARAFLU 11	Glicole etilenico		
ENGINE	FIAT LUBRIFICANTI AMBRA SUPER	API CF - 4 CCMC D4 MIL - L - 2104 E level	15W-40 10W-30	-10 <--> + 50 -25 <--> + 20
TRANSMISSION	FIAT LUBRIFICANTI AMBRA SUPER TUTELA GI/M	API CF - 4 CCMC D4 MIL - L - 2104 E level ATF Type A Suffix A	15W-40 (*) 10W-30 (**) (***)	-10 <--> + 50 -20 <--> + 50
AXLES	FIAT LUBRIFICANTI TUTELA W90/LS(****)	MIL - L 2105 D API GL - 5	SAE 80W-90	-40 <--> + 50
HYDRAULIC SYSTEM	FIAT LUBRIFICANTI IDRAULICAR AP AP 31 AP 46 AP 51	DIN 51524	 ISO 32 ISO 46 ISO 68	 -25 <--> +0 -15 <--> +35 - 0 <--> +50
BRAKES	FIAT LUBRIFICANTI AMBRA SUPER	CCMC D4 MIL - L - 2104 E level	15W-40 10W-30	-10 <-->+50 -20 <--> +50
GREASE FITTINGS	FIAT LUBRIFICANTI TUTELA G9	Lithium grease - Calcium N.L.G.I.2 Consistency	-	-40 <--> +50

(*) With the indicated oil type and outside temperature 0°C :
(**) With the indicated oil type and outside temperature -5°C :
(***) With the indicated oil type and outside temperature -10°C :
(****) Oil with LS antislick and slip additive.

Warm up the engine for about 20 min. after starting, before you move the machine