

W130/W130TC

WHEEL LOADER

Workshop Manual

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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 following exactly the precautions is responsible on his own, for the damages that may result.

Neither the Factory nor any Organizations 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 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 or 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.

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SECTION 0

GENERALITIES

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SAFETY RULES

GENERALITIES

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

Read and comply with all safety precautions before any intervention.

Do not allow unauthorised personnel to operate or service this machine.

Do not wear rings, wrist watches, jewellery, loose or hanging garments, such as ties, torn clothing, scarves, unbuttoned or unzipped jackets that can get caught in moving parts. Wear certified safety clothes such as: hard hat, no-slip footwear, heavy gloves, ear protection, safety glasses, reflector vests, respirators. Ask your employer about specific safety equipment requirements.

Keep the operator's compartment, step plates, grab-rails and handles clean and clear of foreign objects, oil, grease, mud or snow to minimize the danger of slipping or stumbling. Remove mud or grease from your shoes before attempting to mount or operate the machine.

Do not jump on or off the machine. Always keep both hands and one foot, or both feet and one hand in contact with steps and grab rails.

Do not use controls or hoses as hand holds when climbing on or off the machine. Hoses and controls are movable parts and do not provide solid support. Besides, controls may be inadvertently moved and cause unexpected movement of the machine or its attachments.

Never operate the machine or its attachments from any position other than sitting in the driver's seat.

Keep head, body, limbs, hands and feet inside the operator's compartment at all times to reduce exposure to external hazards.

Be careful of possible slippery conditions of the steps and hand rails as well as of the ground around the machine.

Do not leave the machine until it has come to a complete stop.

Check the seat safety belt at least twice per year and replace it if it shows signs of wear, fraying or other weakness that could lead to failure.

STARTING

NEVER START OR OPERATE A FAILED MACHINE. Before operating the machine, always ensure that any unsafe condition has been satisfactorily corrected.

Check brakes, steering and attachment controls before moving off. Report any malfunctioning part or system to the maintenance managers for proper action.

Ensure all protective guards and panels as well as all safety devices provided are in place and in good operating condition.

Ensure that nobody is in the machine operating range before moving off or operating the attachment. **WALK COMPLETELY AROUND** the machine before mounting. Sound the horn.

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

Fasten your seat belts(when fitted).

Obey all flag signals and signs.

Due to the presence of flammable fluids on the machine, never check or fill fuel tanks or accumulator batteries near fires, open flames, or sparks.

REMEMBER THAT SPECIAL STARTING FLUIDS ARE FLAMMABLE. Scrupulously follow recommendations printed on the containers and in this Manual.

DO NOT PUNCTURE OR BURN CONTAINERS.

Containers must be stored in fresh, well ventilated places and out of the reach of unauthorised persons. Strictly follow the instructions provided by the Manufacturer.

Never use these products near fires, open flames, or sparks.

OPERATING

Check wheel and rim retainers before each working shift. If necessary, tighten to the torque specified.

Do not run the engine of this machine in closed buildings without proper ventilation capable to remove harmful exhaust gases.

Roll Over Protective Structures (ROPS) are required on wheel or crawler loaders, dozers, or graders. **NEVER OPERATE** the machine if such protective structure is removed.

Keep the operator's compartment free of foreign objects, especially if not firmly secured. Never use the machine to transport objects, unless proper securing points are provided.

DO NOT CARRY RIDERS ON THE MACHINE

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

According to law provisions, seat belts must be fitted with Roll Over Protection Structures or cabs. Keep safety belts fastened during operation.

For your personal safety, do not climb on or off the machine while it is in motion.

Make sure that bystanders are clear of the machine operating range before starting the engine and operating the attachment. Sound the horn. Obey all indications provided by flags, signs and signals.

DO NOT COAST OR FREEWHEEL down hills. Engage the most suitable gear speed to keep the machine under control.

SAFETY RULES

Do not operate the machine if you are extremely tired or feel ill. Be especially careful towards the end of the working shift.

Do not operate a machine with misadjusted brakes.

Operate the machine at low speed which can ensure complete control at all times.

Travel slowly over very rough terrain, slopes or near drop-offs, in congested areas or on frozen or slippery surfaces.

When backing, always look to where the machine is to be moved. Be alert of the position of bystanders. Should someone enter the work area, STOP THE MACHINE.

Maintain a safe distance from other machines or obstacles to ensure required visibility conditions. Give way to loaded machines.

Maintain a clear vision of the surroundings of the travel or work area at all times. Keep cab windows clean and repaired.

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

When pulling or towing through a cable or chain, do not start suddenly at full throttle. Take-up slack carefully.

Carefully inspect the towing items for flaws or problems before proceeding.

Avoid kinking or twisting chains or cables. Do not pull through a kinked chain or cable as the high stresses existing in this condition may induce failures. Always wear heavy gloves when handling chains or cables.

Chains and cables should be securely anchored. Anchor points should be strong enough to withstand the expected load. Keep anyone clear of anchor points and cables or chains.

DO NOT PULL UNLESS THE OPERATOR'S COMPARTMENTS OF THE MACHINES INVOLVED ARE PROPERLY PROTECTED AGAINST POSSIBLE BACKLASH IN CASE OF CABLE OR CHAIN FAILURE OR DETACHMENT.

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

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

If the engine tends to stall for whatever reason under load or at idle, immediately report this problem to the maintenance managers for proper action. Do not operate the machine until this condition has been corrected.

On machines fitted with suction radiator fans, regularly check the engine exhaust system for leaks, as exhaust fumes expelled towards the operator are toxic.

Operators must know thoroughly the performances of the machine they are driving.

When working on slopes or near sudden level drops in the terrain, avoid areas where ground is loose or soft since overturn or loss of machine control could result.

If noise level is high and continuously exceeds 90 dBA over 8 hours at the operator's ear, wear approved ear protection in compliance with local regulations.

Where counterweights are provided, do not operate the machine if they have been removed.

When transporting a loaded bucket, keep it as rolled-back and low as possible for maximum visibility, stability and safety of the machine. Ground speed should be adequate to the load and ground conditions.

The load must always be properly arranged in the bucket; move with extreme care when transporting oversize loads.

Use only the type of bucket recommended for the machine and the materials to be handled. Follow the recommendations concerning loading capacity, arrangement of the materials, characteristics of the ground and job to be performed.

Do not lift and move loads overhead where persons are standing or working, nor downhill when working crosswise on slopes. In this case, the bucket should be unloaded on the uphill side, whenever possible.

Start and stop the machine carefully when the bucket is full. Do not move off without first reducing engine speed.

Overtaking manoeuvres should be performed only when absolutely necessary and unavoidable. Beware possible uneven terrains, poor visibility, presence of other machinery or persons out of sight.

Operate the machine at a speed adequate to the working site conditions and in any case slow enough to ensure complete control at all times.

Check instruments at start-up and frequently during operation. Stop the machine immediately should any malfunction be signalled.

Never use the bucket as a man lift or to carry riders.

Never use the machine as a work platform or scaffolding, nor for other improper use (such as pushing railway cars, trucks or other machines).

Pay attention to people within the machine operating range. Load trucks from the driver's side whenever possible.

Prior to operating the machine, check which obstacles and/or difficulties you will encounter, such as narrow streets, overhead doors, cables, piping, as well as ground, bridges, paving and ramps bearing load limitations.

In case of road transfers, find out beforehand what conditions are likely to be encountered, such as size restrictions, heavy traffic, paving type, etc.. Beware fog, smoke or dust that obscure visibility.

When crossing gullies or ditches, move at an angle with reduced speed after ensuring ground conditions will permit a safe traverse.

SAFETY RULES

Always inspect the working area to identify potential risks such as: inclines, overhangs, trees, demolition rubble, fires, ravines, steep slopes, rough terrain, ditches, crowns, ridge trenches, heavy traffic, crowded parking and service areas, closed ambients. In such conditions, proceed with extreme care.

Whenever possible, avoid going over obstacles such as very rough terrain, rocks, logs, steps, ditches, railroad tracks. When obstructions must be crossed, do so with extreme care and at an angle, if possible. Slow down and select a lower gear. Ease up to the break-over point, pass the balance point slowly and ease down the other side.

In steep down-hill operation, do not allow the engine to over-speed. Select the proper gear before starting down grade.

Avoid crosswise hill travel, whenever possible. Drive up and down the slope. Should the machine start slipping sideways when going uphill, steer and turn machine front immediately downhill.

The gradient you may attempt to overcome is limited by factors such as ground conditions, load being handled, machine type and speed, and visibility.

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

Avoid operating the attachment too close to an overhang or high wall, either above or below the machine. Beware of caving edges, falling objects and landslips. Remember that such hazards are likely to be concealed by bushes, undergrowth and such.

When pushing-over trees, the machine must be equipped with proper overhead guards. Never drive a machine up the roots, particularly while the tree is being felled. Use extreme care when pushing over any tree with dead branches.

Avoid faggots, bushes, logs and rocks.

NEVER DRIVE OVER THEM, nor over any other surface irregularities that discontinue adherence or traction with the ground, especially near slopes or drop-offs.

Be alert to avoid changes in traction conditions that could cause loss of control. AVOID driving on ice or frozen ground when working on steep slopes or near drop-offs.

Working in virgin 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 (which may act as a leverage under the machine when up-rooted and cause the unit to overturn), etc.

STOPPING

When the machine is to be stopped for whatever reason, do so following the instructions given in chapters "**Stopping the machine**" and "**Shutting off the engine**" in the Operation and Maintenance Instruction Manual.

Always remember to move the gearshift lever to the neutral position and engage the control lever lock for safety purposes.

Apply the parking brake (if fitted).

NEVER LEAVE THE MACHINE UNATTENDED with the engine running.

Prior to leaving the operator's seat, and after making sure that all people are clear of the machine, always slowly lower the attachment until resting it safely to the ground

Park the machine in a non-operating and no-traffic area. Park on firm level ground. If this is not possible, position the machine at a right angle to the slope, making sure there is no danger of uncontrolled sliding. Apply the parking brake.

If parking in traffic lanes cannot be avoided, provide appropriate flags, barriers, flares and signals as required to adequately warn the oncoming drivers.

Keep head, body, limbs, hands and feet clear of the dozer, arms, bucket or ripper when raised.

Always switch off the battery isolator switch before servicing the machine in whatever manner (i.e., cleaning, repairing, maintaining, etc.). Do the same when the machine is to remain parked for prolonged periods of time to avoid accidental or unauthorized starting.

Never lower the attachments other than sitting in the operator's seat. Sound the horn. Make sure that nobody is within the machine operating range. Lower the attachment slowly. DO NOT USE FLOAT POSITION in case of hydraulic controls.

Securely block the machine and lock it every time you leave it unattended. Return keys to authorized security. Perform all necessary operations as detailed in the Operation and Maintenance Instruction Manual. Apply the parking brake (if fitted) every time you leave the machine.

MAINTENANCE

GENERALITIES

Before operating or performing any intervention on the machine:

- carefully read all the norms contained in this Manual;
- read and observe all safety plates and instructions located on the machine.

Do not allow unauthorized personnel to service the machine. Do not carry out any maintenance work without prior authorization. Follow all recommended maintenance and service procedures.

Keep the operator's compartment free of loose objects that are not properly secured.

Do not wear rings, wrist watches, jewellery, loose or hanging garments, such as ties, torn clothing, scarves, unbuttoned or unzipped jackets that can get caught in moving parts.

SAFETY RULES

Wear certified safety clothes such as: hard hat, no-slip footwear, heavy gloves, ear protection, safety glasses, reflector vests, respirators. Ask your employer about specific safety equipment requirements.

Never service the machine with someone sitting in the driver's seat, unless this person is an authorized operator assisting in the maintenance being carried out.

Keep the operator's compartment, step plates, grab rails and handles clear of foreign objects, oil, grease, mud or snow to minimize the danger of slipping or stumbling.

Clean mud or grease from your shoes before climbing on the machine or driving it.

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

Never stand under the boom.

Should it be necessary to move the attachment through the hydraulic controls for maintenance purposes, remember that this should be done while sitting in the operator's seat. Before starting the machine or moving its attachment, apply the brakes, sound the horn and call that you are about to manoeuvre. Raise the attachment slowly.

Always lock machine arms or any other parts that must be lifted for maintenance purposes using adequate external means. Do not allow anyone to pass near or even below a raised yet unlocked attachment. If you are not absolutely sure about your safety, do not stay under a raised attachment, even if it is locked.

Do not place body, limbs, or fingers near articulated cutting edges of uncontrolled machine parts or deprived of the necessary guards, unless they are suitably and safely locked.

Never perform any work on the machine with the engine running, except when this is specifically required. Do not wear loose clothing, jewellery or such near moving parts.

When service or maintenance require access to areas that cannot be reached from the ground, use a ladder or step platform conforming to regulations in force. If such means are not available, use machine grab rails and steps. Always perform all service or maintenance work with the greatest care and attention.

Shop and/or field service platforms or ladders should be manufactured in accordance with safety regulations in force.

Disconnect batteries and label all controls to warn that service work is in progress. Block the machine and all attachments to be raised.

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

BRAKES ARE INOPERATIVE when manually released for servicing. Provisions must be made to maintain control of the machine using suitable blocks or other means.

The fuel filler pipe nozzle must be constantly kept in contact with the filler neck. Keep this contact from the beginning to the end of the fuelling operation to avoid possible generation of sparks due to static electricity.

Tow the machine only from the attaching points provided. Use care in making connections and ensure pins and/or bolt are firmly secured before pulling. Stay clear of draw-bars, cables or chains under load.

To move a failed machine, use a trailer or a low platform truck, if available. In case towing is needed, use all necessary signals required by local regulations, and follow directions provided in this Manual.

Load/unload the machine from transporter on firm level ground providing safe support to the wheels of the truck or trailer. Use strong access ramps, with adequate height and angle. Keep the loading platform free of mud, oil or slippery materials.

Tie the machine securely to the platform of the truck or trailer and opportunely wedge machine wheels or tracks as required.

Never align holes or slots using your fingers; always use appropriate aligning tools.

Remove all sharp edges and burrs from re-worked parts.

Use only approved and effectively grounded auxiliary power sources for heaters, battery chargers, pumps and similar equipment to reduce electrical shock hazard.

Lift and handle heavy components using hoisting devices of appropriate capacity. Ensure the sling has been correctly applied. Use lifting eyes if provided. Pay attention to bystanders.

Never pour gasoline or diesel fuel into open, wide and low containers. Never use gasoline, solvents or other flammable fluids to clean parts. Use proprietary certified non-flammable, non-toxic solvents only.

When using compressed air to clean parts, wear safety glasses with side shields. Limit pressure to max 2 bars, in accordance with local safety regulations in force.

Do not run the engine in closed buildings without proper ventilation capable to remove lethal fumes.

Do not smoke, use open flames or produce sparks nearby while refuelling the unit or handling highly flammable materials.

Do not use any flame as a light source during maintenance work or to look for leaks anywhere on the machine.

Make sure that all tools provided are in good condition at all times. NEVER USE tools with mushroomed or damaged heads. Always wear eye protections.

Move with extreme care when working under the machine, its attachments, and even on or near them. Always wear protective safety equipment as required, such as hard hat, goggles, safety shoes, and ear plugs.

SAFETY RULES

In case tests during which the engine should be kept running, a qualified operator must sit in the driver's seat with the mechanic in sight at all times. Place the transmission in neutral, apply and lock the brakes. **KEEP HANDS OFF MOVING PARTS.**

In case of field service, move machine to level ground, if possible, and block it. If work on an incline cannot be advised, block the machine and its attachments securely. Move damaged to level ground as soon as possible.

Do not trust worn and/or kinked chains and cables. Never use them for lifting or pulling. Always wear heavy gloves to handle chains or cables.

Be sure chains and cables are firmly fastened and that anchor points are strong enough to withstand the expected load. Nobody should stay near the anchor points, cables or chains. **DO NOT PULL OR TOW UNLESS THE OPERATOR'S COMPARTMENTS OF THE MACHINES INVOLVED ARE FITTED WITH THE PROPER GUARDS AGAINST BACKLASH IN CASE OF CABLE OR CHAIN FAILURE OR DETACHMENT.**

Keep the area where maintenance is carried out **CLEAN** and **DRY** at all times. Clean immediately all water and oil spillages.

Do not pile up oily or greasy rags as they represent a major fire hazard. Always store them in closed metal containers.

Before starting the machine or its attachment, check, adjust and lock the operator's seat. Also ensure that nobody is within the machine operating range. Sound the horn.

Rust inhibitors are volatile and flammable. Use them only in well ventilated areas. Keep open flames away - **DO NOT SMOKE** - Store containers in a cool well ventilated place where they could not be reached by unauthorised people.

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

Wear safety glasses with side shields, hard hat, safety shoes, heavy gloves when metal particles or similar may be ejected and hit you.

Wear appropriate protective equipment such as dark safety glasses, hard hat, protective clothing, special gloves and footwear while welding. Nearby persons should also wear dark safety glasses even if they are not welding. **DO NOT LOOK THE WELDING ARC WITHOUT PROPER EYE PROTECTION.**

Become acquainted with all your jacking equipment and its capacity. Remember that the jacking point on the machine should be appropriate for the load applied. Also, be sure the support area of the jack at the machine and on the ground is appropriate and stable.

Any load supported by a jack represents a possible hazard. Always transfer the load onto appropriate support means according to local or national safety requirements before proceeding with service or maintenance work.

Metal cables get frayed after prolonged use. Always wear appropriate protections (heavy gloves, goggles, etc.) while handling them.

Handle all parts carefully. Keep hands and fingers away from gaps, gears, and similar. Always use and wear the appropriate protections.

Water can build up in pneumatic systems from condensate moisture due to changes in atmospheric conditions. If necessary, drain such deposits following instructions.

Before carrying out any maintenance work or service, lock the machine articulated frame modules using the appropriate safety device. Remember to remove and store it properly at the end of work.

If the machine is equipped with hydraulic brakes, make sure that the reservoir is always filled up to the correct level.

Always block all wheels, front and rear, before bleeding the braking system or disconnecting control hoses and/or cylinders.

STARTING

Do not run the engine in closed buildings without proper ventilation capable to remove lethal exhaust fumes.

Do not place head, body, limbs, feet, hands or fingers near rotating fans or belts.

Be especially careful near blower fans.

REMEMBER THAT THE STARTING FLUID IS HIGHLY FLAMMABLE. Follow recommendations provided in this Manual and printed on the containers. Containers must be stored in a cool, well ventilated place out of the reach of unauthorised persons.

DO NOT PUNCTURE OR BURN CONTAINERS.

ENGINE

Loosen the radiator cap very slowly to relieve system pressure before removing it. Always top-up coolant level with the engine off.

Avoid that flammable materials could touch exhaust parts. If not possible, provide necessary protections.

Do not refuel with the engine running, especially if hot, as this increases fire hazard.

Never attempt to check or adjust fan belt tensions when the engine is running.

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

Do not lubricate the machine with the engine running.

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

SAFETY RULES

ELECTRICAL SYSTEM

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

Should booster batteries be used, remember to connect ends of the booster cables in the proper manner: (+) to (+) and (-) to (-). Do not short-circuit terminals. Thoroughly follow instructions given in this Manual.

Before any intervention, make sure that the battery isolator switch is off.

BATTERY GAS IS HIGHLY FLAMMABLE. Leave the battery compartment open during recharging to improve ventilation. Never check battery charge by placing metal objects across the posts. Keep sparks or open flames away from batteries. Do not smoke near the battery to prevent explosion hazard.

Before any intervention, make sure that there are no fuel or electrolyte leakages. If any, correct prior to proceeding with further work. Do not recharge batteries in confined spaces. Ensure proper ventilation is provided to avoid accidental explosions due to build-up of gas released during charging.

HYDRAULIC SYSTEM

Pressure fluid escaping from a very small hole can be almost invisible and still have sufficient force to penetrate the skin. Always check any suspected pressure leaks using a piece of cardboard or wood. **DO NOT USE HANDS.** If injured by escaping fluid, obtain medical attention immediately or serious infection or reaction may develop.

Stop the engine and relieve all system pressure before removing panels, housings, caps, plugs or covers.

Always use gauges of adequate capacity (end-of-scale reading) and follow recommended procedures.

TOOLS

Always keep head, body, limbs, feet, or hands away from bucket, blade, or ripper when in the raised position. Prior to any intervention, install all safety devices according to current regulations. In case the attachment is to be operated through the machine hydraulic system for maintenance purposes, remember to do so only while sitting in the driver's seat. Make sure that nobody is within the machine operating range. Before operating the attachment, alert people by sounding the horn and by voice. Raise the attachment slowly.

Do not use the machine to transport loose objects, unless proper devices to this purpose are provided.

Clutches and brakes of this machine as well as auxiliary devices and attachments (such as drive cylinder or winch control valves) should always be properly adjusted in accordance with the instructions provided by the Manufacturer. Never perform adjustments with the engine running, except when this is specifically required by the relevant procedures.

TYRES AND WHEELS

Make sure that the tyre inflation pressure corresponds to specifications issued by the Manufacturer. Regularly check inflation pressure.

Should pressure be changed, do this while staying on the tyre side and at a safe distance.

Pressure checks should always be carried out with the machine unloaded and cold tyres.

Never use reconditioned tyre rims, since possible weldings, incorrect heat-treatments or repairs can weaken the wheels and cause damages or failures.

Do not cut, nor weld rims with inflated tyres installed.

The spare tyre should be inflated only enough to keep the rim components assembled. Remember that when not installed on the disc, a tyre inflated to maximum pressure can **explode**.

Therefore, maximum care must be taken when handling a fully inflated tyre.

Before servicing tyres, block all wheels, front and rear. After jacking up the machine, block it in the raised position using suitable stands conforming to current safety regulations.

Deflate the tyre before removing objects from the tyre tread.

Never inflate tyres with flammable gas: explosions and severe bodily injuries may result.

When starting your work shift, check for loose wheel or rim bolts and brackets and retighten to correct torque as necessary.

SAFETY RULES

DECOMMISSIONING THE MACHINE

For the decommissioning of the machine, the availability of particular tooling (hoists, hydraulic presses, containers for liquids etc.) is required as well as specific tools listed in the Repair Manuals, available from **FIAT KOBELCO** Dealers.

This has the purpose of avoiding that during disassembly operations, dangerous situations may arise both for the personnel involved and the environment.

In the machine are present:

- Fluids under pressure (hydraulic system, cooling system etc.)
- Gases (air conditioning system and accumulator, if installed)
- Mechanical devices mounted under pressure (track tensioner etc.)
- Heavy machine components (frames, blades, buckets etc.)



WARNING

- The decommissioning of the machine must be performed exclusively by personnel trained, qualified and authorised to perform such operation.
- Start the disassembly of hydraulic components only after the same, the hydraulic oil and lubricants have fully cooled-off and after all residual pressures have been released, as described by the Repair Instruction Manual.
- Prior to proceeding with disassembly operations, comply with the **GENERAL SAFETY RULES** and drain each components of the machine filled with fluids, both in the reservoirs and the relevant systems.



WARNING

Ensure that the attachment is safely resting on to the ground before repairing, adjusting, or servicing machines fitted with hydraulically, mechanically or cable controlled attachments (such as excavators, loaders, dozers, scrapers, etc.). Should it be necessary to partially or fully raise the hydraulically, mechanically, or cable controlled attachment to gain access to certain items, make sure the attachment is adequately retained in the raised position by means other than the hydraulic lift cylinders, cable and/or mechanical devices used for controlling it.

SPECIFICATIONS**ENGINE - EMISSION**

Model	F4GE0684F
Fuel	#2 Diesel (#1 & 2 Mixture Permitted For Cold Temperature)
Number of Cylinders	6
Bore and Stroke	4.09" (104 mm) x 5.20" (132 mm)
Displacement	409 in ³ (6.7 Liters)
Electrical System	24 Volts
Batteries	(2) 12 Volts
Alternator	70 Amp
Compression Ratio	17.5 to 1
Fuel Pump	
Air Cleaner	Dry Type Elements With Warning Restriction Indicator
Oil Filter Full Flow	Replaceable Cartridge
Lubrication	Positive Pressure
Cooling System	Air/Water with Lube Oil Cooler
Power	
- Gross (per SAE J1995)	148 hp (111 kW) @ 2000 RPM
- Net (per SAE J1349)	136 hp (101 kW) @ 2000 RPM
- Gross (per SAE J1995)	149 hp (111 kW) @ 1800 RPM
- Net (per SAE J1349)	139 hp (103 kW) @ 1800 RPM
Torque, Max.	
- Gross (per SAE J1195)	509 lb-ft (690 Nm) @ 1200 RPM
- Net (per SAE J1349)	495 lb-ft (671 Nm) @ 1200 RPM

Governor

Complies with 1996 US EPA and CARB Heavy Duty Non-Road Emissions for 100-750 hp (75-560 kW) engines.

POWER TRAIN**TRANSMISSION**

Make	ZF			
Model	4WG160			
Radio	1 st	2 nd	3 rd	4 th
Forward	4.012	2.024	1.088	0.619
Reverse	3.804	1.919	1.031	-

TORQUE CONVERTER

Make	ZF
Model	06.013.08
Stall Ratio	2.66:1

SPEEDS: mph (km/h)

	1 st	2 nd	3 rd	4 th
(17.5 x 25 L3 Tires)				
- Forward	4.0 (6.4)	7.8 (12.5)	13.8 (22.3)	22.5 (36.2)
- Reverse	4.2 (6.8)	8.2 (13.2)	14.5 (23.4)	
(20.5 x 25 L3 Tires)				
- Forward	4.3 (6.9)	8.4 (13.5)	14.9 (23.9)	24 (38.6)
- Reverse	4.5 (7.3)	8.8 (14.2)	15.6 (25.0)	

AXLES

	Front	Rear
- Differential Ratio	3.18	3.18
- Planetary Ratio	6.40	6.40
- Final Axle Ratio	20.36	20.36

Make	ZF
Model	Front - MTL 3075 Rear - MTL 3065

BRAKES

Hydraulic, wet four-wheel disc. One brake pedals, both pedals apply brakes and electrically neutralizes power flow to wheels with transmission disconnect switch activated. Both pedals apply brakes only when transmission disconnect switch is not activated. Hydraulic brake valve for front and rear split system. Spring applied/hydraulic released disc parking brake on transmission output shaft neutralizes power flow to wheels engaged.

Brake Area of Service Brakes	355.28 in ² (0.229 m ²)/Hub
Brake Area of Parking Brake	9.0 in ² (58 cm ²)
Brake Pressure (@ 2 sec. Setting method)	Front: 1305 psi (8998 kPa) Rear : 1275 psi (8791 kPa)

ACCUMULATOR DATA

Cut In	2275 psi (15686 kPa)
Cut Out	2800 psi (19305 kPa)
Low Pressure Warning	1500 psi (10342 kPa)
Transmission Declutch	350 psi (2413 kPa)
Charge Pressure (N ₂)	800 psi (5516 kPa)

TIRES

20.5 R 25 XTLA TL★	50 psi Front (345 kPa)	40 psi Rear (275 kPa)
20.5 R 25 XHA TL★	50 psi Front (345 kPa)	40 psi Rear (275 kPa)
20.5 R 25 XLD-D2 ★	50 psi Front (345 kPa)	40 psi Rear (275 kPa)
20.5 R 25 GP-2B ★	50 psi Front (345 kPa)	40 psi Rear (275 kPa)
550/65 R 25 XLD ★	50 psi Front (345 kPa)	40 psi Rear (275 kPa)
17.5 R 25 XTLA TL★	50 psi Front (345 kPa)	40 psi Rear (275 kPa)
17.5 R 25 XHA TL★	50 psi Front (345 kPa)	40 psi Rear (275 kPa)
17.5 R 25 GP-2B ★	50 psi Front (345 kPa)	40 psi Rear (275 kPa)

HYDRAULICS AND STEERING

Reservoir:	Filtered vent with relief on hydraulic reservoir maintains 3-5 psi (20-34 kPa) on reservoir. Full time 10 micron return filters furnish only clean oil to all components of the system.
Valves:	Closed-center, load sensing circuit, positive low pressure regeneration for bucket dump. Remote control hydraulic power assist with electromagnet detents. Inlet section gives steering priority with maximum pressure of 3500 psi (24132 kPa). Bucket section gives bucket priority. Relief valve provides maximum loader pressure of 3625 psi (25,000 kPa). Loader control valve section contains float circuitry. Senses steering demand to control oil flow to loader valve or steering valve as required by steering demand.
System:	A variable displacement piston pump is used to supply oil to the integrated loader and steering hydraulic system. Pump displacement 5.49 in³/rev (90 cc/rev). 45.2 GPM @ 2000 RPM @ 3600 psi (171.0 l/min @ 2000 RPM @ 24822 kPa) <i>Steering Section</i> Center pivot articulated steering - front and rear wheels always track. Two hydraulic cylinders controlled by a hydrostatic steering gear and a priority valve. The steering Orbitrol provides 3.8 turns lock-to-lock. Lock-to-lock time at high idle is 2.2 sec.

Hydraulic Cylinder:**Dump:**

(Z-Bar, XR) 5.00 dia x 24.40 stroke x 3.00 rod
(127.0 mm dia x 619.7 mm stroke x 76.2 mm rod)

(TC) 4.13 dia x 37.57 stroke x 2.25 rod
(104.8 mm dia x 954.4 mm stroke x 57.2 mm rod)

Lift:

4.50 dia x 31.00 stroke x 2.50 rod
(114.3 mm dia x 787.6 mm stroke x 63.5 mm rod)

Steer:

2.75 dia x 18.21 stroke x 1.50 rod
(69.9 mm dia x 462.5 mm stroke x 38.1 mm rod)

Diameter of Hydraulic Inlet and Outlet Ports:

One Inlet 2" Split Flange (50.8 mm)

One Outlet 1.25" ORB (31.7 mm)
- Steering Section 1.0" ORB (25.4 mm)

Maximum Oil Velocity at Hydraulic Pump @ 2000 RPM:

Outlets - Implement Section 11.8 ft/sec (3.60 m/sec)

CAPACITIES**Cooling System:**

6.3 US/gal (24.0 liters) to fill system

Gallons Ethylene Glycol (Prestone) required:

2.2 US/gal (8.5 liters) for 0 °F

2.7 US/gal (10.4 liters) for -20 °F

3.4 US/gal (12.8 liters) for -40 °F

Fuel Tank:

50.0 US/gal (189 liters) Usable Fuel

Engine:Crankcase Only

16 quarts (15.1 liters)

Crankcase and Filter

17 quarts (16.1 liters)

Transmission:

6.87 US/gal (26 liters) initial capacity

5.0 US/gal (18.9 liters) service (w/filter)

Axles:**Front/Rear**

Total/Axle

23.2 quarts (22 liters)

Hydraulic Reservoir:Reservoir, oil only

15.0 US/gal (56.8 liters)

Reservoir, oil plus air

23.8 US/gal (90.1 liters)

Total System

30.0 US/gal (113.6 liters)

SOUND LEVEL DATA**Emission Engine w/o Enhanced Sound Package****Sound Level (Arithmetic Average) dBA**Cab Closed

Exterior Sound Level @ 15 meters
per SAE J88 SEP80

Stationary - Rated Speed
Test Average

71.4
72.6

Operator's Station Sound Level
per SAE J919 JUN86

Stationary - Rated Speed
Test Average

70.5
69.8

Sound levels per (in dB(A))
2000/14/EC
98/37/EC (ISO 6395, 6396, 3744)

Combined Dynamic (Test Average)
Decal Value

Interior LpA
71.2
71

Exterior LwA
106.2
107

The option **w Enhanced Sound Package** will be developed at the begin of March.
The standard machine will be w/o Enhanced Sound Package.

Emission Engine w/o Enhanced Sound Package**Sound Level (Arithmetic Average) dBA**Cab Closed

Exterior Sound Level @ 15 meters
per SAE J88 SEP80

Stationary - Rated Speed
Test Average

-
-

Operator's Station Sound Level
per SAE J919 JUN86

Stationary - Rated Speed
Test Average

-

Sound levels per (in dBA)
2000/14/EC
98/37/EC (ISO 6395, 6396, 3744)

Interior LpA

Exterior LwA

Combined Dynamic (Test Average)
Decal Value

-
-

-
-

Note – Rated speed of engine is 2000 rpm and High - Idle is 2160 - 2220 rpm.

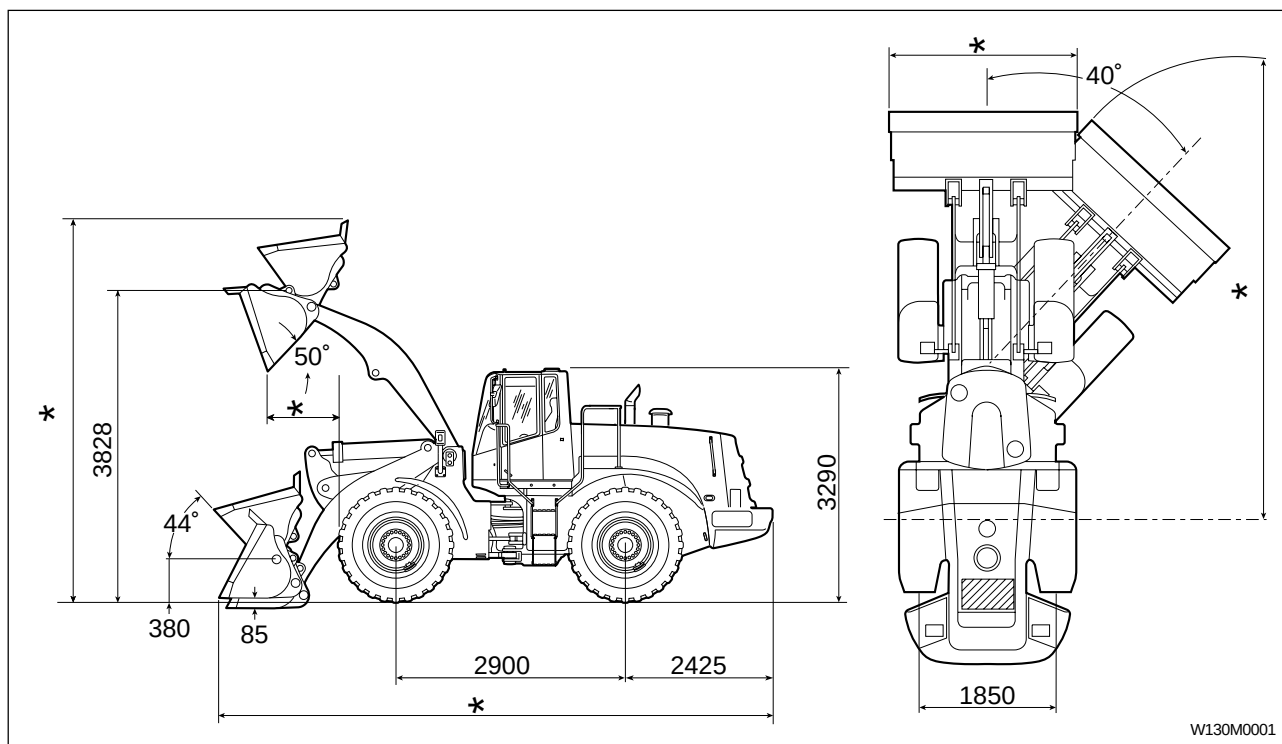
COMPONENT SPECIFICATIONS

ITEM	MODEL	SIZE
Injector Pump	VE6/12F1000	
Primary Fuel Filter	43.061.000.53	
Engine oil filter	LF16015 JD	
Air filter assembly	G100376	10 in. Diameter
Starter	EV	24 volt 4 kw
Alternator	NCB1	24 v, 70 amp
Hydraulic Pump	A10V085	5.19 cu. In./rev (85 cc/rev)
Hydraulic Oil Filter Assembly	HM K013582, HM K0531170 w/ride control	
Head Assy.	P178778	
Element	P165823	
Hyd. control 2 Lever	P/N C0640-10014	
Hyd. control Joystick Hyd. control 3 Lever	4TH6F P/N 08-350-759 C0640-10013	
Hyd. control Joystick + 1 Lever	4TH6F+2TH6 P/N 08-350-759 + P/N 08-350-766	
Loader Control Valve - 2 Spool ZB	M6-1044-00/2M6-15	
Loader Control Valve - 2 Spool TC	M6-1047-00/2M6-15	
Loader Control Valve - 3 Spool ZB	M6-1045-00/3M6-15	
Loader Control Valve - 3 Spool TC	M6-1048-00/2M6-15	

ITEM	MODEL	SIZE
Loader Control Valve - 4 Spool ZB	M6-1046-00/4M6-15	
Loader Control Valve - 4 Spool TC	M6-1049-00/M6-15	
Cab Heater/def/AC Blower Motor Core (combination)	441407913 (006-B39/I 22-24 V)	12kW heater 8 kW evaporator air flow 850 m ³ /h @ 40 mm H ₂ O
	441407913	
Cab heater defroster blower motor Core	(006-B39/I 22-24 V)	
Condenser	383912A1	4R/9F 19.84"x11"
Compressor	4611-6000	
Front Wiper	441411772 (150.208)	24 V 35 min ⁻¹ /55 min ⁻¹ 60° Sweep
Rear Wiper	441412334	24 V 45 min ⁻¹ 175° sweep
Cab Filter Recirculation	441407125	Front surface: 90 x 470 mm Flow 1500 l dm ⁻²
Cab Filter External air	241405799	Front surface: 445 x 114 mm Flow 830 l s ⁻¹ m ⁻²
Steering valve and orbital pump	236-4008-002	
Cooling Fan	832059	28.0" (711 mm) Diameter
Standard Muffler	M080425	Horizontal round
Battery	548.450.1ES	Cap. 100 Ah 12 V 450 Amp

ITEM	MODEL	SIZE
Trasmission	8605271 WG 160	
Hyd. oil cooler	7A8025901C	Air-to-Oilm 9 fins/in
Beacon	35.205.000.14	Halogen 24 V Rotary Lamp
Front axle	MT3075	
Rear axle	MT3065	
Service Brakes Pump	WQ09A1	
Accumulators		
Brake Modulation Valve	19184-OPA3	
Secondary steering - electric pump and motor	02433A00	
Engine drive shaft	04085418	
Front drive shaft	04085422	
Center drive shaft	04085423	
Rear drive shaft	04085424	
Bucket teeth	87408033	
Information Center	11000-MM3600	

DIMENSIONS AND WEIGHT



Dimensions in mm

Operating weight: 11.758 kg

Note – Machine arranged with 2.1 cu m bucket, tyres 20.5x25 filled and operator.

* Please refer to the table

Type of bucket

		With teeth and segments		With suppl. cutting edge	
Bucket capacity	m ³	2.1	2.3	2.1	2.3
Bucket weight	kg	888	935	895	942
Bucket width	mm	2540	2540	2500	2500
Dumping height at 45°	mm	2761	2680	2794	2713
Dumping reach at 45°	mm	1029	1118	991	1080
Max. length (w/ bucket on ground)	mm	7054	7179	7005	7129
Max. height (w/ bucket raised)	mm	5030	5039	5030	5039
Turning radius (in transportation position)	m	11.5	11.56	10.4	11.5

TABLE OF FLUID CAPACITIES

ITEM	QUANTITY LITRES (USG)	FLUIDS OR LUBRICANT <i>Ambra</i>	CLASSIFICATION SPECIFICATIONS	VISCOSITY (SAE)	OUT DOOR TEMPERAT. OF REFERENCE (°C)
ENGINE + OIL FILTER	12.5	Super Gold	API CF-4/SG MIL-L-2104E ACEA E2	15W-40	-10 to 50 °C (14 to 122 °F) -30 to 20 °C (-22 to 68 °F)
		Mastergold HSP*	API CH-4 ACEA E3	15W-40	-10 to 50 °C (14 to 122 °F)
RADIATOR	22	Agriflu	ASTMD-5345	–	-35 to 50 °C (-31 to 122 °F)
TRANSMISSION + FILTER	18.5	Super Gold	API CF-4/SG MIL-L-2104E ACEA E2	10W-30	-30 to 20 °C (-22 to 68 °F)
HYDRAULIC SYSTEM	63 (114 TOT.)	HITECH 46	ISO VG 46, DIN 51524 Item 1 and 2, QFH583/HD	–	-20 to 50 °C (-4 to 122 °F)
AXLES	front 22 rear 22	TRX	API GL4	SAE 80W-140	-20 to 50 °C (-4 to 122 °F)
FUEL TANK	18.3	–	–	–	Diesel fuel ASTM no. 2D
GREASE FITTINGS	–	MG-2	–	Grade 251H-EP Spec. B-27	-40 to 50 °C (-40 to 122 °F)
AIR CONDITIONER COMPRESSOR	0.2 (0.05)	L BAR 134	–	–	–
WINDSHIELD WASHER FLUID	4.7	SC 35	–	–	–

Oil quantities indicated are those required for periodical changes following the draining and filling procedures indicated in detail for each group.
 * In the event engine oil with "CH4" classification is used, the change interval can be prolonged to 500 hours providing that the outer temperature of operation does not exceed 38 °C (100 °F) and that the percentage of sulphur in the fuel does not exceed 0.5 %.
 In the event of really heavy duty conditions, reduce the greasing intervals.

UNITS OF MEASURE**CONVERSION FACTORS****Metric to U.S.**

	MULTIPLY	BY	TO OBTAIN
Area:	sq. meter hectare	10.763 91 2.471 05	square foot acre
Force:	newton newton	3.596 942 0.224 809	ounce force pound force
Length:	millimeter meter kilometer	0.039 370 3.280 840 0.621 371	inch foot mile
Mass:	kilogram	2.204 622	pound
Mass/Area:	kilogram/hectare	0.000 466	ton/acre
Mass/Energy:	g/kW/hr.	0.001 644	lbs/hp/hr.
Mass/Volume:	kg/cubic meter	1.685 555	lb/cubic yd.
Power:	kilowatt	1.341 02	horsepower
Pressure:	kilopascal bar	0.145 038 14.50385	lb/sq. inch lb/sq. inch
Temperature:	degree C	1.8 x C +32	degree F
Torque:	newton meter newton meter	8.850 748 0.737 562	lb/inch lb/foot
Velocity:	kilometer/hr.	0.621 371	miles/hr.
Volume:	cubic centimeter cubic meter cubic meter milliliter litre litre litre litre	0.061 024 35.314 66 1.307 950 0.033 814 1.056 814 0.879 877 0.264 172 0.219 969	cubic inch cubic foot cubic yd. ounce (US fluid) quart (US liquid) quart (Imperial) gallon (US liquid) gallon (Imperial)
Volume/Time:	litre/min. litre/min.	0.264 172 0.219 969	gallon/min. (US liquid) gallon/min. (Imperial)

U.S. to Metric

	MULTIPLY	BY	TO OBTAIN
Area:	sq. foot acre	0.092 903 0.404 686	square meter hectare
Force:	ounce force pound force	0.278 014 4.448 222	newton newton
Length:	inch foot mile	25.4 * 0.304 8 * 1.609 344 *	millimeter meter kilometer
Mass:	pound ounce	0.453 592 28.35	kilogram gram
Mass/Area:	ton/acre	2241 702	kilogram/hectare
Mass/Energy:	lb/hp/hr	608.277 4	gr/kW/hr
Mass/Volume:	lb/cubic yd.	0.593 276	kg/cubic meter
Power:	horsepower	0.745 700	kilowatt
Pressure:	lbs/sq. in. lbs/sq. in. lbs/sq. in.	6.894 757 0.069 0.070 303	kilopascal bar kg/sq. cm
Temperature:	degree F	1.8 F - 32	degree C
Torque:	pound/inch pound/foot	0.112 985 1.355 818	newton meter newton meter
Velocity:	miles/hr.	1.609 344 *	kilometer/hr.
Volume:	cubic inch cubic foot cubic yard ounce (US fluid) quart (US liquid) quart (Imperial) gallon (US) gallons (Imperial)	16.387 06 0.028 317 0.764.555 29.573 53 0.946 353 1.136 523 3.785 412 4.546 092	cubic centimeter cubic meter cubic meter milliliter litre litre litre litre
Volume/Time:	gallon/min.	3.785 412	litre/min.

* = exact

STANDARD TORQUE SPECIFICATION

TORQUE SPECIFICATIONS - DECIMAL HARDWARE

Use the torques in this chart when special torques are not given. These torques apply to fasteners with both UNC and UNF threads as received from suppliers dry, or when lubricated with engine oil. Not applicable if special graphite or molydisulfide greases, or other extreme pressure lubricants are used.

Grade 5 Bolts, Nuts, and Studs		
  		
Size	Pound-Inches	Newton metres
1/4 inch	108 to 132	12 to 15
5/16	204 to 252	23 to 28
3/8 inch	420 to 504	48 to 57
Size	Pound-Feet	Newton metres
7/16 inch	54 to 64	73 to 87
1/2 inch	80 to 96	109 to 130
9/16 inch	110 to 132	149 to 179
5/8 inch	150 to 180	203 to 244
3/4 inch	270 to 324	366 to 439
7/8 inch	400 to 480	542 to 651
1.0 inch	580 to 696	787 to 944
1-1/8 inch	800 to 880	1085 to 1193
1-1/4 inch	1120 to 1240	1519 to 1681
1-3/8 inch	1460 to 1680	1980 to 2278
1-1/2 inch	1940 to 2200	2631 to 2983

Grade 8 Bolts, Nuts, and Studs		
  		
Size	Pound-Inches	Newton metres
1/4 inch	144 to 180	16 to 20
5/16	288 to 348	33 to 39
3/8 inch	540 to 648	61 to 73
Size	Pound-Feet	Newton metres
7/16 inch	70 to 84	73 to 87
1/2 inch	110 to 132	149 to 179
9/16 inch	160 to 192	217 to 260
5/8 inch	220 to 264	298 to 358
3/4 inch	380 to 456	515 to 618
7/8 inch	600 to 720	814 to 976
1.0 inch	900 to 1080	1220 to 1465
1-1/8 inch	1280 to 1440	1736 to 1953
1-1/4 inch	1820 to 2000	2468 to 2712
1-3/8 inch	2380 to 2720	3227 to 3688
1-1/2 inch	3160 to 3560	4285 to 4827
Note – Use thick nuts with Grade 8 bolts.		

TORQUE SPECIFICATIONS - METRIC HARDWARE

Use the following torques when specifications are not given.

These values apply to fasteners with coarse threads as received from supplier, plated or unplated, or when lubricated with engine oil. These values do not apply if graphite or Molydisulfide grease or oil is used.

Grade 8.8 Bolts, Nuts, and Studs		
		
Size	Pound-Inches	Newton metres
M4	24 to 36	3 to 4
M5	60 to 72	7 to 8
M6	96 to 108	11 to 12
M8	228 to 276	26 to 31
M10	456 to 540	52 to 61
Size	Pound-Feet	Newton metres
M12	66 to 79	90 to 107
M14	106 to 127	144 to 172
M16	160 to 200	217 to 271
M20	320 to 380	434 to 515
M24	500 to 600	675 to 815
M30	920 to 1100	1250 to 1500
M36	1600 to 1950	2175 to 2600

Grade 10.9 Bolts, Nuts, and Studs		
		
Size	Pound-Inches	Newton metres
M4	36 to 48	4 to 5
M5	84 to 96	9 to 11
M6	132 to 156	15 to 18
M8	324 to 384	37 to 43
Size	Pound-Feet	Newton metres
M10	54 to 64	73 to 87
M12	93 to 112	125 to 150
M14	149 to 179	200 to 245
M16	230 to 280	310 to 380
M20	450 to 540	610 to 730
M24	780 to 940	1050 to 1275
M30	1470 to 1770	2000 to 2400
M36	2580 to 3090	3500 to 4200

Grade 12.9 Bolts, Nuts, and Studs

Usually the torque values specified for grade 10.9 fasten can be used satisfactorily on grade 12.9 fasteners.

TORQUE SPECIFICATIONS - STEEL HYDRAULIC FITTINGS

Tube OD Hose ID	Thread Size	Pound- Inches	Newton metres
37 Degree Flare Fitting			
1/4 inch 6.4 mm	7/16-20	72 to 144	8 to 16
5/16 inch 7.9 mm	1/2-20	96 to 192	11 to 12
3/8 inch 9.5 mm	9/16-18	120 to 300	14 to 34
1/2 inch 12.7 mm	3/4-16	180 to 504	20 to 57
5/8 inch 15.9 mm	7/8-14	300 to 696	34 to 79
Tube OD Hose ID	Thread Size	Pound- Inches	Newton metres
3/4 inch 19.0 mm	1-1/16-12	40 to 80	54 to 108
7/8 inch 22.2 mm	1-3/16-12	60 to 100	81 to 135
1.0 inch 25.4 mm	1-5/16-12	75 to 117	102 to 158
1-1/4 inch 31.8 mm	1-5/8-12	125 to 165	169 to 223
1-1/2 inch 38.1 mm	1-7/8-12	210 to 250	285 to 338

Tube OD Hose ID	Thread Size	Pound- Inches	Newton metres
Straight Threads with O-ring			
1/4 inch 6.4 mm	7/16-20	144 to 228	16 to 26
5/16 inch 7.9 mm	1/2-20	192 to 300	22 to 34
3/8 inch 9.5 mm	9/16-18	300 to 480	34 to 54
1/2 inch 12.7 mm	3/4-16	540 to 804	57 to 91
Tube OD Hose ID	Thread Size	Pound- Inches	Newton metres
5/8 inch 15.9 mm	7/8-14	58 to 92	79 to 124
3/4 inch 19.0 mm	1-1/16-12	80 to 128	108 to 174
7/8 inch 22.2 mm	1-3/16-12	100 to 160	136 to 216
1.0 inch 25.4 mm	1-5/16-12	117 to 187	159 to 253
1-1/4 inch 31.8 mm	1-5/8-12	165 to 264	224 to 357
1-1/2 inch 38.1 mm	1-7/8-12	250 to 400	339 to 542

Split Flange Mounting Bolts		
Size	Pound- Inches	Newton metres
5/16-18	180 to 240	20 to 27
3/8-16	240 to 300	27 to 34
7/16-14	420 to 540	47 to 61
Size	Pound- Feet	Newton metres
1/2-13	55 to 65	74 to 88
5/8-11	140 to 150	190 to 203

TORQUE SPECIFICATIONS - STEEL HYDRAULIC FITTINGS

Nom SAE Dash Size	Tube OD	Thread Size	Pound- Inches	Newton metres	Thread Size	Pound- Inches	Newton metres
O-ring Face Seal End					O-ring Boss End Fitting or Lock Nut		
-4	1/4 inch 6.4 mm	9/16-18	120 to 144	14 to 16	7/16-20	204 to 240	23 to 27
-6	3/8 inch 9.5 mm	11/16-16	216 to 240	24 to 27	9/16-18	300 to 360	34 to 41
-8	1/2 inch 12.7 mm	13/16-16	384 to 480	43 to 54	3/4-16	540 to 600	61 to 68
					Thread Size	Pound- Inches	Newton metres
-10	5/8 inch 15.9 mm	1-14	552 to 672	62 to 76	7/8-14	60 to 65	81 to 88
Nom SAE Dash Size	Tube OD	Thread Size	Pound- Inches	Newton metres	1-1/16-12	85 to 90	115 to 122
					1-3/16-12	95 to 100	129 to 136
-12	3/4 inch 19.0 mm	1-3/16-12	65 to 80	90 to 110	1-5/16-12	115 to 125	156 to 169
-14	7/8 inch 22.2 mm	1-3/16-12	65 to 80	90 to 110	1-5/8-12	150 to 160	203 to 217
-16	1.0 inch 25.4 mm	1-7/16-12	92 to 105	125 to 140	1-7/8-12	190 to 200	258 to 271
-20	1-1/4 inch 31.8 mm	1-11/16-12	125 to 140	170 to 190			
-24	1-1/2 inch 38.1 mm	2-12	150 to 180	200 to 254			

LOCTITE PRODUCT CHART

Product	Color	Similar Products	Gap (In Inches)	Strength (Steel/Steel)	Working Temperature Range-Fahrenheit	Fixture/Full Cure (Steel/Steel) Time	Primer	Description
#3	Dark Brown					24 hr	N/A	Form a Gasket (works with oil, fuel or grease) Pliable
80	Yellow					Fast	N/A	Weatherstrip Adhesive
123	Clear					N/A	N/A	Parts Cleaner Fluid
220	Blue	290	0.003	57/143 in lbs	-65 to +250	6 min/24 hrs	747	Wicking Threadlocker
221	Purple	222	0.005	75/44 in lbs	-65 to +300	2 min/24 hrs	747	Low Strength Threadlocker
222	Purple		0.005	53/30 in lbs	-65 to +300	20 min/24 hrs	764	Low Strength Threadlocker (Small Screws)
225	Brown	222	0.010	45/25 in lbs	-65 to +300	7 min/24 hrs	747	Low Strength Threadlocker
242	Blue		0.005	80/50 in lbs	-65 to +300	10 min/24 hrs	764	Medium Strength Threadlocker
262	Red	271	0.005	160/190 in lbs	-65 to +300	5 min/24 hrs	747	High Strength Threadlocker
270	Green	271	0.007	160/320 in lbs	-65 to +300	3 min/24 hrs	747	High Strength Threadlocker
271	Red	262	0.007	160/320 in lbs	-65 to +300	10 min/24 hrs	764	High Strength Threadlocker
272	Red	620	0.007	180/220 in lbs	-65 to +450	30 min/24 hrs	764	High Temperature, High Strength
275	Green	277	0.010	210/300 in lbs	-65 to +300	3 min/24 hrs	747	High Strength Threadlocker
277	Red		0.010	225/300 in lbs	-65 to +300	60 min/24 hrs	764	High Strength Threadlocker
290	Green		0.003	85/350 in lbs	-65 to +300	6 min/24 hrs	764	Wicking Threadlocker
*404	Clear	495	0.006	3200 psi	-65 to +180	30 sec/24 hrs	NA	Instant Adhesive
*406	Clear		0.004	3200 psi	-65 to +180	15 sec/24 hrs	N/A	Surface Insensitive Adhesive
*409	Clear	454	0.008	2500 psi	-65 to +180	50 sec/24 hrs	N/A	Gap Instant Adhesive
*414	Clear		0.006	2500 psi	-65 to +180	30 sec/24 hrs	N/A	Instant Adhesive
*415	Clear	454	0.010	2500 psi	-65 to +180	50 sec/24 hrs	N/A	Gap Filling Instant Adhesive (Metals)
*416	Clear	454	0.010	2500 psi	-65 to +180	50 sec/24 hrs	N/A	Gap Filling Instant Adhesive (Plastics)
*420	Clear		0.002	2500 psi	-65 to +180	15 sec/24 hrs	N/A	Wicking Instant Adhesive
*422	Clear	454	0.020	2800 psi	-65 to +180	60 sec/24 hrs	N/A	Gap Filling Instant Adhesive
*430	Clear		0.005	2500 psi	-65 to +180	20 sec/24 hrs	N/A	Metal Bonding Adhesive
*445	White/Black		0.250	2000 psi	-65 to +180	5 min/24 hrs	N/A	Fast Setting 2 Part Epoxy
*454	Clear		0.010	3200 psi	-65 to +180	15 sec/24 hrs	N/A	Surface Insensitive Gen Instant Adhesive
*495	Clear		0.004	2500 psi	-65 to +180	20 sec/24 hrs	N/A	General Purpose Instant Adhesive
*496	Clear		0.005	2500 psi	-65 to +180	20 sec/24 hrs	N/A	Metal Bonding Adhesive
504	Brt Orange	515	0.030	750 psi	-65 to +300	90 min/24 hrs	None	Rigid Gasket Eliminator
509	Light Blue		0.020	750 psi	-65 to +320	6 hr/72 hrs	764	Flange Sealant
510	Red		0.020	1000 psi	-65 to +400	30 min/24 hrs	764	High Temperature, Gasket Eliminator
515	Purple		0.010	750 psi	-65 to +300	1 hr/24 hrs	764	Gasket Eliminator 515

* Products 404-496 (except for #445) are all instant adhesives (super glues) they differ mostly in viscosity

Product	Color	Similar Products	Gap (in Inches)	Strength (Steel/Steel)	Working Temperature Range-Fahrenheit	Fixture/Full Cure (Steel/Steel) Time	Primer	Description
518	Red	515	0.030	500 psi	-65 to +300	1 hr/24 hrs	764	Gasket Eliminator 518 for Aluminum
542	Brown	569	N/A	132/92 in lbs	-65 to +300	2 hrs/24 hrs	747	Hydraulic Sealant
545	Purple		N/A	25/20 in lbs	-65 to +300	4 hrs/24 hrs	747	Low Strength Pneumatic/Hydraulic Sealant
549	Orange	504	0.020	2500 psi	-65 to +300	2 hrs/24 hrs	747	Instant Seal Plastic Gasket
554	Red	277	0.015	240/240 in lbs	-65 to +300	2 to 4 hrs/24 hrs	764	Refrigerant Sealant
567	White	592	N/A	500 psi	-65 to +400	4 hrs/24 hrs	764	Pipe Sealant for Stainless Steel
568	Orange	277	0.015	2500 psi	-65 to +300	12 hrs/24 hrs	764	Plastic Gasket
569	Brown	545	0.010	40/25 in lbs	-65 to +300	1 hr/24 hrs	764	Hydraulic Sealant
570	Brown	592	N/A	25/40 in lbs	-65 to +300	6 hrs/72 hrs	764	Steam Sealant
571	Brown	592	0.015	40/20 in lbs	-65 to +300	2 to 4 hrs/24 hrs	764	Pipe Sealant
572	White	578.575	N/A	80/27 in lbs	-65 to +300	24 hrs/72 hrs	None	Gasketing
592	White		0.020	500 psi	-65 to +400	4 hrs/72 hrs	736	Pipe Sealant with Teflon
593	Black		0.250	400 psi	-95 to +400	30 min/24 hrs	N/A	RTV Silicone
601	Green	609	0.005	3000 psi	-65 to +300	10 min/24 hrs	764	Current PIN #609
609	Green		0.005	3000 psi	-65 to +300	10 min/24 hrs	764	General Purpose Retaining Compound
620	Green	640	0.015	3000 psi	-65 to +450	30 min/24 hrs	747	High Temperature Retaining Compound
635	Green	680	0.010	4000 psi	-65 to +300	1 hr/24 hrs	747	High Strength Retaining Compound
638	Green	680	0.015	4100 psi	-65 to +300	10 min/24 hrs	747	High Strength Retaining Compound
640	Green	620	0.007	3000 psi	-65 to +400	1 hr/24 hrs	747	High Temperature Retaining Compound
660	Silver		0.020	3000 psi	-65 to +300	20 min/24 hrs	764	Quick Metal
675	Green	609	0.005	3000 psi	-65 to +300	20 min/24 hrs	747	General Purpose Retaining Compound
680	Green	635	0.015	4000 psi	-65 to +300	10 min/24 hrs	747	High Strength Retaining Compound
706	Clear	755	N/A	N/A	N/A	N/A	N/A	Cleaning Solvent
707	Amber		N/A	N/A	N/A	N/A	N/A	Activator for Structural Adhesives
736	Amber		N/A	N/A	N/A	N/A	N/A	Primer NF
738	Amber		N/A	N/A	N/A	N/A	N/A	Depend Activator
747	Yellow	N/A	N/A	N/A	N/A	N/A	N/A	Primer T
751	Clear		N/A	N/A	N/A	N/A	N/A	Activator for Structural Adhesives
755	Clear		N/A	N/A	N/A	N/A	N/A	Cleaning Solvent
764	Green		N/A	N/A	N/A	N/A	N/A	Primer N
767	Silver		N/A	N/A	-65 to +1600	N/A	N/A	Anti-Seize Lubricant

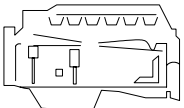
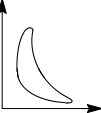
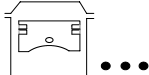
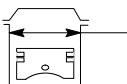
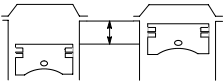
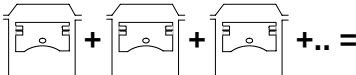
SECTION 1

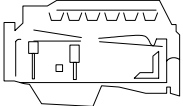
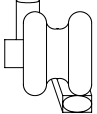
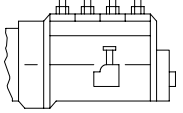
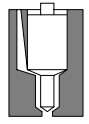
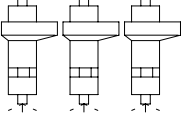
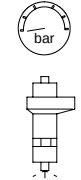
ENGINE

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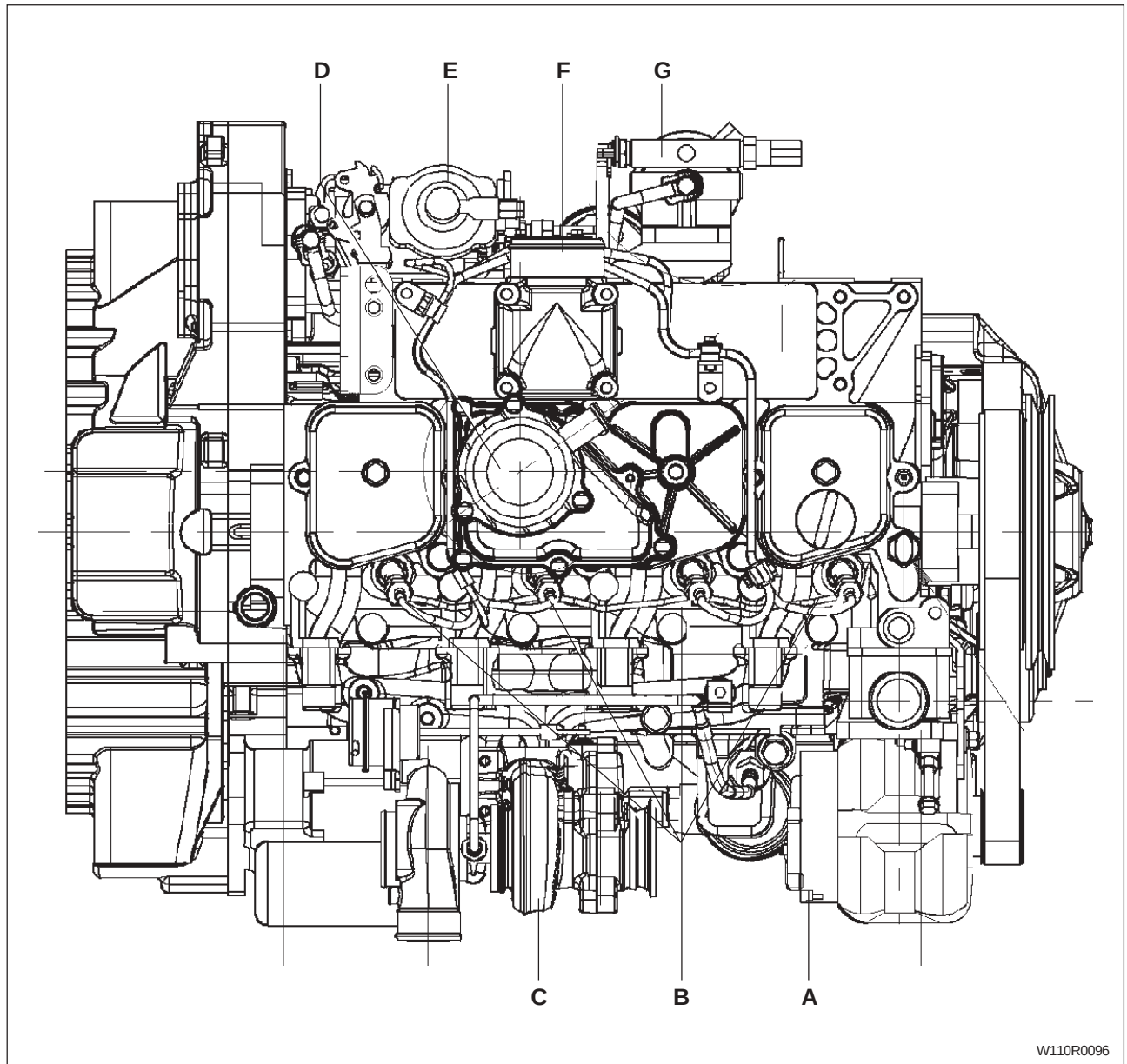
1.1 GENERAL FEATURES

	Type	F4GE0684F
	Cycle	Diesel 4-stroke
	Intake	Turbocharged w/aftercooler
	Injection	Direct
	Number of cylinders	6 in-line
	Bore	mm 104
	Stroke	mm 132
	Total displacement	cm ³ 6700
ρ	Compression ratio	17 : 1
	Maximum power	kW 111 (HP) 148 @ rpm 2000
	Maximum torque (kgm)	Nm 690 @ rpm 1200
	Engine low idle	@ rpm 1020 to 1080
	Engine high idle	@ rpm 2060 to 2180
	Maximum speed hydraulic stall	@ rpm 1925 to 2085
	Maximum speed transmission stall	@ rpm 1925 to 2085
	Maximum speed total stall (hydr. + transmission)	@ rpm 1340 to 1650

	Type	F4GE0684F
	TURBOCHARGING	w/ AFTERCOOLER
	CHARGING PRESSURE	1.10 ± 0.1 bar
	Turbocharger type:	HOLSET HX35W
	LUBRICATION	Forced by gear pump, pressure relief valve, oil filter
	Oil pressure with hot engine:	
	at low idle bar	1.2
	at high idle bar	3.8
	COOLING	Liquid
	Water pump drive:	Belt
	Thermostat starts opening at: °C (°F)	81 ± 2 (178 ± 3.6)
	INJECTION type Bosch	VE4/ 12F 1100
	Injector nozzles type	DSLA 145 P603
	Firing order	1 - 3 - 4 - 2
	Injection pressure bar	245

1.2 DESCRIPTION OF MAIN GROUPS

Upper view



W110R0096

Upper view

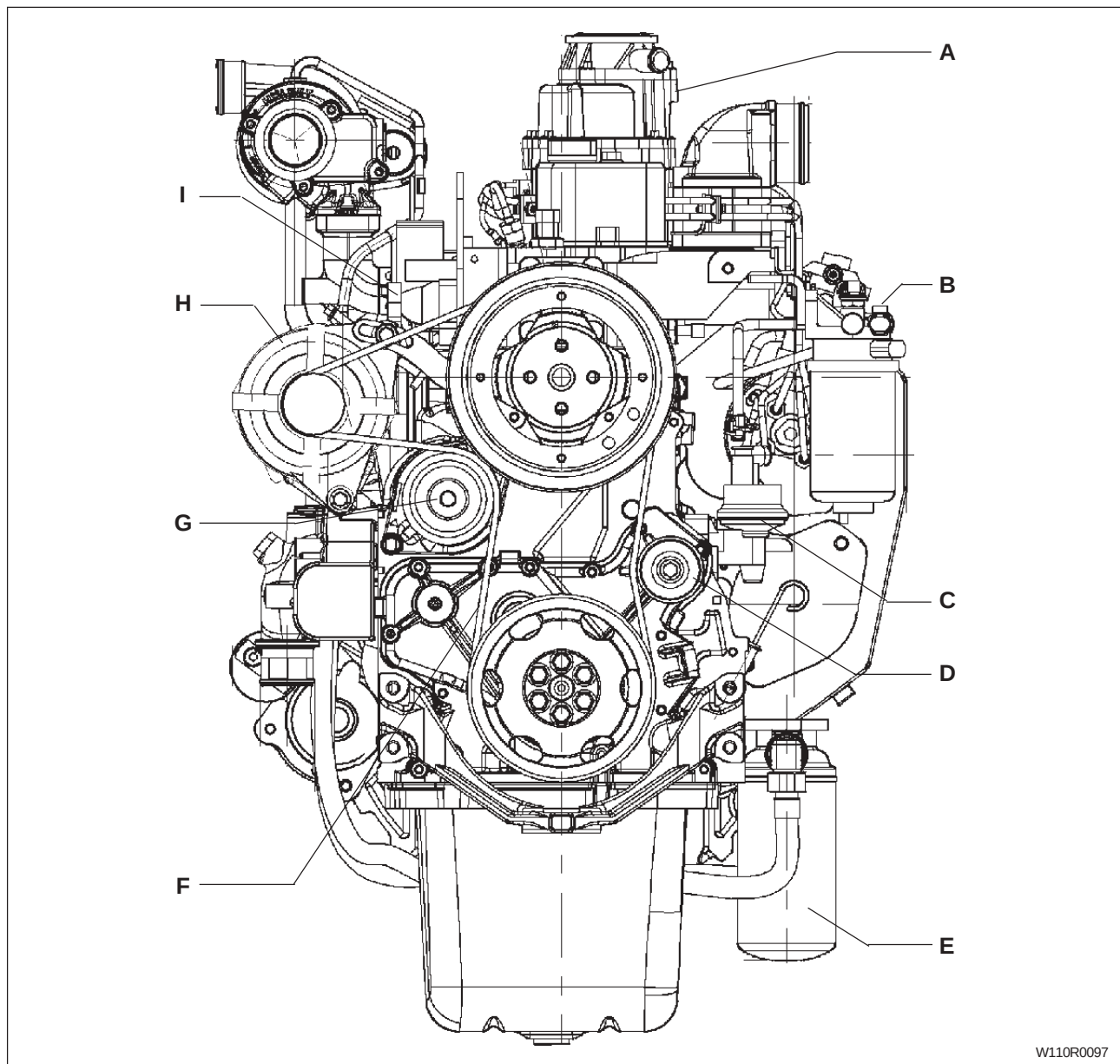
A. Alternator - B. Injectors - C. Turbocharger - D. Blow-by - E. Injection pump - F. Intake manifold - G. Fuel filter.



WARNING

Due to application requirements, some auxiliary groups can be located in different positions with respect to what illustrated in this section of the manual.

Front view



W110R0097

Front view

A. Blow-by - **B.** Fuel filter - **C.** Fuel pump - **D.** Idle pulley - **E.** Oil filter - **F.** Poly-V belt - **G.** Water pump - **H.** Alternator - **I.** Thermostat.

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