



FD80

HYDROSTATIC

CRAWLER DOZER

SERVICE MANUAL

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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.

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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.

Carefully read indications, cautions and safety warning quoted in the "SAFETY RULES" section.

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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, or mechanically, controlled equipment be certain the equipment is lowered to the ground before servicing, adjusting and/or repairing. If it is necessary to have the controlled equipment partially or fully raised to gain access to certain items, be sure the equipment is suitably supported by means of proper devices other than those used for controlling the equipment.

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HYDROSTATIC DOZER

Service 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.

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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.



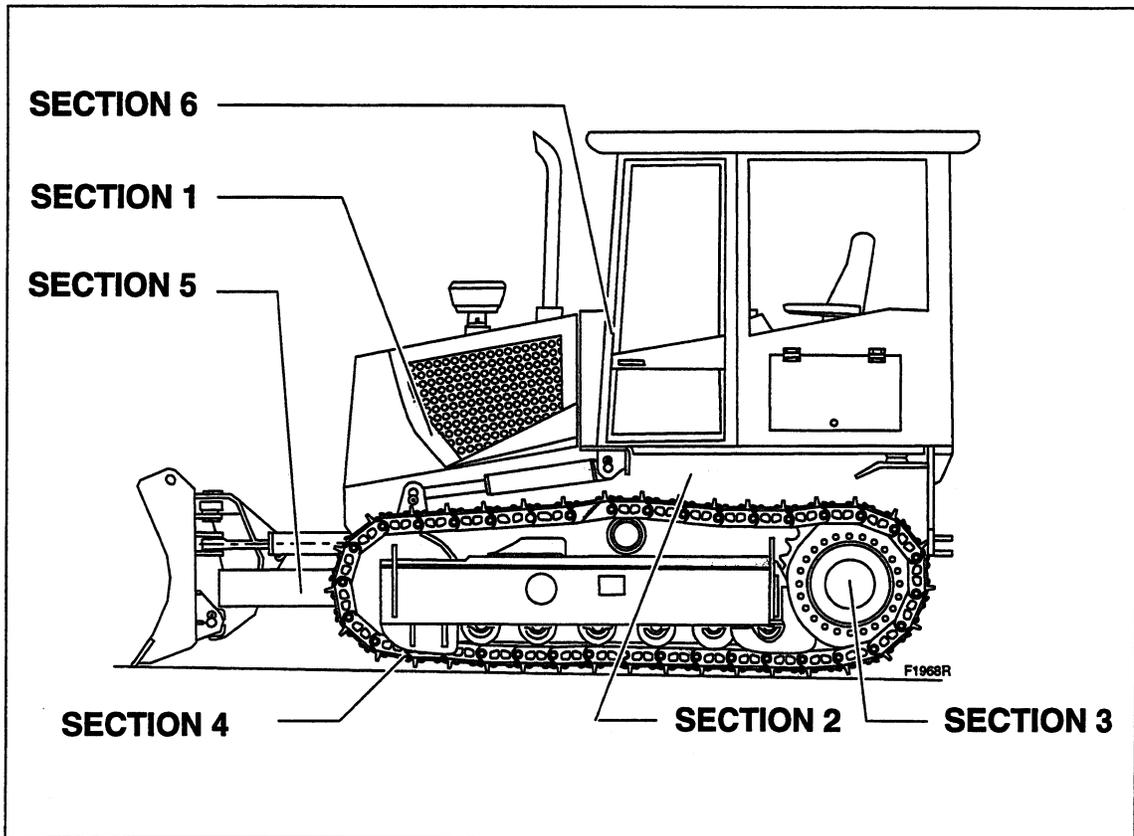
WARNING

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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WARNING

**Study this Manual before starting, operating, maintaining, fuelling or servicing the machine.
Read and heed all safety rules before any intervention.**

SAFETY RULES

- Do not allow unauthorised personnel to operate service or maintain this machine.
- Do not wear rings, wrist watches, jewellery, loose or hanging apparels, such as ties, torn clothing, scarves, unbuttoned or unzipped jackets that can catch on moving parts. Wear proper safety equipment as recommended for the job. Examples: hard hat, heavy gloves, ear protection, safety glasses or goggles, reflector vests, respirator. Consult your employer for specific safety equipment requirements.
- Keep operator's compartment, stepping points, grab-rails and handles clear of foreign objects, oil, grease, mud or snow accumulation to minimize the danger of slipping or stumbling. Clean mud or grease from shoes before attempting to mount or operate the machine.
- Do not jump on or off the machine. Keep two hands and one foot, or two feet and one hand in contact with step grab rails and handles at all times.
- Do not use controls or hoses as hand holds 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. Wear safety boots or shoes that have a high slip resistant sole material.
- Do not leave the machine until it is completely stopped.
- Check the seat safety belt at least twice a year. If there are signs of wear or fraying or other signs of weakness that could lead to failure, replace it.
- Be sure all protective guards or panels are in place, and all safety devices provided are in place and in good operating conditions.
- Be sure exposed personnel in the area of operation are clear of the machine before moving it or its attachments. **WALK COMPLETELY AROUND** the machine before mounting. Sound horn. Obey flag men, safety signals and signs.
- Before starting machine, check, adjust and lock the operator's seat for maximum comfort and control of the machine.
- Fasten your seat belt (when provided).
- Obey all flag signals and signs.
- Due to the presence on the machine of flammable fluids, never check or fill fuel reservoirs or batteries near open flames, smoking materials or sparks.
- **REMEMBER THAT STARTING FLUID IS FLAMMABLE.** Follow recommendations printed on containers and in the Operation and Maintenance Manual.
- **DO NOT PUNCTURE OR BURN CONTAINERS.**
- Containers must be stored in fresh, well ventilated places, out of reach of unauthorised persons. Follow strictly the instructions provided by the Manufacturer.
- Never use these products near open flames, smoking materials or sparks.

OPERATION

STARTING

- **NEVER START OR OPERATE AN UNSAFE MACHINE.** Before operating a machine, always ensure that any unsafe condition has been satisfactorily remedied.
- Check brakes, steering and attachment controls before moving. Advise the proper maintenance authority of any malfunctioning part or system.
- Do not run the engine of this machine in closed areas without proper ventilation to remove deadly exhaust gases.
- Roll Over Protective Structures are required on loaders, dozers, graders, excavators. **NEVER OPERATE** machines without ROPS.
- Make sure the Operator's compartment is free of foreign objects, especially if not firmly secured. Never use the machine to transport objects, unless proper securing points are provided.
- Check monitoring instruments at start-up and frequently during operation if the warning light signals an anomaly

SAFETY RULES

stop immediately the machine.

- DO NOT CARRY RIDERS ON MACHINE
- Study and familiarize with escape routes alternate to normal exit routes.
- Seat belts are required to be provided with Roll Over Protection Structures or cabs. Keep safety belts fastened around you during operation.
- For your personal protection, do not climb on or off machine while machine in motion.
- Make sure that exposed persons in the area of operation are clear of the machine, before starting the engine and operating the equipment. Obey all indications provided by flags and signals.
- Do not operate machinery in a condition of extreme fatigue or illness. Be especially careful towards the end of working shift.
- Operate the machine at speeds slow enough to ensure complete control at all times.
- Travel slowly over rough terrain, on slopes or near drop-offs, in congested areas or on ice or slippery surfaces.
- When backing, always look to where the machine is to be moved. Be alert to the position of exposed personnel. DO NOT OPERATE if exposed personnel enter the immediate work area. STOP THE MACHINE.
- Maintain a safe distance from other machines. Provide sufficient clearance for ground and visibility conditions. Yield right-of-way to loaded machines.
- Maintain clear vision of areas of travel or work. Keep cab windows clean and repaired.
- When machines are operating in tandem, the pusher (rear) must be equipped with the appropriate deflectors to protect the unit in front from the air stream coming from the radiator.
- When pulling or towing through a cable or chain, do not start suddenly at full throttle; take-up slack carefully. Inspect carefully for flaws or troubles before using.
- Avoid kinking chains or cables. Do not pull through a kinked chain or cable to the high stresses and possibility of failure of the kinked area. Always wear heavy gloves when handling chains or cables.
- Be sure chains and cables are anchored and the anchor points are strong enough to handle the expected load. Keep exposed personnel clear of anchor points and cables or chains.
- DO NOT PULL UNLESS OPERATOR'S COMPARTMENT OF MACHINES INVOLVED ARE PROPERLY GUARDED AGAINST POTENTIAL CABLE OR CHAIN BACKLASH.
- Be alert to soft ground conditions close to newly constructed walls. The fill material and weight of the machine may cause the wall collapse under the machine.
- In darkness, check area of operation carefully before moving in with machine. Use all lights provided. Do not move into area of restricted visibility.
- If engine has a tendency to stall for any reason under load or idle, report this for adjustment to proper maintenance authority immediately. Do not continue to operate machine, until condition has been corrected.
- On machines supplied with suction radiator fans, be sure to periodically check engine exhaust parts for leaks, as exhaust fumes are dangerous to the operator.
- In case of enclosed cabs, always let open a discharge to the outside, to ensure air circulation.
- Operators must know thoroughly the performances of the machine they are operating. When working on slopes or near sudden level drops of the terrain, avoid areas where ground is loose or soft since rolling-over or loss of control of machine could result.
- Where noise exposure exceeds 90 dBA for 8 hours, wear approved ear protection.
- When counterweights are provided, do not work machine if they have been removed.
- Overtaking manoeuvres must be performed only when absolutely necessary and unavoidable. Beware of possible uneven terrains, poor visibility conditions, the presence of other machinery or persons out of sight.
- Operate the machine at a speed adequate to the working conditions in the site and slow enough to ensure complete control at all times.
- Check monitoring instruments at start-up and frequently during operations. In case of abnormal condition warnings, stop immediately the machine.
- Never use the machine as a work platform or scaffolding, nor other inappropriate operations (i.e pushing railway cars, trucks or other machines).

SAFETY RULES

- Be alert of people in the operating area of the machine. When operating a machine, know what clearances will be encountered, overhead doors, cables, pipes, bearing load limitations of ground, bridges, floors or ramps.
- When roading, find-out what conditions are likely to be encountered, clearances, traffic congestion, type of road surfacing, etc. Beware of fog, smoke or dust elements that obscure visibility.
- When crossing gullies or ditches, move at an angle with reduced speed after ensuring ground conditions will permit a safe traverse.
- Explore the working area to identify potential risks such as: slopes, overhangs, pits, demolition rubble, fires, ravines, ditches, soft terrain, heavy traffic, crowded parking areas, closed ambients. In such conditions, proceed with extreme care.
- Whenever possible, avoid going over obstacles such as rough terrain, rocks, logs highly irregular ground, steps, ditches, railroad tracks. When obstructions must be crossed, do so with extreme care at an angle, if possible. Reduce speed, shift-down. Ease up to the break over point, pass the balance point slowly on the obstruction and ease down on the other side.
- In steep down-hill operation, do not allow engine to over-speed. Select proper gear before starting down grade.
- Avoid side hill travel, whenever possible. Drive up and down the slope. Should the machine slipping sideways, turn it immediately downhill.
- The grade of slope you should attempt will be limited by factors such as condition of the ground, load being handled, type of machine, speed of machine and visibility.
- There is no substitute for good judgement when working on slopes.
- Avoid operating equipment too close to an overhang or high wall, either above or below the machine. Be on the look-out for caving edges, falling objects and slides. Beware of concealment by brush and undergrowth of these danger.
- When pushing-over trees, the machine must be equipped with proper overhead guarding. Never allow a machine to climb up on the root structure particularly while the tree is being felled. Use extreme care when pushing over any tree with dead branches.
- Avoid brush piles, logs or rocks. NEVER DRIVE OVER THEM or other surface irregularities that brake traction with the ground, especially when on slopes or near drop-offs.
- Be alert to avoid changes in traction conditions that could cause loss of control. DO NOT DRIVE on ice or frozen ground conditions when working the machine on steep slopes or near drop-offs.
- Working in virgin and rough terrains is characterized by the presence of all the perils and risks listed above. In these conditions, it is emphasised the danger represented by large tree limbs (possibly falling on the machine), large roots (acting as a leverage under the machine when up-rooted causing the roll-over of the unit) etc..

STOPPING

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

SAFETY RULES

- Securely block the machine and lock it every time you leave it unattended. Return keys to authorized security. Heed all shut-down operations of the Operation and Maintenance Instruction Manual are followed. Every time you leave the machine, engage parking brake (if equipping unit).

MAINTENANCE

GENERALITIES

- Before operating or performing any intervention on the machine:
 - read carefully all the rules contained by this Manual;
 - read and obey all safety related plates and instructions located on the machine.
- Do not allow unauthorized personnel to perform any maintenance operation. Do not perform maintenance operation without prior authorization. Follow all recommended maintenance and service procedures.
- Keep operator's compartment free of all loose objects that are not properly secured.
- 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 recommended for the job. Examples: hard hat, heavy gloves, ear protection, safety glasses or goggles, reflector vests, respirator. Consult your employer for specific safety equipment requirements.
- Do not use controls or hoses as handholds when climbing on or off the machine. These components are movable and do not provide a solid support. Controls may also be moved unintentionally causing accidental machine or equipment movements.
- Do not jump on or off the machine. Keep two hands and one foot, or two feet and one hand in contact with steps and grab rails and handles at all times.
- Do not perform any service operation on the machine with a person seated in the operator's compartment, unless he is an authorized operator co-operating in the operation to be performed.
- Keep operator's compartment, stepping points, grab-rails and handles clear of foreign objects, oil, grease, mud or snow accumulation to minimize the danger of slipping or stumbling. Clean mud or grease from shoes before attempting to mount or operate the machine.
- Keep shoes free of mud or grease before climbing or driving the machine.
- Never attempt to operate the machine or its tools from any position other than seated in the operator's seat.
- When maintenance operations require moving hydraulically operated attachments by means of machine's hydraulic system remember that all manoeuvres must be made only when seated in the operator's seat. Before starting machine or moving attachment or tools, set brakes, sound horn and call for an all clear. Raise attachment slowly.
- Always block with external supports any linkage or part on machine that requires work under the raised linkage, part or machine. Never allow anyone to walk under or be near unblocked raised equipment. Unless you are positively sure that total safe condition exists, avoid staying under raised equipment, even if blocked.
- Never place head, body, limbs, fingers, feet or hands into exposed portions between uncontrolled or unguarded scissor points of machine without first providing secure blocking.
- Never perform interventions with engine running, except as called for in a Manual. Do not wear loose clothing or jewellery near moving parts.
- When servicing or maintenance require access to areas that cannot be reached from the ground, use a ladder or step platform that meet local and national regulations, to reach the service point. If such ladder or platform are not available, use the machine hand holds and steps as provided. Perform all service or maintenance carefully.
- Shop and/or field service platforms or ladders must be constructed and maintained in accordance with local and national regulations.
- Disconnect batteries and microprocessor. TAG all controls according to current regulations to warn that work is in progress. Block machine and all attachments that must be raised according to current regulations. Due to the presence of flammable fluids, never check or fill fuel tanks, batteries, nor use starting fluid near lighted smoking materials or open flames.
- BRAKES ARE INOPERATIVE when manually released for servicing. Provisions must be made to maintain control of the machine by blocking or other means.
- The fuel filling nose must be kept constantly inside the filling neck. Keep this contact from the beginning to the end of the fuelling operation to avoid the possibility that sparks due to static electricity are generated.
- Use only designated towing or attaching points. Use care in making attachments. Make sure pins and/or locks are secure before pulling. Stay clear of drawbars, cables or chains under load.
- To move a disabled machine, use a trailer or a low-boy, if available. In case towing is needed, use all necessary signals required by local and national regulations, and follow the directions provided in this Manual.

SAFETY RULES

- To load/unload a machine from transporter, choose a level surface ensuring firm support to the wheels of truck or trailer. Use strong access ramps, with adequate height and angle. Keep surface free of mud, oil or slippery materials.
- Anchor the machine securely to the bed of truck or trailer and block wheels or tracks with appropriate wedges.
- Never align holes with fingers or hands; always use appropriate aligning tools.
- Eliminate all sharp edges and burrs from re-worked parts.
- Use only approved grounded auxiliary power sources for heaters, chargers, pumps and similar equipment to reduce the hazards of electrical shocks.
- Lift and handle heavy parts with a lifting device of proper capacity. Be sure parts are supported by proper slings and hooks. Use lifting eyes if provided. Watch-out for people in the vicinity.
- Never pour gasoline or diesel fuel into open, wide and low containers. Never use gasoline, solvent or other flammable fluid to clean parts. Use exclusively qualified, non-flammable, non-toxic commercial solvents.
- When using compressed air for cleaning parts, use safety glasses with side shields or goggles. Limit pressure to 2 bar, in accordance with local and national regulations.
- Do not run the engine in closed areas without proper ventilation to remove deadly exhaust fumes.
- Do not smoke or permit any open flames or spark near when re-fuelling or handling flammable materials.
- Do not use an open flame as a light source to look for leaks or for inspection anywhere on the machine.
- Make sure that all mechanic's tools are in good conditions. NEVER USE tools with mushroomed heads or frayed. Always wear eye protections.
- Move with extreme care when working under the machine, its attachments and on or near them. Always wear protective safety equipment as required, such as hard hat, goggles, safety shoes, ear plugs.
- When performing operations requiring running of the engine, have a qualified operator in the operator's seat at all times with the mechanic on sight. Place the transmission in neutral and set the brakes and safety lock. KEEP HANDS AND CLOTHING AWAY FROM MOVING PARTS.
- For field service, move machine to level ground, if possible, and block it. If work on an incline is absolutely necessary, first block machine and its attachments securely, than move it to level ground as soon as possible.
- Do not trust worn and /or kinked chains and cables; do not use them for lifting or pulling operations. To handle them, always use heavy gloves.
- Avoid kinking chains or cables. Do not pull through a kinked chain or cable to the high stresses and possibility of failure of the kinked area. Always wear heavy gloves when handling chains or cables.
- Be sure chains and cables are anchored and the anchor points are strong enough to handle the expected load.
- Keep exposed personnel clear of anchor points and cables or chains.
- DO NOT PULL UNLESS OPERATOR'S COMPARTMENT OF MACHINES INVOLVED ARE PROPERLY GUARDED AGAINST POTENTIAL CABLE OR CHAIN BACKLASH.
- Keep the area where maintenance operations are performed CLEAN and DRY. Eliminate immediately all water and oil spillages.
- Do not pile oily or greasy rags; they represent a fire hazard. Store in closed metal container.
- Before starting machine, check, adjust and lock the operator's seat for maximum comfort and control of the machine. Be sure exposed personnel in the area of operation are clear of the machine before moving it or its attachments. Sound horn.
- Rust inhibitors are volatile and flammable. Use only in well ventilated areas. Keep open flames away - DO NOT SMOKE - Store containers in a cool well ventilated place, secure against unauthorised personnel.
- Do not carry loose objects in pockets that might fall unnoticed into open compartments.
- Wear proper protective equipment such as safety goggles or safety glasses with side shields, hard hat, safety shoes, heavy gloves when metal or other particles are apt to fly or fall.
- 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 zones. DO NOT LOOK AT ARC WITHOUT PROPER EYE PROTECTION.
- Know your jacking equipment and its capacity. Be sure the jacking point used on the machine is appropriate for the load to be applied. Be sure the support of the jack at the machine and under jack is appropriate and stable.

SAFETY RULES

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

- Steel cables are frayed after prolonged use; always wear appropriate protections (heavy gloves, goggles etc.).
- Handle all parts carefully. Keep hands and fingers away from structures, gears or moving parts. Use and wear always the appropriate protections
- Compressed air systems can have water deposits created by moisture condensation due to changes of atmospheric conditions. If required, discharge deposits, as instructed.

STARTING

- Do not run the engine in closed areas without proper ventilation to remove deadly exhaust fumes.
- Do not place head, body, limbs, feet, hands or fingers, near rotating fans or belts. Be especially alert near pusher fans.
- **REMEMBER THAT STARTING FLUID IS FLAMMABLE.** Follow recommendations printed on containers and in the Operation and Maintenance Manual.
- Containers must be stored in fresh, well ventilated places, out of reach of unauthorised persons. Follow strictly the instructions provided by the Manufacturer. **DO NOT PUNCTURE OR BURN CONTAINERS.**

ENGINE

- Loosen the radiator cap very slowly, to release pressure from the system, before removing it. All coolant level top-ups must be performed with engine OFF.
- Avoid that flammable materials touch exhaust parts. Should this be possible, provide the necessary protections.
- Do not run engine when refuelling and use care if the engine is hot due to the increased possibility of a fire if fuel is spilled.
- Never attempt to check or adjust fan belts when engine is running.
- Do not adjust engine fuel pump when machine is moving.
- Do not lubricate the machine with engine running.

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

ELECTRICAL SYSTEM

- Always disconnect batteries and microprocessor prior to any intervention on machine or electrical system (cleaning, repair, maintenance).
- Should booster batteries be used, remember to connect both ends of the booster cables in the proper manner (+) with (+) and (-) with (-). Avoid short-circuits of the terminals. Follow thoroughly the instructions of this Manual.
- Before any intervention, make sure that the main switch is OFF.
- **BATTERY GAS IS HIGHLY FLAMMABLE.** Leave battery box open to improve ventilation when recharging batteries. Never check charge by placing metal objects across the posts. Keep sparks or open flames away from batteries. Do not smoke near battery to guard against the possibility of causing an explosion.
- Before any intervention, make sure that there are no fuel or electrolyte leakages; eliminate them before proceeding with further work. Do not charge batteries in closed areas: ensure enough ventilation to prevent the possibility of accidental explosions due to accumulation of gases generated during the recharging.

HYDRAULIC SYSTEM

- Fluid escaping under pressure from a very small hole can be almost invisible and can have sufficient force to penetrate the skin. Use a piece of cardboard or wood to search for suspected pressure leaks. **DO NOT USE HANDS.** If injured by escaping fluid, see a doctor at once. Serious infection or reaction can develop if proper medical treatment is not administered immediately.
- Stop the engine and release all pressures in the system before removing panels, housings, plugs or covers.
- In case pressures must be measured, use instruments of adequate capacity. Always follow the recommended procedures.

TOOLS

- Keep head, body, limbs, feet, fingers or hands away from bucket, blade or ripper when in raised position.
- Prior to any intervention, install all safety devices according to current rules and regulations. In case

SAFETY RULES

equipment on the machine must be operated by hydraulic systems, remember to proceed only after seating in the operator's compartment. Make sure that there are no persons in the operating area of the machine. Alert people before operating using the horn and by voice. Move the equipment very carefully.

- Do not use machine to transport loose objects, unless proper devices for this purpose are provided.
- Clutches and brakes of this machine and eventual auxiliary equipment and attachments (such as operating

cylinder or winches control valves) must always be properly adjusted in accordance with the instructions provided by the Manuals of the Manufacturer. Never perform adjustments with engine running, except when called for by the above instructions.

- Do not proceed with adjustments with engine running, unless required by prescribed procedures.



WARNING

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

SAFETY RULES

SAFETY RULES FOR SEALS

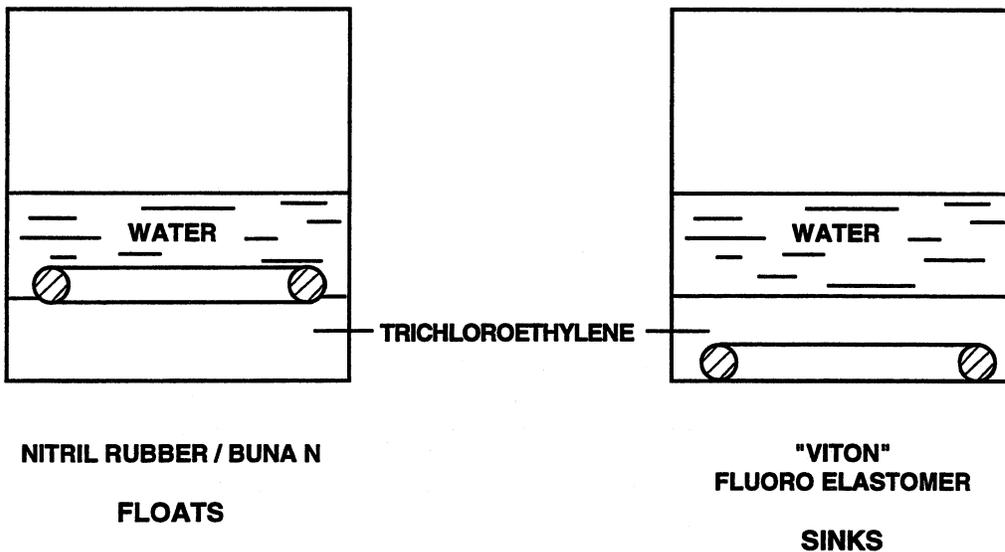
VITON SEALS (fluoro - elastomer)

Seals, especially Viton made O-rings normally coloured red) are used in systems operating at high temperatures, considering the resistance of this material to the effects of heat. However, should this material be subject to temperatures exceeding 315°C (600°F) - in practice only in case of a fire or subject to the flame of an oxyacetylene torch - hydrofluoric acid is generated. **This acid is highly corrosive and can cause severe burns** if in contact with the skin.

Every time it is necessary to intervene on components equipped with Viton rings, and there is the suspicion that they have been exposed to excessive temperatures the following procedures must be applied:

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

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



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DOZER

TECHNICAL DATA TABLES

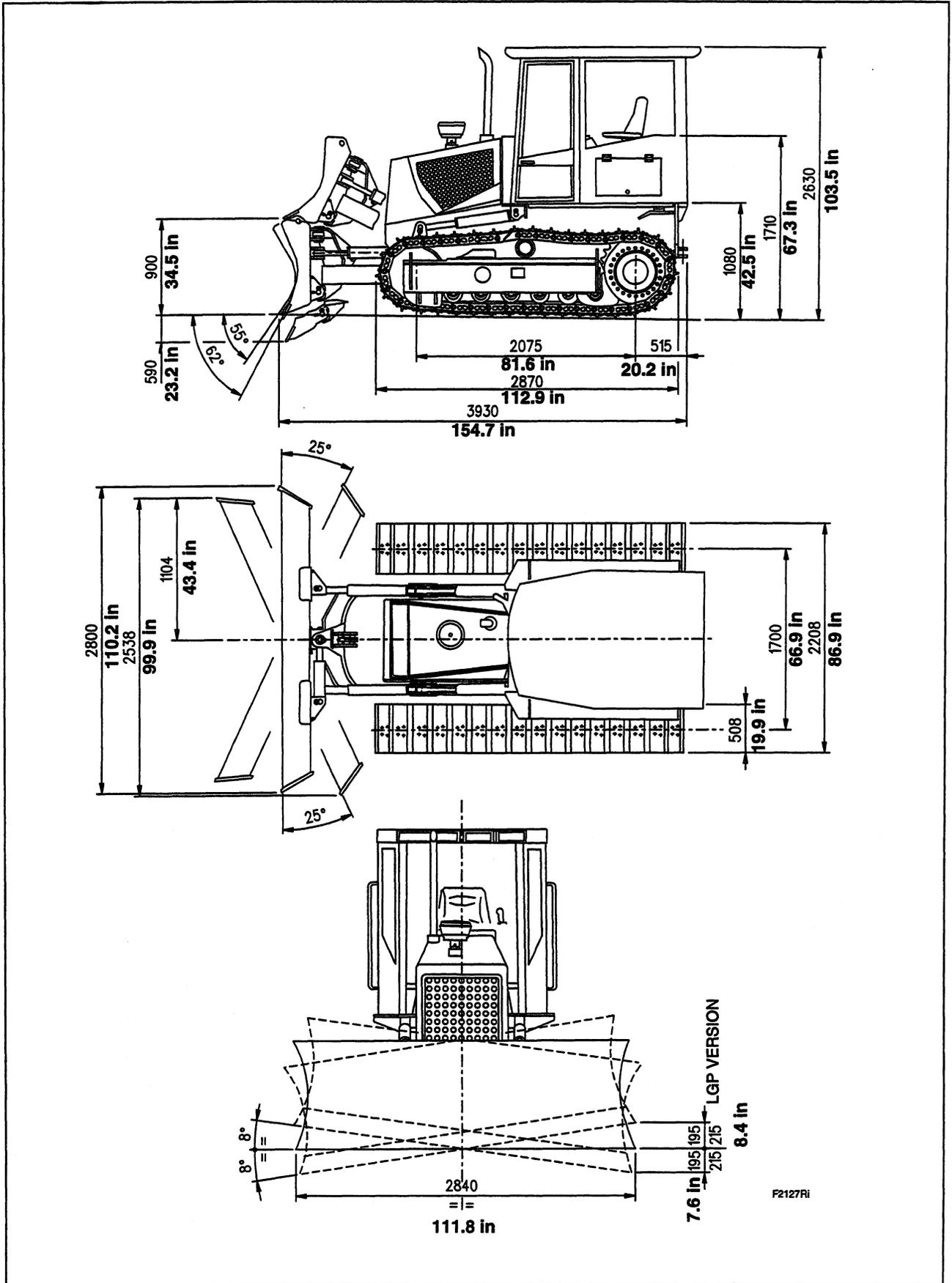


Fig. 0-1

Studio 81, Imador 05708 [60406341]

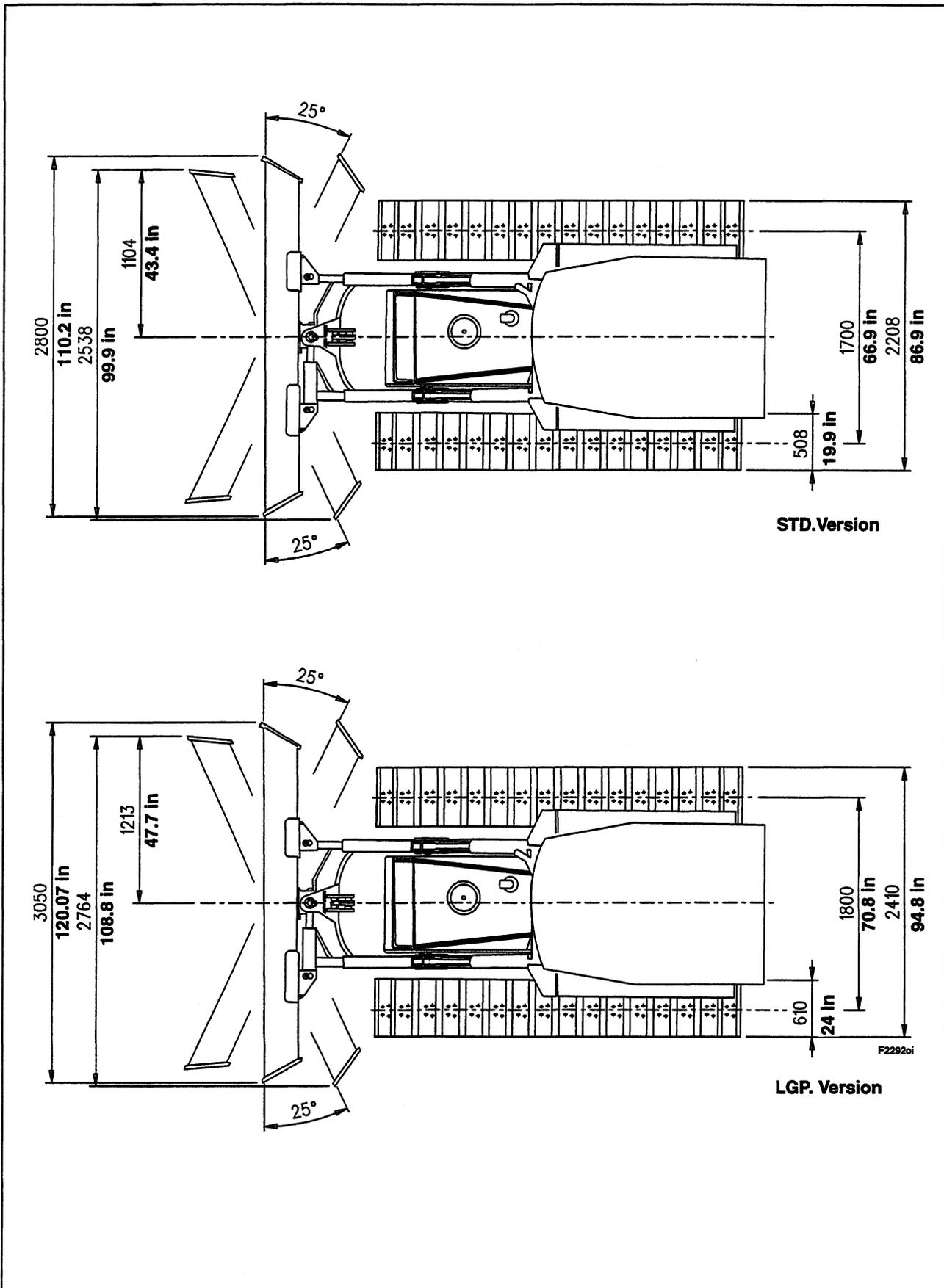


Fig. 0-2

DIMENSIONS	Overall length (bare tractor)		mm	2870
	Overall length (with blade)		in	112.9
			mm	3930
			in	154.7
	Overall width (bare tractor)		mm	2208
	(LGP- version 610 mm / 24 in shoes)		in	86.9
			mm	2410
		in	94.8	
Overall width with blade (bare tractor)		mm	2800	
		in	110.2	
(LGP version)		mm	3050	
		in	120.7	
Overall height with ROPS canopy		mm	2630	
		in	103.5	
Track gauge (bare tractor)		mm	1700	
(LGP version)		in	66.9	
		mm	1800	
		in	70.8	
Minimum distance from ground		mm	400	
		in	15.7	
Length of track on ground		mm	2075	
		in	81.6	
Track shoe width (standard)		mm	508	
		in	19.9	
Track shoe width (LGP version)		mm	610	
		in	24	
MASS	Shipping weight (including ROPS canopy, blade lift cylinders, lubricants, coolant, 10% fuel)			
	- bare tractor		kg	7500
		pounds	16534	
- LGP version		kg	7600	
		pounds	16754.5	
PERFORMANCE	SPEEDS	Fwd 1st	Km/h	0 - 3.9
			miles/h	0 - 2.4
		Fwd 2nd	Km/h	0 - 10
			miles/h	0 - 6.2
		Rev 1st	Km/h	0 - 3.9
			miles/h	0 - 2.4
		Rev 2nd	Km/h	0 - 10
		miles/h	0 - 6.2	
NOISE LEVEL	Inside cab standard (Lpa)	CEE 89/514	dB	84
	Outside (Lwa)	CEE 89/514	dB	106
GROUND PRESSURE	Track shoes width 508 mm / 20 in		Kg/cm ²	0.35
			pound/in ²	0.024
	LGP shoes 610 mm / 24 in wide		Kg/cm ²	0.30
		pound/in ²	0.021	
(With blade and ROPS cab)				
GRADEABILITY	(1st speed)		degree	45
			gradient	100%

Studio H. Imada 05798 60406841

ENGINE	Engine	CUMMINS 4 BT 3.9 C "ELITE"
	Type	4 - cycle, in line vertical type direct injection, turbocharged, aftercooled
	Bore x stroke	102 x 120 mm / 4.01 x 4.7 in
	Displacement	3920 cm ³ / 239.1 in ³
	Number of cylinders	4
	Net flywheel power (DIN 6270)	69.5 kw/min - 94 HP at 2200 rev/min
	Net flywheel power (ISO 9249)	62.5 kw/min - 83.7 HP at 2100 rev/min
	Net flywheel power (CEE 80/1269)	62.5 kw/min - 83.7 HP at 2100 rev/min
	Max net torque	35.8 daNm (36.5 kgm) at 1400 rev/min
	Governed speed	2200 rev/min
	Low idling	900 rev/min
	Fuel consumption ratio (max torque)	158 rev/Cv-h - 215 rev/kW-h
	Cranking motor	12 V
	Alternator	12 V - 60 A
	Battery	12 V - 180 Ah
	Radiator	Air - water oil with tubes and line cores
	Core size	695 x 780 x 133 mm / 27.3x30.7x5.2 in
Radiator cap pressure	0.75 bar / 75 kPa	
Fan	Blower steel sheet, 12 blades, diameter 610 mm / 24 in	
Air cleaner	Dry type, two state with safety element and centrifugal separator, restrictor indicator	
Muffler	Horizontal dimensions 170 x 540 mm / 6.6 x 22.4 in	

HYDROSTATIC TRANSMISSION	Type	Hydrostatic with closed circuit, with dual variable displacement pump and variable displacement motors.
	Transmission pump	With direct piloting by means of a hydraulic servocontrol and automatic adjustment depending on available power controlled by a microprocessor. Pump max. capacity : 2 x 130 l/min 2 x 34.3 gal/min Operating pressure : 420 bar 4200 kPa
	Transmission filter	Delivery Oversupply Filter with cartridge wet of resin 10 mm/0.3 in
	Pilot control valve (manipulator)	No. 1 joystick on the left of the operator's seat for forward and reverse gears and back-up alarm. Right and left counterrotation.
	Speed change	Electrical speed commutator: two positions 1 st and 2 nd
	Supercharging hydraulic pump	Gear type MIN 20 bar / 2000 kPa MAX 35 bar / 3500 kPa

POWER TRAIN SYSTEM	Brake		<p>The reductor unit is supplied with a safety negative multidisc brake hydraulically driven (parking brake).</p> <p>Nbr. of steel discs 5 Nbr. of sintered discs 6 Nbr. of springs 18 Minimum brake release pressure 13 bar 1300 kPa Maximum brake release pressure 50 bar 5000 kPa Braking torque 60±10% daNm</p>
	Travelling reductor units	<p>TECHNICAL DATA Nominal torque 2500 daNm Max output torque 3500 daNm Ratios 1:35.32 Peak input speed 3500 rev/min - 123.4 ounces/min Oil quantity 4.5±10% l. - 1.18±10% gal Weight without oil 285±10% kg - 628.3±10% pounds Code 711 C2 B30 C 35 H6 GU (2T263300508)</p> <p>TECHNICAL DATA BRAKE Braking torque 60 daNm Min release pressure 13 bar / 1300 kPa Max operating pressure 50 bar / 5000 kPa</p>	
	Sprocket		bolt-on segment type
	Total No. of teeth	25	
	Pitch diameter	625 mm/155.57 mm 24.6 in / 6.12 in	
	Tooth width	51 mm 2.007 in	
TRACK	Track frames	Box section type fixed.	
	Lubrication system	Rollers, idlers, pins and bushing, sealed and permanently lubricated	
	Idlers	With hydraulic track adjuster	
	Carrier rollers (each side)	1	
	Track roller (each side)	6	
	Track shoe 508 mm / 20 in (standard)	Assembly type single grouser, on each side	
	Track shoe 610 mm / 24 in (LGP)		
	Grouser height	84 mm	
Link pitch	155.57 mm		

LOWER IMPLEMENTS HYDRAULIC SYSTEM	IMPLEMENTS HYDRAULIC PUMP	Type Capacity at governed speed Relief valve pressure	Gear type 54 l/min - 14.26 gal/min 180 bar / 18000 kPa
	MAIN CONTROL VALVE	Type Specifications	Three spools Lower - raise Blade left and right tilt control Tilt blade control Tandem circuit Capacity 70l/min (nominal), safety valves on each circuit.
	FRONT IMPLEMENT JOYSTICK	*Functions	
	HYDRAULIC TANK	Type	Box type
	HYDRAULIC FILTERS	Return	Out of tank, microfiber type and 25 micron filter capacity with by-pass (pressure cal. 0.3 bar).
	LIFT CYLINDERS	Type Cylinder bore Piston stroke Outside diameter of piston rod Max distance between pins Min distance between pins	Double acting 80 mm / 3.14 in 423 mm / 16.6 in 45 mm / 1.77 in 1158 mm / 45.59 in 735 mm / 28.9 in

* The angle has an electrical button and can be operated in any position.

Studio H Imola 05/98 [60406841]

IMPLEMENT	Type		Multiple box section with lower reversible cutting sectors with ribbings.	
	Blade support		Brace type (tilt cylinder on left).	
	DIMENSIONS	Blade width	STANDARD 2800 mm / 110.23 in	LGP 3050 mm / 120.07 in
		Blade height	875 mm / 34.4 in	875 mm / 3.44 in
	PERFORMANCE	Max lifting height from ground	900 mm / 35.4 in	900 mm / 35.4 in
		Max lowering depth from ground	590 mm / 23.22 in	590 mm / 23.22 in
Max tilt		390 mm / 15.35 in	390 mm / 15.35 in	
Cutting angle range		55°- 62° - 131°F / 143.6 °F (two mechanics position)		
Moldboard volume		1.53 m ³ / 2.001 yd ³	1.53 m ³ / 2.001 yd ³	
TILT - HYDR. CYLINDER BULLDOZER	Type	Double acting		
	Cylinder bore	80 mm / 3.14 in	80 mm / 3.14 in	
	Piston stroke	150 mm / 5.9 in	150 mm / 5.9 in	
	Outside diameter piston rod	45 mm / 1.77 in	45 mm / 1.77 in	
	Max distance between pin	655 mm / 25.7 in	655 mm / 25.7 in	
	Min distance between pins	505 mm / 19.8 in	505 mm / 19.8 in	
ANGLE CYLINDER	Type	Double acting		
	Cylinder bore	80 mm / 3.14 in	80 mm / 3.14 in	
	Piston stroke	45 mm / 1.7 in	45 mm / 1.7 in	
	Outside diameter piston rod	423 mm / 16.6 in	423 mm / 16.6 in	
	Max distance between pins	1158 mm / 45.5 in	1158 mm / 45.5 in	
	Min distance between pins	735 mm / 28.9 in	735 mm / 28.9 in	

COLANT AND LUBRICANT

ITEM	Q.TY (Liter/Gallons)	MANUFACTURE PRODUCT	REFILL (International classification)	VISCOSITY	AMBIENT TEMPERATURE (C°)
COOLING SYSTEM	30 / 7.9	PARAFLU 11	50 - 50 mixture of water and reputable high quality commercial permanent fluid providing adequate oxidation, foaming, corrosion, scaling and freezing protection down to -35°C (-31°F)	-	-
FUEL TANK	190 / 50.19	-	Diesel fuel ASTM N.2-D grade TT of reputable quality and make	-	-
ENGINE	10 / 2.6	-	Engine oil "CCMC D4" "API CF4" "MIL - L - 2104 E Level"	SAE 15W-40	-15°C/+5°F + +40°C/+104°F
PUMP DRIVERS	1 / 0.26	-	API GL 5	SAE 85W/90	-15°C/+5°F +40°C/+104°F
HYDRAULIC SYSTEM	80 / 21.13	-	Hydraulic oil DIN 51524/2 or MIL - H - 46152 B	ISO VG 68	-10°C/+23°F + +30°C/+86°F
TRAVELLING REDUCTION UNITS (each)	4.5 / 1.18	-	API GL 5	SAE 85W/90	-15°C/+5°F +40°C/+104°F
TRACK IDLERS AND ROLLERS	-	-	Engine oil "CCMC D4" "API CF4" "MIL - L - 2104 E Level"	SAE 15W-40	-15°C/+5°F + +40°C/+104°F
GREASE FITTINGS	-	TUTELA G9	Lithium - calcium base grease N.L.G.I. N. 2 consistency	-	-

NOTE: The quantities of oil indicated are those required for first supply.
If fuel sulphur content is over 0.5% change engine oil as follows:

% sulphur	Periodic change
0.5 to 10%	Half normal interval
Over 1.0%	Quarter normal interval

		STANDARD VALUE	PERMISS. VALUE
HYDROSTATIC TRANSMISSION OPERATING PRESSURES	Forward Max pressure	430 bar 43000 kPa	± 5
	Reverse Min pressure	430 bar 43000 kPa	± 5
STEERING MANIPULATOR PRESSURE SETTINGS	Pilot pressure: Min Max	20 bar / 2000 kPa 35 bar / 3500 kPa	+0,5 ± 2
BRAKE VALVE PRESSURE SETTINGS	Brake pressure Brake lever travel Min Max	20 bar / 2000 kPa 35 bar / 3500 kPa	± 1 -
WORK EQUIPMENT HYDRAULIC SYSTEM CALIBRATION	Operating pressure at governed speed	180 bar / 18000 kPa	± 5
	Max pressure valves calibration (flow 54 l/min - 14.26 gal/min, oil temperature 80°C / 176°F) Principal Secondary	180 bar / 18000 kPa 210 bar / 21000 kPa	± 7 ± 5

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Study SAFETY RULES in the front of this manual thoroughly for the protection of machine and safety of personnel.