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FX 210

Service Manual

Print No. 604 06 755

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.

FX 210

hydraulic excavator

Service Manual

Print No. 604 06 755

NOTICE

"Neither the Factory nor any organization in its distribution chain, including but not limited to national, regional of 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 product manufactured or merchandized by the Factory.
In any case, no warranty of any kind is made or shall be imposed with respect to product manufactured of merchandized by the Factory when failures are caused by the parts and/or components not approved by the Factory.

IMPORTANT

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

SAFETY RULES

GENERAL

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

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

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

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

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

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

Never exceed the lifting capacity of the machine.

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

Be careful when the sprocket is under the cab; the direction of movement of the transport levers will be opposite of direction of machine movement.

Know the working range of the machine.

Always check height, width and weight restrictions in the working area, and be sure the machine will not exceed these limitations.

Provide clearance for rear super-structure swing by barricading area to discourage entry.

Use recommended buckets for machine, taking into account weight of material, loadability and heaping characteristics of material, terrain and other pertinent job factors.

When counterweights have been provided, do not work machine if they have been removed.

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

Do not use controls or hoses as handholds when climbing on or off machine. Hoses and controls are movable and do not provide a solid support. Controls also may be inadvertently moved causing accidental machine or equipment movement.

Keep operator's compartment stepping points, grab rails and handles clear of foreign objects, oil, grease, mud or snow accumulation, to minimize the danger of slipping or stumbling. Clean mud or grease from shoes before attempting to mount or operate the machine.

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

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

Never leave the machine unattended with the engine running.

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

Do not wear rings, wrist watches, jewelry, loose or hanging apparel, such as ties, torn clothing, scarves, unbuttoned or unzipped jackets that can catch on moving parts. Do wear proper safery equipment as authorized for the job. Examples: hard hat, safety shoes, heavy gloves, ear protectors, safety glasses or goggles, reflector vests, or respirators. Consult your employer for specific safety equipment requirements.

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

Do not use machine to carry loose objects by means other than attachments for carrying such objects.

No machine should ever be used as a work platform or scaffolding. Other unorthodox uses (such as pushing trucks or other machinery) should be avoided.

Always be aware of presence of people in the work site. Adjust all mirrors for visibility towards the rear of the machine.

Never use the bucket or attachment as a man lift or allow riders on the machine.

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

Do not operate this machine without a Falling Object Protective Structure.

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

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

To move a disabled machine, use a trailer or low boy truck if available. If towing is necessary, provide warning signals as required by local rules and regulations and follow Operation and Maintenance Instruction Manual recommendations. Load and unload on a level area that gives full support to the trailer wheels. Use ramps of adequate strenght, low angle and proper

height. Keep trailer bed clean of clay, oil and all materials that become slippery. Tie machine down securely to truck or trailer bed and block tracks (or wheels or superstructure as required by the carrier).

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

STARTING FLUID IS FLAMMABLE. Follow the recommendations as outlined in the Operation and Maintenance Instruction Manual and as marked on the containers. Store containers in cool, well-ventilated place secure from unauthorized personnel. DO NOT PUNCTURE OR BURN CONTAINERS. Follow the recommendations of the manufacturer for storage and disposal.

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

OPERATION

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

DO NOT START OR OPERATE AN UNSAFE MACHINE.

Before working the machine, be sure that any unsafe condition has been satisfactorily remedied. Check brakes, steering and attachment controls before moving the machine. Advise the proper maintenance authority of any malfunction part or system. Be sure all protective guards or panels are in place, and all safety devices provided are in place and in good operating condition.

If controls or other hydraulic systems feel "spongy" have the machine checked for air in the systems. Presence of air in these systems could cause improper control and result in an accident. See the Operation and Maintenance Instruction Manual for corrective procedures.

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

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

Make sure no one is near the work area of the excavator before starting the machine, or before swinging or moving in any direction.

Be sure the throttle setting is adequate for the contemplated operation.

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

Items to be lifted by the machine should be slung only from the designated lift point. Never exceed the load chart rating. Failure of the bucket linkage or slings could result if chains or slings are incorrectly attached, resulting in death or personal injury.

Always be sure that slings used to lift the load are of adequate strength for the purpose intended, and that they are in good condition.

Do not swing, hoist or brake unnecessarily fast. All can cause accidents.

Load trucks from the rear or side.

Before loading a truck be sure the driver is in a safe place.

Never swing or position bucket, load or attachment over ground crew or truck cab.

Place the machine in relationship between the excavation and the dump area to swing to the left for discharge of material, for best visibility.

Be sure the exact locations of gas lines, utility lines, sewers, overhead and buried power lines and other obstructions or hazards are known. Such locations should be precisely marked by the proper authorities to reduce the risk of accidents. Obtain shutdown or relocation of any such facilities before starting work, if necessary.

Before working in the vicinity of gas lines or other utility lines:

- Always contact the owners of the gas lines or the nearest gas utility before beginning work. Look them up in your local telephone directory.
- Determine jointly what specific precautions must be taken to insure safety.
- Slow down the operating cycle. Reaction time may be too slow and distances may be misjudged.
- When working in the vicinity of gas or utility lines use a signal person. The responsibility of the signal person is to observe, from the best vantage point, the approach of any part of the excavator or attachment to the gas line. The signal person must be in direct communication with the operator, and the operator must pay close attention to the signals.
- It is the responsibility of the user and the gas utility to see that necessary precautions are taken.

Working in the vicinity of electrical power lines presents a very serious hazard and special precautions must be taken. For purposes of this manual you are considered to be working in the vicinity of power lines when the attachment or load of your excavator, in any position, can reach to within the minimum distances specified by Local, State and Federal Regulations.

Safe operating practices require that you maintain the maximum possible distance from the lines and never violate the minimum clearance.

Be certain to comply with all Local, State and Federal Regulations regarding working in the vicinity of power lines.

Before working in the vicinity of power lines:

- Always contact the owners of the power lines or the

nearest electric utility before beginning work. Look them up in your local telephone directory.

— You and the electric utility representative must jointly determine what specific precautions must be taken to insure safety.
— Consider all lines to be power lines and treat all power lines as energized even thought it is known that the power is shut off and the line is visibly grounded.
— It is the responsibility of the user and the electric utility to see that necessary precautions are taken.
— Slow down the operating cycle. Reaction time may be too slow and distances may be misjudged.
— Caution all ground personnel to stand clear of the machine and the load at all times. If the load must be guided into place consult your local electric utility company for specific precautions that must be taken.
— Use a signal person. The responsibility of the signal person is to observe, from the best vantage point, the approach of any part of the machine or load to the power line. The signal person must be in direct communication with the operator, and the operator must pay close attention to the signals.

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

When pulling or towing through a cable or chain do not start suddenly at full throttle. Take up slack carefully. Guard against kinking chains or cables. Inspect carefully for flaws before using. Do not pull through a kinked chain or cable due to the high stresses and possibility of failure of the kinked area. Always wear heavy gloves when handling chain or cable.

Be sure cables are anchored and the anchor point is strong enough to handle the expected load. Keep exposed personnel clear of anchor point and cable or chain. DO NOT PULL OR TOW UNLESS OPERATORS COMPARTMENTS OF MACHINES INVOLVED ARE PROPERLY GUARDED AGAINST POTENTIAL CABLE OR CHAIN BACKLASH.

Operating on slopes is dangerous. Level off the working area if possible. Slow down the work cycle where leveling cannot be accomplished.

Avoid swinging bucket or load in a down hill direction as this reduces the stability of the machine.

Avoid working with the bucket on the uphill side. The counterweights, when swung down-hill will act to reduce stability on slopes making tipping a dangerous possibility.

On slopes it is recommended to work with the bucket in the down hill direction after first determining the stability of the machine by rotating the superstructure 360° with the booms and empty bucket fully extended, and then again with the booms fully retracted.

Do not swing loads over exposed people. Avoid swinging loads towards the down hill side of slopes as this reduces the stability of the machine. Dump on the uphill side if at all possible.

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

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

When working in or near a pit, in trenches or near high banks, be sure to have the walls shored properly to prevent cave-in.

Be particularly careful when digging near overhanging banks or where cave-ins may occur. Make sure footing is firm enough to avoid cave-ins.

Position undercarriage perpendicular to slopes, overhangs, etc. to facilitate transport exit from area.

Slides or cave-ins are a hazard when excavating. Check the condition of the soil or the material to be moved. Shore or brace to prevent slides or cave-ins whenever necessary including:

— When excavations or trenches are made adjacent to backfilled excavations.
— When soil conditions are not good.
— Where excavations are subject to vibrations from railroads, highway traffic, or the operation of machinery.

Use good judgment about the operating conditions with particular regard to supporting ground conditions.

Keep machine well back from the edge of an excavation.

Never undercut machine.

When undercutting is necessary, always be sure adequate shoring is provided to prevent the machine from falling into the excavation.

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

Always carry the bucket low when traveling.

Handle only loads which are safely arranged.

Beware of overhanging material or objects.

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.

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

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

Avoid going over obstacles such as rough terrain, rocks, logs, curbs, ditches, ridges, and railroad tracks whenever possible. When obstructions must be crossed, do so with extreme care at an angle if possible.

Reduce speed-down-shift. Ease up to the breakover point-pass the balance point slowly on the obstruction and ease down on the other side.

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

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

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

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

Avoid sidehill travel whenever possible. Drive up and down the slope. Should the machine start slipping sideways on a grade, put the bucket with teeth into the ground.

Avoid brushpiles, logs or rocks. DO NOT DRIVE THE MACHINE ONTO BRUSHPILES, LOGS, LARGE ROCKS or other surface irregularities that break traction with the ground especially when on slopes or near dropoffs.

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

When loading a machine on a trailer, use a ramp. If a ramp is not available, use blocking to build one. The ramp must be solid and substantial enough to bear the weight of the machine. Always load and unload on the level.

Follow the instructions contained in the Operation and Maintenance Manuals for towing the machine.

Travel with lights on.

Use proper traffic warning flags and signs.

Know and obey state and local laws.

When cornering, allow for boom, overhead and structure clearance.

Watch boom clearance when traveling or transporting. Uneven ground may cause the boom to bob or weave enough to contact power lines or other obstructions.

Cross obstacles at an angle and at slow speed. Be alert for lurching of the machine as the "center of gravity" of the machine crosses the obstacle.

Before traveling or transporting, lock the swing to prevent accidental movement of the superstructure.

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

When traveling up or down slopes, maintain the rotating structure in alignment with the undercarriage.

Avoid traveling on side slopes.

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

Signal your intention to move by sounding the horn. Two blasts for a forward move, three for a reverse move.

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

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

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

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

Align the rotating structure with the undercarriage to provide access to and from the operator's station.

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

Always follow the shutdown instructions as outlined in the Operation and Maintenance Instruction Manual.

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

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

MAINTENANCE

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

Machine should not be serviced with anyone in the operator's seat unless they are qualified to operate the machine and are assisting in the servicing.

Shut off engine and disengage the Power Take-Off lever, if so equipped, and engage all control locks before attempting adjustments or service.

Always turn ther master switch (key switch if so equipped) to the off position before cleaning, repairing, or

servicing and when parking machine to forestall unintended or unauthorized starting.

Disconnect batteries and TAG all controls according to local or national requirements to warn that work is in progress. Block the machine and all attachments that must be raised according to local or national requirements.

Never lubricate, service or adjust a machine with the engine running except as called for in the Operation and Maintenance Instruction Manual. Do not wear loose clothing or jewelry near moving parts.

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

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

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

Always place the hinged hood and cover support in the place provided, before attempting any maintenance or service work in the engine compartment.

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

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

When making equipment checks that require running of the engine, have an operator in the operator's seat at all times with the mechanic in sight. Place the transmission in neutral and set the brakes and lock. KEEP HANDS AND CLOTHING AWAY FROM MOVING PARTS.

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

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

If movement of an attachment by means of machine's hydraulic system is required for service or maintenance, do not raise or lower attachments from any position other than when seated in the operator's seat. Before starting machine or moving attachments or tools, set brakes, sound horn and call for an all clear. Raise attachment slowly.

Scissors Points (Pinch Points), which result from relative motion between mechanical parts, are areas of the machine that can cause personal injury. Care must be taken to prevent motion by blocking or to avoid such areas when movement is possible.

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

Never align holes with fingers or hands — Use the proper aligning tool.

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

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

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

Do not charge batteries in a closed area.

Provide proper ventilation to guard against an accidental explosion from an accumulation of explosive gases given off in the charging process.

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

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

Rust inhibitors are volatible and flammable. Prepare parts in well ventilated place. Keep open flame away — DO NOT SMOKE. Store container in a cool well-ventilated place secure against unauthorized personnel.

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

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

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

Never place gasoline or diesel fuel in an open pan.

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

Turn radiator cap slowly to relieve pressure before removing. Add coolant only with engine stopped or idling if hot. See Operation and Maintenance Instruction Manual.

Fluid escaping under pressure from a very small hole can almost be invisible and can have sufficient force to penetrate the skin. Use a piece of cardboard or wood to search for suspected 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.

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

Never do service work or maintenance with the machine on a slope. Should this become necessary in an emergency, always block the tracks to prevent accidental movement. Check the Operation and Maintenance Instruction Manual for proper procedure.

For field service, move machine to level ground if possible and block machine. If work is absolutely necessary on a incline, block machine and its attachments securely. Move the machine to level ground as soon as possible.

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

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

Know your jacking equipment and its capacity. Be sure the jacking point used on the machine is appropriate for the load to be applied.

Be sure the support of the jack at the machine and under the jack is appropriate and stable.

Any equipment up on a jack is dangerous.

Transfer load to appropriate.

blocking as a safety measure before proceeding with service or maintenance work according to local or national requirements.

The attachment is held in position by a trapped column of oil under high pressure. Always lower the attachment to a ground supported position and relieve all presure before attempting maitenance or repair of any kind.

Always block with external support any linkage or part on machine that requires work under the raised linkage, parts, or machine per local or national requirements.

Never allow anyone to walk under or be near unblocked raised equipment. Avoid working or walking under raised blocked equipment unless you are assured of your safety.

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

Shop or field service platforms and ladders used to maintain or service machinery should be constructed and maintained according to local or national requirements.

Lift and handle all heavy parts with a lifting device of proper capacity. Be sure parts are supported by proper slings and hooks. Use lifting eyes if provided. Watch out for people in the vicinity.

Handle all parts with extreme care. Keep hands and fingers from between parts. Wear authorized protective equipment such as safety glasses, heavy gloves, safety shoes.

When using compressed air for cleaning parts use safety glasses with side shields or goggles. Limit the pressure to 2 bar (30 psi) according to local or national requirements.

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

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

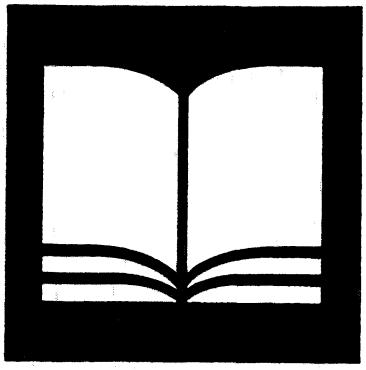
Use only grounded auxiliary power source for heaters, chargers, pumps and similar equipment to reduce the hazards of electrical shock.

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

Remove sharp edges and burrs from reworked parts.

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

FX 210
HYDRAULIC EXCAVATOR
SERVICE MANUAL



Section 1 HOW TO USE

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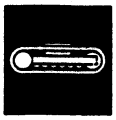
SECTION & GROUP CONTENTS



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SECTION & GROUP CONTENTS

SECTION & GROUP CONTENTS

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INTRODUCTION

1. INTRODUCTION

This service manual is for training new personnel and for reference by experienced service technician.

It works to give you both the general background as a training text and technical details of shop service and field service.

It is concise service guide for specific machine. It covers specifications construction, theory of operation, trouble shooting, removal and installation, disassembly and assembly, maintenance and repair.

Using the service manual as a guide will reduce error and costly delay. It will also assure you the best in finished service work.

All information, illustrations and specifications contained in this technical manual are based on the latest information available at the time of publication.
The right is reserved to make changes at any time without notice.

CARE OF THE HANDLING

2. REVISIONS AND SUPPLEMENTS

This loose-leaf manual can be easily kept up-to-date by inserting or exchanging the revisions and supplements.

The person in charge is responsible for updating the manual as soon as possible. Also, please dispose of the obsolete sheets to avoid confusion.

INTRODUCTION

3. SYMBOLS

In this manual, the following symbols are used to indicate important place for safety and quality.

3.1 SAFETY

CAUTION: This safety symbol is used for important safety messages. When you see this symbol, follow the safety message to avoid personal injury.

3.2 NOTE: Special technical notice or other notice for preserving standards are necessary when performing the work.

FEATURES OF THIS MANUAL

1. CONSTRUCTION

This manual is divided into eleven sections. The section names and its contents are as below. To fully use this service manual, understand how it is organized. Spend a minute reading this now and save many minutes of searching later.

Section 1

HOW TO USE

In the beginning, read this section for effective use of this manual.

Section 2

SPECIFICATIONS

Specifications of machine and components and general service data are given in this section.

Section 3

GENERAL

Use this section not only as a reference guide to maintenance or repair but also as a text-book to train new personnel.

Section 4

SUPERSTRUCTURE

Section 5

UNDERCARRIAGE

Section 6

FRONT-END ATTACHMENTS

Refer to each of these sections according to the component you need to know.

Section 7

HYDRAULIC SYSTEM

Section 8

PNEUMATIC SYSTEM

Delete this section for not using pheumatic system.

Section 9

ELECTRICAL SYSTEM

Refer to each of these sections according to the system you need to know.

FEATURES OF THIS MANUAL

Section 10 ----------

TROUBLESHOOTING

Use to find out the causes relating troubled phenomena and to remove them.

Section 11 ----------

ENGINE

3. PAGE

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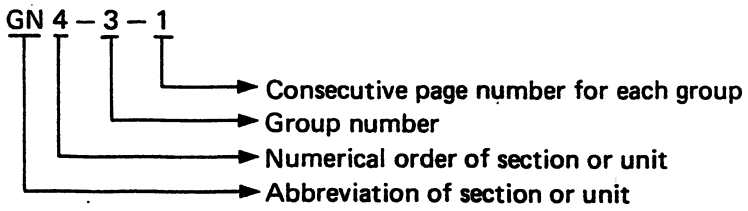

4. CONTENTS

Use the table of section & group contents to locate the information on the first section (HOW TO USE)

SAFETY RULES

UNDERSTAND MACHINE OPERATION

Only qualified personnel should be allowed to operate the machine.
Learn the location and purpose of all controls, instruments, indicator lights and decals.

WEAR PROTECTIVE CLOTHING

Wear fairly tight clothing ... and use safety equipment.

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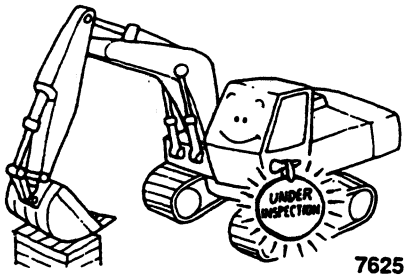
PRECAUTIONS FOR INSPECTION AND MAINTENANCE

Place a sign "Under inspection and maintenance" on the cab door or control lever.
Never get under the machine when it is self-jacked by the boom and arm.
When inspecting or servicing the machine with raised boom and arm always use safety blocks, props, stands, etc.



7625

USE SAFETY EQUIPMENT

Place and fasten a first aid kit and fire extinguisher on machine. Keep the extinguisher fully charged. Learn to use it in accordance with national or local regulations.

7626

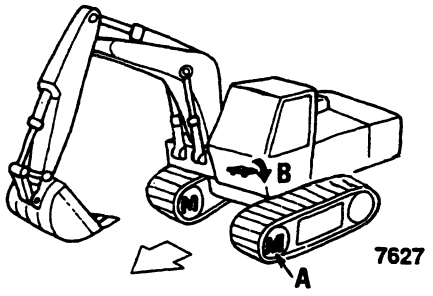
INSPECT EXCAVATOR

Inspect your excavator carefully each day before starting out on the job: use the check list provided in this Manual.
Do not start or operate the excavator unless you are in the operator's seat. When you operate the excavator do not carry any riders.
When getting on or off the machine use the hand rails, steps and grabs provided. Start the engine only in well ventilated areas to ensure the removal of deadly exhaust fumes.
Before you move the boom or arm be sure there are no persons in the working area.

SAFETY RULES

MOVE EXCAVATOR SAFELY

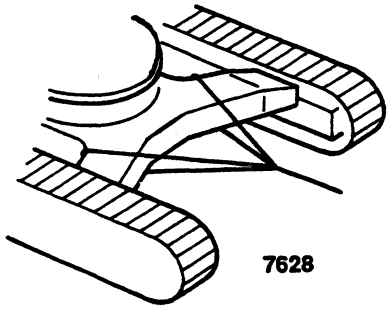
Do not move machine unless you first learn well how to use travel drive pedals B to obtain the desired direction of travel. If travel drive motors A are located in front of cab push down the rear of pedal B to move forward. Do not travel without the help of a flagman preceding the machine.
Do not travel near the edge of a ditch, gully, trench or excavation. Proceed with much care where room is limited, over rough or sloping grounds.



7627

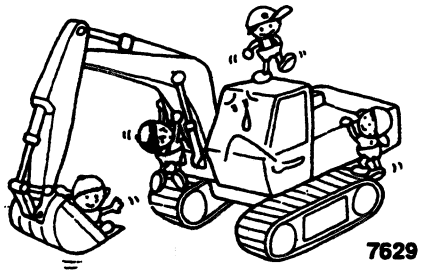
TOWING PRECAUTIONS

If the excavator needs to be towed, or is used to tow another vehicle, attach the tow ropes as shown. Only designated towing or pulling attachment points are to be used for towing or pulling. Do not start suddenly at full throttle against a tow chain or cable. Take up slack carefully.


7628

PARKING

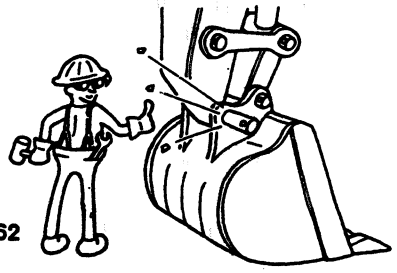
Before you leave the cab:
Lower bucket to ground
Stop engine
Shift control lever to neutral.
When the excavator is parked on slopes, lock the tracks with suitable blocks.
Never park or stand with tracks pointing downhill.
Do not leave the lock switch key in cab: take key with you.


7629

SAFETY RULES

PROTECT YOUR EYES

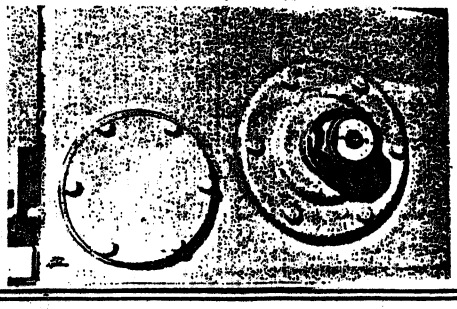
When you drive connecting pins in or out, guard against injury from flying pieces of metal.
Wear approved goggles or safety glasses.



7662

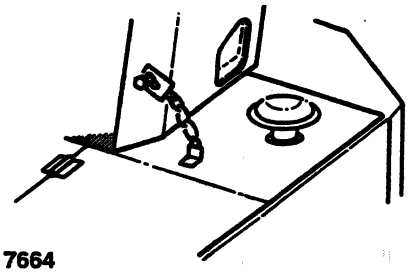
SERVICE HYDRAULIC SYSTEM SAFELY

The oil tank is always pressurized.
Before you work on the hydraulic system:
Take off the breather cap, and drain the air in the tank.
Before you use the hydraulic system, be sure all connections are tight.



LOCK THE ENGINE HOOD

Lock the engine hood after opening.
Don't leave the hood open on slopes or in strong winds.



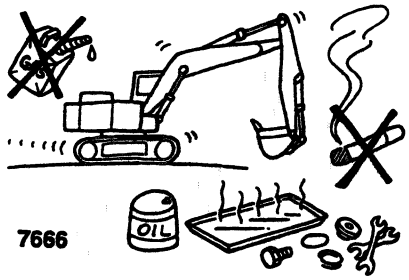
7664

Be careful not to touch hot surfaces or high temperature fluids.

7665

HANDLE FUEL SAFELY

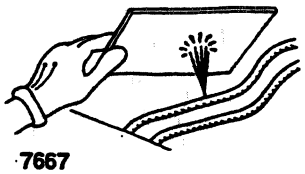
Be careful when you work with any kind of fuel.
Do not fill the fuel tank when the engine is hot or running.
Do not smoke while you fill the fuel tank or service the fuel system.



7666

AVOID HIGH PRESSURE FLUIDS

Escaping fluid under pressure can have sufficient force to penetrate the skin, causing serious injury. Before disconnecting lines, be sure to relieve pressure. Before applying pressure, be sure connections are tight and lines, pipes and hoses are not damaged. Use a piece of cardboard or wood, rather than hands, to search for suspected leaks.
If injured by escaping fluid, see a doctor at once.

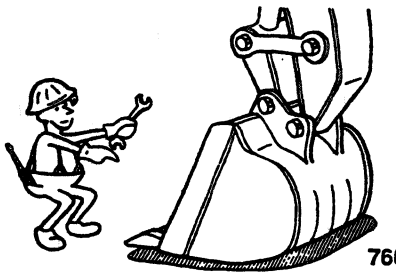


7667

SAFETY RULES

SUPPORT RAISED EQUIPMENT

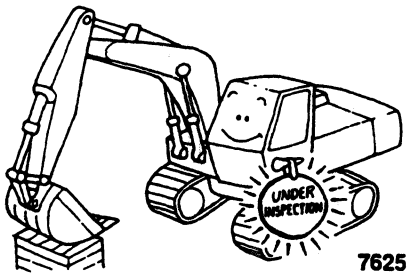
Do not work under a raised bucket. Lower the bucket to ground or onto blocks.
Do not stay under a raised track.



7668

CAUTIONS FOR INSPECTION AND MAINTENANCE

Place a notice board "under inspection and maintenance" on the cab door or control lever.
Never get under the machine while it is jacked up by the boom and arm.
When inspecting or servicing the machine with raised boom and arm, always use safety blocks or safety supports.



7625

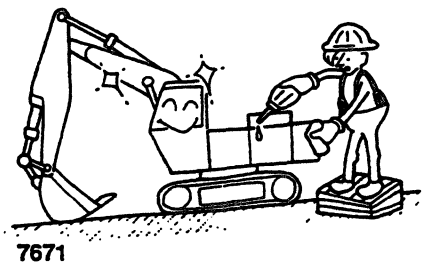
UNDERSTAND CORRECT MAINTENANCE AND OPERATION PROCEDURES

Be sure you understand all maintenance and operation procedures before working on the excavator.
Do not run the engine while you service the excavator unless the procedure is approved.
Do not start or operate the excavator unless you are in the operator's seat.
Do not lubricate or work on the excavator while it is moving.

7670

BE SURE TO STOP THE ENGINE

Place the machine on level ground. Lower the bucket to the ground, apply the swing lock.

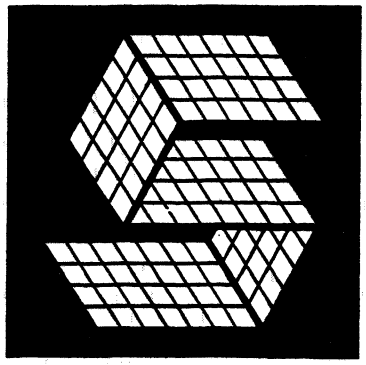


7671

AVOID DANGEROUS SITUATIONS

Never attempt to get on or off the machine while it is operating.
When getting on or off the machine, use handles and stepping points.

7672



Section 2 SPECIFICATIONS

CONTENTS

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ENGINE

Type 6BT5.9C
Turbocharged, direct injection
4-cycle Diesel
Number of cylinders 6
Bore ..... 102 mm
Stroke ..... 120 mm
Total displacement ..... 5580 cmc
Governed rpm 2000
Governed power (SAE J 139) ..... 137 Hp/102 Kw
Forced lubrication by gear pump
Water cooled

AUTO-IDLING DEVICE, which automatically reduces the engine rpm about 4 secs after implement controls are in neutral.

ELECTRICAL SYSTEM

Voltage ..... 24 V
Batteries/total rating ..... 2/85 amp h
Alternator ..... 30 amp
Starter motor ..... 4 Kw

HYDRAULIC SYSTEM

FIAT-HITACHI's ETS (Electronic Total Control System) can achieve maximum job efficiency and reduce fuel consumption and noise.
The system includes:
- E-P Control (Computer Aided Engine-Pump Control System).
- OHS (Optimum Hydraulic System) assures fully independent and combined operations.
- FPS (Fuel saving Pump System).
- Travel system with two speeds and high pressure for high traction force and high travel speeds.

Main pumps

2 variable displacement axial piston type
Maximum flow ... 2 x 220 lt/min (2 x 48.2 Imp g.pm)
Pilot pump ..... gear type
- maximum flow ..... 33.6 lt/min (7.4 Imp g.pm)
Maximum relief valve pressures:
- boom/dipper stick and bucket ..... 285 bar
- swing system ..... 285 bar
- travel system ..... 325 bar
- pilot system ..... 40 bar

Hydraulic cylinders

The boom and dipper stick hydraulic cylinders are equipped with stroke- end cushion devices.
- boom (two) ..... 125 x 1315 mm (4.92 x 51.80 in)
- dipper stick (one) 135 x 1630 mm (5.32 x 64.17 in)
- bucket (one) ..... 120 x 1055 mm (4.72 x 41.50 in)
- positioning arm (one, triple articulation version) ..... 150 x 1050 mm (5.90 x 41.34 in)

TRANSMISSION

Type ..... hydrostatic
Motors ..... axial piston type, in-shoe mounted
Brakes ..... automatic disc type, spring applied, hydraulically released
Final drive ..... oil bath, planetary reduction
Max. gradeability 35° (continuous) 70%
Travel speed:
- high ..... 0 ÷ 3,8 km/h
- low ..... 0 ÷ 3 km/h

TURRET SWING

One axial piston type hydraulic motor with oil bath planetary reduction. The hydraulic motor gives a high output torque. The bull gear includes a two rev. ball bearing with inner teeth, induction hardened. The bull gear and reduction pinion are grease lubricated. The swing brake is automatic, disc type, spring applied, hydraulically released.
Swing speed: ..... 13.7 rpm

UNDERCARRIAGE

- Sealed bulldozer type undercarriage.
- Lifetime lubricated idlers, sprockets and rollers.
- Counterbored link type track chains.
- Hydraulic track adjusters.

Quantity of carrier/support rollers per track 10/2

Shoes width available ..... 500/600 mm
..... 750/900 mm

Heavy-duty welded track frame.

DIMENSIONS (mm) Monobloc

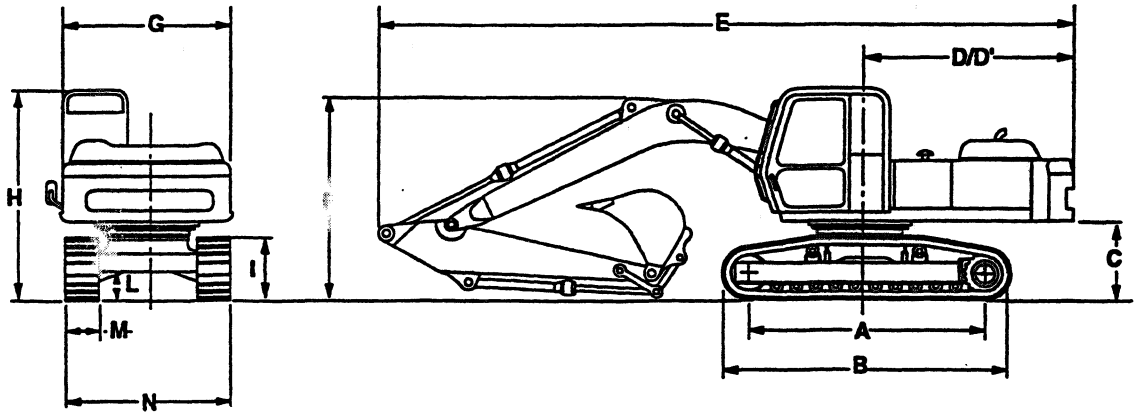

Fig. 2 A001/2

A	B	C	D	D'	E	F	G	H	I	L	M	N
3607	4410	1060	2745	2760	9570	2860	2500	2860	915	450	500	2500 (◊) 2850 (Δ)
											600	2600 (◊) 2950 (Δ)
											750	3100 (Δ)
											900	3250 (Δ)

(Δ): Model with wide carriage
(◊): Model with narrow carriage

DIGGING DATA (mm) - with 5680 mm monobloc

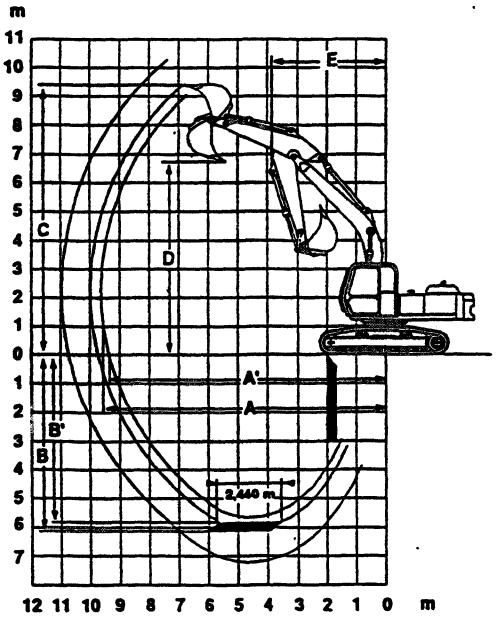

Fig. 3 A002/2

Dipperstick	mm.	2000	2400	2900	3500
A	mm.	9240	9420	9920	10510
A'	mm.	9040	9230	9740	10340
B	mm.	5700	6080	6570	7170
B'	mm.	5480	5880	6400	7020
C	mm.	9380	9080	9430	9800
D	mm.	6520	6320	6630	6700
E	mm.	3730	3730	3660	3730
Bucket force	daN	11000	11000	11000	11000
Digging force	daN	11500	10700	8800	7700