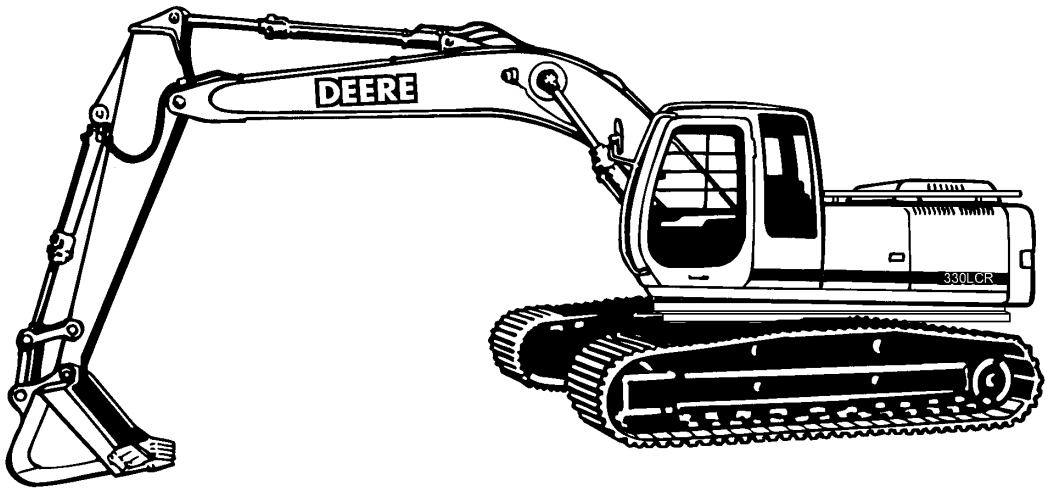
TECHNICAL MANUAL

OPERATOR'S MANUAL

HYDRAULIC EXCAVATOR
JOHN DEERE
MODEL 330LCR
NSN 3805-01-463-0805



HEADQUARTERS, DEPARTMENT OF THE ARMY

15 FEBRUARY 2000

INSERT LATEST UPDATED PAGES. DESTROY SUPERSEDED DATA.

LIST OF EFFECTIVE PAGES

Note: The portion of text or illustration affected by the updates is indicated by a vertical line in the outer margins of the page. Updates to wiring diagrams are indicated by shaded areas.

Dates of issue for original and updated pages are:

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Technical Manual
No. 5-3805-281-10

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**HEADQUARTERS,
DEPARTMENT OF THE ARMY
Washington, DC, *15 February 2000***

OPERATOR'S MANUAL

HYDRAULIC EXCAVATOR
JOHN DEERE
MODEL 330LCR
NSN 3805-01-463-0805

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this publication. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Submit your DA Form 2028-2 (Recommended Changes to Equipment Technical Publications), through the Internet, on the Army Electronic Product Support (AEPS) website. The Internet address is http://aeps.ria.army.mil. If you need a password, scroll down and click on "ACCESS REQUEST FORM". The DA Form 2028 is located in the ONLINE FORMS PROCESSING section of the AEPS. Fill out the form and click on SUBMIT. Using this form on the AEPS will enable us to respond quicker to your comments and better manage the DA Form 2028 program. You may also mail, fax or email your letter, DA Form 2028, or DA Form 2028-2 direct to: Commander, U.S. Army Tank-automotive and Armaments Command, ATTN: AMSTA-LC-CI, Rock Island, IL 61299-7630. The email address is AMSTA-LC-CI@ria.army.mil. The fax number is DSN 793-0726 or Commercial (309) 782-0726.

NOTE

As this operator manual is a commercial product supplemented to include Army specific procedures, the manual may advise the operator to perform tasks that would normally not be assigned to the operator level in a DATM. Always follow the limits established in the PMCS. Also, references are made throughout the manual to see your authorized dealer or John Deere dealer for repair or information. In those instances, notify your supervisor or next higher maintenance level.

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WARRANTY

1. **General.** This section explains the contractor's warranty for the Hydraulic Excavator (HYEX), including all of its components and subassemblies. It also contains information, instructions, methods and forms required to obtain services and/or supplies and for processing claims for items covered under warranty for the HYEX. If additional warranty information is required for the HYEX, contact your local Warranty Control Office/Officer (WARCO) or TACOM-WRN Logistics Assistance Representative (LAR). If your WARCO or TACOM LAR is not available, contact TACOM-WRN. The numbers at TACOM to call are DSN 786-7215/(810) 574-7215, DSN 786-7420/(810) 574-7420, or DSN 786-8297/(810) 574-8297. The caller should be prepared to provide: (1) name, (2) telephone number and/or electronic address, (3) complete unit designation, (4) identification of the vehicle to include serial number(s) and (5) a brief description of the problem.

2. **Coverage Specific.** The information and data contained in this Technical Manual applies to the U.S. Army's Hydraulic Excavator (HYEX), model number 330LCR, NSN 3805-01-463-0805. The HYEX is manufactured by Deere & Company, Moline, IL under contract number DAAE07-98-D-S009.

3. **Claim Procedures.** DA Form 2407, along with information and instructions provided by the contractor at time of delivery of the HYEX, shall be used to process warranty claims.

4. **Claim Denial/Disputes.** All denials or disputes will be handled by TACOM. The contact point for warranty claim denials or disputes is:

   Commander
   U.S. Army Tank-Automotive and Armaments Command
   ATTN: AMSTA-LC-CJBB
   Warren, MI 48397-5000

   Telephone: DSN 786-5314
   Commercial: (810) 574-5314

5. **Local WARCO.** Upon completion of warranty actions by the contractor, the WARCO shall complete and provide a copy of DA Form 2407 to TACOM for information and warranty tracking purposes only. **NOTE**: The DA Form 2407 shall be stamped or otherwise clearly marked **"FOR INFORMATION ONLY"**. Send the completed DA Form 2407 to:

   Commander
   U.S. Army Tank-Automotive and Armaments Command
   ATTN: AMSTA-LC-CJCB
   Warren, MI 48397-5000

   Telephone: DSN 786-7215
   Commercial: (810) 574-7215

   Forms may also be faxed to TACOM. Fax the forms to: DSN 786-5605, Commercial - (810) 574-5605. Include ATTN: AMSTA-LC-CJCB on all related materials being faxed to TACOM.

INTRODUCTION

READ THIS MANUAL carefully to learn how to operate and service your machine correctly. Failure to do so could result in personal injury or equipment damage. This manual and safety signs on your machine may also be available in other languages. (See your John Deere dealer to order.)

THIS MANUAL SHOULD BE CONSIDERED a permanent part of your machine and should remain with the machine when you sell it.

MEASUREMENTS in this manual are given in both metric and customary U.S. unit equivalents. Use only correct replacement parts and fasteners. Metric and inch fasteners may require a specific metric or inch wrench.

RIGHT-HAND AND LEFT-HAND sides are determined by facing in the direction of forward travel.

GROUP NUMBERS (e.g., GRP NO. XXXX) following maintenance task titles in the Table of Contents refer to the John Deere Functional Group Coding system.

WARRANTY is provided as part of John Deere's support program for customers who operate and maintain their equipment as described in this manual. The warranty is explained on the warranty certificate, which you should have received from your dealer.

This warranty provides you the assurance that John Deere will back its products where defects appear within the warranty period. In some circumstances, John Deere also provides field improvements, often without charge to the customer, even if the product is out of warranty. Should the equipment be abused, or modified to change its performance beyond the original factory specifications, the warranty will become void and field improvements may be denied. Setting fuel delivery above specifications or otherwise overpowering machines will result in such action.

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.

CHAPTER 1

SAFETY AND SAFETY SIGNS

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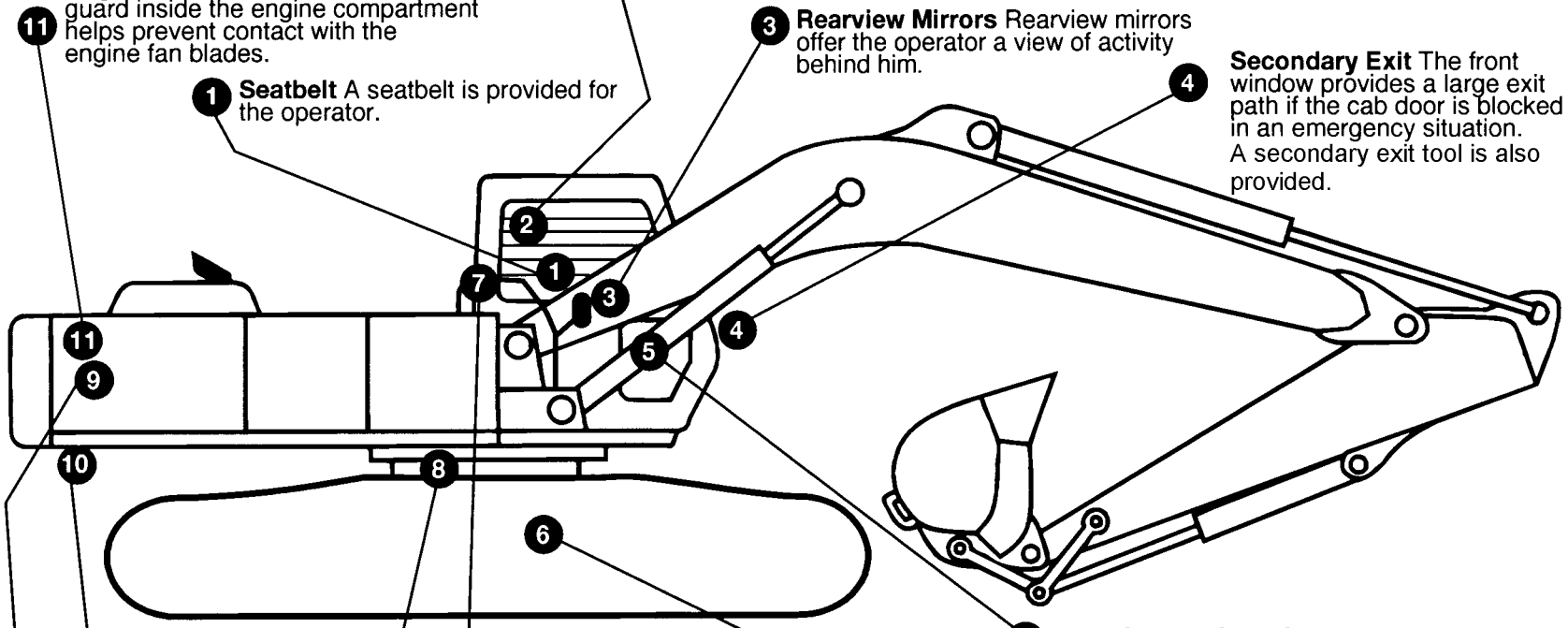
John Deere Excavator Safety Features

Please remember the **operator** is the key to preventing accidents.



Window Guarding Window bars prevent contact with a moving boom.

Engine Fan Guard A secondary fan guard inside the engine compartment helps prevent contact with the engine fan blades.

Rearview Mirrors Rearview mirrors offer the operator a view of activity behind him.

Seatbelt A seatbelt is provided for the operator.

Secondary Exit The front window provides a large exit path if the cab door is blocked in an emergency situation. A secondary exit tool is also provided.

Pilot Control Shut-Off A lever near the cab exit reminds the operator to deactivate hydraulic functions before leaving the machine.

Travel Alarm Alerts bystanders of machine movement when propeling.

Handholds Large conveniently placed handholds make it easy to enter or exit the operator's station or service area.

Steps Wide slip resistant steps make entry and exit easier - also provides a place to clean shoes.

Swing Brake Swing brake engages automatically when engine is stopped - helps secure upperstructure when transporting the machine.

Bypass Start Protection Shielding over the starter helps prevent dangerous bypass starting.

TX,05,DH5855 –19–15AUG97–1/1

T111123 –19–14AUG97

RECOGNIZE SAFETY INFORMATION

This is the safety-alert symbol. When you see this symbol on your machine or in this manual, be alert to the potential for personal injury.

Follow recommended precautions and safe operating practices.

T81389 –UN–07DEC88

DX,ALERT –19–03MAR93–1/1

UNDERSTAND SIGNAL WORDS

A signal word—DANGER, WARNING, or CAUTION—is used with the safety-alert symbol. DANGER identifies the most serious hazards.

DANGER or WARNING safety signs are located near specific hazards. General precautions are listed on CAUTION safety signs. CAUTION also calls attention to safety messages in this manual.

TS187 –19–30SEP88

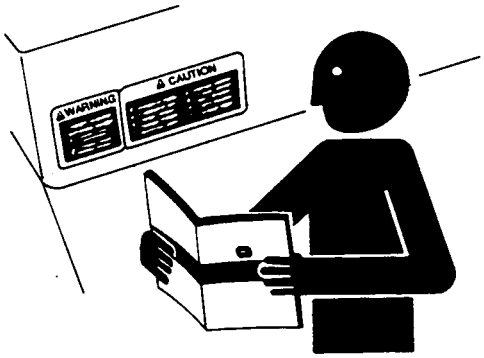
DX,SIGNAL –19–03MAR93–1/1

FOLLOW SAFETY INSTRUCTIONS

Carefully read all safety messages in this manual and on your machine safety signs. Keep safety signs in good condition. Replace missing or damaged safety signs. Be sure new equipment components and repair parts include the current safety signs.

Learn how to operate the machine and how to use controls properly. Do not let anyone operate without instruction.

Keep your machine in proper working condition. Unauthorized modifications to the machine may impair the function and/or safety and affect machine life.



TS201 –UN–23AUG88

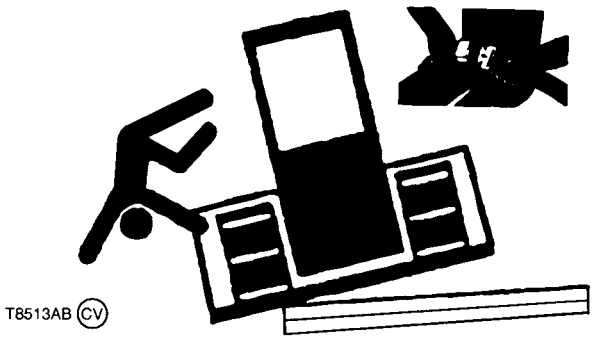
TX,05,DY336 –19–15MAY96–1/1

AVOID INJURY FROM:
LOADING MACHINE ON A TRAILER,
FASTENING MACHINE TO TRAILER,
UNLOADING MACHINE FROM TRAILER

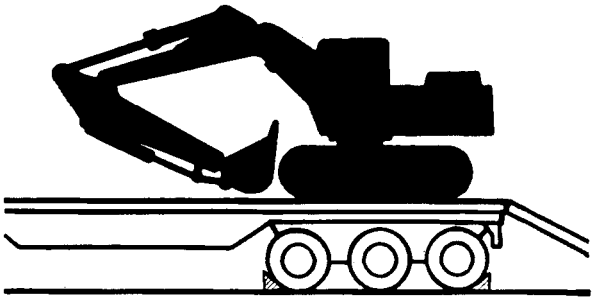
ALWAYS USE CAUTION WHEN LOADING AND UNLOADING MACHINES ON A TRAILER

ALWAYS KNOW AND FOLLOW THE RECOMMENDED PROCEDURES FOR THE MACHINE, BECAUSE ALL MACHINES ARE NOT LOADED, FASTENED, AND UNLOADED THE SAME WAY

ALWAYS KEEP BYSTANDERS CLEAR OF THE AREA



T8513AB –UN–28JUN95



T7405BJ –UN–29NOV90

To avoid injury:

Keep the trailer bed clean.

Park the trailer on a firm, hard, level surface that will not give way when the weight of the machine is on the trailer.

Put chock blocks against truck wheels.

Use a ramp or loading dock. Ramps must be strong enough to adequately handle the load and have a low angle and correct height.

If machine is equipped with a seatbelt, fasten it before starting the engine.

Drive machine on or off the ramp slowly.

fasten chains or cables to machine tracks or track chain links. Do not place chains or cable over or against hydraulic lines or hoses.

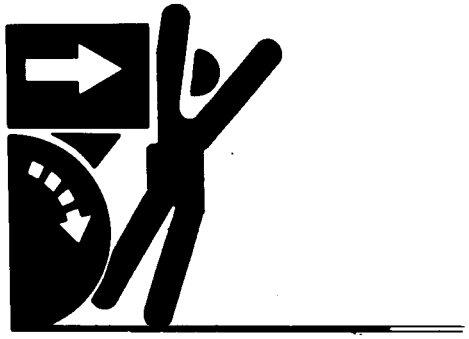
TX,05,FF1808 –19–28JUN90–1/1

AVOID INJURY FROM BACKOVER ACCIDENTS

BEFORE MOVING MACHINE, BE SURE ALL PERSONS ARE CLEAR OF AREA

ALWAYS BE ALERT FOR BYSTANDERS MOVING INTO THE WORK AREA. USE HORN OR OTHER SIGNAL TO WARN BYSTANDERS BEFORE MOVING MACHINE

WHEN USING A SIGNAL PERSON, KEEP PERSON IN VIEW AT ALL TIMES, BE SURE SIGNAL PERSON IS CLEAR BEFORE BACKING UP



T7241AY –UN–21FEB90

To avoid backover accidents:

Always look around before you back up. Be sure that everyone is in the clear.

Keep travel alarm in working condition.

Use a signal person when backing up if view is obstructed. Always keep signal person in view.

Learn the meaning of all flags, signs, and markings used on the job and who has the responsibility for signaling.

Keep windows, mirrors, and lights clean and in good condition.

Dust, heavy rain, fog, etc., can reduce visibility. As visibility decreases, reduce speed and use proper lighting.

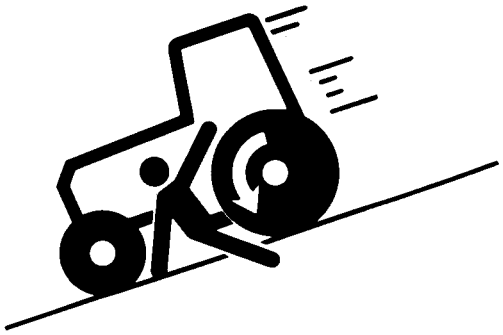
Read and understand the operating instructions in this operator's manual.

TX,05,DY337 –19–15MAY96–1/1

AVOID INJURY FROM ROLLAWAY ACCIDENTS

TO PREVENT ROLLAWAY, ALWAYS MAKE SURE MACHINE IS PROPERLY SECURED BEFORE LEAVING OPERATOR'S SEAT

DEATH OR SERIOUS INJURY MAY RESULT IF YOU ATTEMPT TO MOUNT OR STOP A MOVING MACHINE



T7241AZ –UN–21FEB90

To avoid rollaways:

Select level ground when possible to park machine.

Pull pilot control shut-off lever to locked position.

Lower all equipment to ground.

Stop the engine.

Block all tracks if you must park on a grade. Position machine to prevent rolling.

Park a reasonable distance from other machines.

Read and understand the operating instructions in this operator's manual.

TX,05,FF2433 –19–22MAY91–1/1

INSPECT MACHINE

Inspect your machine carefully each day by walking around it before you start it. (See Pre-Start Inspection Chapter.)

T6607AQ –UN–18OCT88

T82,BHSA,CL –19–14MAR90–1/1

USE HANDHOLDS AND STEPS

Falling is one of the major causes of personal injury.

When you get on and off the machine, always maintain a three point contact with the steps and handrails and face the machine. Do not use any controls as handholds.

Never jump on or off the machine. Never mount or dismount a moving machine.

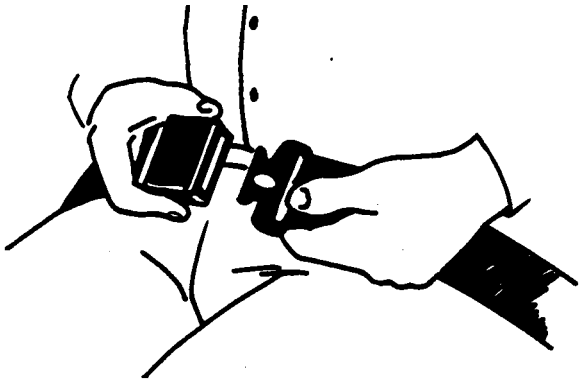
Be careful of slippery conditions on platforms, steps, and handrails when leaving the machine.

T6981AN –UN–15JUN89

TX,05,DH832 –19–16MAR92–1/1

USE SEAT BELT

Always use the seat belt when operating your machine.



TS175 –UN–23AUG88

TX,05,DH3732 –19–18AUG95–1/1

MAINTAIN SEAT BELT

Keep the seat belt in good condition.

The complete seat belt assembly should be replaced after three years of usage, regardless of appearance.

Between replacement intervals:

Carefully examine buckle, webbing, and attaching hardware.

Be sure that the retractor, if equipped, locks to prevent belt extension after latching buckle.

Be sure that attaching hardware is in place. Tighten, if necessary.

Replace the seat belt if it does not operate properly, or if it is damaged, worn, or deteriorated.

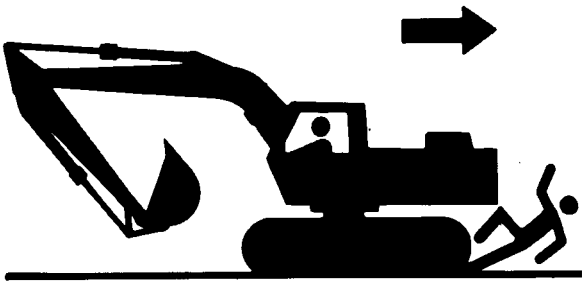
TX,05,DH3729 –19–09AUG95–1/1

MOVE AND OPERATE MACHINE SAFELY

Bystanders can be run over. Know the location of bystanders before moving, swinging, or operating the machine.

Always keep the travel alarm in working condition. It warns people when the machine starts to move.

Use a signal person when moving, swinging, or operating the machine in congested areas. Coordinate hand signals before starting the machine.



T7273AL –UN–08JUN90

TX,05,FF1806 –19–05OCT90–1/1

OPERATE ONLY FROM OPERATOR'S SEAT

Avoid possible injury or machine damage. Do not start engine by shorting across starter terminals.

NEVER start engine while standing on ground. Start engine only from operator's seat.

T6607AO –UN–18OCT88

TX,05,FF1615 –19–14JUN90–1/1

SECONDARY EXITS

Machines equipped with cabs are equipped with secondary exits. For additional secondary exit information, see the topics "Secondary Exit Tool" and "Opening Upper Front (Secondary Exit) Window" in chapter 10 of this manual.

TX,05,DH5848 –19–13AUG97–1/1

OPERATE MACHINE SAFELY

Clear all persons from area of operation and machine movement.

Use your seat belt.

Make sure the work site footing has sufficient strength to firmly support the machine. When working close to an excavation, position machine with propel motors at the rear.

Be cautious of tipping when working on frozen ground. Temperature increases will cause ground to become soft, making ground unstable.

When digging deep, avoid hitting bottom of boom or bucket cylinder hoses against the ground.

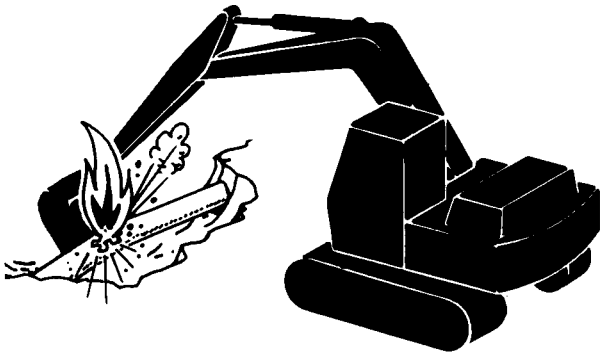
Use the bucket only for digging. Do not use it as a jack hammer or wrecking ball.

T7252AL –UN–08JUN90

TX,05,DH3730 –19–09AUG95–1/1

DIG WITH CAUTION

Before digging, check the location of cables, gas lines, and water lines.

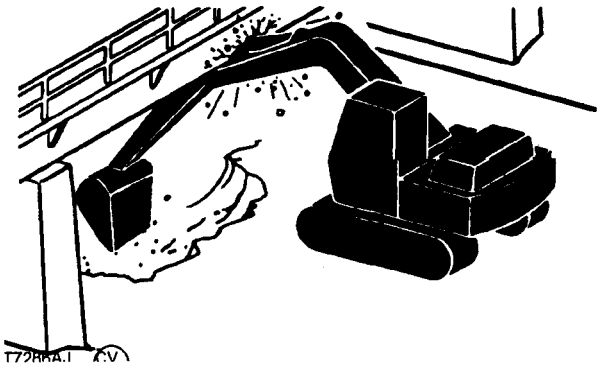


T7252AJ –UN–08JUN90

05,RR,592 –19–12JUN90–1/1

OPERATE WITH CAUTION

Avoid contact of boom or arm and overhead obstacles when you operate the machine.



T7286AJ –UN–08JUN90

TX,05,RR,602 –19–26FEB91–1/1

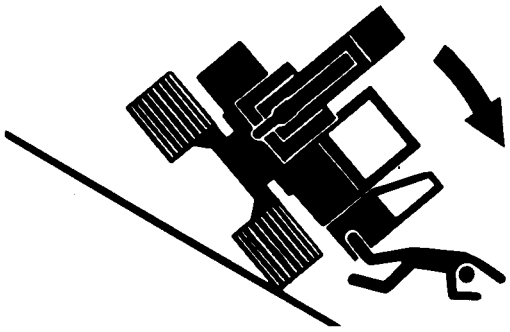
AVOID TIPPING

Use your seat belt.

When operating on a slope, keep bucket low to ground and close to machine. Point tracks uphill.

Avoid tipping the machine when swinging heavy loads. Reduce swing speed as necessary.

Be cautious of tipping when working on frozen ground. Temperature increases will cause ground to become soft and make ground travel unstable.



T7273AE –UN–08JUN90

TX,05,DH3731 –19–09AUG95–1/1

AVOID POWER LINES

Serious injury or death can result from contact with electric lines.

Never move any part of the machine or load closer to electric line than 3 m (10 ft) plus twice the line insulator length.

T7273AD –UN–08JUN90

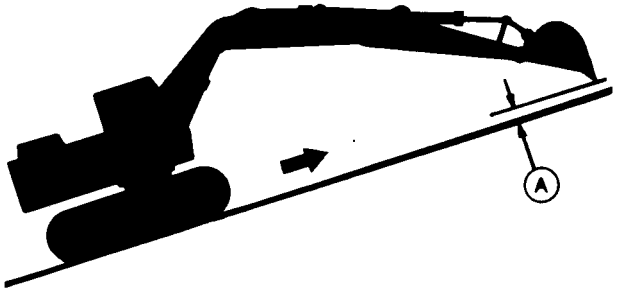
TX,05,RR,594 –19–12JUN90–1/1

DRIVE MACHINE SAFELY

Use your seat belt.

Before moving machine, find out which way to move propel pedals/levers for the direction you want to go. Pushing down on the front of the propel pedals or pushing the levers moves the machine towards the idlers.

Keep the bucket on the uphill side, approximately 30 cm (12 in.) (A) above ground, when going up or down hill. If machine starts to slip or become unstable, lower the bucket immediately.



T7273AG –UN–08JUN90

TX,05,DH3733 –19–09AUG95–1/1

BEWARE OF EXHAUST FUMES

Prevent asphyxiation. Engine exhaust fumes can cause sickness or death.

If you must operate in a building, be positive there is adequate ventilation. Either use an exhaust pipe extension to remove the exhaust fumes or open doors and windows to bring enough outside air into the area.

T6458AO –UN–18OCT88

02T,05,J9 –19–07JAN91–1/1

PARK MACHINE SAFELY

Before working on the machine:

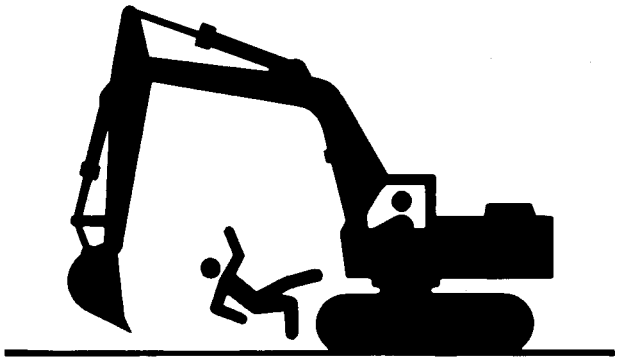
- Park machine on a level surface.
- Lower bucket to the ground.
- Turn auto-idle switch off.
- Run engine with engine rpm dial at 1/3 position for 2 minutes.
- Move engine rpm dial to slow idle position.
- Turn key switch to OFF. Remove key from switch.
- Pull pilot control shut-off lever to locked position.
- Allow engine to cool.

TX,05,DH5002 –19–28MAY96–1/1

KEEP RIDERS OFF MACHINE

Only allow the operator on the machine. Keep riders off.

Riders on machine are subject to injury such as being struck by foreign objects and being thrown off the machine. Riders also obstruct the operator's view resulting in the machine being operated in an unsafe manner.



T7273AH –UN–08JUN90

TX,05,RR,560 –19–05OCT90–1/1

OPERATE ATTACHMENT SAFELY

An attachment may change the capabilities of your machine in any or all of these ways:

- Safe range of motion
- Machine stability
- Hydraulic performance
- Engine performance

Read the attachment manual to learn how the attachment works.

In an area free of bystanders and obstructions, carefully operate the attachment to learn the available range of motion. Anticipate how objects manipulated by the attachment, or the attachment itself, may contact the machine, especially the operator's station. Consider adding guards to the machine to protect the operator, and if necessary, to prevent damage to machine.

See your dealer to match attachment demands to machine performance.

TX,05,FF2883 –19–29OCT92–1/1

HANDLE FLUIDS SAFELY—AVOID FIRES

Handle fuel with care; it is highly flammable. Do not refuel the machine while smoking or when near open flame or sparks. Always stop engine before refueling machine. Fill fuel tank outdoors.

TS202 –UN–23AUG88

Continued on next page

TX,05,FF1622 –19–14JUN90–1/2

Store flammable fluids away from fire hazards. Do not incinerate or puncture pressurized containers.

Make sure machine is clean of trash, grease, and debris.

Do not store oily rags; they can ignite and burn spontaneously.

TS227 –UN–23AUG88

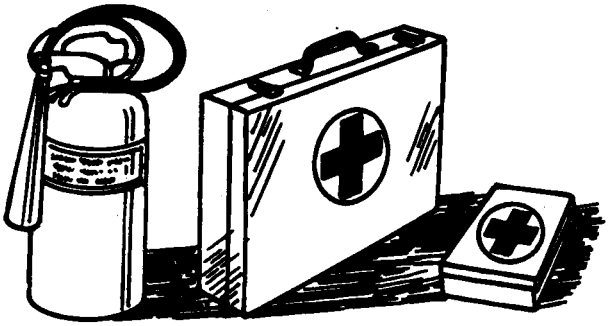
TX,05,FF1622 –19–14JUN90–2/2

PREPARE FOR EMERGENCIES

Be prepared if a fire starts.

Keep a first aid kit and fire extinguisher handy.

Keep emergency numbers for doctors, ambulance service, hospital, and fire department near your telephone.



TS291 –UN–23AUG88

DX,FIRE2 –19–03MAR93–1/1

HANDLE STARTING FLUID SAFELY

Starting fluid is highly flammable.

Keep all sparks and flame away when using it. Keep starting fluid away from batteries and cables.

To prevent accidental discharge when storing the pressurized can, keep the cap on the container, and store in a cool, protected location.

Do not incinerate or puncture a starting fluid container.

TS1356 –UN–18MAR92

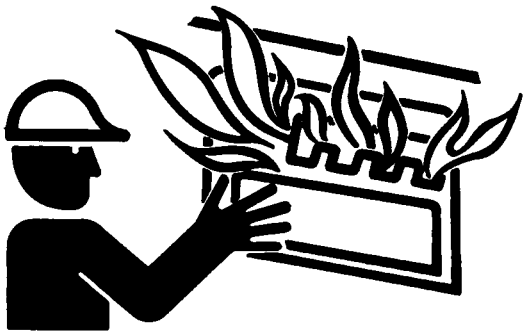
DX,FIRE3 –19–16APR92–1/1

CLEAN TRASH FROM MACHINE

Keep engine compartment, radiator, batteries, hydraulic lines, fuel tank, and operator's station clean.

Temperature in engine compartment may go up immediately after engine is stopped. BE ON GUARD FOR FIRES DURING THIS PERIOD.

Open access door(s) to cool the engine faster, and clean engine compartment.

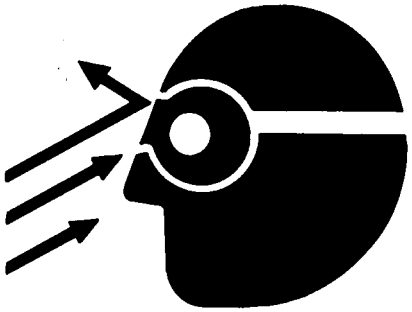


T6669AG –UN–18OCT88

02T,05,J33 –19–14MAR90–1/1

PROTECT AGAINST FLYING DEBRIS

Guard against injury from flying pieces of metal or debris; wear goggles or safety glasses.



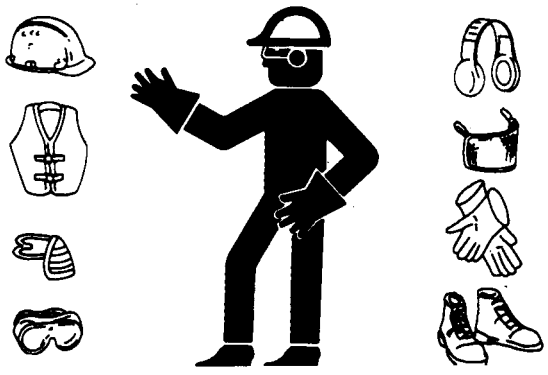
T6642DK –UN–18OCT88

TX,05,FF1613 –19–14JUN90–1/1

WEAR PROTECTIVE CLOTHING

Wear close fitting clothing and safety equipment appropriate to the job.

Operating equipment safely requires the full attention of the operator. Do not wear radio or music headphones while operating machine.



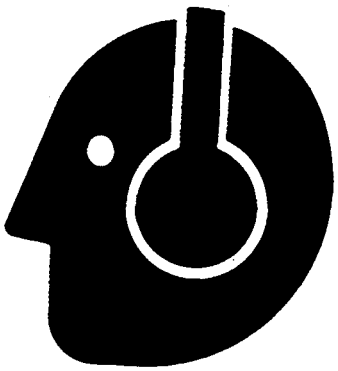
TS206 –UN–23AUG88

DX,WEAR2 –19–03MAR93–1/1

PROTECT AGAINST NOISE

Prolonged exposure to loud noise can cause impairment or loss of hearing.

Wear a suitable hearing protective device such as earmuffs or earplugs to protect against objectionable or uncomfortable loud noises.



TS207 –UN–23AUG88

DX,NOISE –19–03MAR93–1/1

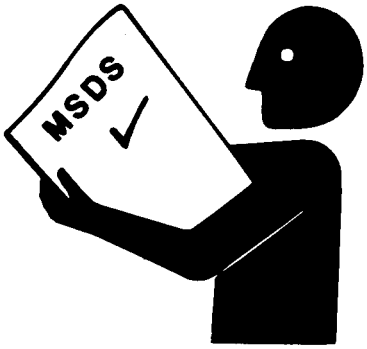
HANDLE CHEMICAL PRODUCTS SAFELY

Direct exposure to hazardous chemicals can cause serious injury. Potentially hazardous chemicals used with your machine include such items as lubricants, coolants, paints, and adhesives.

A Material Safety Data Sheet (MSDS) provides specific details on chemical products: physical and health hazards, safety procedures, and emergency response techniques.

Check the MSDS before you start any job using a hazardous chemical. That way you will know exactly what the risks are and how to do the job safely. Then follow procedures and recommended equipment.

See your authorized dealer for MSDS's on chemical products used with your machine.



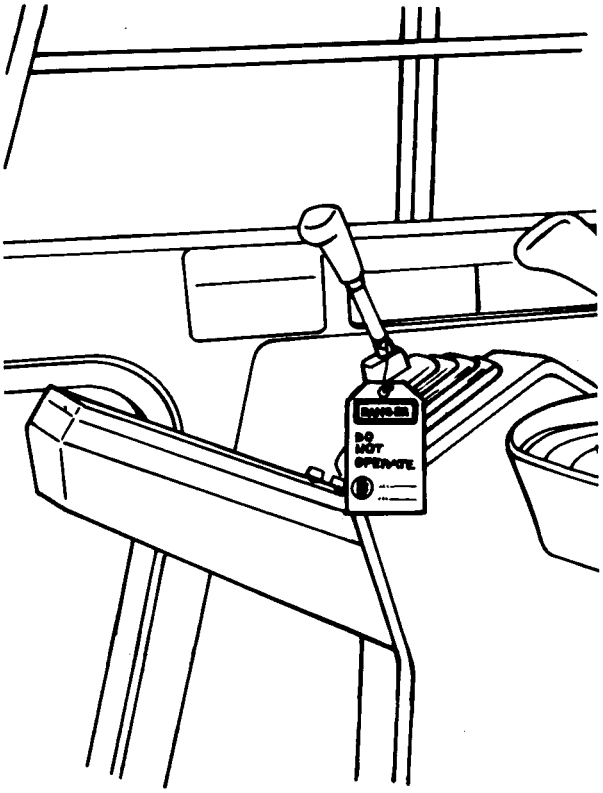
TS1132 –UN–26NOV90

TX,05,DH2500 –19–02OCT92–1/1

WARN OTHERS OF SERVICE WORK

Unexpected machine movement can cause serious injury.

Before performing any work on the machine, attach a "Do Not Operate" tag on the right control lever.



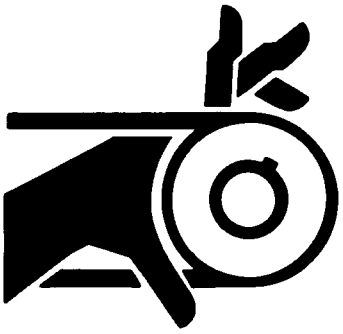
T7273AP –UN–08JUN90

TX,05,RR,566 –19–23JUL91–1/1

STAY CLEAR OF MOVING PARTS

Entanglements in moving parts can cause serious injury.

To prevent accidents, use care when working around rotating parts.



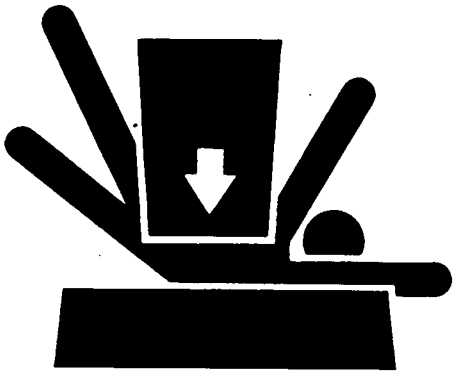
T7273AS –UN–08JUN90

TX,05,RR,572 –19–12JUN90–1/1

SUPPORT MACHINE PROPERLY

Always lower the attachment or implement to the ground before you work on the machine. If you must work on a lifted machine or attachment, securely support the machine or attachment.

Do not support the machine on cinder blocks, hollow tiles, or props that may crumble under continuous load. Do not work under a machine that is supported solely by a jack. Follow recommended procedures in this manual.



TS229 –UN–23AUG88

DX,LOWER –19–04JUN90–1/1

SERVICE COOLING SYSTEM SAFELY

Explosive release of fluids from pressurized cooling system can cause serious burns.

Shut off engine. Only remove filler cap when cool enough to touch with bare hands. Slowly loosen cap to first stop to relieve pressure before removing completely.

TS281 –UN–23AUG88

DX,RCAP –19–04JUN90–1/1

PRACTICE SAFE MAINTENANCE

Understand service procedure before doing work. Keep area clean and dry.

Never lubricate or service machine while it is moving. Keep hands, feet and clothing from power-driven parts.

Before servicing machine.

- Park machine on a level surface.
- Lower bucket to the ground.
- Turn auto-idle switch off.
- Run engine with engine rpm dial at 1/3 speed for 2 minutes.
- Move engine rpm dial to slow idle position.
- Turn key switch to OFF. Remove key from switch.
- Attach a "Do Not Operate" tag on the right side controller lever.
- Pull pilot control shut-off lever to locked position.
- Allow engine to cool.

TS218 –UN–23AUG88

If maintenance procedure must be performed with engine running, do not leave machine unattended.

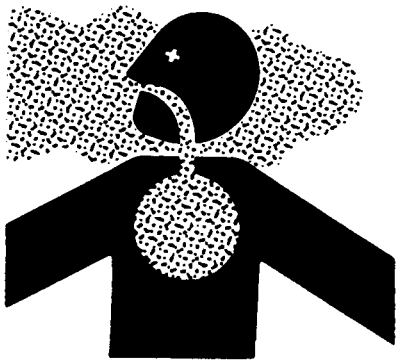
Securely support any machine elements that must be raised for service work. Never work under a machine raised by the boom. If the machine must be raised, keep a 90-110° angle between boom and arm.

Keep all parts in good condition and properly installed. Fix damage immediately. Replace worn or broken parts. Remove any buildup of grease, oil, or debris.

Disconnect battery ground cable (-) before making adjustments on electrical systems or welding on machine.

TX,05,DH5001 –19–28MAY96–1/1

REMOVE PAINT BEFORE WELDING OR HEATING



TS220 –UN–23AUG88

Avoid potentially toxic fumes and dust.

Hazardous fumes can be generated when paint is heated by welding, soldering, or using a torch.

Do all work outside or in a well ventilated area. Dispose of paint and solvent properly.

Remove paint before welding or heating:

- If you sand or grind paint, avoid breathing the dust. Wear an approved respirator.
- If you use solvent or paint stripper, remove stripper with soap and water before welding. Remove solvent or paint stripper containers and other flammable material from area. Allow fumes to disperse at least 15 minutes before welding or heating.

DX,PAINT –19–03MAR93–1/1

AVOID HEATING NEAR PRESSURIZED FLUID LINES

TS953 –UN–15MAY90

Flammable spray can be generated by heating near pressurized fluid lines, resulting in severe burns to yourself and bystanders. Do not heat by welding, soldering, or using a torch near pressurized fluid lines or other flammable materials. Pressurized lines can be accidentally cut when heat goes beyond the immediate flame area.

DX,TORCH –19–03MAR93–1/1

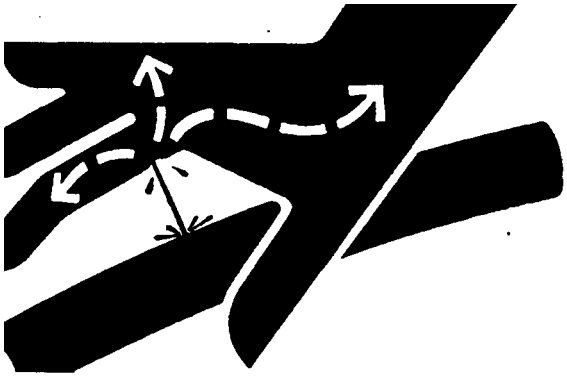
AVOID HIGH-PRESSURE FLUIDS

Escaping fluid under pressure can penetrate the skin causing serious injury.

Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure.

Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.

If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available from Deere & Company Medical Department in Moline, Illinois, U.S.A.



X9811 –UN–23AUG88

DX,FLUID –19–03MAR93–1/1

PREVENT BATTERY EXPLOSIONS

Keep sparks, lighted matches, and open flame away from the top of battery. Battery gas can explode.

Never check battery charge by placing a metal object across the posts. Use a volt-meter or hydrometer.

Do not charge a frozen battery; it may explode. Warm battery to 16°C (60°F).

TS204 –UN–23AUG88

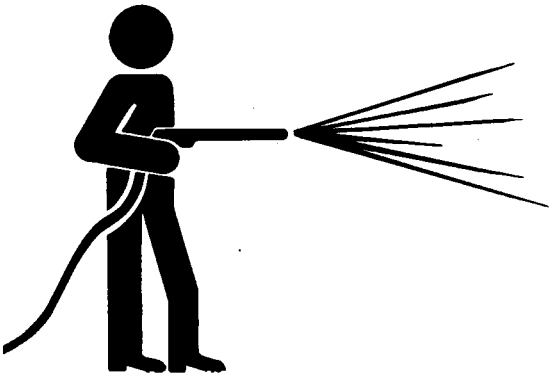
DX,SPARKS –19–03MAR93–1/1

CLEAN THE MACHINE REGULARLY

Remove any grease, oil, fuel, or debris build-up to avoid possible injury or machine damage.

High pressure washing [greater than 1379 kpa (13.8 bar) (200 psi)] can damage freshly painted finishes. Paint should be allowed to air dry for 30 days minimum after receipt of machine before cleaning with high pressure. Use low pressure wash operations until 30 days have elapsed.

Do not spray oil cooler fins at an angle. Fins may bend.



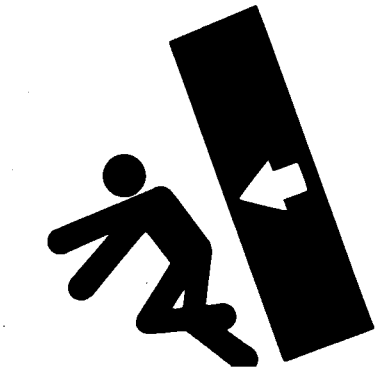
T6642EJ –UN–18OCT88

TX,05,FF2787 –19–27JUL94–1/1

STORE ATTACHMENTS SAFELY

Stored attachments such as buckets, hydraulic hammers, and blades can fall and cause serious injury or death.

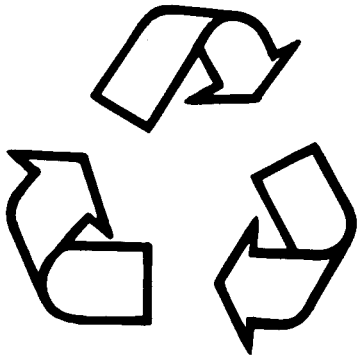
Securely store attachments and implements to prevent falling. Keep playing children and bystanders away from storage area.



TS219 –UN–23AUG88

TX,05,RR,576 –19–26APR90–1/1

DISPOSE OF WASTE PROPERLY



TS1133 –UN–26NOV90

Improperly disposing of waste can threaten the environment and ecology. Potentially harmful waste used with your machine include such items as oil, fuel, coolant, brake fluid, filters, and batteries.

Use leakproof containers when draining fluids. Do not use food or beverage containers that may mislead someone into drinking from them.

Do not pour waste onto the ground, down a drain, or into any water source.

Air conditioning refrigerants escaping into the air can damage the Earth's atmosphere. Government regulations may require a certified air conditioning service center to recover and recycle used air conditioning refrigerants.

Inquire on the proper way to recycle or dispose of waste from your local environmental or recycling center, or from your authorized dealer.

TX,05,DH2502 –19–26AUG92–1/1

BATTERY TERMINALS, LIFTING EQUIPMENT, DRY CLEANING SOLVENT AND COMPRESSED AIR

WARNING: Avoid possible injury. Disconnect the negative terminal first and reconnect the negative terminal last when disconnecting/reconnecting battery terminals.

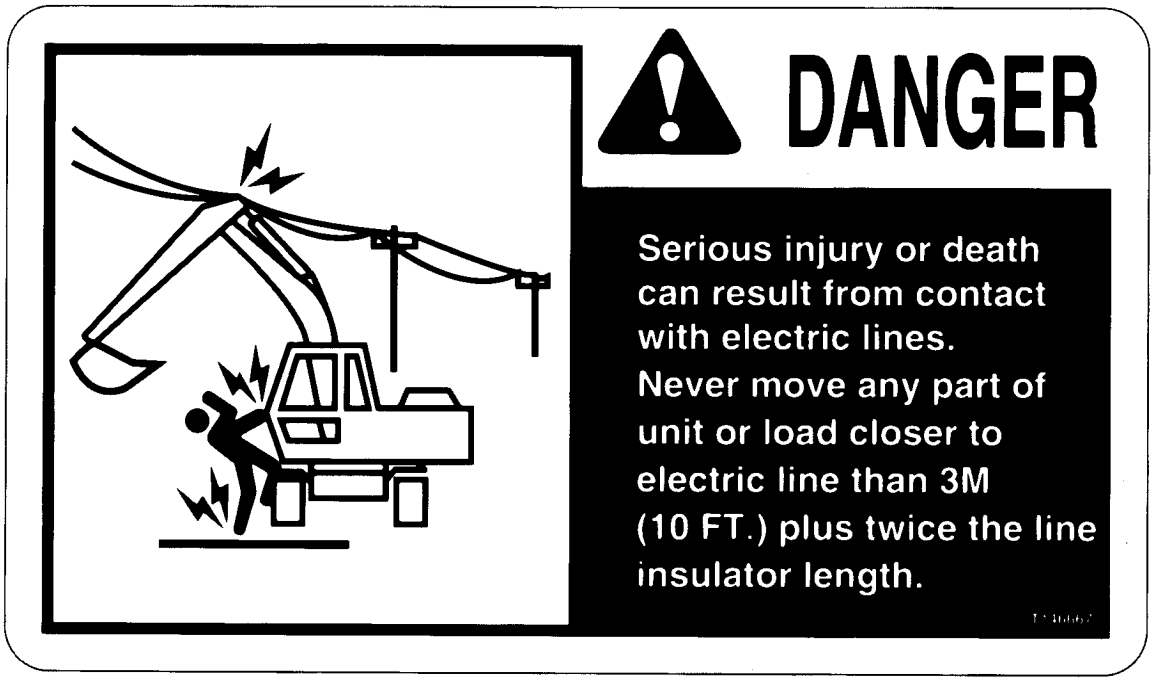
WARNING: When lifting equipment, ensure that the lifting device is capable of supporting the desired weights and the inspection date stamped on the lifting device has not expired.

WARNING: Dry cleaning solvent PD-680 Type III is toxic and flammable. Wear protective goggles and gloves and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flames or excessive heat. The flash point is 200°F (93°C). If you become dizzy while using solvent, get fresh air immediately and get medical aid. If contact with eyes is made, wash your eyes with water and get medical aid immediately.

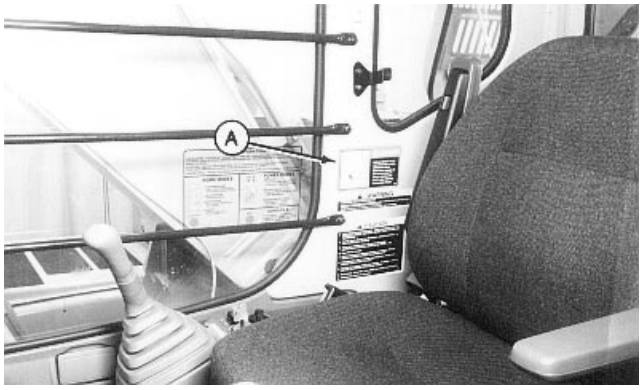
WARNING: Compressed air used for cleaning purposes shall not exceed 30 psi. Use only with effective chip guarding and personnel protective equipment (goggles/shield/gloves, etc.).

CED,OUOE042,40 –19–18OCT99–1/1

SAFETY SIGNS



T7748CZ –19–14OCT92



T101484 –UN–27JUN96

A—Danger Decal Location

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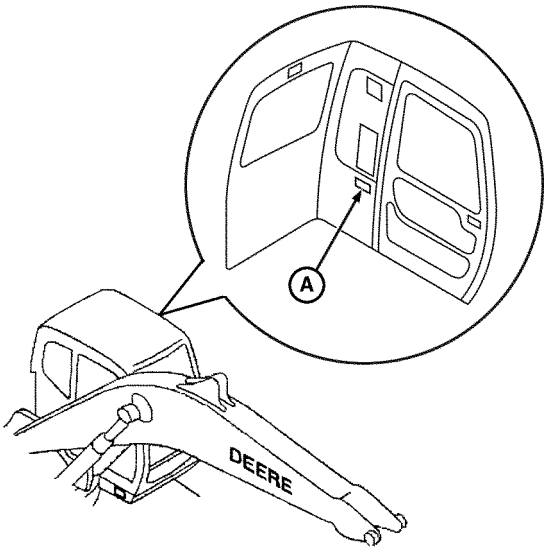
CED,OUOE042,5057 –19–14APR99–1/11

T125067

T125067 –UN–28OCT99



T125066

T125066 –UN–28OCT99

A—Caution Decal Location

Continued on next page

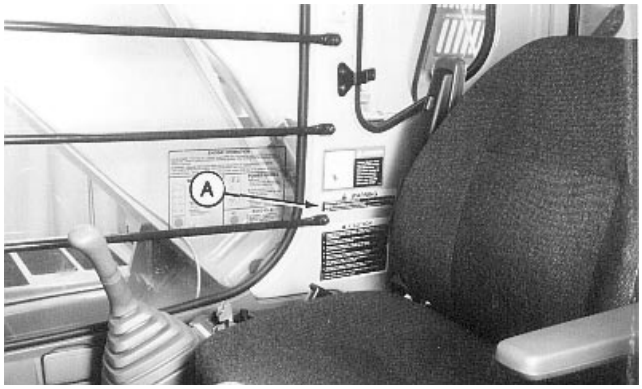
CED,OUOE042,5057 –19–14APR99–2/11

WARNING

- AVOID SERIOUS CRUSHING INJURY FROM BOOM
- NEVER place any part of body beyond window bars or frame. It could be crushed by the boom if boom control lever is accidentally bumped or otherwise engaged.
- DO NOT remove window bars. If window is missing or broken, replace immediately.

T146668

T7748DA –19–14OCT92



T101485 –UN–27JUN96

A—Warning Decal Location

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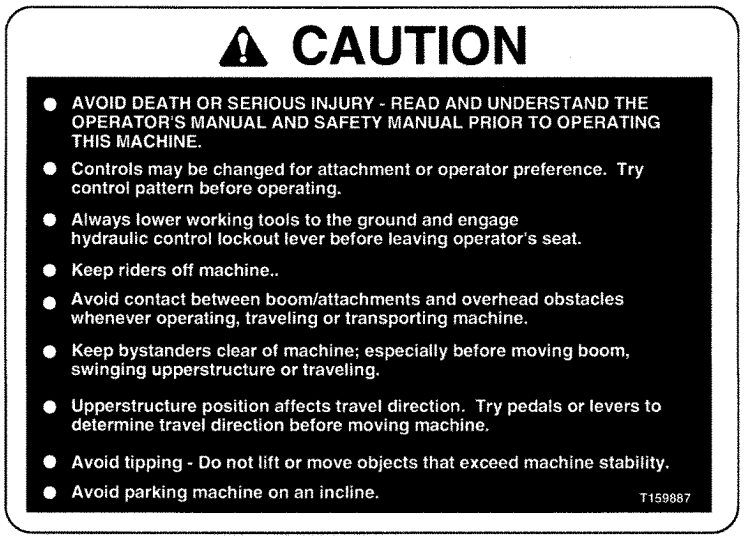
CED,OUOE042,5057 –19–14APR99–3/11



T102888

T102888 –19–23AUG96

T101483 –UN–27JUN96

A—Caution Decal Location

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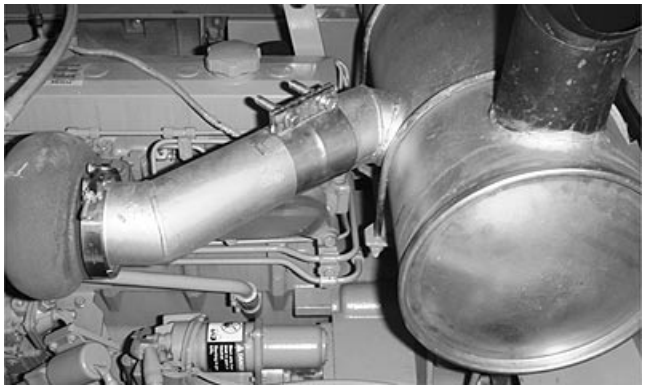
CED,OUOE042,5057 –19–14APR99–4/11

T7972AP –19–22MAR93



T108112B –UN–27MAR97

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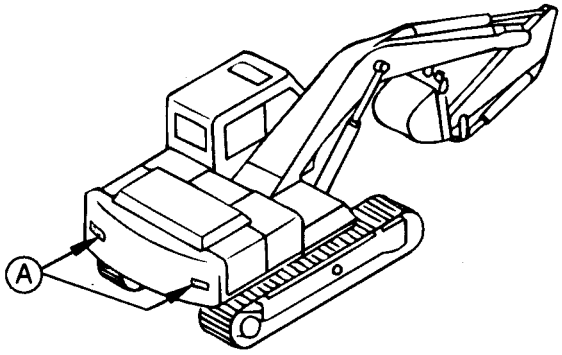
CED,OUOE042,5057 –19–14APR99–5/11

T7748DC –19–14OCT92

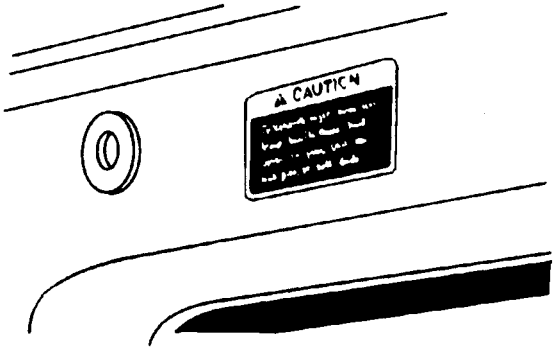


T8167AL –UN–06FEB94

A—Warning Decal Location

CED,OUOE042,5057 –19–14APR99–6/11

T7748CX –19–14OCT92



T7748DH –UN–15OCT92

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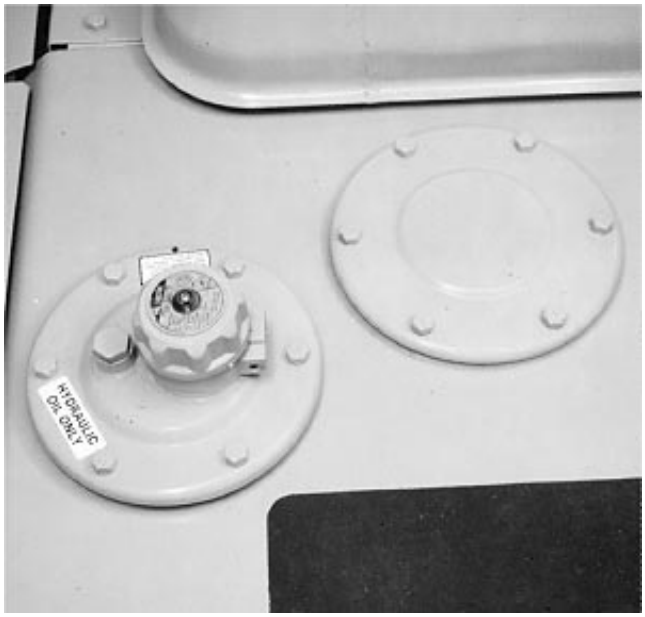
CED,OUOE042,5057 –19–14APR99–7/11

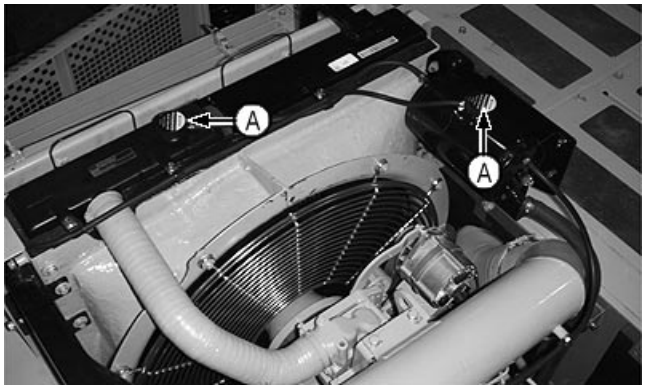
T7900AB –19–03DEC92



T7748DK –UN–22OCT92

CED,OUOE042,5057 –19–14APR99–8/11

T101279 –19–14MAY96



T115432B –UN–15MAY98

A—Caution Decal Locations

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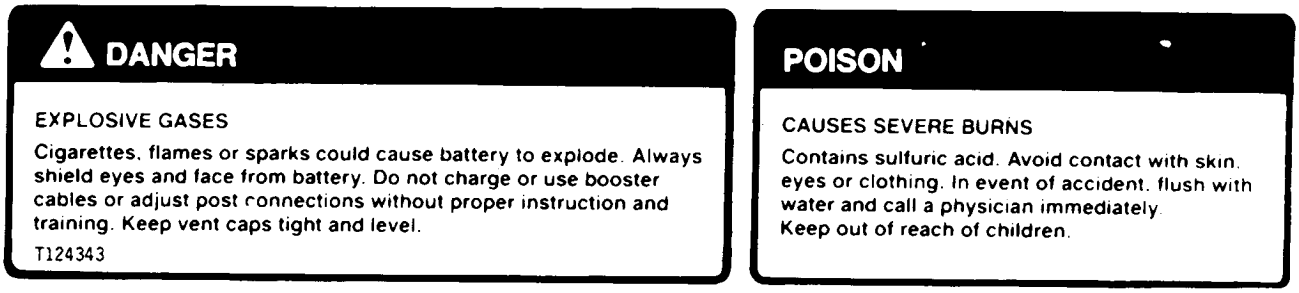
CED,OUOE042,5057 –19–14APR99–9/11



T6888AC –19–06JAN89

Decal is located on top of each battery.

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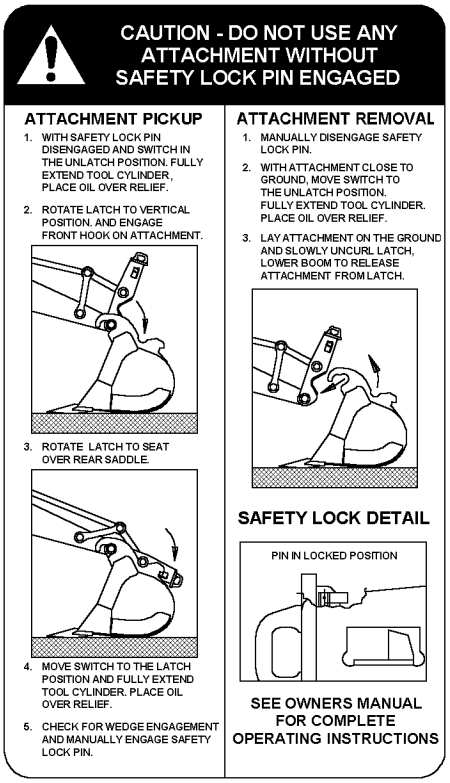
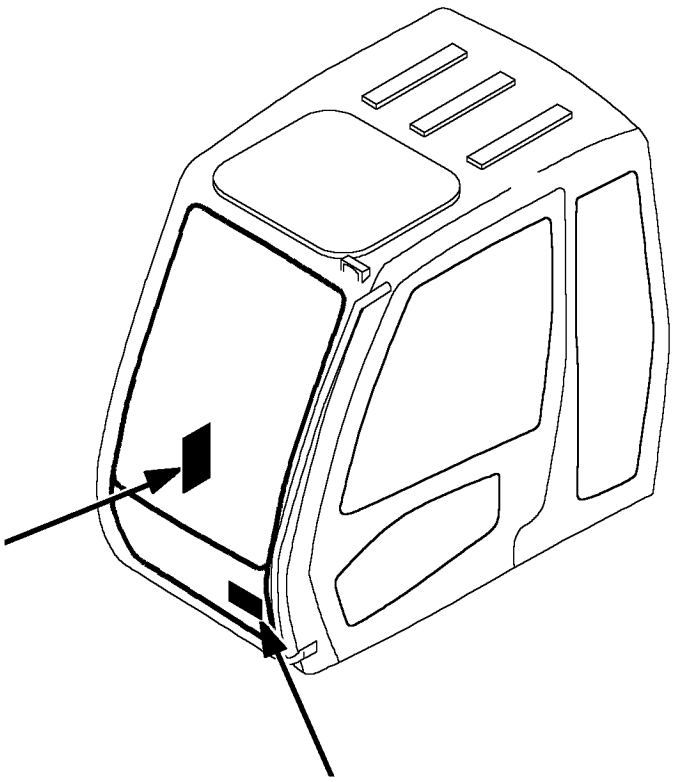
CED,OUOE042,5057 –19–14APR99–10/11



Located on inside right window



Located on inside lower left windshield

T120457

T120457 –19–25MAR99

CED,OUOE042,5057 –19–14APR99–11/11

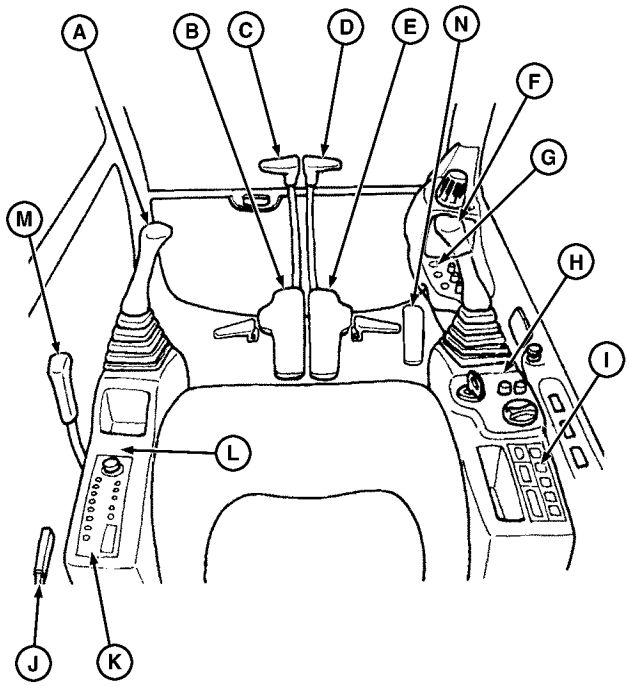
CHAPTER 2

OPERATOR'S STATION

BLANK

Operator's Station

PEDALS, LEVERS, AND PANELS



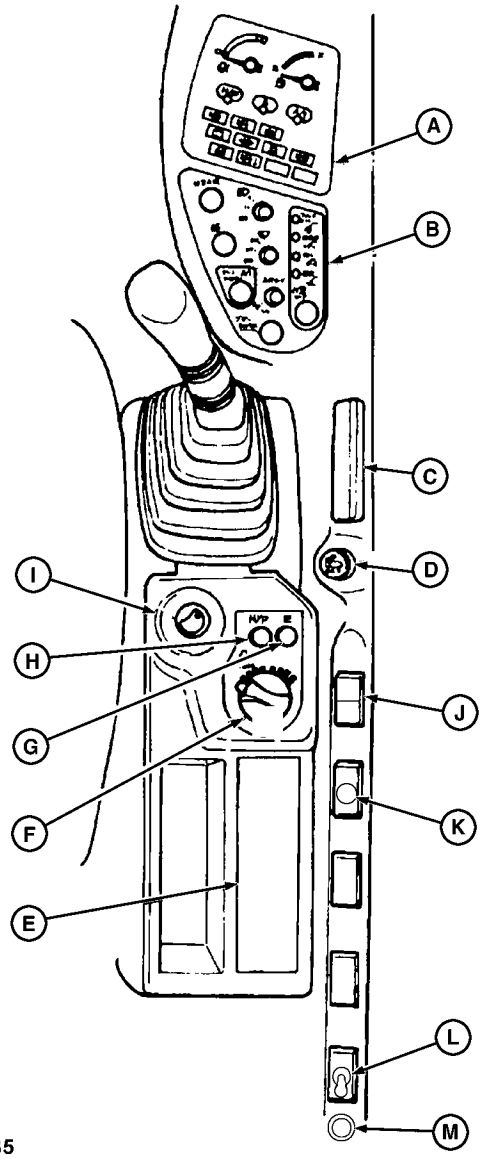
T126384 –UN–06DEC99

T126384

A—Left Control Lever/Horn Switch (On Top of Lever)
B—Left Travel Pedal
C—Left Travel Lever
D—Right Travel Lever
E—Right Travel Pedal
F—Right Control Lever/Power Boost Switch (On Top of Lever)
G—Front Right Panel
H—Right Console Panel
I—Air Conditioner Panel—If Equipped
J—Cab Door Release Lever
K—Radio
L—Left Console Panel
M—Pilot Control Shut-Off Lever
N—Impact Breaker Pedal

CED,OUOE042,5059 –19–14APR99–1/1

RIGHT FRONT PANEL AND RIGHT CONSOLE PANEL

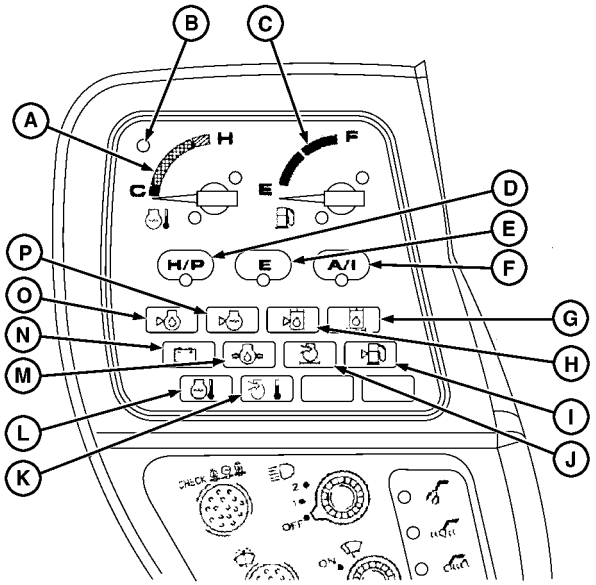


T121035

A—Monitor Panel
B—Switch Panel
C—Ash Tray
D—Cigar Lighter
E—Air Conditioner Panel-If Equipped
F—Engine rpm Dial
G—E (Economy) Mode Switch
H—H/P (High Power) Mode Switch
I—Key Switch
J—Rear Light Switch
K—Overload Alarm/Indicator
L—Artic Heater Switch
M—Artic Heater Indicator

TX,10,DH5709 –19–21APR97–1/1

MONITOR PANEL



T120386 –UN–25MAR99

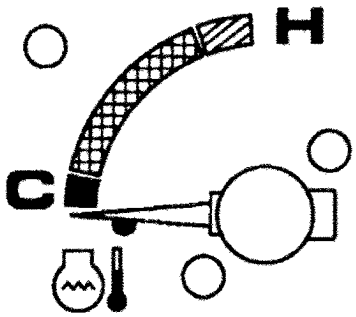
T120386

A—Engine Coolant Temperature Gauge
B—Warm-up Indicator
C—Fuel Gauge
D—H/P (High Power) Mode Indicator
E—E (Economy) Mode Indicator
F—Auto-Idle Indicator
G—Hydraulic Oil Filter Restriction Indicator
H—Hydraulic Oil Level Indicator
I—Fuel Level Indicator
J—Air Filter Restriction Indicator
K—Charge Air Temperature Indicator
L—Engine Coolant Temperature Indicator
M—Engine Oil Pressure Indicator
N—Alternator Voltage Indicator
O—Engine Oil Level Indicator
P—Engine Coolant Level Indicator

CED,OUOE020,15 –19–03MAR99–1/1

ENGINE COOLANT TEMPERATURE GAUGE

IMPORTANT: If needle points to "RED" zone, idle engine to bring back needle to "GREEN" zone before stopping engine. If needle continues to rise, shut engine OFF.

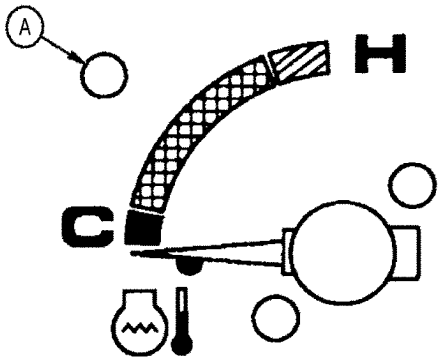


T101569 –UN–11JUL96

TX,10,DH5067 –19–25JUN96–1/1

WARM-UP INDICATOR

Yellow indicator (A) will turn off when the engine coolant temperature reaches approximately 30°C (86°F).



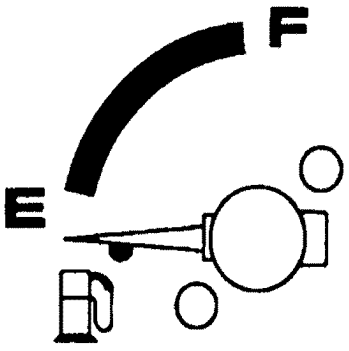
T101574 –UN–11JUL96

A—Warm-up Indicator

TX,10,DH5045 –19–17JUN96–1/1

FUEL GAUGE

Fuel machine before needle reaches “E”.

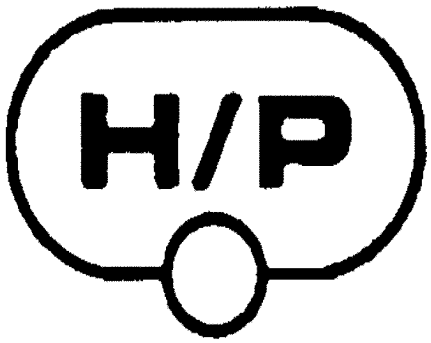


T101570 –UN–11JUL96

TX,10,DH5020 –19–04JUN96–1/1

HP (HIGH POWER) MODE INDICATOR

Green indicator will light when the H/P mode switch is turned on.

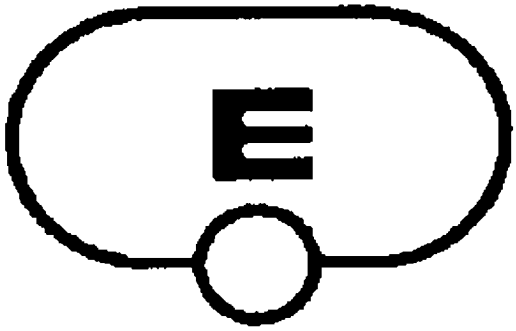


T101571 –UN–11JUL96

TX,10,DH5109 –19–11JUL96–1/1

E (ECONOMY) MODE INDICATOR

Green indicator will light when the E mode switch is turned on.

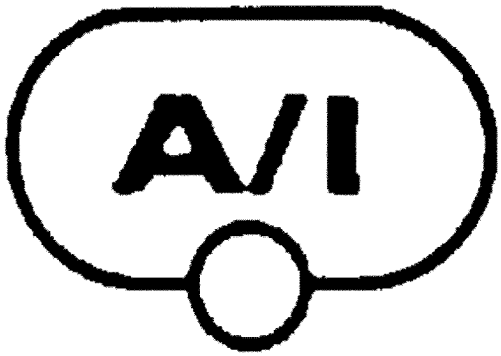


T101572 –UN–11JUL96

TX,10,DH5044 –19–17JUN96–1/1

AUTO-IDLE INDICATOR

Green indicator will light when the auto-idle switch is turned on.



T101573 –UN–11JUL96

TX,10,DH5046 –19–17JUN96–1/1

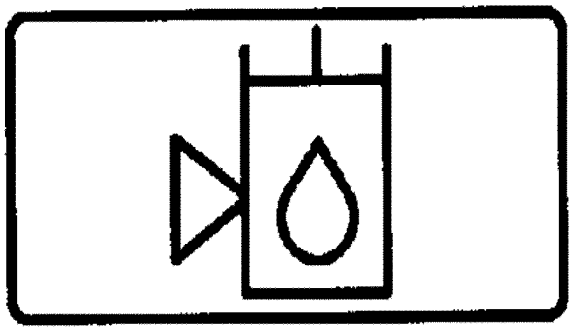
HYDRAULIC OIL LEVEL INDICATOR

Park machine on level ground.

Position machine with arm cylinder fully retracted and bucket cylinder fully extended.

Pressing the level check switch before starting the machine will turn the indicator on if oil level is adequate for operation.

NOTE: This check does NOT take the place of daily inspection.



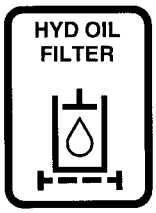
T101577 –UN–27JUN96

TX,10,DH5022 –19–04JUN96–1/1

HYDRAULIC OIL FILTER RESTRICTION INDICATOR

IMPORTANT: Prevent possible hydraulic pump damage. Change hydraulic oil filter as soon as possible when a problem occurs.

Indicator light will light and service required indicator light will light when filter elements are restricted. Change filter elements.

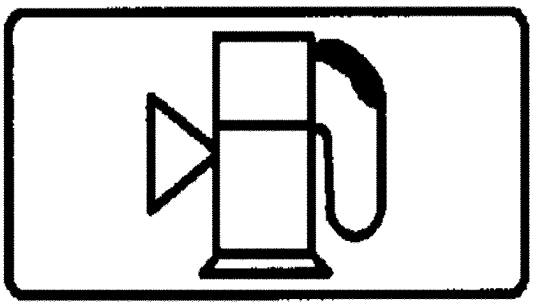


T8381AG –UN–03JAN95

CED,OUOE042,58 –19–07APR99–1/1

FUEL LEVEL INDICATOR

When red fuel indicator lights, approximately 30 liters (8 gal.) of fuel remain.

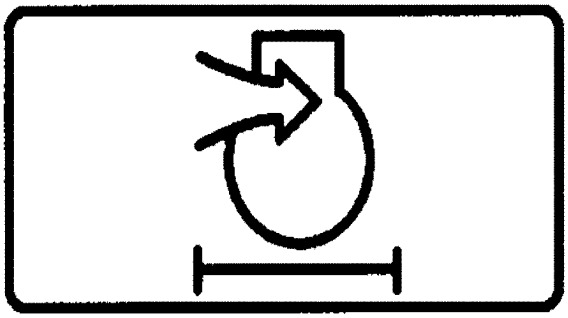


T101578 –UN–27JUN96

TX,10,DH5068 –19–25JUN96–1/1

AIR FILTER RESTRICTION INDICATOR

Red indicator will light when the air filter elements are clogged. Clean or replace elements.



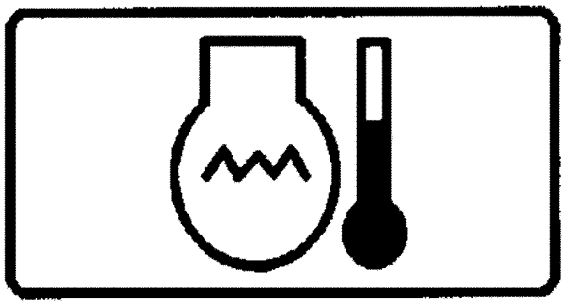
T101580 –UN–27JUN96

TX,10,DH5024 –19–04JUN96–1/1

ENGINE COOLANT TEMPERATURE INDICATOR

IMPORTANT: Do not stop engine when coolant temperature light comes on or temperature will rise further. Reduce load and run engine at slow idle. If temperature light continues to stay ON, shut engine OFF.

Red indicator will light and buzzer will sound when the engine coolant overheats. Reduce load immediately and run engine at slow idle. Inspect for debris around radiator. Check for low coolant level in the radiator recovery tank.



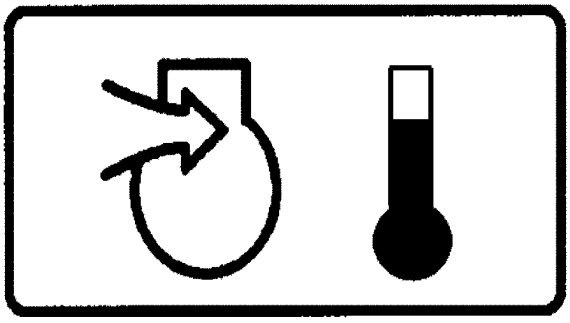
T101581 –UN–11JUL96

TX,10,DH5019 –19–04JUN96–1/1

CHARGE AIR TEMPERATURE INDICATOR

IMPORTANT: Prevent possible engine damage. If charge air indicator light comes on while operating, stop engine.

Red indicator will light when air intake temperature is excessively high. Stop engine. Check for debris on charge air cooler inlet screens. Check fan for proper operation. A clogged charge air system will reduce engine performance.



T107672 –UN–27FEB97

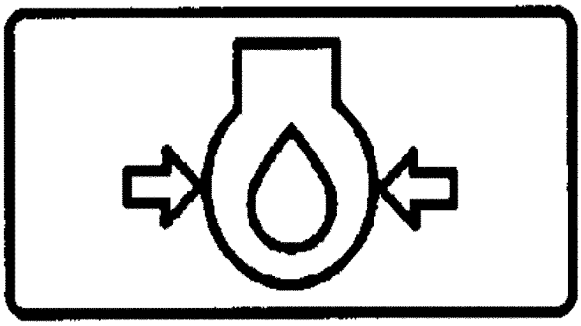
TX,10,DH5710 –19–22APR97–1/1

ENGINE OIL PRESSURE INDICATOR

IMPORTANT: Prevent possible engine damage. If engine oil pressure light comes on while operating, stop engine immediately.

Red indicator will light and buzzer will sound when engine oil pressure is low. Stop engine immediately.

NOTE: Cold oil, low oil level, or extreme off level operation may cause indicator to light.

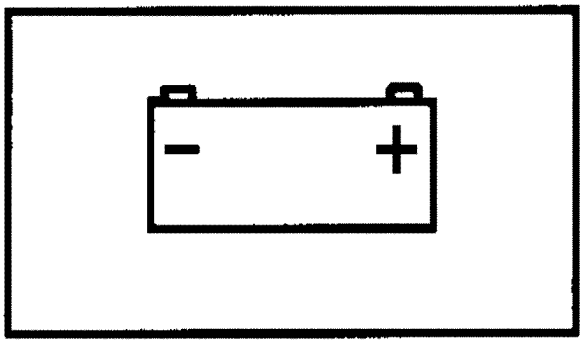


T101579 –UN–27JUN96

TX,10,DH5021 –19–04JUN96–1/1

ALTERNATOR VOLTAGE INDICATOR

Indicator will light with no alternator output. Check electrical system.



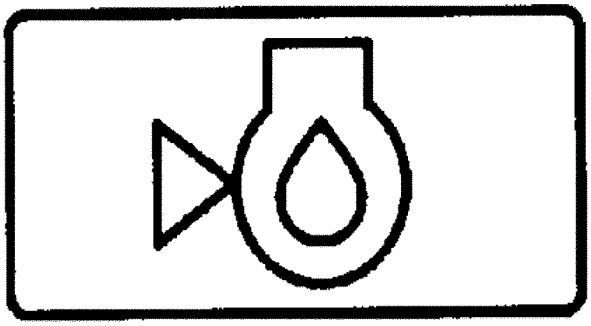
T101582 –UN–27JUN96

O2T,25,M8 –19–09APR92–1/1

ENGINE OIL LEVEL INDICATOR

Pressing the level check switch before starting the machine will turn the indicator on if oil level is adequate for operation.

NOTE: This check does NOT take the place of daily inspection.



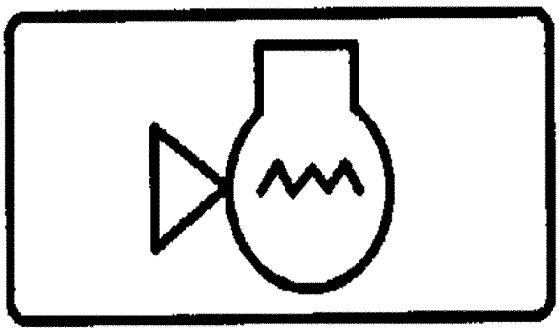
T101575 –UN–27JUN96

TX,10,DH5051 –19–18JUN96–1/1

COOLANT LEVEL INDICATOR

Pressing the level check switch before starting the machine will turn the indicator on if coolant level is adequate for operation.

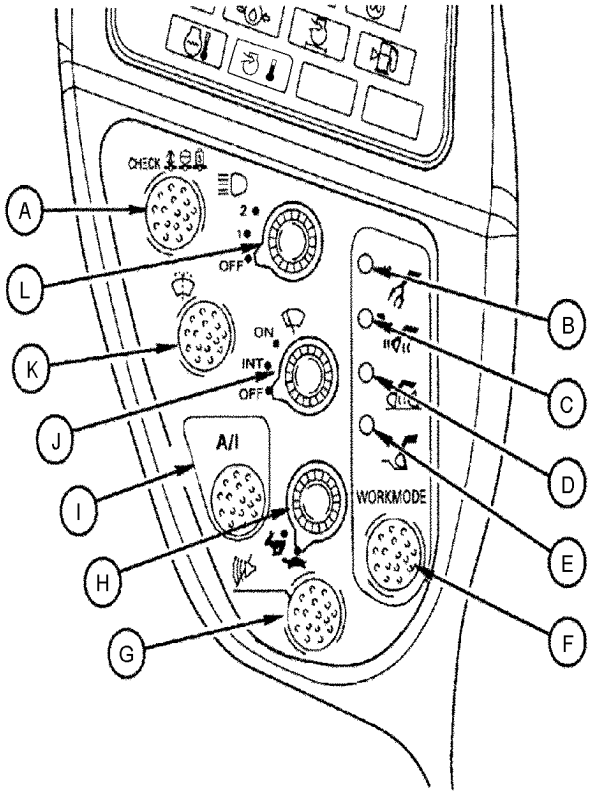
NOTE: This check does NOT take the place of daily inspection.



T101576 –UN–27JUN96

TX,10,DH5023 –19–04JUN96–1/1

SWITCH PANEL



T107673 –UN–27FEB97

A—Level Check Switch
B—Attachment Mode Indicator
C—Precision Mode Indicator
D—Grading Mode Indicator
E—Dig Mode Indicator
F—Work Mode Switch
G—Buzzer Stop Switch
H—Propel Speed Switch
I—Auto-idle Switch
J—Wiper Switch
K—Washer Switch
L—Operating Lights Switch

TX,10,DH5403 –19–27FEB97–1/1

BUZZER AND BUZZER STOP SWITCH

THE BUZZER SOUNDS WHEN:

- Engine oil pressure is low (indicator light (C) will also light). If engine oil pressure is low, stop the engine immediately.

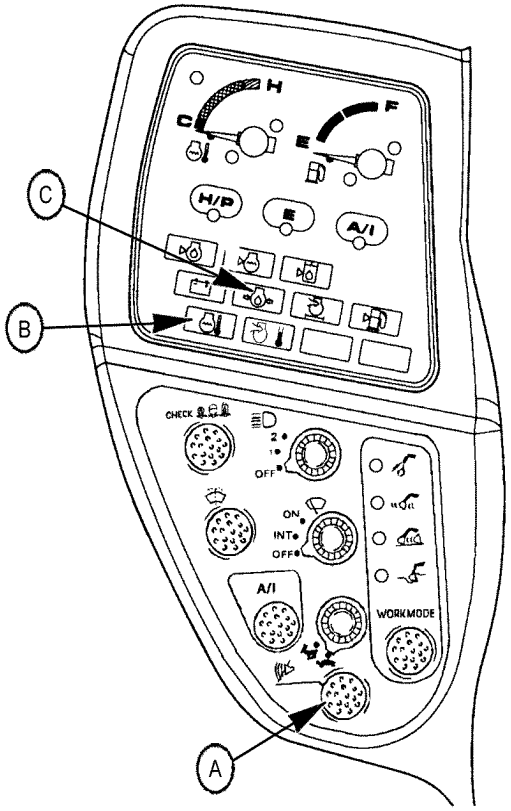
NOTE: The buzzer cannot be turned off when engine oil pressure is low.

- Engine coolant overheats (indicator light (B) will also light). If coolant temperature is high, push buzzer stop switch (A), reduce load immediately, and run engine at decreased engine speed. If high temperature continues, stop the engine. Check fluid levels.

When the buzzer stop switch is pushed and released the buzzer stops sounding and the buzzer function is automatically reset for the engine coolant overheat function.

TO RESET THE BUZZER:

Turn the key switch to OFF. The buzzer will not sound more than once for the same problem unless the switch is reset.



T107674 –UN–27FEB97

A—Buzzer Stop Switch
B—Engine Coolant Temperature Indicator
C—Engine Oil Pressure Indicator

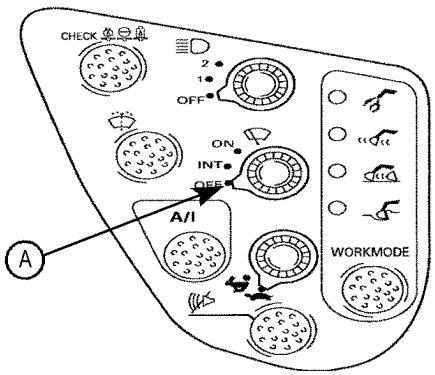
TX,10,DH5833 –19–24JUL97–1/1

WIPER SWITCH

Wiper switch (A) has three positions.

- INT position.....Wiper starts operating intermittently.
- ON position.....Wiper operates continuously
- OFF position.....Wiper automatically stops operating.

NOTE: The wiper and washer do not operate unless the upper front window is closed and the right-side lock pin is installed.



T101626 –UN–20JUN96

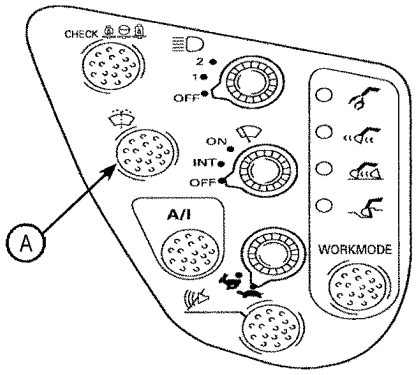
A—Wiper Switch

TX,10,DH5048 –19–18JUN96–1/1

WASHER SWITCH

IMPORTANT: Washer motor may be damaged if washer switch is held down for more than 20 seconds, or continually operated with no fluid in container.

Push switch (A) to squirt windshield washer fluid on windshield. Do not hold down switch for more than 20 seconds.



T101627 –UN–20JUN96

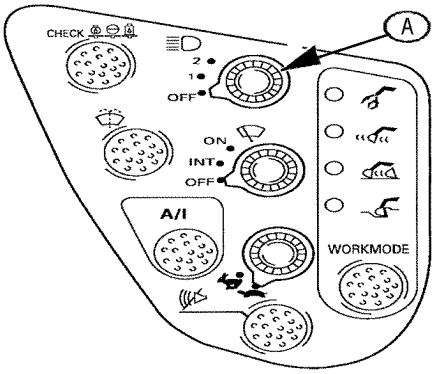
A—Washer Switch

TX,10,DH5018 –19–04JUN96–1/1

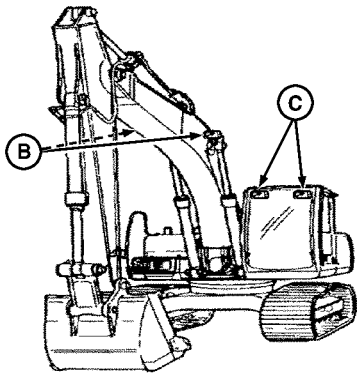
OPERATING LIGHTS SWITCH

Turn light switch (A) to first position to turn on light (C).

Turn light switch to second position to turn on lights (B and C).



T101591 –UN–27JUN96



T120793 –UN–25MAR99

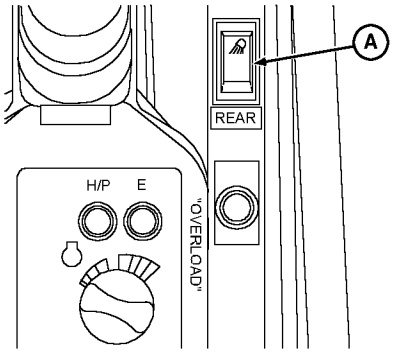
T120793

A—Light Switch
B—Operating Light
C—Operating Light

CED,OUOE042,5060 –19–14APR99–1/1

OPERATING REAR LIGHTS SWITCH

Move switch (A) to turn the rear outside work lights on or off.



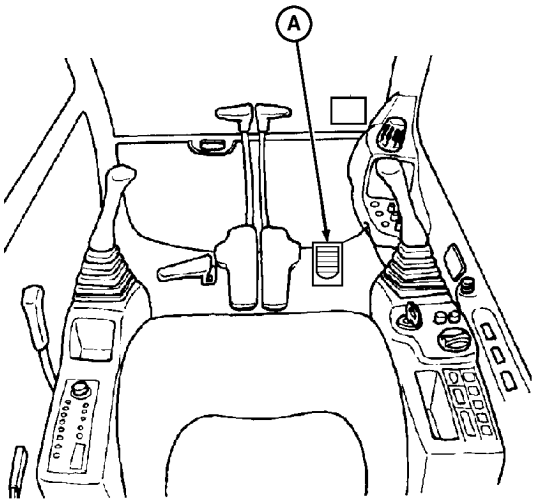
T120402

T120402 –UN–25MAR99

AG,OUOE042,19 –19–03MAR99–1/1

HYDRAULIC IMPACT BREAKER AUXILIARY SWITCH

Switch (A) is a ON/OFF type switch and controls the hydraulic impact breaker.



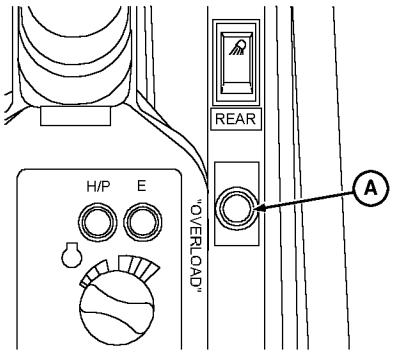
T120541

T120541 –UN–25MAR99

CED,OUOE020,36 –19–14MAR99–1/1

OVERLOAD ALARM AND INDICATOR

The overload alarm and indicator (A) will activate when the digging capacity is exceeded, while the machine is digging from the side.



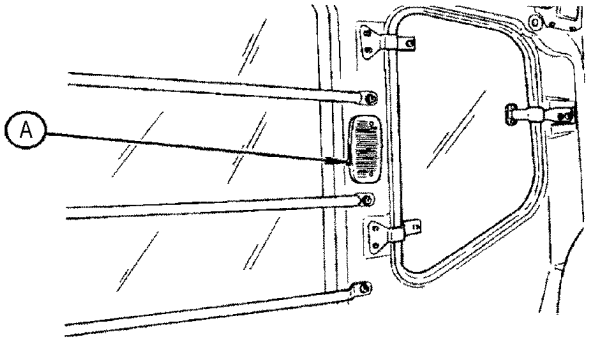
T120413

T120413 –UN–25MAR99

CED,OUOE020,18 –19–03MAR99–1/1

CAB LIGHT

Move switch (A) to turn the inside cab light on or off.



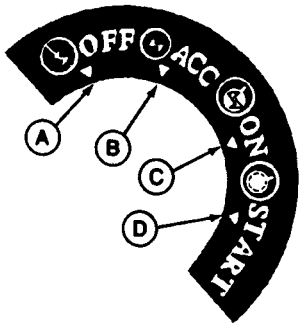
T101592 –UN–27JUN96

A—Cab Light Switch

TX,10,DH5050 –19–18JUN96–1/1

KEY SWITCH

Engine will stop when key switch is turned from ON to ACC. Always turn key to OFF position to prevent batteries from draining.



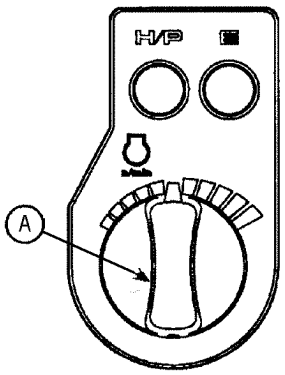
T7396DS –UN–27JUN91

A—Engine Off
B—Accessory
C—Engine On
D—Start

TX,10,DH5003 –19–29MAY96–1/1

ENGINE RPM DIAL

Use engine rpm dial (A) to adjust engine speed. Turn dial clockwise to increase engine speed or counterclockwise to decrease engine speed.



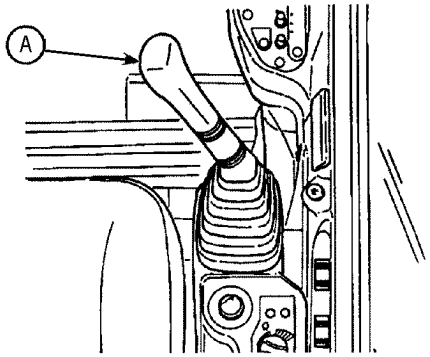
T101628 –UN–20JUN96

A—Engine RPM Dial

TX,10,DH5052 –19–19JUN96–1/1

POWER BOOST SWITCH

Power boost switch (A) is located on top of right control lever.



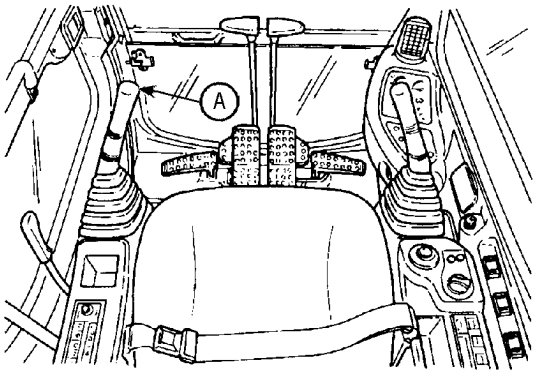
T101633 –UN–20JUN96

A—Power Boost Switch

TX,10,DH5590 –19–22MAR97–1/1

HORN

Horn switch (A) is located on top of left control lever.



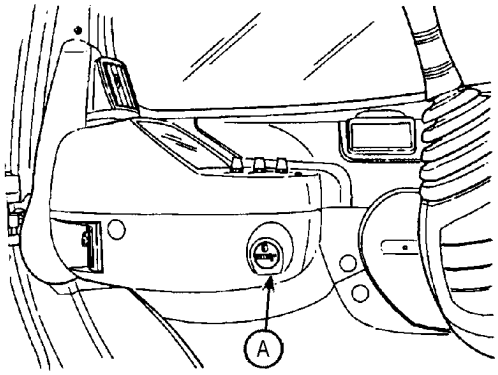
T101634 –UN–20JUN96

A—Horn Switch

TX,10,DH5015 –19–04JUN96–1/1

HOUR METER

The right hand number on the hour meter (A) indicates tenths of an hour (six minutes).

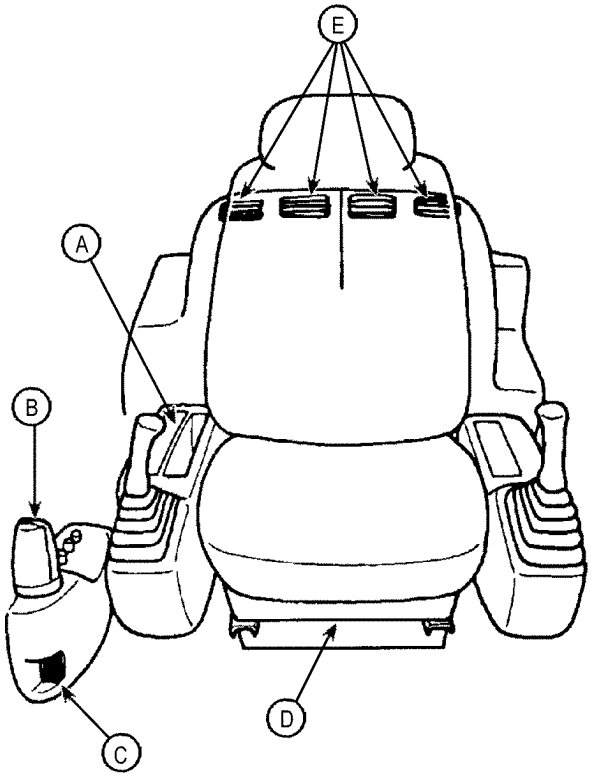


T101639 –UN–26JUN96

A—Hour Meter

TX,10,DH5062 –19–24JUN96–1/1

CAB HEATER AND AIR CONDITIONER

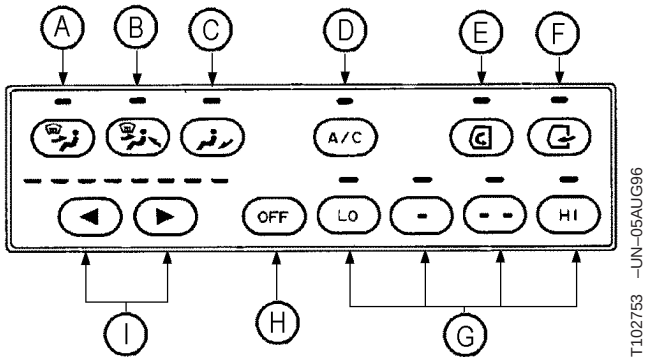


T101645 –UN–20JUN96

A—Control Panel
B—Front Vent
C—Defroster Vent
D—Foot Vent
E—Rear Vents

CED,OUOE042,70 –19–07APR99–1/1

CONTROL PANEL SWITCHES



A—Mode Switch
B—Mode Switch
C—Mode Switch
D—Air Conditioner Switch
E—Air Vent Switch
F—Fresh Air Vent Switch
G—Blower Switches
H—Blower OFF Switch
I—Temperature Control Switches

Mode Switches

(A) Air flows out of front vent and defroster vent.

(B) Air flows out of front and rear vents, and defroster vent.

(C) Air flows out of foot vent only.

Temperature Control Switches

Eight indicators are situated just above the temperature control switches (I). The indicators will turn red when the right arrow switch is pressed, and green when the left arrow switch is pressed. Air temperature is highest if all indicators are red, and coolest if all indicators are green. Either warm or cool air will flow out of vent(s) selected by the mode switches.

Blower Switches

Press blower switches (G) to select desired blower speed. Air conditioner will turn on when A/C switch (D) is pressed and any of the blower indicators is on. When blower OFF switch (H) is pressed, the blower and the air conditioner will turn off. The blower will turn on if one of the blower switches is pressed whether the air conditioner switch is turned on or off.

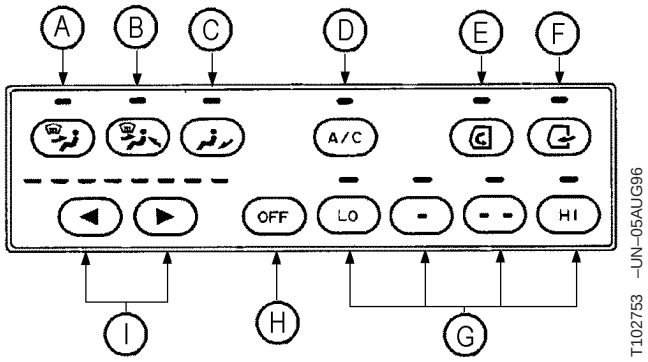
Fresh Air Vent Switch

Press fresh air vent switch (F) to route outside air into the cab. Press air vent switch (E) to close fresh air vent and circulate air already in cab.

TX,10,DH5055 –19–19JUN96–1/1

CAB HEATER OPERATION

1. Press desired mode switch (A, B, or C).
2. Press right temperature control switch (I) until all indicators are red.
3. Press blower switch (G to select desired blower speed.
4. Press air conditioner switch (D) to turn indicator off if not already off.
5. Press temperature control switches and blower switches to adjust cab temperature

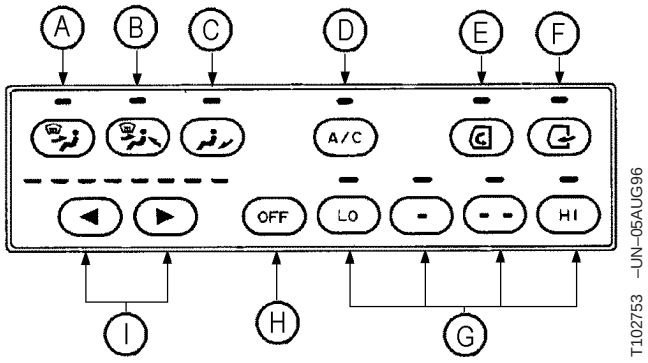


A—Mode Switch
B—Mode Switch
C—Mode Switch
D—Air Conditioner Switch
E—Air Vent Switch
F—Fresh Air Vent Switch
G—Blower Switches
H—Blower OFF Switch
I—Temperature Control Switches

TX,10,DH5057 –19–20JUN96–1/1

AIR CONDITIONER OPERATION

1. Press desired mode switch (A, B, or C).
2. Press left temperature control switch (I) until all indicators are green.
3. Press blower switch (G) to select desired blower speed.
4. Press air conditioner switch (D) to turn indicator green if not already green.
5. Press temperature control switches and blower switches to adjust cab temperature

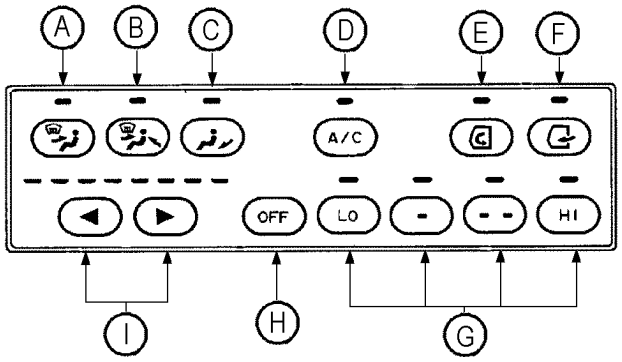


A—Mode Switch
B—Mode Switch
C—Mode Switch
D—Air Conditioner Switch
E—Air Vent Switch
F—Fresh Air Vent Switch
G—Blower Switches
H—Blower OFF Switch
I—Temperature Control Switches

TX,10,DH5058 –19–20JUN96–1/1

DEFROSTER OPERATION

1. Press front vent mode switch (A) or rear vent mode switch (B).
2. Press temperature control switches (I) to select desired air temperature.
3. Press fresh air vent switch (F).
4. Press blower switches (G) to select desired blower speed.
5. Adjust the louvers on front vent and defroster vent as required.
6. Press temperature control switches and blower switches to adjust cab temperature.
7. Press air conditioner switch (F) on if windows become clouded or if dehumidifying is required.

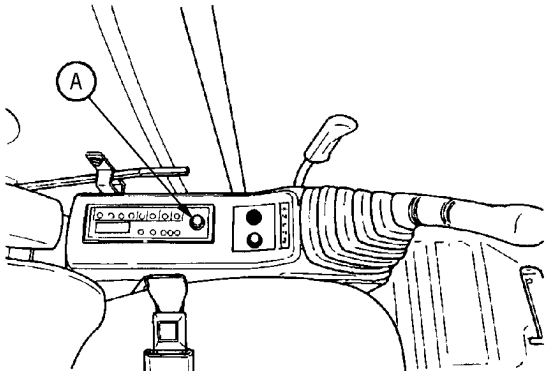


T102753 –UN–05AUG96

A—Mode Switch
B—Mode Switch
C—Mode Switch
D—Air Conditioner Switch
E—Air Vent Switch
F—Fresh Air Vent Switch
G—Blower Switches
H—Blower OFF Switch
I—Temperature Control Switches

TX,10,DH5059 –19–20JUN96–1/1

FRONT CONSOLE



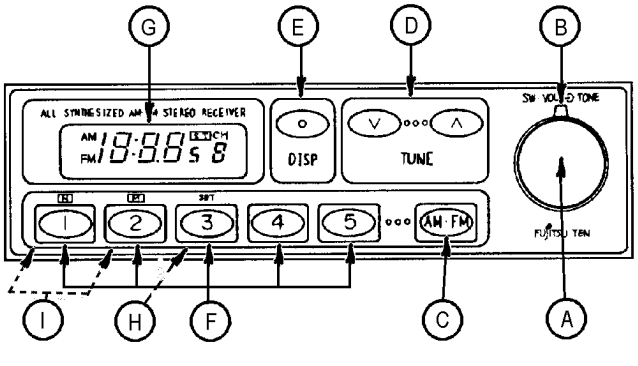
T101647 –UN–07AUG96

A—Radio/Clock

TX,10,DH5060 –19–20JUN96–1/1

OPERATING THE AM/FM RADIO

Press power switch (A) to turn radio on, and repeatedly press one of tuning switches (D) until desired station is reached. To preset a station, select the desired station using tuning switches. Press and hold station preset (F) for more than 2 seconds until an electronic tone is heard. The frequency of the preset station will be indicated on digital display (G).



A—Power Switch/Volume Control Knob
B—Tone Adjustment Ring
C—AM/FM Switch
D—Tuning Switches
E—Display Mode Change Switch
F—Station Presets
G—Digital Display
H—Set Switch
I—Time Set Switches

TX,10,DH5036 –19–06JUN96–1/1

SETTING THE CLOCK

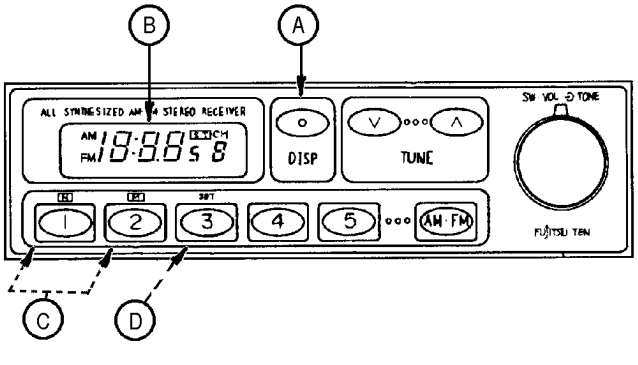
NOTE: In order to set the clock, digital display (B) must be in the time display mode.

While pressing display mode change switch (A) use time set switches (C) and set switch (D) to set the clock.

Press set switch to reset the minute display to "00."

Press time set switch (H) to set correct hour.

Press time set switch (M) to set correct minute.



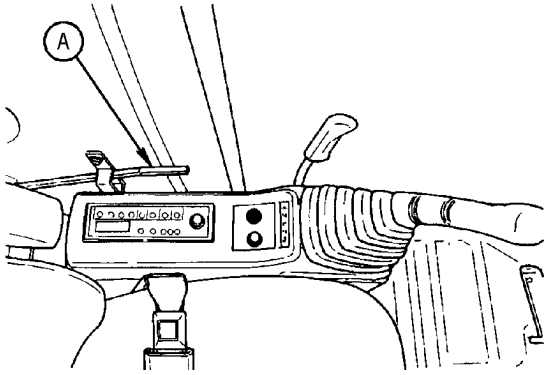
A—Display Mode Change Switch
B—Digital Display
C—Time Set Switches
D—Set Switch

TX,10,DH5035 –19–06JUN96–1/1

CAB DOOR RELEASE LEVER

The cab door can be locked in the open position. Open the door all the way until it locks in the latch on the side of the cab.

To release the door from this locked position, push down on lever (A).



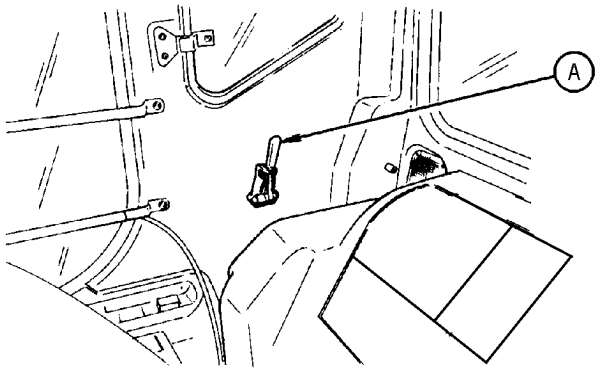
T101648 –UN–07AUG96

A—Cab Door Release Lever

TX,10,DH5034 –19–04JUN96–1/1

SECONDARY EXIT TOOL

IMPORTANT: FOR SECONDARY EXIT. Use tool (A) to break window. Always keep tool in machine.



T105379 –UN–26NOV96

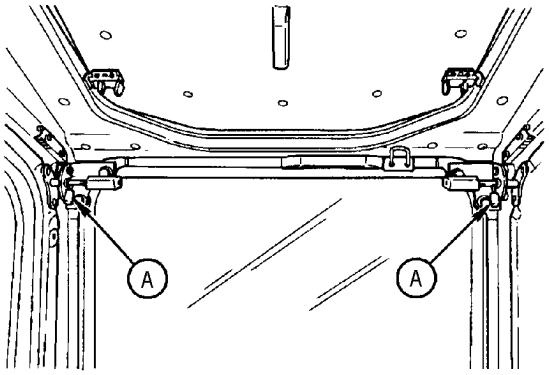
A—Secondary Exit Tool

TX,10,DH5967 –19–26NOV96–1/1

OPENING UPPER FRONT (SECONDARY EXIT) WINDOW

NOTE: The washer and wiper cannot operate with the upper front window opened.

1. Move lock pins (A) toward center of window.



T101649 –UN–26JUN96

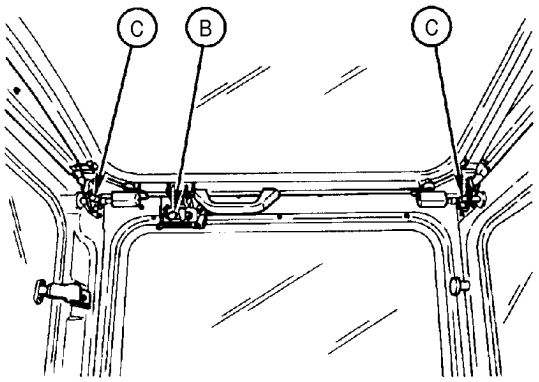
A—Lock Pins

TX,10,DH5029 –19–04JUN96–1/2

2. Pull window up and back until it catches in latch (B) for convenient storage overhead.

CAUTION: Prevent possible injury from window closing. DO NOT rely on latch (B) alone to hold the window in the up position. Always lock the pins in the cab frame boss holes.

3. Slide the two pins (C) into the cab frame boss holes and turn to lock.



T101650 –UN–24JUN96

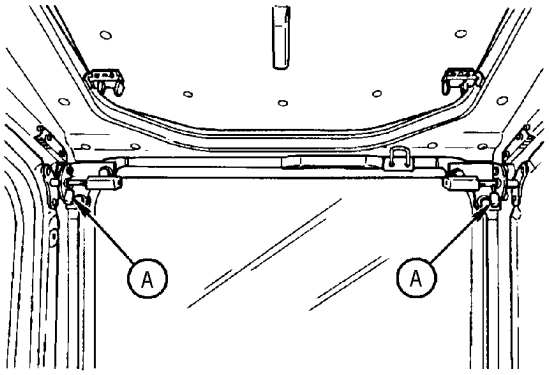
B—Latch
C—Lock Pins

TX,10,DH5029 –19–04JUN96–2/2

CLOSING UPPER FRONT WINDOW

CAUTION: Prevent possible injury from window closing. Upper front window comes down very forcefully. Close window only when sitting on operator's seat. Guide window down slowly.

1. Pull out lock pins (A) to unlock window.

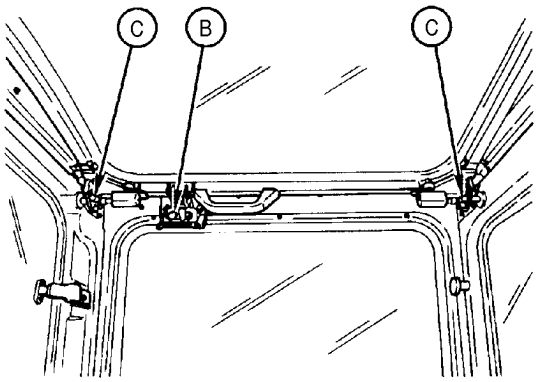


T101649 –UN–26JUN96

A—Lock Pins

TX,10,DH5061 –19–21JUN96–1/2

2. Push lever (B) to release latch.
3. Pull window down slowly.
4. Slide the two pins (C) into the cab frame boss holes and turn to lock.



T101650 –UN–24JUN96

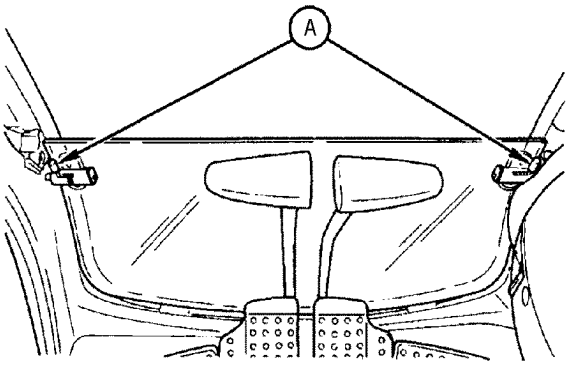
B—Lever
C—Pins

TX,10,DH5061 –19–21JUN96–2/2

REMOVING AND STORING THE LOWER FRONT WINDOW

NOTE: Upper front window must be raised before lower front window can be removed.

1. Pull in on lock pins (A) to unlock and remove window.



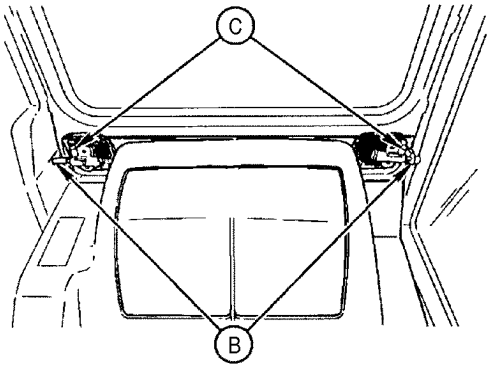
T101651 –UN–24JUN96

A—Lock Pins

TX,10,DH5410 –19–27FEB97–1/2

2. The window can be stored by inserting tabs on bottom of window into brackets (B) and locking the pins into holes (C) located below rear window in cab.

NOTE: In cold weather some operators may choose to work with the top glass open and the bottom glass in place. This provides excellent visibility and tends to hold the heat being circulated around the operator's feet.



T105380 –UN–26NOV96

B—Brackets
C—Holes

TX,10,DH5410 –19–27FEB97–2/2

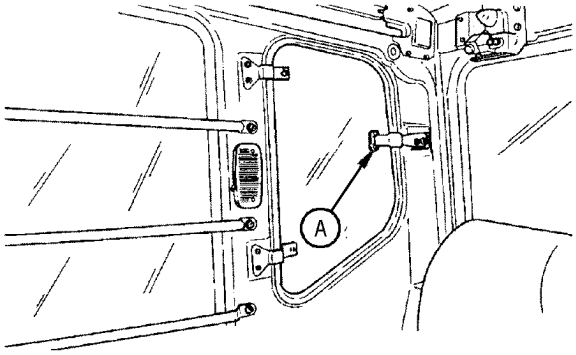
OPENING SIDE WINDOWS

CAUTION: Avoid serious crushing injury from boom. Never place any part of body beyond window bar or frame. It could be crushed by the boom if boom control lever is accidentally bumped or otherwise engaged.

Do not remove window bars. If window or bars are missing or broken, replace immediately.

Both right side window and cab door window can be opened.

1. Right-rear side window: Unlatch the lock (A). Push joint part of lock to open window.
2. Cab door window: Slide front pane to the rear and rear pane to the front.



T101653 –UN–24JUN96

A—Window Lock

TX,10,DH5032 –19–04JUN96–1/1

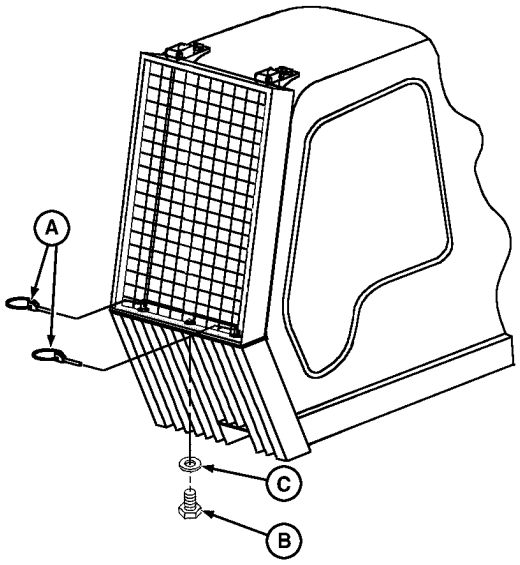
OPENING AND CLOSING THE UPPER SCREEN

Opening:

1. Remove center capscrew (B) and washer (C).
2. Remove two lynch pins (A).
3. Raise upper screen and engage prop rod in right lower corner above lower guard to hold screen open.

Closing:

1. Lower upper screen.
2. Install two lynch pins (B).
3. Install center cap screw (B) and washer (C).



T121078

T121078 –UN–14APR99

A—Lynch Pin
B—Capscrew, 10 mm x 25 mm
C—Washer

CED,OUOEBAS,3 –19–19JAN00–1/1

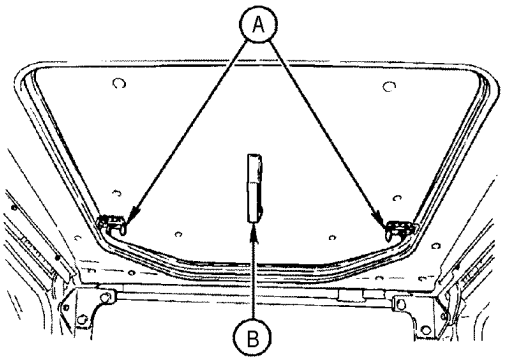
OPENING AND CLOSING THE ROOF EXIT COVER

Opening:

1. Move lock pins (A) toward center of roof exit cover.
2. Push on handle (B) to open roof exit cover.

Closing:

Hold handle and pull cover down until pins lock in position.



T101654 –UN–24JUN96

A—Lock Pins
B—Handle

TX,10,DH5944 –19–01DEC97–1/1

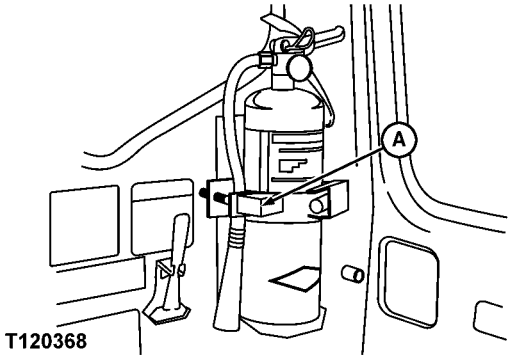
REMOVING AND STORING FIRE EXTINGUISHER

REMOVING

1. Pull the latch assembly (A) outward.
2. Remove extinguisher.

STORING

1. Insert extinguisher into the seat.
2. Close latch assembly (A).



T120368 –UN–25MAR99

A—Latch Assembly

TX,OUOE042,10 –19–19FEB99–1/1

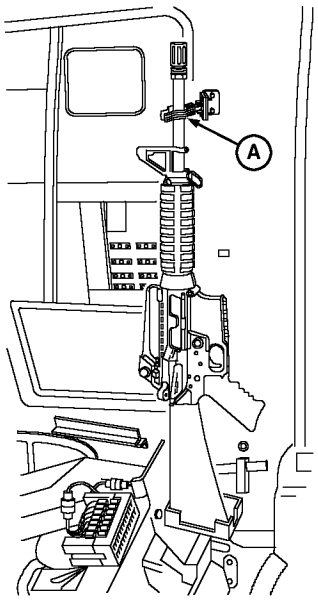
REMOVING AND STORING RIFLE

REMOVING

1. Open latch (A) and remove barrel.
2. Lift rifle from saddle.

STORING

1. Insert rifle butt into saddle.
2. Snap barrel into latch (A).



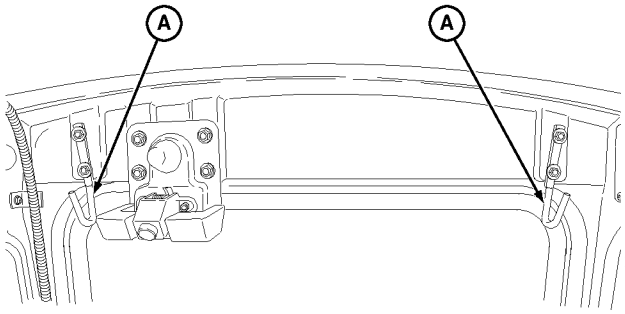
T120371

T120371 –UN–25MAR99

TX,OUOE042,11 –19–19FEB99–1/1

J-HOOKS

The J-Hooks (A) are used to hang the operator's Load Bearing Equipment (LBE) and individual chemical equipment bag.



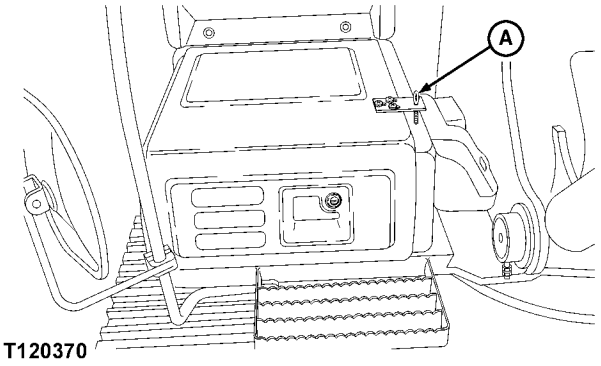
T120374

T120374 –UN–25MAR99

TX,OUOE042,12 –19–19FEB99–1/1

TOOLBOX SECURITY HASP

The toolbox security hasp (A) is located on the inside corner of the toolbox. The hasp is used to secure the toolbox.

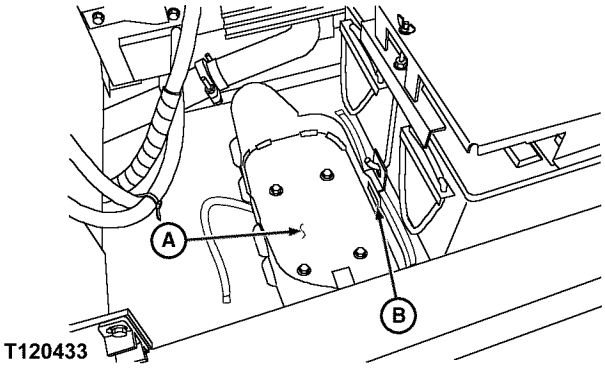


A—Toolbox Security Hasp

TX,OUOE042,16 –19–01MAR99–1/1

DECONTAMINATION KIT BRACKET

The decontamination kit bracket (A) is located next to the batteries. The decontamination kit is secured with a strap (B).



A—Decontamination Kit Bracket
B—Strap

CED,OUOE020,24 –19–10MAR99–1/1

ADJUSTING THE SEAT

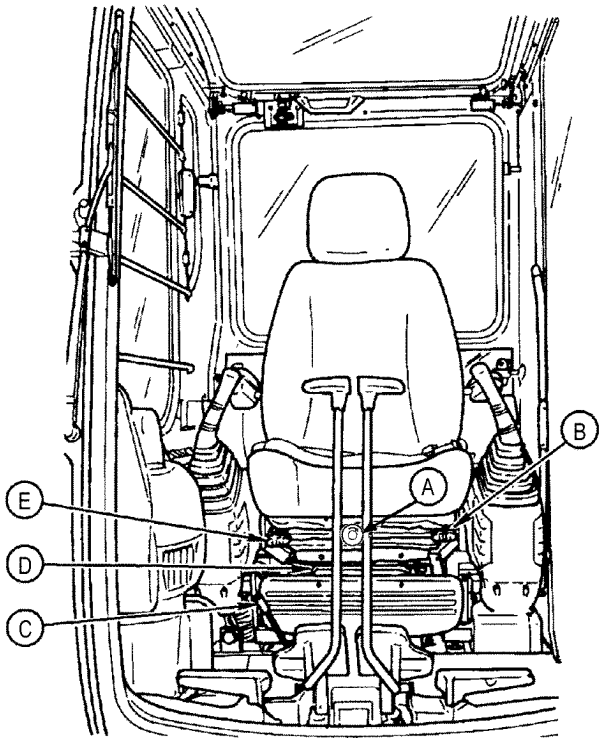
Turn knob (A) to adjust seat to weight of operator. Weight is displayed on knob.

Push down lever (B) while sitting on seat or while standing and pulling up on seat to obtain desired height. Release lever. Push down lever while sitting on seat to adjust seat to desired angle. Release lever.

Push down lever (C) to adjust seat and both right and left consoles to desired distance from travel pedals and levers. Release lever to lock seat and consoles into position.

Pull up lever (D) to unlock seat from both consoles. Slide the seat to desired distance from control levers. Release lever.

Pull up lever (E) to release backrest lock. Move backrest to desired position and release lever.



T102204 –UN–26JUL96

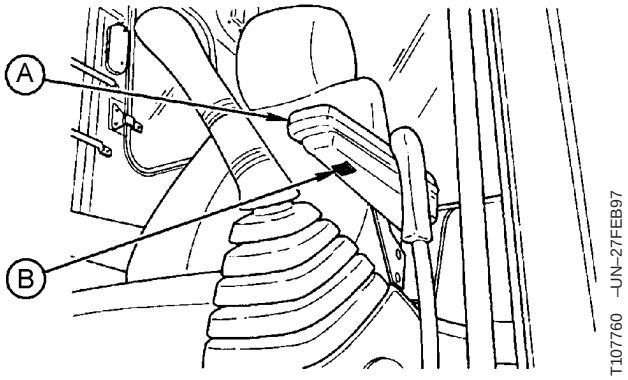
A—Weight Adjustment Knob
B—Seat Height And Angle Adjustment
C—Console And Seat Fore-Aft Adjustment Lever
D—Seat Fore-Aft Adjustment
E—Backrest Adjustment

TX,10,DH5125 –19–29JUL96–1/1

ADJUSTING THE ARMREST

Pull up on armrest (A) to move armrest out of way when exiting.

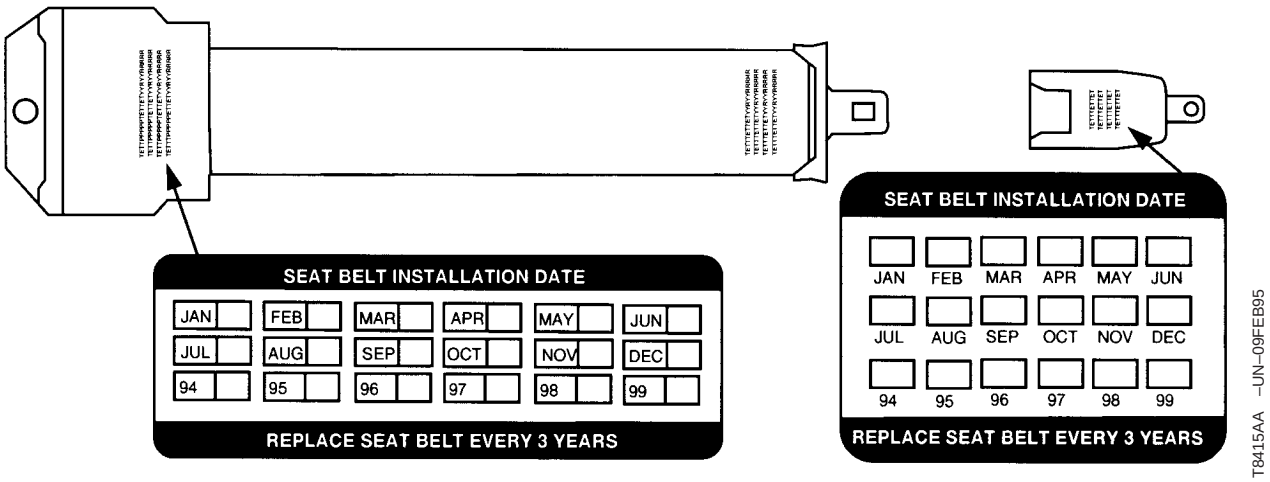
Turn dial (B) to adjust angle of armrest.



A—Armrest
B—Dial

TX,10,DH5412 –19–27FEB97–1/1

SEAT BELT



Seat belt and mounting hardware must be inspected for wear or damage before operating the machine. Replace the belt or mounting hardware if worn or damaged.

Replace the complete seat belt assembly every three years regardless of appearance. A date label, to determine the age of the belt, is attached to each belt.

TX,10,DH3548 –19–17FEB98–1/1

OPERATOR'S MANUAL COMPARTMENT

Store operator's manual behind the seat.

TX,10,DH5064 –19–24JUN96–1/1

BLANK

CHAPTER 3

BREAK-IN

BLANK

Break-In

ENGINE BREAK-IN OIL

New engines are filled at the factory with John Deere ENGINE BREAK-IN OIL. This is an SAE 5W-30 viscosity oil. During the break-in period (first 100 hours), add oil as needed to maintain the specified oil level. (See Fuels and Lubricants chapter.)

If at any time during the break-in period, the engine is exposed to air temperatures below -25°C (-13°F), change the oil and filter using specified oil. (See Fuels and Lubricants chapter.)

Change the oil and filter after the first 100 hours of operation. Refill with specified oil. (See Fuels and Lubricants chapter.)

- API Service Classification CE
- CCMC Specification D4

After the break-in period, use John Deere PLUS-50™or other diesel engine oil as recommended in this manual.

IMPORTANT: Do not use John Deere PLUS-50 oil or engine oils meeting API CG4, API CF4, or CCMC D5 performance levels during the first 100 hours of operation of a new or rebuilt engine. These oils will not allow the engine to break-in properly.

PLUS-50 is a trademark of Deere & Company

CED,OUOE020,50 –19–13APR99–1/1

EVERY 4 HOURS

Lubricate boom, arm, and bucket linkage every 4 hours for the first 20 hours of operation. (See Maintenance—Every 50 Hours chapter.)

TX,15,DH5110 –19–12JUL96–1/1

EVERY 10 HOURS OR DAILY

1. Perform 10 hours or daily service. (See Maintenance—Every 10 Hours or Daily chapter.)

2. Watch for fluid leaks.

3. Lubricate working tool pivots every 10 hours during the first 30—100 hours of operation and when working in mud or water. (See Maintenance—Every 50 Hours chapter.)

TX,15,DH5111 –19–12JUL96–1/1

AFTER THE FIRST 50 HOURS

1. Perform 10 hours or daily and 50 hour service. (See Maintenance—Every 10 Hours or Daily and Maintenance—Every 50 Hours chapters.)

2. Change hydraulic oil filter (See Maintenance—Every 500 Hours chapter) and pilot filter (See Maintenance—Every 1000 Hours chapter).

3. Check accessible hardware torque. (See Hardware Torque Specifications in Maintenance chapter.)

TX,15,FF2247 –19–06JUL94–1/1

AFTER THE FIRST 100 HOURS

1. Perform 10 hour or daily and 50 hour service. (See Maintenance—Every 10 Hours or Daily and Maintenance—Every 50 Hours chapters.)

2. Change engine oil and filter. (See Maintenance—Every 250 Hours chapter.)

3. Change fuel filter. (See Maintenance—Every 500 Hours chapter.)

TX,15,FF2987 –19–06JUL94–1/1

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CHAPTER 4

PRE-START INSPECTION

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Pre-Start Inspection

INSPECT MACHINE DAILY BEFORE STARTING

Do periodic service checks in the Maintenance—Every 10 Hours or Daily chapter.

ELECTRICAL SYSTEM: Check for worn or frayed wires and loose or corroded connections.

BOOM, BUCKET, SHEET METAL, TRACKS: Check for bent, broken, loose, or missing parts.

HARDWARE: Check for loose or missing parts.

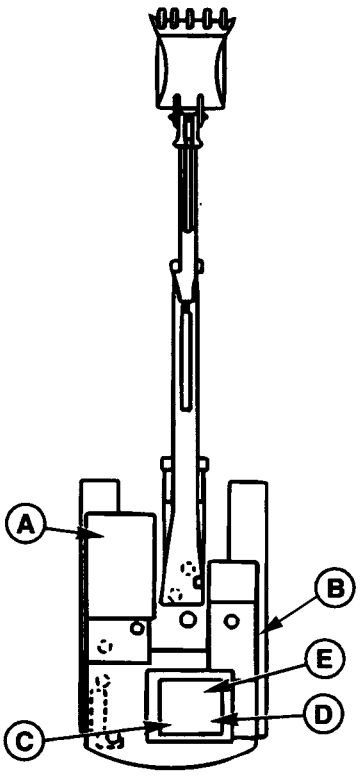
FUEL SYSTEM: Drain fuel filter and fuel tank sump.

HYDRAULIC SYSTEM: Check for leaks, missing or loose clamps, kinked hoses, and lines or hoses that rub against each other or other parts.

LUBRICATION: Check lubrication points on Periodic Maintenance chart.

PROTECTIVE DEVICES: Check guards, shields, covers.

SAFETY: Walk around machine to clear all persons from machine area.



T105341 –UN–25NOV96

A—Check pedals and levers for freedom of movement. Clean operator's station.
B—Check hydraulic reservoir oil level.
C—Check engine oil level.
D—Check coolant level at recovery tank.
E—Clean radiator and oil cooler fins.

TX,20,DH5330 –19–25NOV96–1/1

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CHAPTER 5

OPERATING THE ENGINE

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Operating the Engine

CHECK INSTRUMENTS BEFORE STARTING

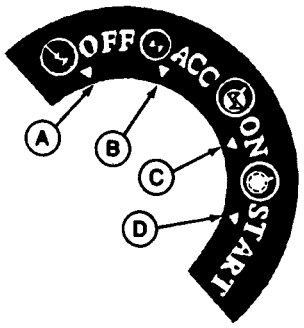
Turn key switch to ON position. All indicator lights will stay on for approximately 3 seconds.

The indicator lights will also stay on for approximately 3 seconds when the key switch is turned to START position.

If any lamp fails to light, the bulb may be burned out.

The fuel gauge will show the fuel level.

The coolant gauge should NOT go to the red zone.



T7396DS –UN–27JUN91

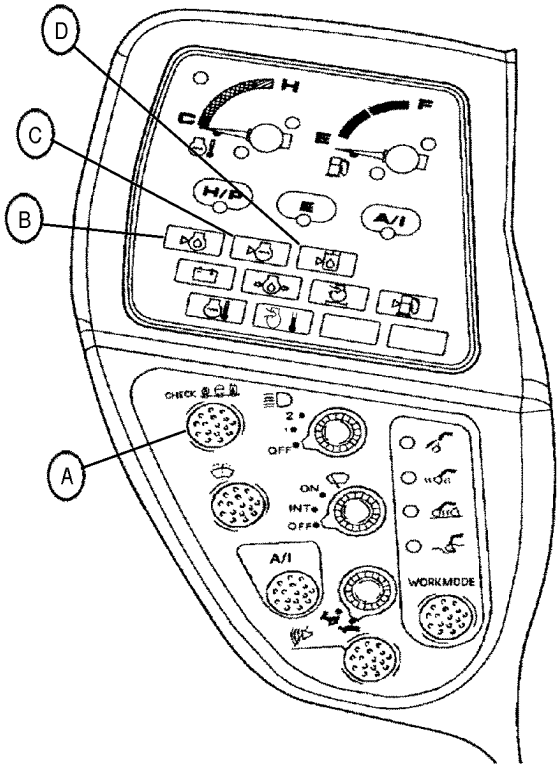
A—OFF
B—ACC
C—ON
D—START

TX,25,DH5005 –19–29MAY96–1/1

LEVEL CHECK

1. Turn key switch to ON position.
2. Press level check switch (A).
3. Hydraulic oil level (B) engine coolant level (C) and engine oil level (D) indicators will light if levels are adequate for operation.

IMPORTANT: The level check does NOT take the place of daily checks at hydraulic oil level window, engine coolant recovery tank, and engine oil level dipstick.



T107675 –UN–27FEB97

A—Level Check Switch
B—Hydraulic Oil Level Indicator
C—Engine Coolant Level Indicator
D—Engine Oil Level Indicator

TX,25,DH5405 –19–27FEB97–1/1

STARTING THE ENGINE

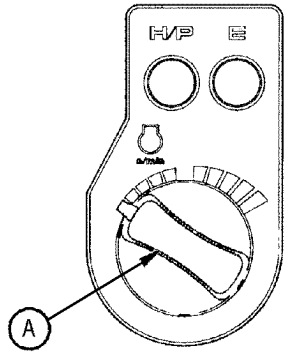
IMPORTANT: Before starting the engine in extreme cold, unit must be prepared with proper grade lubricants.

1. Move engine rpm dial (A) to slow idle position.

IMPORTANT: Prevent starter damage. Never operate starter for more than 30 seconds at a time. If engine fails to start, return key switch to OFF. Wait for about 2 minutes, then try again. After a false start, do not turn key switch until engine stops.

2. Sound horn to alert persons nearby.

3. Turn key switch to START. Release key; switch will return to ON position.



T101749 –UN–27JUN96

A—Engine RPM Dial

CED,OUOE020,1 –19–17DEC99–1/1

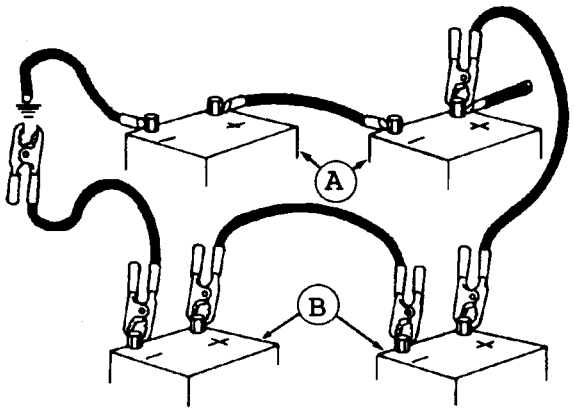
USING BOOSTER BATTERIES—24 VOLT SYSTEM

Before boost starting, machine must be properly shut down to prevent unexpected machine movement when engine starts.

CAUTION: An explosive gas is produced while batteries are in use or being charged. Keep flames or sparks away from the battery area. Make sure the batteries are charged in a well ventilated area.

IMPORTANT: The machine electrical system is a 24-volt negative (-) ground. Connect two 12-volt booster batteries together in series as shown for 24 volts.

1. Connect one end of the positive cable to the positive terminal of the machine batteries and the other end to the positive terminal of the booster batteries.
2. Connect one end of the negative cable to the negative terminal of the booster batteries. Connect other end of the negative cable to the machine frame as far away from the machine batteries as possible.
3. Start engine. (See procedure on previous page.)
4. Immediately after starting engine disconnect end of the negative cable from the machine frame. Then disconnect the other end of the negative cable from the negative terminal of the booster batteries.
5. Disconnect positive cable from booster batteries and machine batteries.



T6713AH1 CV

T6713AH1 –UN–24OCT91

Two Battery Application

A—Machine Batteries
B—Booster Batteries

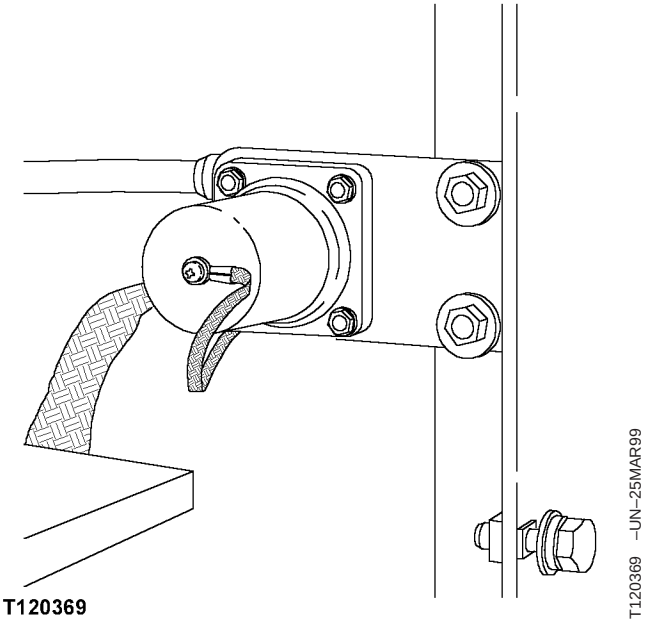
CED,TX14740,6112 –19–12MAY98–1/1

SLAVE RECEPTACLE—24 VOLT SYSTEM

Before boost starting, machine must be properly shut down to prevent unexpected machine movement when engine starts.

CAUTION: An explosive gas is produced while batteries are in use or being charged. Keep flames or sparks away from the battery area. Make sure the batteries are charged in a well ventilated area.

The slave receptacle can be used to charge the batteries and slave start the engine from an external power source. The slave receptacle can also be used to charge and slave other equipment.

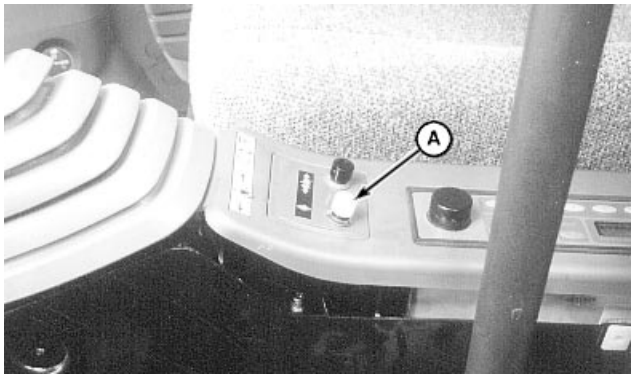


T120369

T120369 –UN–25MAR99

CED,OUOE042,59 –19–07APR99–1/1

STARTING FLUID (COLD WEATHER STARTING AID)



CAUTION: Prevent possible injury from exploding container. Starting fluid is highly flammable. Keep container away from heat, sparks, and open flame. Contents are pressurized. Do not puncture or incinerate container from machine if engine does not need starting fluid.

IMPORTANT: Prevent damage to engine. Use starting aid when temperatures are below 4.4°C (40°F) and only when engine is COLD.

USING STARTING FLUID

1. Move engine rpm dial to the slow idle position.
2. Turn key switch clockwise to the START position.
3. As soon as the engine starts cranking you must depress the starting aid switch (A).

IMPORTANT: Excess starting fluid could damage engine; push starting aid button only when engine is cold and cranking. Starting aid fluid is being injected into engine as long as you push switch.

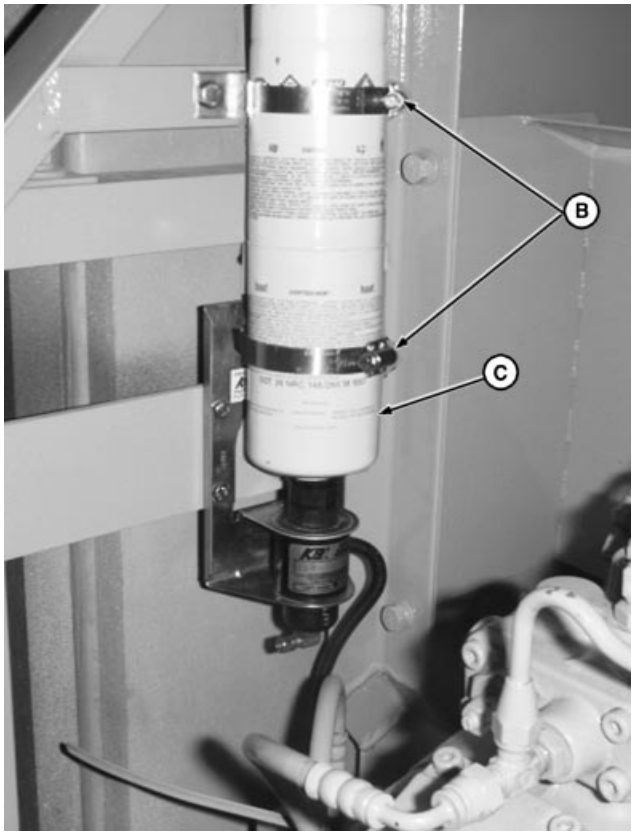
4. If engine is cranking but no cylinders are firing you must crank the engine for a maximum of 30 seconds. Then release the starting aid switch (A) and turn the key switch to the OFF position.
5. If the engine is cranking and some cylinders are firing, continue cranking and pushing the starting aid switch (A) for a maximum of 50 seconds. Or until the engine is running.

Continued on next page

REPLACING STARTING AID CAN

1. Remove clamp (B) from container.
2. Turn container (C) counterclockwise to remove.
3. Turn container clockwise to install.

IMPORTANT: Protect starting aid components from possible damage. Install dust cap (D) on the starting valve when cylinder is not installed in starting valve.



T120334 –UN–25MAR99

T120336 –UN–25MAR99

CED,OUOE042,61 –19–07APR99–2/2

USING THE ARCTIC STARTER

The arctic starter is a fuel fired coolant heater located between the engine and the rear counterweight. The exhaust pipe comes out the bottom of the heater box and can be accessed by removing the lower bottom cover at the rear of the vehicle.

CAUTION: Prevent possibility of fire by keeping the area around the arctic starter exhaust pipe clean and free of debris. The exhaust pipe outlet must be directed away from electrical wiring, hydraulic hoses, fuel lines, and cold weather starting aid lines.

CAUTION: Prevent asphyxiation. Exhaust fumes from operating the arctic starter can cause sickness or death. Never operate in an enclosed area or building unless there is adequate ventilation to expel the exhaust fumes.

The arctic starter must be used when the engine has been off for at least eight hours at ambient temperatures below -32°C (-25°F) and is recommended at temperatures below -23°C (-10°F). Ignite the arctic starter and allow to run for 45 minutes. Then shut the arctic starter OFF and start the engine. (See Starting The Engine in this manual.)

NOTE: The arctic starter may not ignite at ambient temperatures below -40°C (-40°F).

NOTE: The arctic starter does not preheat any oils. All oils must be of the proper viscosity depending upon the ambient air temperature. (See Fuels And Lubricants in this manual.)

CED,OUOE020,11 –19–26FEB99–1/1

STARTING THE ARCTIC STARTER

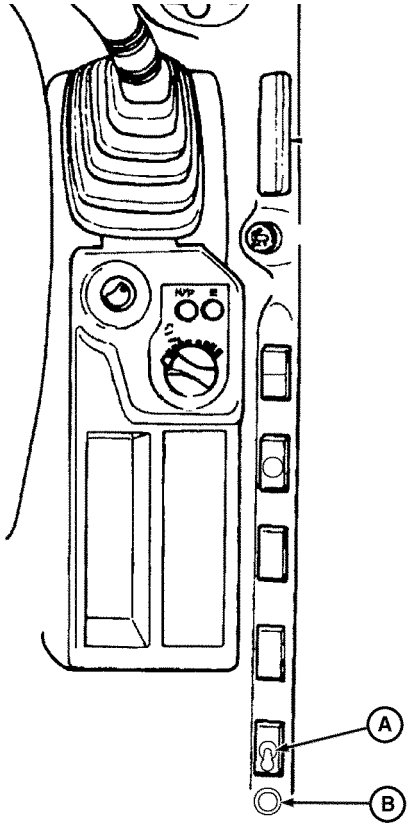
Move switch (A) to ON position.

A continuous green on the LED light (B) indicates the system is operating properly. There is a normal delay of up to 90 seconds before actual ignition of the heater burner.

If the LED light (B) flashes green something in the system sequence did not occur properly and default sensors have shut down the heater start-up. If this occurs, move switch (A) to OFF position for 15 seconds and then move switch to ON position.

If the LED light (B) does not stay a continuous green after four consecutive tries, move switch (A) to OFF position and see your authorized dealer.

NOTE: Move switch (A) to ON position for two minutes with a continuous green LED light (B) once a month when it is not used. This will prevent the water pump and combustion engine from seizing.



T125068 –UN–28OCT99

T125068

A—Heater Switch
B—LED Light

CED,OUOE020,14 –19–01MAR99–1/1

CHECK INSTRUMENTS AFTER STARTING

IMPORTANT: Prevent possible damage to engine. If indicator lights do not go out after starting engine, IMMEDIATELY STOP THE ENGINE. Find and correct the problem.

After the engine is started, the indicator lights should go out. If they do not, stop the engine immediately. Find and correct the problem.

TX,25,DH3613 –19–27JUN95–1/1

WARMING THE MACHINE

1. Start engine. Run engine at 1/3 speed for 30 seconds. Do not run engine at fast or slow idle. Do not accelerate rapidly during warm up.

2. Operate machine at less-than-normal loads and speeds until engine is at normal operating temperature.

TX,25,DH5065 –19–24JUN96–1/1

COLD WEATHER WARM-UP

CAUTION: Prevent possible injury from unexpected machine movement. If hydraulic oil is cold, hydraulic functions move slowly. DO NOT attempt normal machine operation until hydraulic functions move at close-to-normal cycle times.

In extremely cold conditions, an extended warm-up period will be necessary. Under such conditions, the radiator and oil cooler should be covered to maintain correct operating temperature.

Avoid sudden operation of all functions until the engine and hydraulic oil are thoroughly warm.

1. Run engine at 1/2 speed for 5 minutes. Do not run at fast or slow idle.

CAUTION: Prevent possible injury from unexpected machine movement. Clear the area of all persons before running your machine through the warm-up procedure. If machine is inside a building, warm the propel circuit first and move the machine to a clear area outside. Cold oil will cause machine functions to respond slowly.

2. Exercise propel and swing functions slowly, initially moving only short distances.

3. Operate boom, arm, and bucket functions by moving cylinders a short distance each direction for the first time.

4. Continue cycling cylinders by increasing the travel each cycle until full stroke is obtained.

5. Swing upperstructure so boom is perpendicular to tracks.

CAUTION: Prevent possible injury from machine sliding backwards. Keep angle between boom and arm 90—110°.

6. Keeping the angle between boom and arm 90—110°, fully actuate bucket close function (cylinder extend) and lower bucket to raise track off ground.

IMPORTANT: Holding function actuated for more than 10 seconds can cause damage from hot spots in the control valve.

7. While rotating raised track in forward direction, actuate bucket curl function (cylinder extend) for 10 seconds and release for 5 seconds for a period of 2-1/2 minutes.

8. Repeat procedure with track rotating in reverse direction.

9. Lower machine to ground.

10. Repeat steps 5—9 on opposite track.

11. Operate all hydraulic functions to distribute warm oil in all cylinders, motors, and lines.

12. If hydraulic functions still move slowly, repeat steps 6 and 7.

TX,25,DH3660 –19–21JUN95–1/1

STOPPING THE ENGINE

IMPORTANT: Prevent possible engine damage. If engine stops when operating under load, remove load. Restart engine immediately. Run 30 seconds at 1/2 speed before adding load.

1. Park machine on a level surface.
2. Lower bucket to the ground.
3. Turn auto-idle switch off.

IMPORTANT: Turbocharger may be damaged if engine is not properly shut down.

4. Run engine with engine rpm dial at 1/3 position without load for 2 minutes.
5. Move engine rpm dial to slow idle position.
6. Turn key switch to OFF. Remove key from switch.
7. Pull pilot control shut-off lever to locked position.

TX,25,DH5004 –19–29MAY96–1/1

BLANK

CHAPTER 6

DRIVING THE MACHINE

BLANK

Driving the Machine

STEERING THE MACHINE USING PEDALS

CAUTION: Keep bystanders clear of machine when traveling. Before moving machine, determine which way to press propel pedals.

Keep bystanders clear of machine when traveling.

The instructions below apply when the propel motors (E) are to the rear of the machine. If the propel motors are to the front of the machine, the machine moves OPPOSITE to the direction described.

FORWARD TRAVEL: Push down on front (A) of both pedals.

REVERSE TRAVEL: Push down on rear (C) of both pedals.

NEUTRAL POSITION (B): Propel brakes will automatically stop and/or hold the machine.

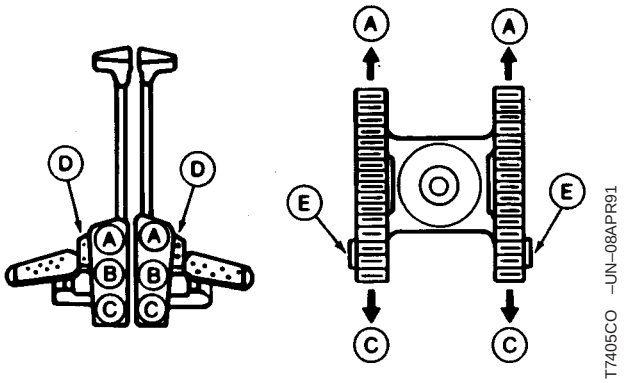
RIGHT TURN: Push down on front of left pedal.

LEFT TURN: Push down on front of right pedal.

SHORT TURN (COUNTERROTATE): Push down the front of one pedal and the rear of the other.

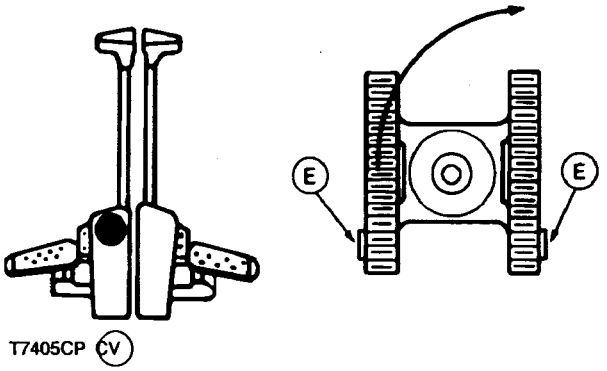
IMPORTANT: When traveling over long distances, swing upperstructure so propel motors are to the rear.

LONG DISTANCE TRAVEL: When traveling over long distances, swing upperstructure so propel motors are to the rear. Push down on pedal tabs (D) and rest feet on footrests.



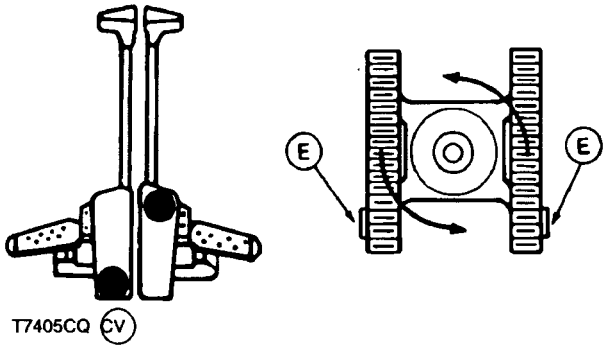
T7405CO –UN–08APR91

Steering with Pedals



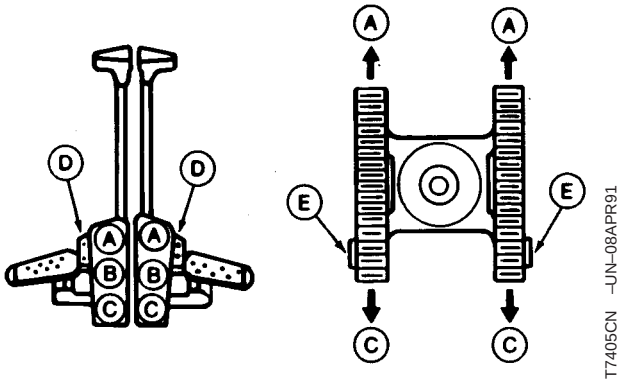
T7405CP –UN–08APR91

Right Turn



T7405CQ –UN–08APR91

Short Turn (Counterrotate)



T7405CN –UN–08APR91

Long Distance Travel

A—Forward Travel
B—Neutral Position
C—Reverse Travel
D—Pedal Tabs
E—Propel Motors

Continued on next page

TX,10,FF2292 –19–28OCT91–1/2

CAUTION: Prevent possible injury from machine tipping. Operate control pedals slowly when traveling down a slope.

TRAVELING DOWN A SLOPE: Operate control pedals slowly when traveling down a slope.

COLD WEATHER OPERATION: Propel pedal dampers are provided for smooth control. In extremely cold weather, pedal effort will increase. Operate pedal several times with pilot control shut-off lever in locked position.

TX,10,FF2292 –19–28OCT91–2/2

STEERING THE MACHINE USING LEVERS

CAUTION: Keep bystanders clear of machine when traveling. Before moving machine, determine which way to move propel levers.

Keep bystanders clear of machine when traveling.

The instructions below apply when the propel motors (E) are to the rear of the machine. If the propel motors are to the front of the machine, the machine moves OPPOSITE to the direction described.

FORWARD TRAVEL: Push both levers forward (A).

REVERSE TRAVEL: Pull both levers rearward (B).

NEUTRAL POSITION (C): Propel brakes automatically will stop and/or hold the machine.

RIGHT TURN: Push left lever forward.

LEFT TURN: Push right lever forward.

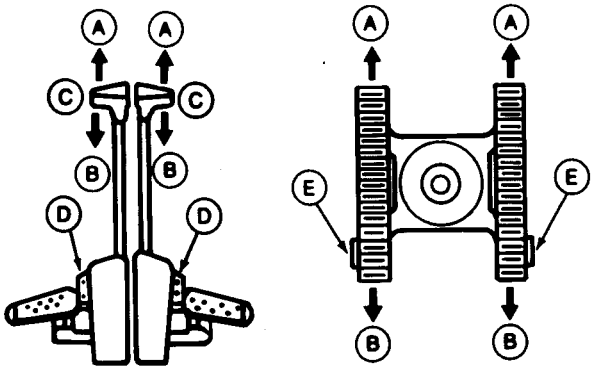
SHORT TURN (COUNTERROTATE): Push one lever forward and pull the other rearward.

IMPORTANT: When traveling over long distances, swing upperstructure so propel motors are to the rear.

LONG DISTANCE TRAVEL: When traveling over long distances, swing upperstructure so propel motors are to the rear.

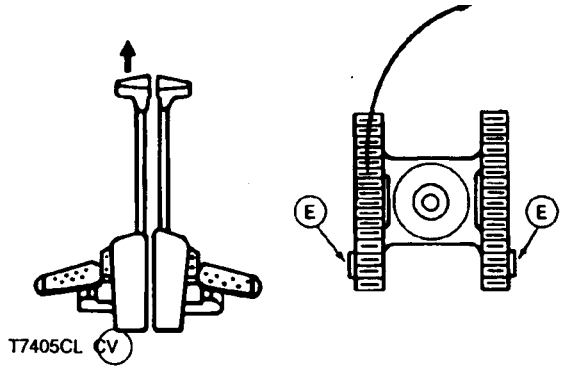
CAUTION: Prevent possible injury from machine tipping. Operate control levers slowly when traveling down a slope.

TRAVELING DOWN A SLOPE: Operate control levers slowly when traveling down a slope.



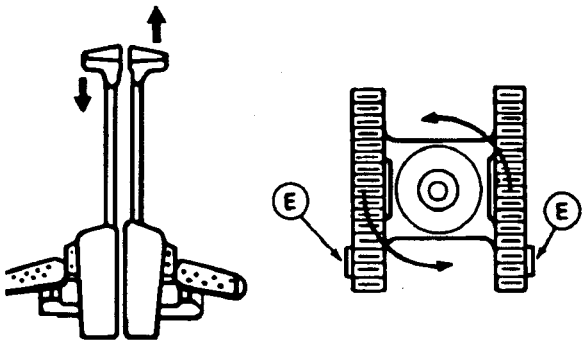
T7405CK –UN–08APR91

Steering With Levers



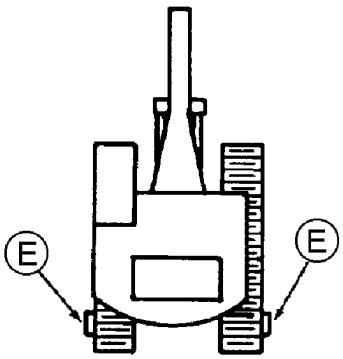
T7405CL –UN–08APR91

Right Turn



T7405CM –UN–08APR91

Short Turn (Counterrotate)



T115945 –UN–19JUN98

Long Distance Travel

A—Forward Travel
B—Reverse Travel
C—Neutral Position
D—Pedal Tabs
E—Propel Motors

Continued on next page

CED,TX14740,6007 –19–23JAN98–1/2

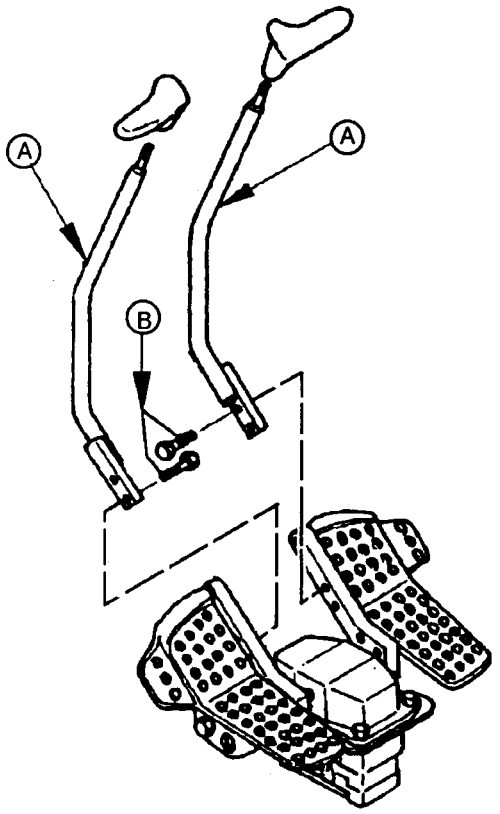
COLD WEATHER OPERATION: Propel lever dampers are provided for smooth control. In extremely cold weather, lever effort will increase. Operate lever several times with pilot control shut-off lever in locked position.

CED,TX14740,6007 –19–23JAN98–2/2

REMOVING PROPEL LEVERS

Propel levers may be removed if desired.

Remove cap screws (B) (two on each lever) to remove levers (A) from brackets.



T7396EA –UN–12NOV91

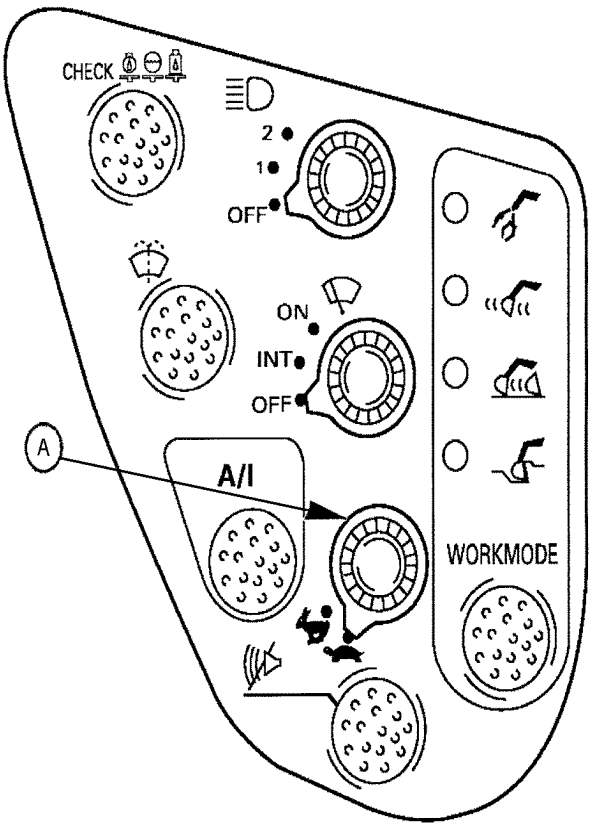
A—Lever
B—Cap Screw

TX,90,FF2018 –19–14NOV91–1/1

PROPEL SPEED SWITCH

Fast speed or slow speed travel can be selected in each working mode by turning the propel speed switch (A).

To lower travel speed, such as traveling on a slope or moving in a tight space, turn switch to slow speed.



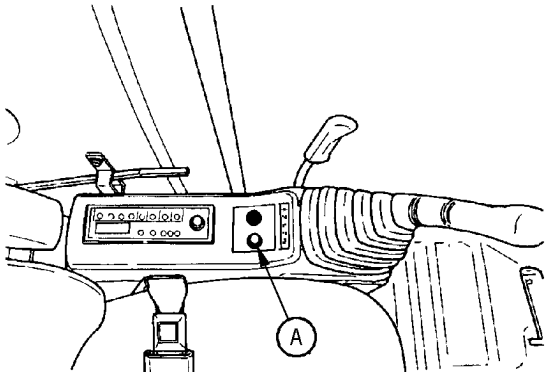
A—Propel Speed Switch

TX,30,DH5611 –19–03JUN96–1/1

TRAVEL ALARM AND TRAVEL ALARM CANCEL SWITCH

The travel alarm sounds when a propel pedal is depressed and will continue as long as the tracks are moving. When travel motion stops, the travel alarm switch is reset.

After the initial 12 second alarm, alarm can be silenced by depressing the travel alarm cancel switch (A).



A—Travel Alarm Cancel Switch

TX,30,DH5066 –19–24JUN96–1/1

PARKING THE MACHINE

1. Park machine on a level surface.
2. Lower bucket to the ground.
3. Turn auto-idle switch off.

IMPORTANT: Turbocharger may be damaged if engine is not properly shut down.

4. Run engine with engine rpm dial at 1/3 position without load for 2 minutes.
5. Move engine rpm dial to slow idle position.
6. Turn key switch to OFF. Remove key from switch.
7. Pull pilot control shut-off lever to locked position.

IMPORTANT: Prevent cab electrical component damage from bad weather. Always close windows, roof vent, and cab door.

8. Close windows, roof vent, and cab door.
9. Lock all access doors and compartments.

TX,30,DH5037 –19–06JUN96–1/1

PARKING MACHINE DURING FREEZING WEATHER

IMPORTANT: Prevent damage to undercarriage. During freezing weather, park machine on a hard surface to prevent tracks from freezing to the ground. Clean debris from tracks and track frames.

If tracks are frozen to the ground, raise tracks using boom. Move machine carefully to prevent damage to drive train and tracks.

During freezing weather, park machine on a hard surface. Clean debris from tracks and track frames.

If tracks are frozen to the ground, raise the tracks using boom. Move machine carefully.

TX,35,FF2310 –19–06AUG91–1/1

LOCK ALL COMPARTMENTS

Your machine is equipped with locks on the side shields, fuel cap, hood, cab door, access door in hood, tool box, and vandal shields (if equipped). One key will fit all locks. The battery compartment has a lockable door. Use these locks to help safeguard your machine.

02T,30,C45 –19–09APR92–1/1

BLANK

CHAPTER 7

OPERATING THE MACHINE

BLANK

Operating the Machine

CONTROL LEVERS

CAUTION: Operators require single hearing protection when operating vehicle with windows or door open. Single hearing protection is required by ground personnel within 23 feet of the 330LCR vehicle at high idle.

Never place any part of body beyond window frame. It could be crushed by the boom if boom control lever is accidentally bumped or otherwise engaged. If window is missing or broken, replace immediately.

Prevent possible injury from unexpected machine movement. Make sure you know the location and function of each control before operating.

Never place any part of the body beyond the window frame. Replace missing or broken windows immediately.

The machine is factory equipped with the control pattern shown.

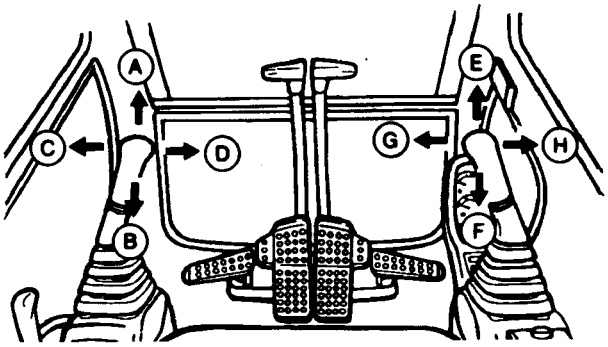
IMPORTANT: Prevent possible machine damage. When digging, avoid contacting tracks with boom cylinders or bucket.

When digging over the end of the tracks, propel motors should be at the rear to minimize chain and sprocket wear and to maximize machine stability and lift capacity.

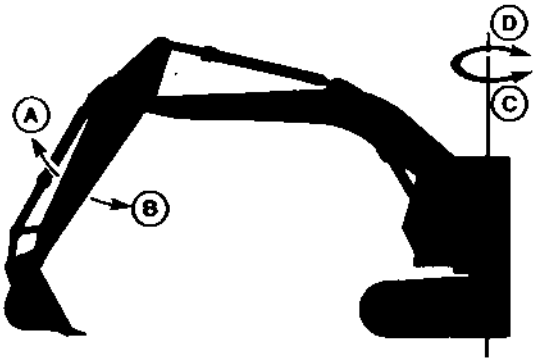
NOTE: With this control pattern, functions must correspond to the black-on-white labels located on the control console.

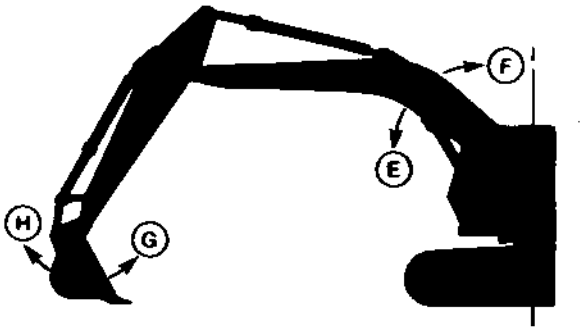
Do not contact tracks with boom cylinders or bucket. When digging over the end of tracks, propel motors should be at the rear of machine.

When a lever is released, it will return to neutral. The machine will remain positioned.



T7364AT –UN–10OCT90





T6811AC –UN–18OCT88

A—Arm Out
B—Arm In
C—Swing Left
D—Swing Right
E—Boom Down
F—Boom Up
G—Bucket Load
H—Bucket Dump

TX,35,FF2005 –19–13AUG91–1/1

CONTROL LEVER PATTERN CONVERSION

To change your machine pilot control levers from the standard pattern to a John Deere pattern:

1. Lower bucket to the ground. Turn auto-idle switch off.
2. Run engine with engine rpm dial at 1/3 position without load for 2 minutes.
3. Move engine rpm dial to slow idle position, and turn key switch to OFF to stop engine. Remove key from switch.
4. Move pilot control shut-off lever to locked position.

CAUTION: High pressure release of oil from pressurized system can cause serious burns or penetrating injury. The hydraulic tank is pressurized. Do not remove vent plug. Release pressure by loosening vent plug.

5. Loosen vent plug to relieve air pressure.
6. Open door on storage compartment behind cab.
7. Remove cover above flow regulator valve.

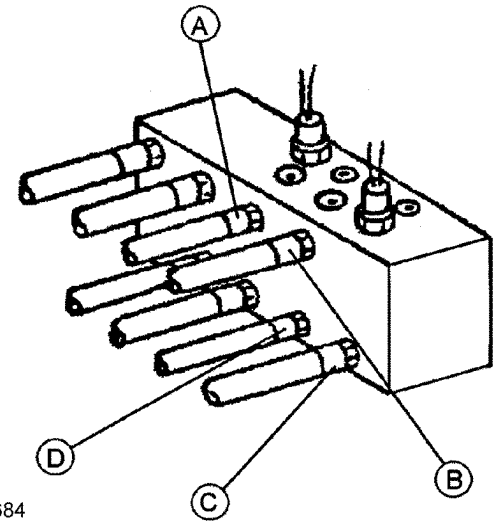
Continued on next page

NOTE: DO NOT use manufacturer's line tags or markings on line ends to identify lines for this conversion procedure. The conversion must be done on the front (cab side) of the flow regulator valve.

- Switch hose (A) with hose (C).
- Switch hose (B) with hose (D).

CAUTION: Prevent injury from unexpected control lever function. Install new decals on control consoles.

8. Install new decals (black on yellow) on control consoles near the base of control levers. Decals are enclosed in Operator Manual package. Additional decals can be purchased from your John Deere dealer.



T102684

T102684 –UN–07AUG96

A—Hose (A)
B—Hose (B)
C—Hose (C)
D—Hose (D)

TX,35,DH5038 –19–06JUN96–2/2

CONTROL LEVERS JOHN DEERE PATTERN

CAUTION: Avoid serious crushing injury from boom. Never place any part of body beyond window frame. It could be crushed by the boom if boom control lever is accidentally bumped or otherwise engaged. If window is missing or broken, replace immediately.

Prevent possible injury from unexpected machine movement. Make sure you know the location and function of each control before operating.

Never place any part of the body beyond the window frame. Replace missing or broken windows immediately.

A conversion kit is available from your John Deere dealer to change your controls to the pattern shown.

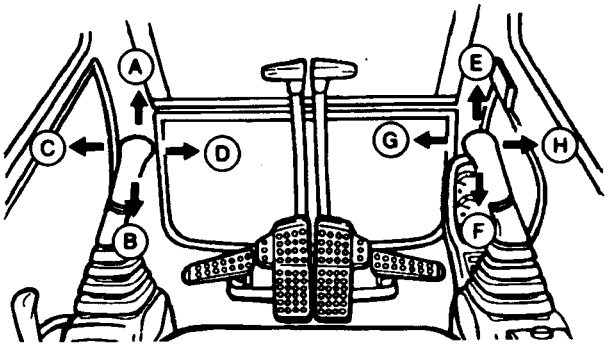
IMPORTANT: Prevent possible machine damage. When digging, avoid contacting tracks with boom cylinders or bucket.

When digging over the end of the tracks, propel motors should be at the rear to minimize chain and sprocket wear and to maximize machine stability and lift capacity.

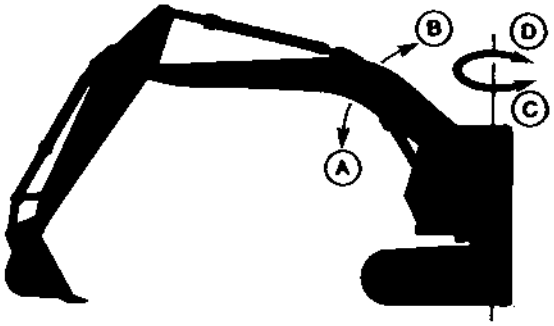
NOTE: With this control pattern, functions must correspond to the black-on-yellow labels located on the control console.

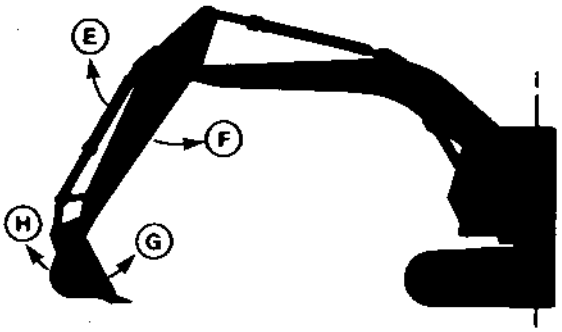
Do not contact tracks with boom cylinders or bucket. When digging over the end of tracks, propel motors should be at the rear of machine.

When a lever is released, it will return to neutral. The machine will remain positioned.



T7364AT –UN–10OCT90





T6811AD –UN–18OCT88

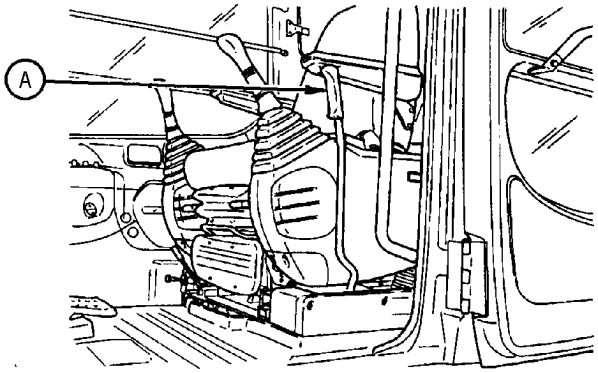
A—Boom Down
B—Boom Up
C—Swing Left
D—Swing Right
E—Arm Out
F—Arm In
G—Bucket Load
H—Bucket Dump

TX,35,FF2006 –19–13AUG91–1/1

PILOT CONTROL SHUT-OFF LEVER

The pilot control shut-off lever (A) shuts off hydraulic pilot pressure to all pilot control valves. When pilot control shut-off lever is in locked position, the machine will not move if a lever or pedal is accidentally moved.

Always pull pilot control shut-off lever to locked position when you stop the engine or leave the operator's station.



T101635 –UN–26JUN96

A—Pilot Control Shut-Off Lever

TX,35,DH5039 –19–07JUN96–1/1

AUTO-IDLE SWITCH

The auto-idle circuit automatically reduces engine speed after 4 seconds when control levers are placed in neutral position. Press switch (A) to turn circuit ON.

CAUTION: Turn auto-idle switch OFF when automatic acceleration of engine speed is not desired, and when stopping engine.

Always check auto-idle switch before operating any control levers. When ON, the engine speed lowers to auto-idle speed (regardless of the position of the engine speed control lever) approximately 4 seconds after the control levers are returned to neutral. By operating the control levers, the engine speed increases to the engine rpm dial setting.

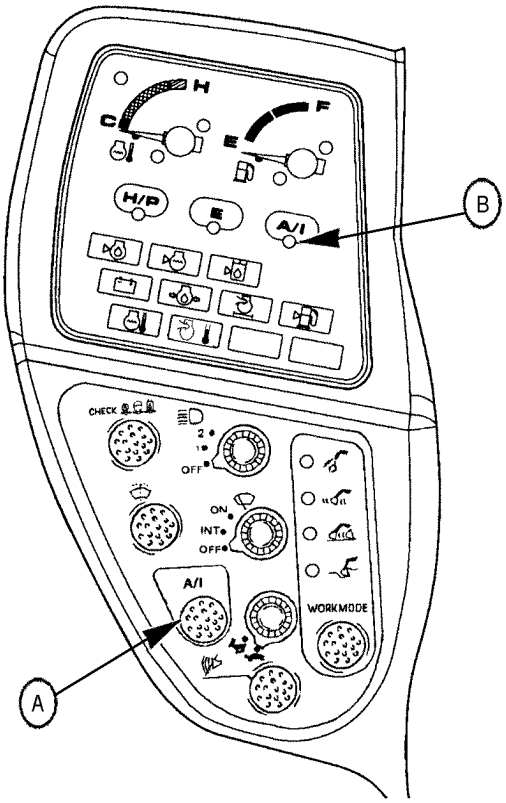
Starting engine when auto-idle is ON:

1. When key switch is turned ON, buzzer will sound briefly.
2. The engine will run at the engine rpm dial setting for 4 seconds after turning the key switch ON. The auto-idle system will then slow the engine to auto-idle engine speed.
3. Engine speed increases to engine rpm dial setting when any control lever is operated.
4. Four seconds after control levers are returned to neutral, the engine speed is reduced automatically to auto-idle level. Engine will run at auto-idle speed if engine is started more than 4 seconds after turning key switch ON.

   When the auto-idle switch is turned OFF, the engine speed is controlled by the engine rpm dial.

   Indicator (B) will light when auto-idle is ON.

   Turn auto-idle switch OFF and set engine rpm dial to improve machine control in difficult work areas, loading, and unloading.



T107692 –UN–27FEB97

A—Auto-Idle Switch
B—Auto-Idle Indicator

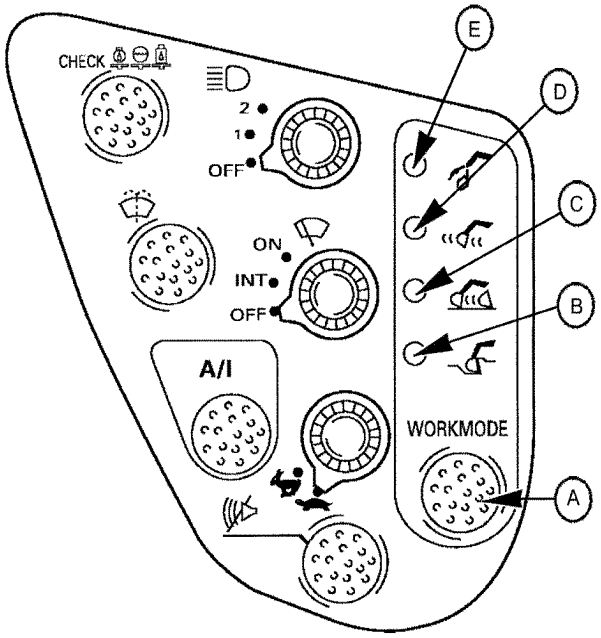
TX,35,DH5406 –19–27FEB97–1/1

WORKMODE SELECTION SWITCH

Select operating modes by pressing the workmode selection switch (A). In each mode, a microcomputer automatically selects the best combination of engine speed and pump flow rate that fits the working load. The dig mode (B) is automatically selected when the engine is started.

Use the following as a guide:

- Dig Mode (B)—Designed for general digging and truck loading.
- Grading Mode (C)—Arm roll-in is slower for grading and finishing work.
- Precision Mode (D)—For work that requires precision front movement.
- Attachment Mode (E)—When using attachments other than the bucket.



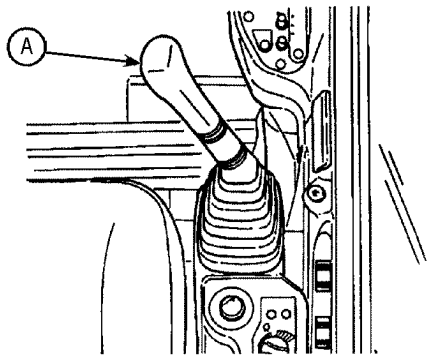
T101585 –UN–11JUL96

A—Workmode Selection Switch
B—Dig Mode
C—Grading Mode
D—Precision Mode
E—Attachment Mode

CED,TX14740,6008 –19–23JAN98–1/1

POWER BOOST SWITCH

Push power boost switch (A) on top of right control lever for an 8 second, 6% increase in hydraulic power. Release switch to reset power boost function.



T101633 –UN–20JUN96

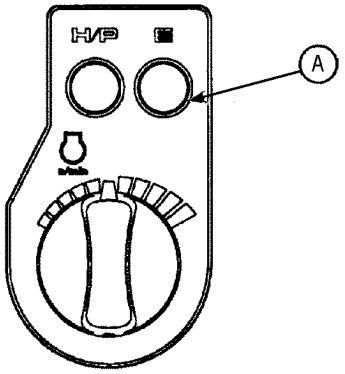
A—Power Boost Switch

TX,35,DH5654 –19–07APR97–1/1

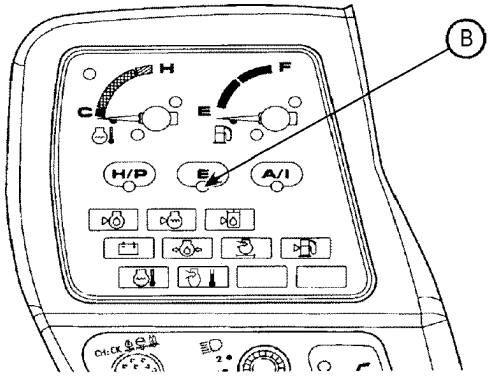
E (ECONOMY) MODE

Use E mode to improve fuel efficiency and reduce noise level with a small difference in engine speed. E mode is effective when the dig mode is selected as the work mode.

Push down E mode switch (A). The switch will stay down and E mode indicator (B) will light. Push the E mode switch again. The switch will return to original position and will deactivate the E mode.



T101632 –UN–01JUL96



T107693 –UN–27FEB97

A—E (Economy) Mode Switch
B—E (Economy) Mode Indicator

TX,35,DH5587 –19–22MAR97–1/1

H/P (HIGH POWER) MODE

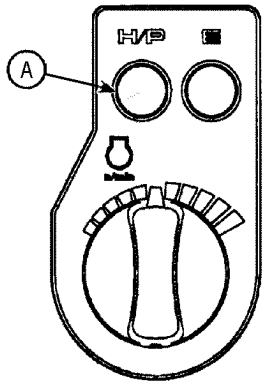
NOTE: With both the H/P and E modes turned on, the digging power increases while achieving low fuel consumption.

Use H/P mode when extra horse power is needed for rolling in the arm in excavation work. The H/P mode is effective when the dig mode is selected as the work mode. H/P mode can also be used with the E mode turned on.

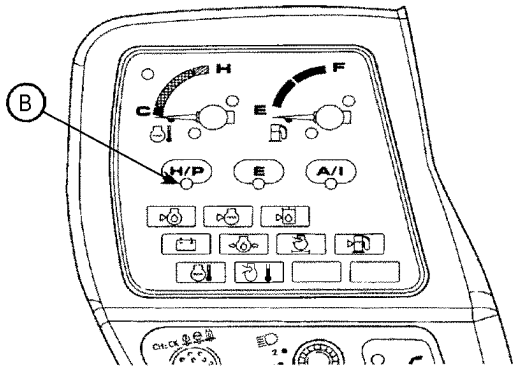
The H/P mode will be activated, automatically increasing the engine speed when:

- H/P mode switch (A) is pushed down.
- Engine speed is set to 1600 rpm or higher.
- Arm roll-in is operated.
- A load heavier than a specified amount is applied.

Push down H/P mode switch (A). The switch will stay down and H/P mode indicator will light. Push the H/P mode switch again. The switch will return to original position and will deactivate the H/P mode.



T101630 –UN–01JUL96



T107694 –UN–27FEB97

A—H/P (High Power) Mode Switch
B—H/P (High Power) Mode Indicator

TX,35,DH5408 –19–27FEB97–1/1

STANDARD MODE

The engine is in standard mode when no switches are pushed down and no indicator lights are on.

TX,35,DH5135 –19–03AUG96–1/1

OPERATING TIPS

Before starting work, walk the site to uncover hazards and to plan the job. Check for buried utility lines and pipes, and for gas and oil pipelines

Keep site clean and level to maximize machine stability, reduce operator fatigue, and increase productivity.

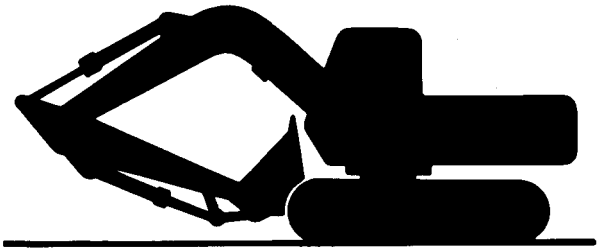
Do not knock down stakes or grade markers. If you lose sight of your guides, you may have to re-work the job.

TX,35,DH5070 –19–27JUN96–1/1

DRIVING MACHINE

Use your seat belt.

Select a route that is as flat as possible. Steer machine as straight as possible making small, gradual changes in direction.



T7527DS –UN–15JUL91

When driving over rough terrain, reduce speed to lessen possibility of undercarriage damage. Reduce speed when carrying a heavy load, or working in a congested area. When possible, avoid obstacles, rough terrain, rocks, curbs, and ditches. In general, decreasing speed increases control.

When driving, carry bucket or attachment low for good visibility and machine stability and to avoid overhead obstacles. Visibility may also be improved by rotating upperstructure slightly.

Limit hydraulic excavator travel times at high speed over grass terrain while using the bucket and hammer to four (4) hours.

If the operational scenario will not permit operating in four (4) hour increments, provide the operator with a 30 minute rest, after four (4) hours of operating the hydraulic excavator, before resuming operations.

TX,35,DH5786 –19–04JUN97–1/1

DRIVING ON SLOPES

Use your seat belt.

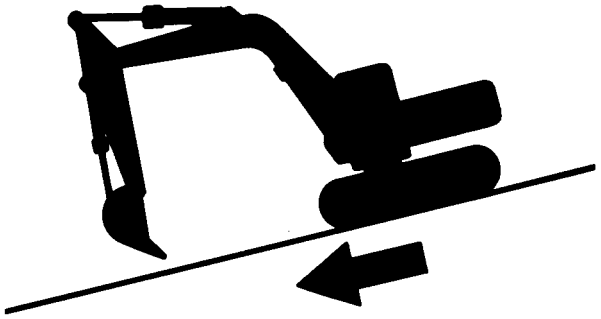
CAUTION: Prevent possible injury from machine rollover. Do not turn machine on a slope.

Do not turn machine on a slope.

TX,35,FF2441 –19–13AUG91–1/1

DRIVING DOWN A SLOPE

- Use your seat belt.
- Lower bucket near to ground as shown.
- Angle of boom to arm should be 90 degrees.
- Drive down slope with boom on the downhill end of the machine.
- If machine begins to slide, lower boom, placing bucket against or in the ground to slow the machine.

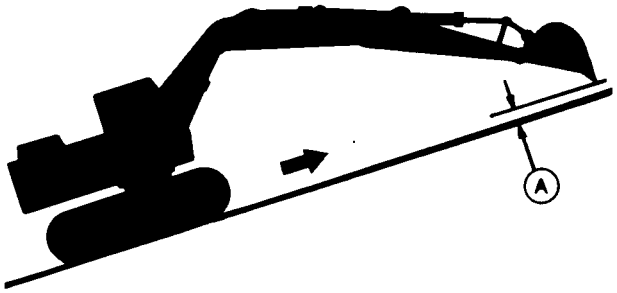


T7527CQ –UN–10JUL91

TX,35,FF2322 –19–02JUL91–1/1

DRIVING UP A SLOPE

- Use your seat belt.
- Position undercarriage so propel motors will be on uphill end of machine.
- Keep the bucket on the uphill side, approximately 30 cm (12 in.) (A) above ground.
- If machine starts to slip or become unstable, lower the bucket immediately.

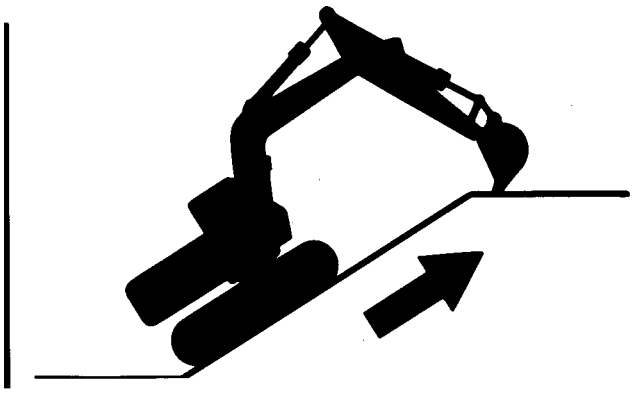


T7273AG –UN–08JUN90

A—Bucket Distance

TX,35,FF2337 –19–13AUG91–1/1

DRIVING UP A STEEP OR SLIPPERY SLOPE—BOOM ON UPHILL END OF MACHINE



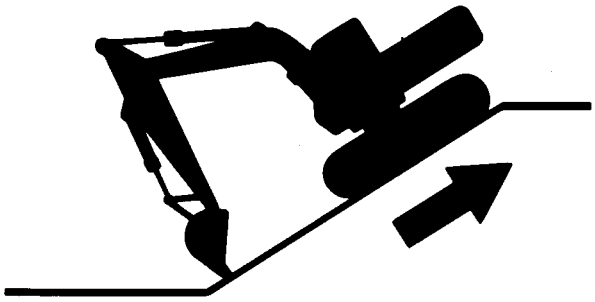
T7527CS –UN–10JUL91

CAUTION: Prevent possible injury from machine rollover. Use this technique only on a short slope. Machine depends on support of boom/arm/bucket during entire procedure until machine reaches top of slope. Repositioning the bucket during this procedure is NOT recommended. Do not swing upperstructure during this procedure.

- Use your seat belt.
- Position undercarriage so propel motors will be on uphill end of machine.
- Push bucket into the ground.
- Drive up slope. Pull machine using boom and arm cylinders to help propel motors. DO NOT reposition bucket during this procedure.

TX,35,FF2338 –19–13AUG91–1/1

DRIVING UP A STEEP OR SLIPPERY SLOPE—BOOM ON DOWNHILL END OF MACHINE



T7527CT –UN–10JUL91

CAUTION: Prevent possible injury from machine rollover. Use this technique only on a short slope. Machine depends on support of boom/arm/bucket during entire procedure until machine reaches top of slope. Repositioning the bucket during this procedure is NOT recommended. Do not swing upperstructure during this procedure.

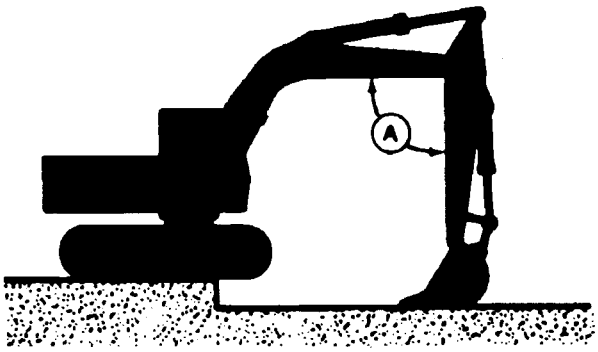
- Use your seat belt.
- Position undercarriage so propel motors will be on uphill end of machine.
- Push bucket into the ground.
- Drive up slope. Push machine using boom and arm cylinders to help propel motors. Do NOT reposition bucket during this procedure.

TX,35,FF2339 –19–13AUG91–1/1

MOVING MACHINE OFF AN EMBANKMENT

1. To move machine over edge of embankment, position bucket with flat surface resting on ground. Angle (A) of arm to boom should be 90°.

   Bucket must be on ground before machine begins to tip.



T7527DJ –UN–05JUN91

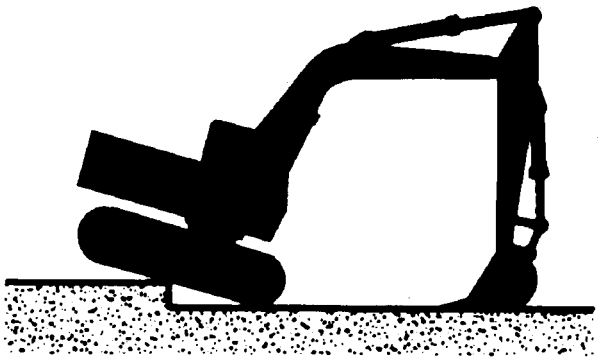
A—Boom-To-Arm Angle

TX,35,DH5637 –19–26MAR97–1/3

IMPORTANT: To prevent machine damage, do not allow machine to impact ground with bucket absorbing force of the fall.

2. As machine moves forward, raise the boom and retract arm until front of tracks reaches the lower ground level.

3. Raise bucket off the ground. Rotate upperstructure 180°.



T7527DK –UN–05JUN91

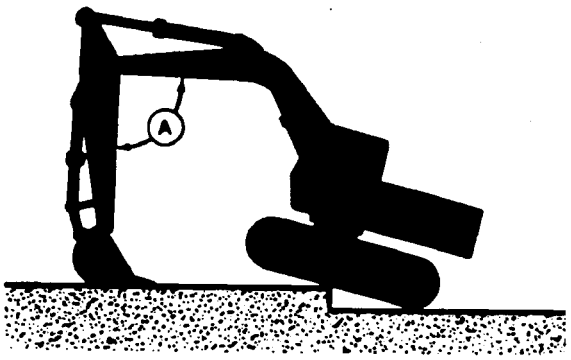
TX,35,DH5637 –19–26MAR97–2/3

4. Position bucket on ground with flat surface of bucket resting on ground. Angle (A) of arm to boom should be 90°.

5. Lower boom slightly and propel machine towards lower level as the arm is extended.

6. When tracks clear embankment, raise boom to lower undercarriage on lower ground level.

7. To move machine onto an embankment, reverse procedure.



T7527DL –UN–05JUN91

A—Boom-To-Arm Angle

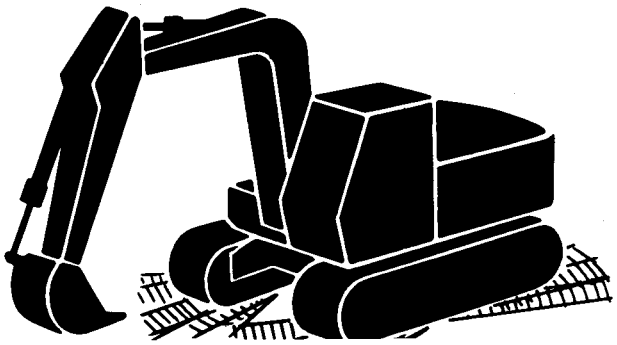
TX,35,DH5637 –19–26MAR97–3/3

LEVELING MACHINE

Operating on a firm, level surface optimizes machine stability.

To create a level surface:

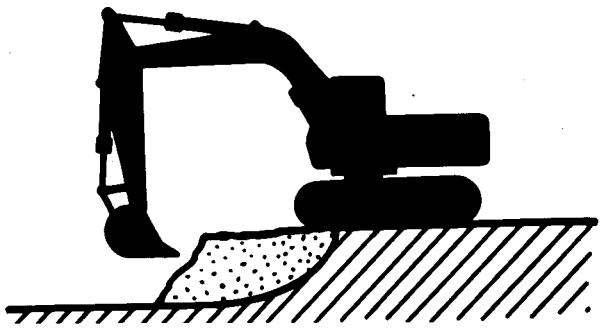
- Counterrotate tracks 30° to each side.



T7527CU –UN–15JUL91

TX,35,FF2324 –19–13FEB92–1/2

- Use bucket to add or remove material to level the worksite. When adding material to the worksite, drive over new material to compact it until the worksite feels stable.



T7527DE –UN–15JUL91

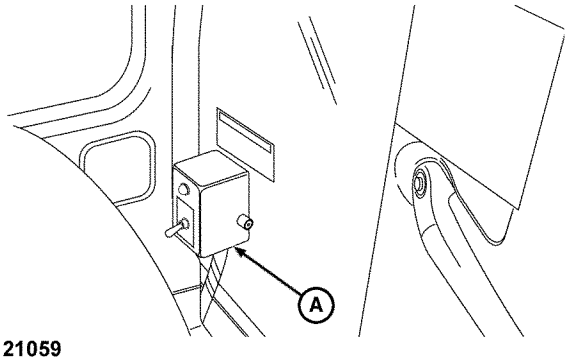
TX,35,FF2324 –19–13FEB92–2/2

USING QUICK-DISCONNECT HITCH

1. The cylinder in the Quick-Disconnect Hitch is powered by hydraulic oil from the excavator bucket cylinder which is diverted to the Quick-Disconnect by an electric solenoid valve.

NOTE: The solenoid coil is energized only in the unlatch position.

2. To attach the Quick-Disconnect Hitch to an attachment manually lift and rotate the safety lock pin lever on the top rear of the Quick-Disconnect Hitch. Fully extend the bucket cylinder and set the Quick-Disconnect Hitch switch (A) to the unlatch position. Extend the bucket cylinder again to place the oil over relief. This will activate the cylinder to the open position.



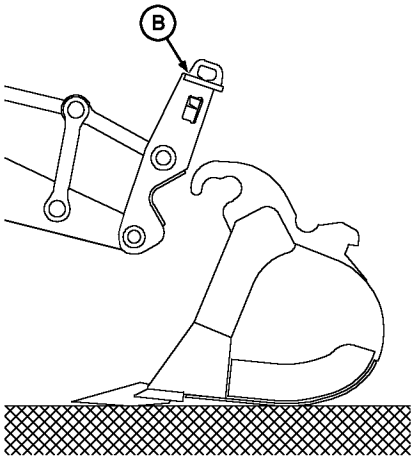
T121059

T121059 –UN–28OCT99

Continued on next page

CED,OUOE042,66 –19–09DEC99–1/8

3. Operate the excavator to position the Quick-Disconnect Hitch in the vertical position (B). The attachment must be level and resting on the ground.

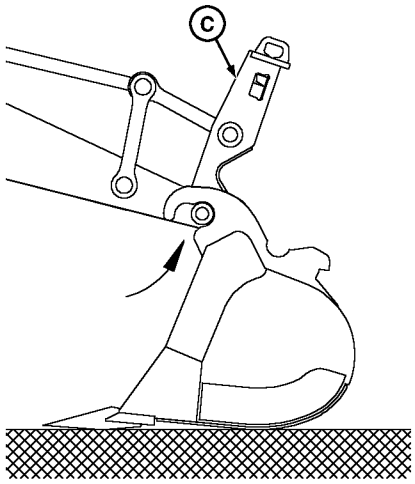


T126537

T126537 –UN–06DEC99

CED,OUOE042,66 –19–09DEC99–2/8

4. Position the Quick-Disconnect Hitch to engage the front hook of the attachment (C).



T126541

T126541 –UN–06DEC99

Continued on next page

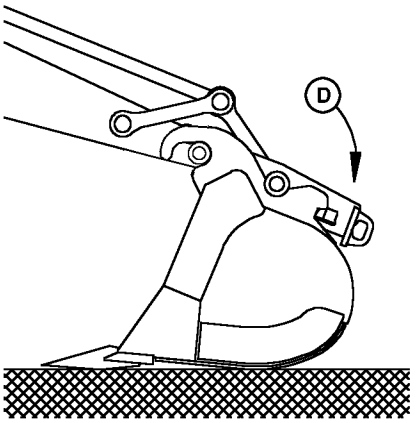
CED,OUOE042,66 –19–09DEC99–3/8

5. Rotate the Quick-Disconnect Hitch to seat the rear of the latch over the rear attachment pins (D).

CAUTION: Do not raise the attachment without acceptable wedge engagement. The attachment can fall causing possible injury to people in the vicinity of attachment.

6. Move the latch switch to the latch position and move the control in order to carefully curl the Quick-Disconnect Hitch and the attachment to full extension of the bucket cylinder. This will place oil over relief and divert oil to the hydraulic latch cylinder in order to engage the wedge into the attachment.

NOTE: Keep the attachment close to the ground during all latch and unlatch operations.



T126542

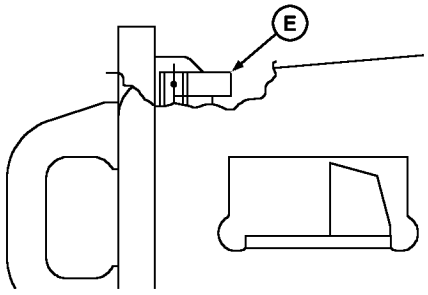
T126542 –UN–06DEC99

CAUTION: Wedge must be engaged into attachment.

CED,OUOE042,66 –19–09DEC99–4/8

IMPORTANT: The safety lock pin is a safety device to mechanically secure the attachment in the event of hydraulic system failure. The machine should not be operated without the safety lock pin in the locked position (E).

7. The safety lock pin lever is at the rear of the Quick-Disconnect Hitch. Carefully rotate the spring loaded safety lock pin lever toward the excavator to engage the lock pin.



T120313

T120313 –UN–25MAR99

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CED,OUOE042,66 –19–09DEC99–5/8

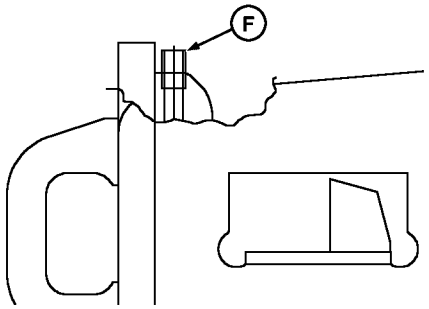
QUICK-DISCONNECT ATTACHMENT REMOVAL

1. Fully extend arm and curl bucket in. Place the attachment on the ground.

2. Manually lift and rotate the safety lock pin lever from its locked position and install it in the unlocked position (F).

NOTE: Alarm will sound when switch is in unlocked position.

3. To unlatch the Quick-Disconnect Hitch from an attachment fully extend the bucket cylinder. Move the Quick-Disconnect Hitch switch (A) in the operators cab to the unlatch position. Move the control to extend the bucket cylinder again to place hydraulic oil over relief. This will activate the latch cylinder to the open position.

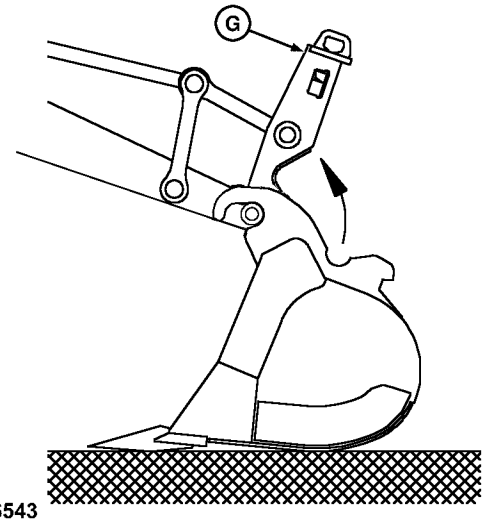


T120314

T120314 –UN–25MAR99

CED,OUOE042,66 –19–09DEC99–6/8

4. Operate the excavator to rotate the Quick-Disconnect Hitch in the vertical position (G).



T126543

T126543 –UN–06DEC99

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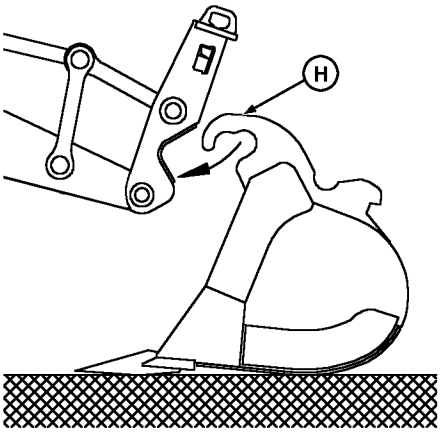
CED,OUOE042,66 –19–09DEC99–7/8

5. Remove the Quick-Disconnect Hitch from the hook on the front of the attachment (H).



T126544

T126544 –UN–06DEC99

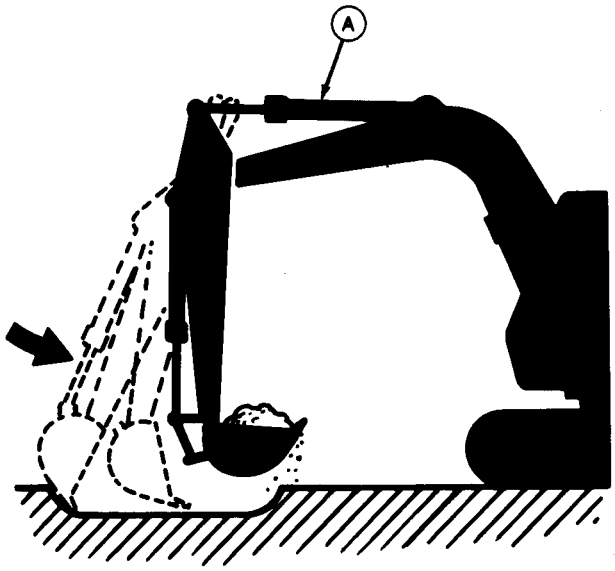
CED,OUOE042,66 –19–09DEC99–8/8

USING BUCKET

ARM DIGGING: For most general excavating, leveling material, and digging trenches.

To begin excavating, position arm in vertical position and then move it away from machine approximately 0.61 m (2 ft).

Using mainly the arm cylinder (A), retract the arm. As the bucket fills, curl the bucket while retracting the arm. The first cut should be approximately 1.2 m (4 ft) long and 75—100 mm (3—4 in.) deep. Remaining cuts should be approximately 1.2 m (4 ft) long and 100—150 mm (4-6 in.) deep.



T7527CV –UN–10JUL91

A—Arm Cylinder

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TX,35,FF2325 –19–28JAN92–1/3

BUCKET DIGGING: For power digging and for working in a small or cramped excavation. Use the bucket cylinder (A) for digging.

Lower bucket to the digging area and use boom to force the bucket into the ground. Work two functions at once; retracting the arm, and curling the bucket until the bucket is full.

If the bucket stalls, raise the boom slightly and continue to curl bucket.

If arm stalls, roll back bucket to break out.

IMPORTANT: To avoid damaging cylinder(s), do not strike ground with bucket or use bucket for tamping when bucket cylinder is fully extended (bucket completely curled under).

When bucket cylinder is fully extended, do not strike the ground with the bucket or use the bucket for tamping.

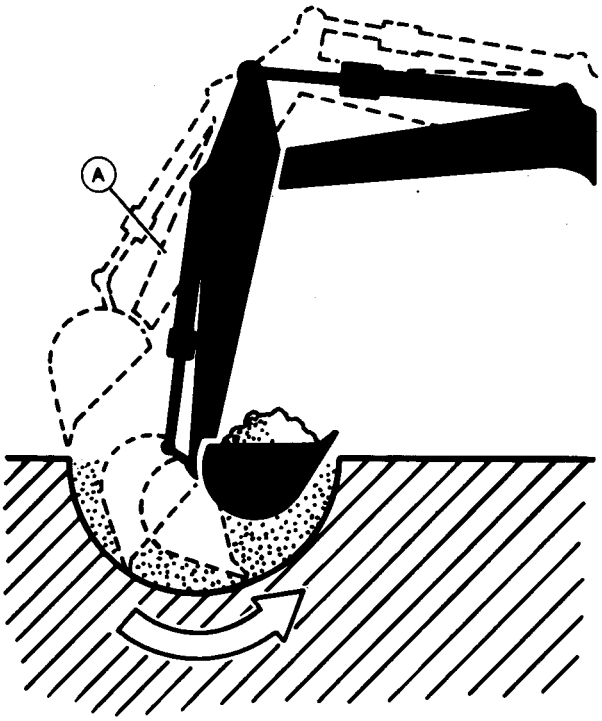
Do not use the bucket as a hammer or pile driver. Do not attempt to shift rocks and break walls using swing motion.

Do not sideload bucket. For example, do not swing bucket to level material or do not strike objects from the side with the bucket.

Match bucket, bucket teeth, or attachment to type of material being handled.

Loose, fragmented material dumps quickly from the bucket. To break up material as it enters the bucket, excavate material in thin layers rather than jamming it into the bucket. This is especially important with sticky materials.

If you clean the bucket by rapping it against the stop, to prevent cylinder damage, use the MINIMUM amount of force. Clean the bucket by hand if rapping bucket lightly does not work. Do not try to remove material from bucket by striking bucket against the ground or another object.



T7527CW –UN–10JUL91

A—Bucket Cylinder

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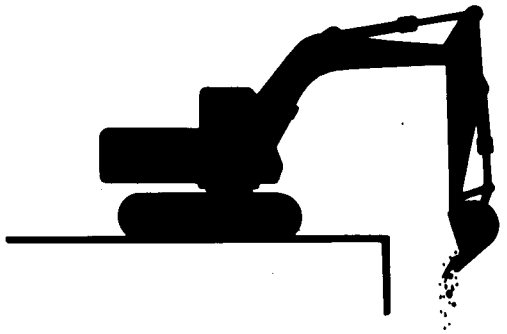
TX,35,FF2325 –19–28JAN92–2/3

To prevent cave-in's:

- Work perpendicular to or at an angle to excavation, with propel motors to the rear of the machine.
- Do not drive near the edge of an excavation or trench.
- Do not dig under the machine.



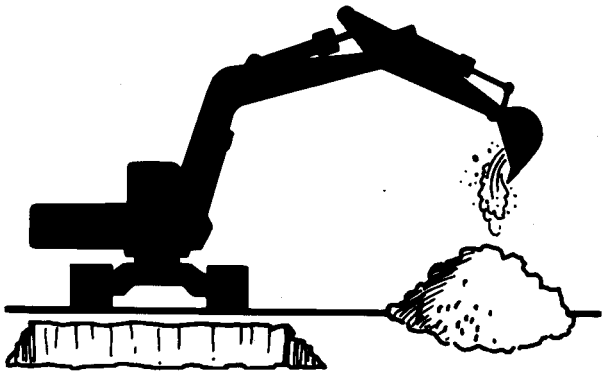
T7527CX –UN–10JUL91

TX,35,FF2325 –19–28JAN92–3/3

PLANNING SPOIL PILES

To prevent cave-in's, place spoil pile at least 1 m (3 ft) away from excavation. The deeper the excavation the further the spoil pile should be placed from the excavation. Place spoil piles for convenient truck loading or backfilling.

On slopes, place spoil piles on the upper side of the slope for improved machine stability and easier backfilling.



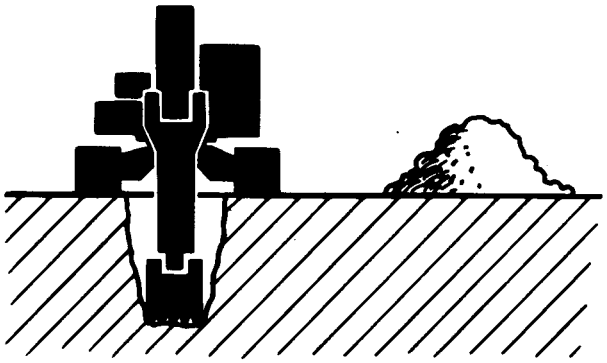
T7527CY –UN–10JUL91

TX,35,FF2323 –19–13AUG91–1/1

TRENCHING

Before starting work, walk the site to uncover hazards and to plan the job. Check for buried utility lines and pipes and for gas and oil pipelines.

To prevent cave-in's, dig a "V" shaped trench and place spoil piles at least 1 m (3 ft) away from trench. The deeper the trench, the further the spoil pile should be placed from it.



T7527CZ –UN–10JUL91

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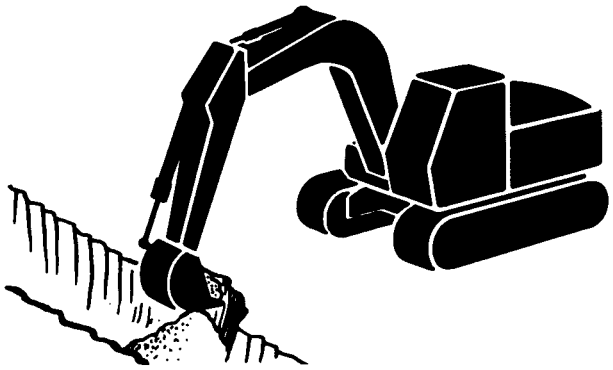
TX,35,FF2327 –19–13AUG91–1/4

If you have to clean up a cave-in and cannot reach it from machine's present position, DO NOT back over the trench. Drive the machine beside the trench to the cave-in. Park the machine at a 90° angle to trench, with propel motors to the rear of the machine. Clean cave-in from the side of the trench.

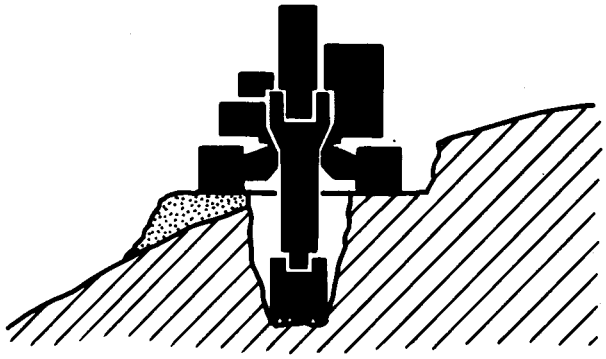


T7527DA –UN–10JUL91

TX,35,FF2327 –19–13AUG91–2/4

When trenching across a slope, level the machine so that bottom of trench will be level. Level machine by counterrotating tracks or by digging a shelf.

Place the spoil pile on the upper side of the trench. The machine is more stable and backfilling is easier.

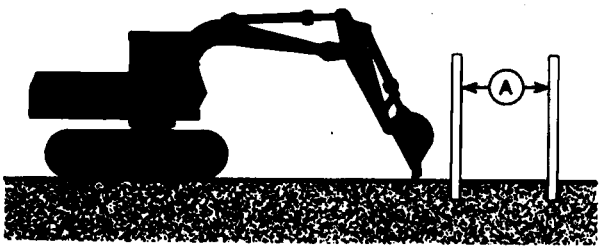


T7527DB –UN–10JUL91

TX,35,FF2327 –19–13AUG91–3/4

For straight line trenching, drive two stakes in at the beginning of the trench. Drive the first stake in immediately behind the starting point and the second stake approximately 9 m (30 ft) behind the first (A).

Use the stakes as a sight gauge. They are especially helpful if the machine is moved often.



T6879AU –UN–06DEC88

TX,35,FF2327 –19–13AUG91–4/4

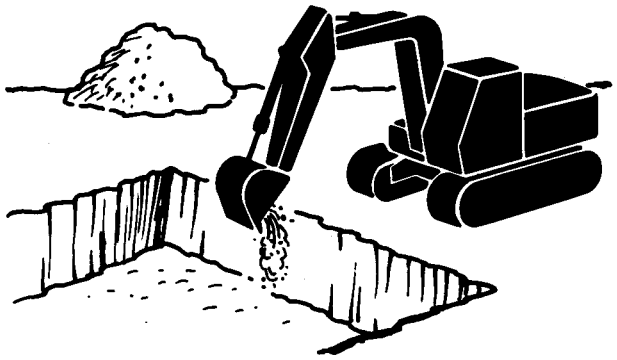
BACKFILLING

When backfilling, position machine at a 90° angle to the excavation, with propel motors to the rear of the machine.

To prevent machine damage DO NOT use the side of the bucket to backfill.

The bucket side can be used for finish grading.

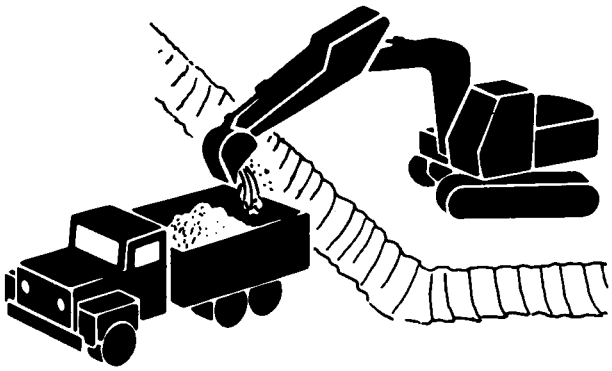
Extra material can be backfilled around foundations to allow for settling.



T7527DC –UN–10JUL91

TX,35,FF2331 –19–02JUL91–1/1

TRUCK LOADING



T7527DD –UN–15JUL91

Level loading area during wait time between trucks to maximize machine stability, decrease operator fatigue, and increase productivity.

Know location of all persons in working area, including truck driver. Do not load the truck unless the truck driver is in a safe place.

If possible, park truck where wind will be behind operator to keep dust of the dumped load out of operator's eyes and out of engine air cleaner.

Raise the bucket while swinging toward the truck.

Drop first load into truck from a minimum height to lessen the stress on the truck. The first material in the box will cushion following loads. Dump load into truck at a steady pace (rather than abruptly) to minimize stress on truck.

Load truck box from center front to center rear.

If loading large rock, first place a load of smaller rock into truck to cushion impact of large rock in truck.

Move bucket to excavation level while swinging away from the truck.

Do not swing the bucket over the cab.

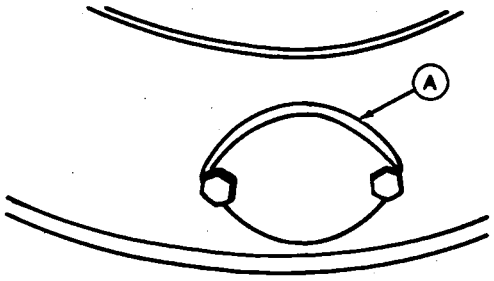
TX,35,FF2332 –19–02JUL91–1/1

OPERATING IN WATER AND MUD

Be careful not to operate the machine in water or mud above the upper deck surface of the undercarriage, causing the swing bearing and rotary manifold to be submerged.

If the swing bearing and rotary manifold are submerged, remove cover from underneath center of machine. Remove drain plug (A) to drain water and mud.

Clean swing gear area. Install plug and cover. Lubricate swing gear and swing bearing. (See Maintenance—Every 500 Hours chapter.)



T6274AR –UN–20APR89

A—Drain Plug

TX,35,FF2007 –19–06JUL94–1/1

CLEAN TRACK FRAME AREA

1. Swing upperstructure 90°.

CAUTION: Prevent possible injury from machine sliding backwards. Keep angle between boom and arm 90-110°.

2. Lower bucket (round side down) to raise track off ground, keeping angle (A) between boom and arm 90-110°.

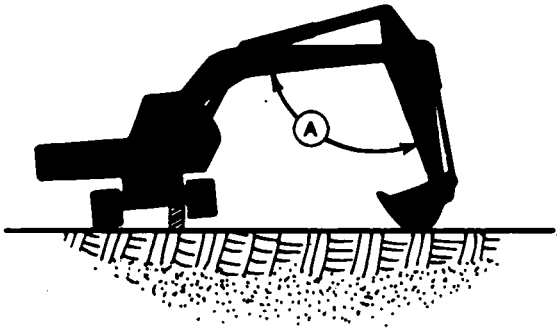
3. Run track back and forth to remove mud and dirt.

4. Turn engine off.

CAUTION: Prevent possible injury from unexpected machine movement. Place blocks under machine frame to support machine while cleaning track frame area when track is stationary.

5. Place blocks under machine frame if further cleaning of track frame area is performed while track is stationary.

   Clean track often during cold weather to prevent damage to track components.



T6879AT –UN–06DEC88

A—Boom-To-Arm Angle

TX,FF,42 –19–06AUG91–1/1

LIFTING

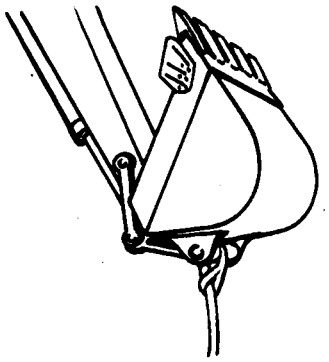
CAUTION: Prevent possible injury. Never move the load suddenly. Never move load over a person's head. Do not allow any persons near load.

Keep all persons away from raised load until blocks are supporting it or load is sitting on the ground.

Check chart on the right window or lifting capacity specification of this manual before lifting with machine. Position upperstructure so track sprockets are at the rear.

Do not attach sling/chain to bucket teeth. Do not lift with damaged or worn sling, chain, or bucket.

1. Secure sling/chain tightly to load being lifted.
2. Without bucket loop: Fasten chain/sling to pivot pin on machine, bucket curled, and arm retracted



T6589AA –UN–18OCT88

Without Bucket Loop

Continued on next page

TX,35,DH5145 –19–10AUG96–1/2

With bucket loop: Fasten sling/chain to bucket loop (A), bucket curled and arm retracted.

3. Coordinate hand signals with your signal man before starting.

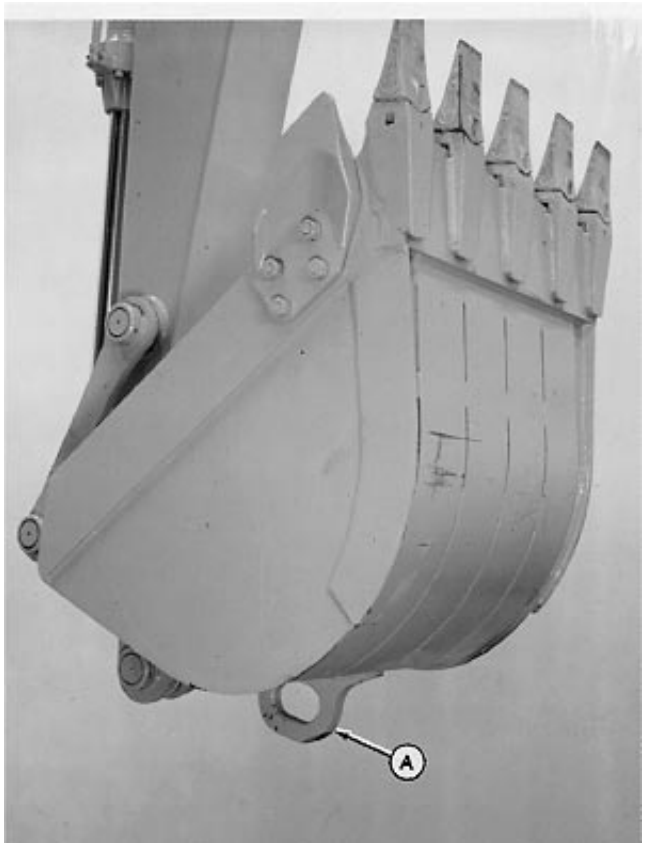
4. Know location of all persons in working area.

5. Attach a hand line to load and make sure person holding it is away from load.

6. Before starting job, test your load.

   - Park your machine close to load.
   - Attach load to machine.
   - Raise load 50 mm (2 in.) above the ground.
   - Swing the load all the way to one side.
   - While keeping load close to the ground, move it away from machine.
   - If there is any indication of reduced stability of your machine, lower load to the ground.

7. Lift load only as high as necessary.



With Bucket Loop

A—Bucket Loop

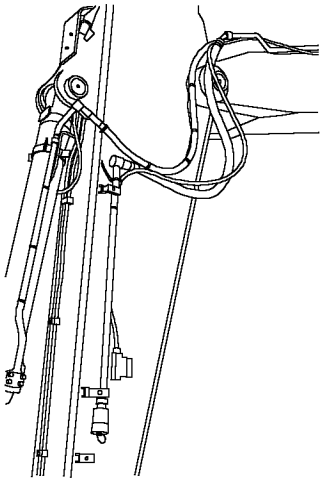
TX,35,DH5145 –19–10AUG96–2/2

USING QUICK-COUPLER TYPE ATTACHMENTS

GENERAL OPERATING TIPS

IMPORTANT: To avoid damaging machine cylinder(s), do not strike ground with attachment or operate with cylinders fully extended or retracted.

- Do not operate the attachment with the hydraulic cylinder rods fully extended or fully retracted.
- Do not strike the ground or other objects with the attachment.



T120404

T120404 –UN–25MAR99

KEEPING HYDRAULIC SYSTEM CLEAN

IMPORTANT: To prevent damage to hydraulic components, keep contamination from entering hydraulic system.

Use wrench to loosen connectors when connecting and disconnecting hydraulic lines to attachment.

While attaching or detaching attachments, the hydraulic lines are open. Contamination can enter the hydraulic system at this time, causing machine damage. If attachments are changed frequently, there are more opportunities for contamination to enter the hydraulic system. To keep hydraulic oil contamination to a minimum:

- Clean connectors before disconnecting hydraulic lines.
- Install caps and plugs on hydraulic lines as soon as possible.
- Change hydraulic return filter at half the normal interval (250 hours).
- Sample hydraulic oil every 500 hours. (See OILSCAN PLUS® in Periodic Maintenance chapter.) Follow OILSCAN PLUS recommendations for oil change interval, but never change the oil less frequently than recommended for the machine.

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CED,OUOE042,67 –19–09DEC99–1/1

HYDRAULIC BREAKER AND CRUSHER ATTACHMENTS

Hydraulic breaker or crusher operation subjects the machine's hydraulic system to possible contamination and accelerated deterioration. The hydraulic return filter and hydraulic oil must be replaced more often to prevent damage to hydraulic pumps and other hydraulic components. Change the hydraulic return filter and oil at the intervals recommended below based on the amount of machine operating time the attachment is used.

Percentage of Operating Time Breaker or Crusher Used	Hydraulic Return Filter Change Interval (Hours)	Hydraulic Oil Change Interval (Hours)
100	100	600
60	150	800
40	200	1000
20	300	1300

TX,35,FF2664 –19–13MAY93–1/1

LOWER BOOM WITH ENGINE STOPPED

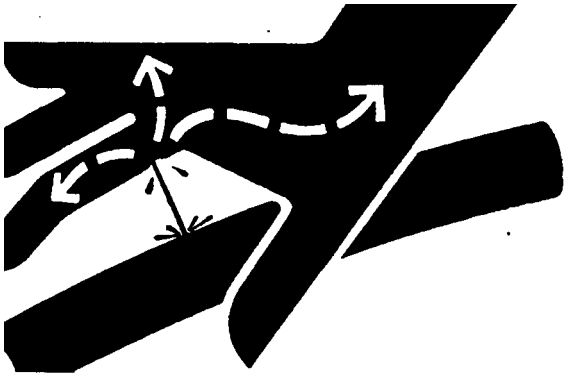
When an engine stops during operation, the boom cannot be lowered using the pilot controller because there is no pilot pressure oil to move the boom valve spool or to unlatch the boom load lowering valves.

Continued on next page

CED,TX14740,6037 –19–24MAR98–1/2

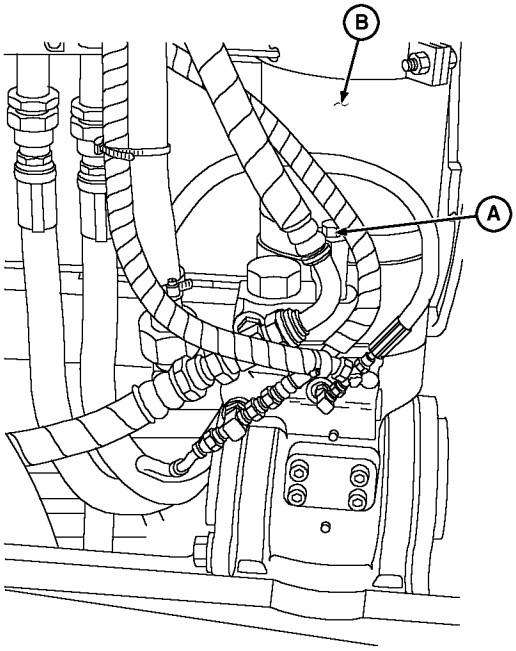
CAUTION: To avoid injury from escaping fluid under pressure, never loosen boom manual lower needle valve more than 4 turns from closed position as valve may come out of housing. Tighten valve and nut before applying pressure.

Prevent possible injury from unexpected machine movement. Clear all persons from the area before lowering the boom with the engine stopped.



X9811 –UN–23AUG88

1. Check that the area is clear of all persons before lowering boom.
2. Loosen jam nut on relief valve (A). Back off relief valve set screw, counting number of turns, until boom starts to lower slowly.
3. After bucket is on ground, reset relief valve (A) by turning set screw clockwise the same number of turns noted in step 2 and lock jam nut.



T127542 –UN–19JAN00

T127542

A—Relief Valve
B—Boom Cylinder

CED,OUOEBAS,4 –19–19JAN00–2/2

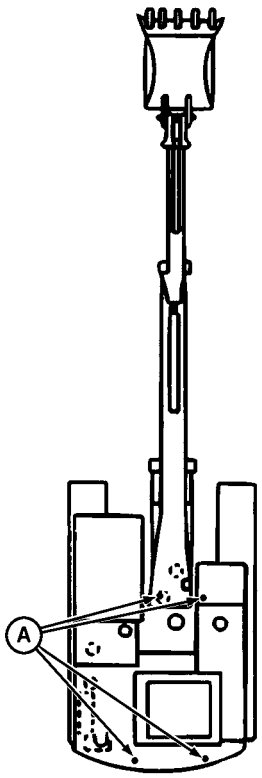
LIFTING THE MACHINE

Use all four lifting rings (A) to lift the machine.

CAUTION: Prevent possible injury from unexpected machine movement when lifting the machine. Check lifting capacity of crane before lifting the excavator. Lift load only as high as necessary.

Keep all people clear of raised load.

Approximate weight of machine, less bucket, is 31 715 kg (69,920 lb).



T120447

T120447 –UN–25MAR99

TX,OUOE042,24 –19–14DEC99–1/1

INSTALL HYDRAULIC IMPACT BREAKER

CAUTION: The operating weight of the hydraulic impact breaker is approximately 2195 kg (4840 lb). Use suitable lifting device to position the impact breaker onto blocking.

1. Support impact breaker approximately 457 mm (18 in.) off ground using suitable blocking so that impact breaker is stable and quick-disconnect hitch will not contact the ground when rotated into position.

NOTE: See Using Quick-Disconnect Hitch in this chapter for additional information when performing steps 2 through 6.

2. Manually place hitch safety lock pin in unlocked position and set quick-disconnect switch in cab to unlatch position. Extend bucket cylinder. Place oil over relief.

Continued on next page

CED,OUOESLH,4 –19–08DEC99–1/2

3. Operate excavator to position hitch in vertical position and engage front hooks of impact breaker adapter (A).

4. Rotate hitch downward to seat hitch and engage wedge into impact breaker adapter (B).

CAUTION: Do not raise the impact breaker without acceptable wedge engagement. The impact breaker can fall causing possible injury to people in the vicinity of the impact breaker.

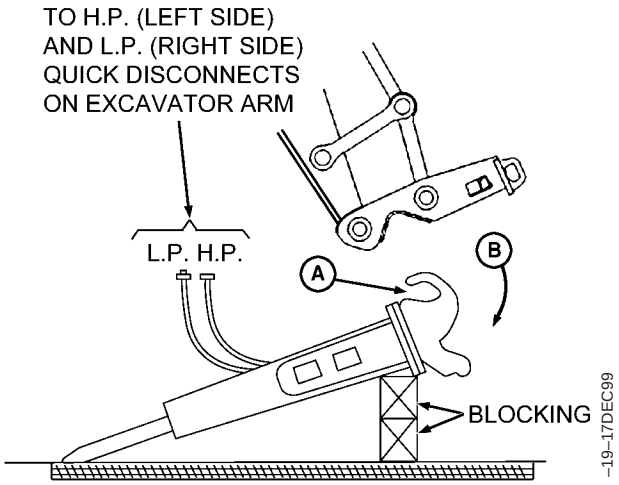
5. Set quick-disconnect switch in cab to latch position and fully extend bucket cylinder. Place oil over relief.

6. Check for wedge engagement and manually engage hitch safety lock pin.

NOTE: See Using Quick-Coupler Type Attachments in this chapter for general operation tips and information on keeping the hydraulic system clean when connecting attachments.

7. Remove cap from quick-disconnect fitting of high pressure hose on left side of excavator arm and plug from quick-disconnect fitting on low pressure hose on right side of excavator arm.

8. Connect high pressure and low pressure hydraulic hoses from impact breaker to corresponding high and low pressure quick-disconnect fittings on excavator arm.



T126528

T126528 –19–17DEC99

CED,OUOESLH,4 –19–08DEC99–2/2

REMOVE HYDRAULIC IMPACT BREAKER

1. Operate excavator and support impact breaker approximately 457 mm (18 in.) off ground using suitable blocking so that impact breaker is stable and quick-disconnect hitch does not contact the ground.

2. Clean and disconnect impact breaker hydraulic hoses connected to corresponding hoses on excavator arm and screw hydraulic disconnects together to prevent contamination of impact breaker when not installed on excavator. (See Using Quick-Coupler Type Attachments in this chapter.)

3. Install plug and cap on quick-disconnect fittings on excavator arm.

NOTE: See Quick-Disconnect Attachment Removal in this chapter for additional information when performing steps 4 through 7.

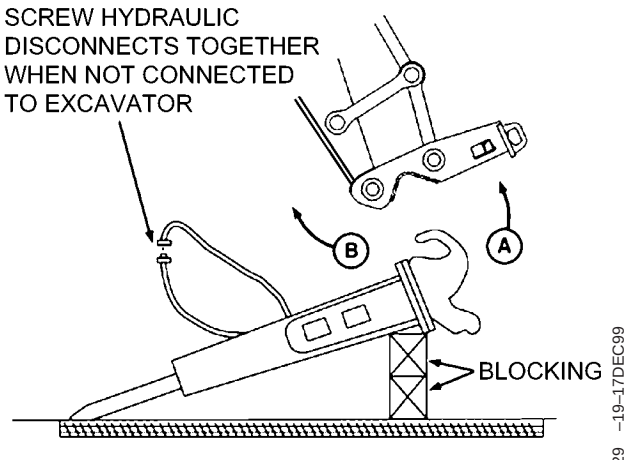
4. Manually place hitch safety lock pin in the unlock position.

5. Set quick-disconnect hitch switch in cab to unlatch position.

CED,OUOESLH,5 –19–08DEC99–1/2

6. Operate excavator to rotate hitch upward to vertical position (A). Fully extend bucket cylinder. Place oil over relief.

7. Remove hitch from hooks of impact breaker bracket (B).



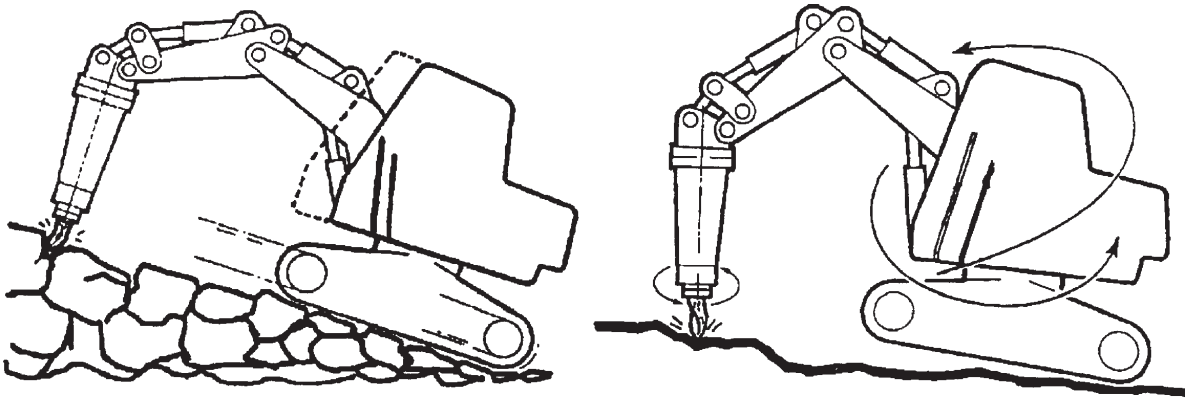
T126529

CED,OUOESLH,5 –19–08DEC99–2/2

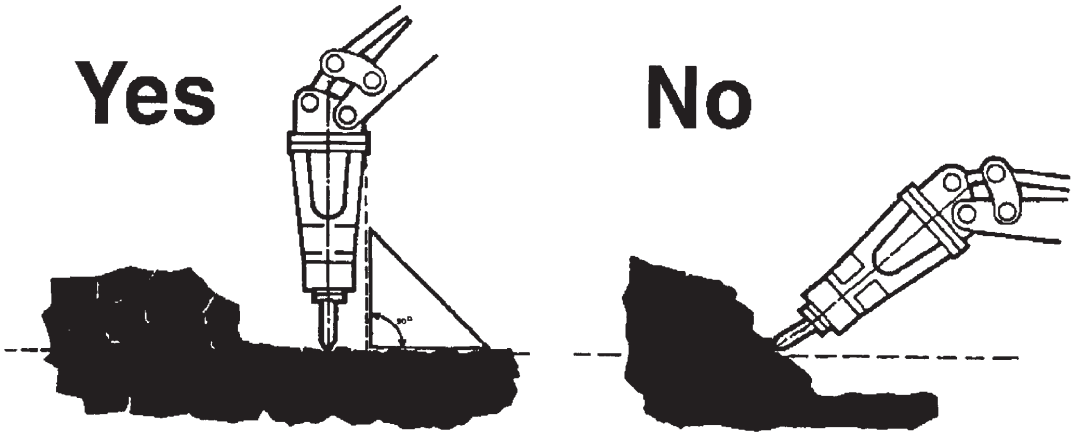
USING THE HYDRAULIC IMPACT BREAKER

THIS HYDRAULIC DEMOLITION HAMMER, AS A GENERAL RULE, SHOULD BE USED WITH THE SAME TECHNIQUE AS A JACKHAMMER. CHOOSE THE APPROPRIATE TOOL IN ORDER TO OBTAIN MAXIMUM PRODUCTIVITY. THE PROFILE OF THE TOOL SHOULD BE CHOSEN ACCORDING TO THE NATURE OF THE MATERIAL, DEPENDING ON THE TYPE OF JOB: QUARRY, EARTH MOVING, TRENCH WORK, TUNNELS, DEMOLITION, ETC.

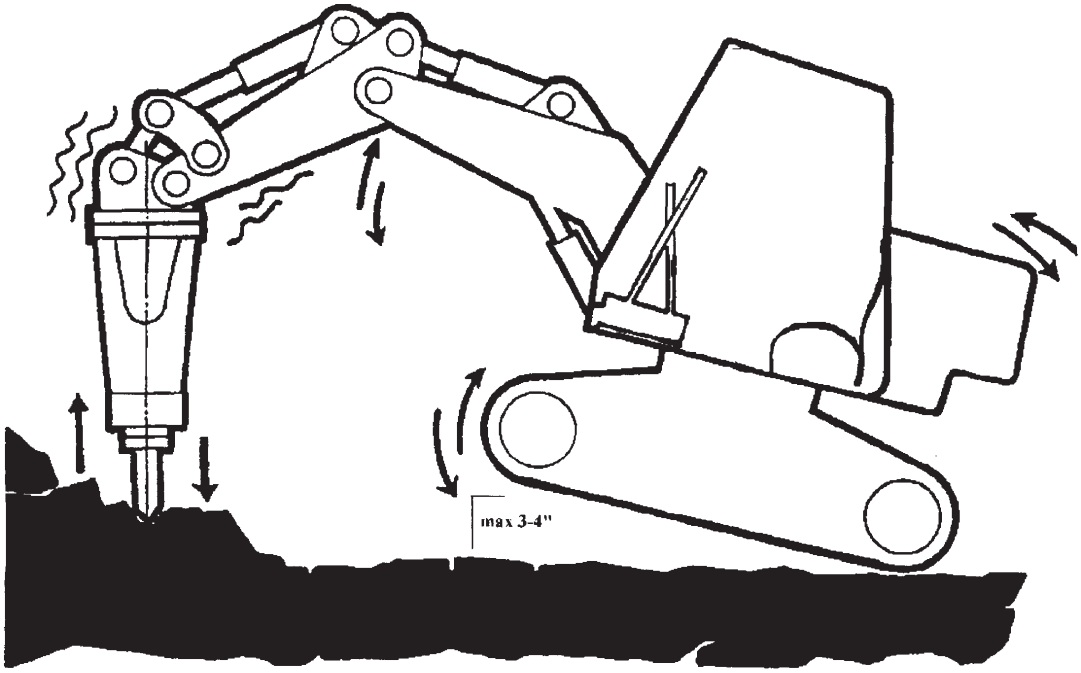
a) Position the carrier so that the reach to the work is adequate. Ensure that the carrier is in a stable position and is not placed on a crumbling or slipping surface during operation. This guarantees a constant load on the hammer.



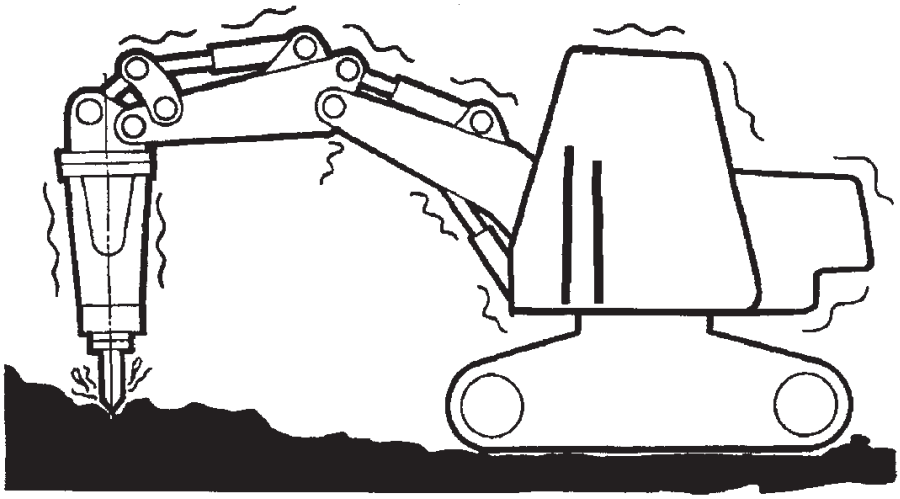
b) Place the hammer tool perpendicular to the surface to be broken. Always act with the carrier arm, keeping the hammer perpendicular to the work and describing a slight arc, closing the arm towards the operator. This method of operation will dramatically extend the life of the tool and bushing.



c) Maintaining an even pressure from the carrier to the hammer, start the hammer. If the downward pressure from the boom is too weak, you will hear metallic (rather than sharp) strokes, because the hammer is not striking the tool correctly. If the downward pressure is excessive, it will produce strong vibrations in the carrier and the tool, retaining axle, bushings, etc.



d) If the hammer is in the correct position, and the hammer and case are vibrating, the downward pressure from the carrier is insufficient. If exerting further pressure from the carrier does not solve the problem, it may be that internal hydraulic leaks from the rams or valves may not be allowing the carrier to exert the correct amount of pressure. In this case, replace the carrier cylinder seals and/or check the control valve seals.

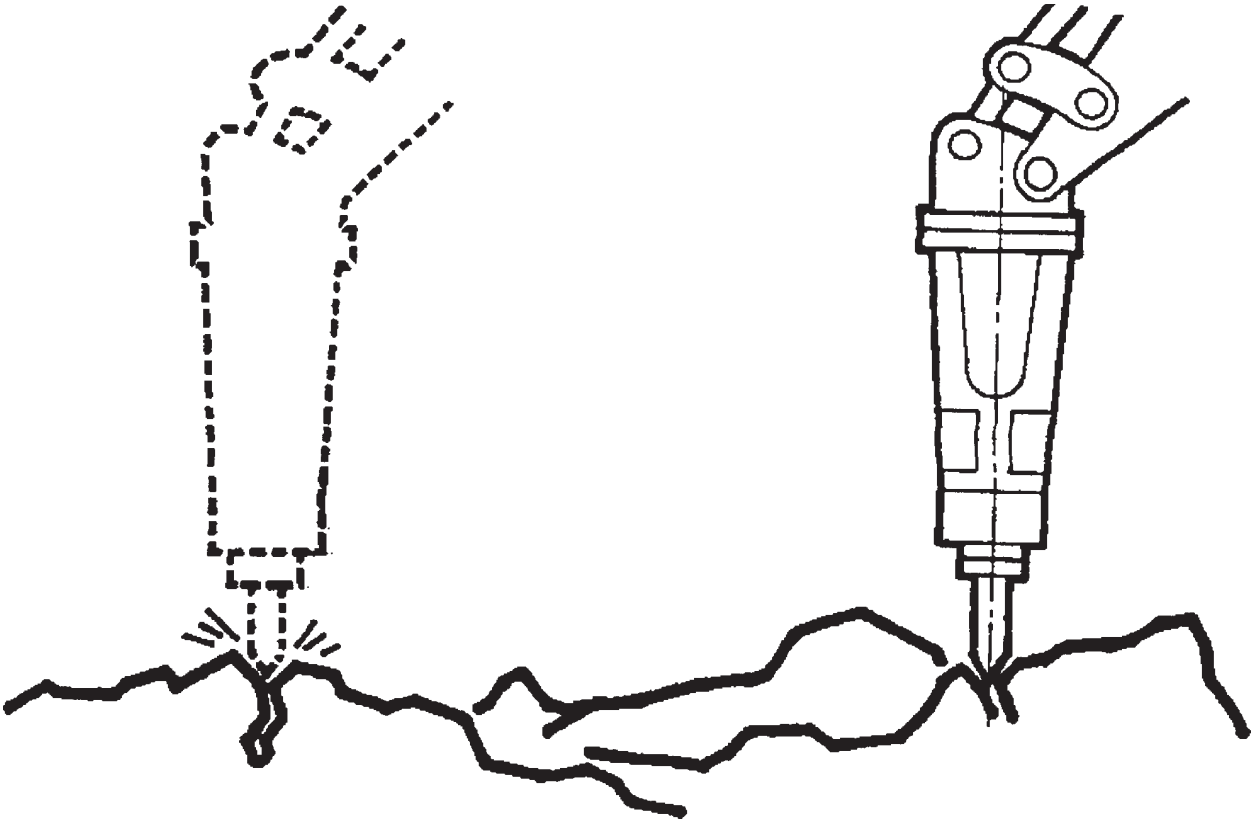


e) If vibrations start to occur after the hammer has been operative for some time, this means that the carrier downward pressure has not followed the tool penetration. You must maintain a constant pressure from the carrier on the hammer, as the hammer is penetrating the work.

f) An INDECO hammer senses the strength and density of the surface being broken, and adjusts hammer impact power accordingly. The operator will be able to hear the difference in the blows when a rock is broken or not broken. The hammer rhythm will be fast and sharp if the material is frail and flaky; slow and powerful if the rock is compact and uniform. Impact speed will also be slower the deeper the hammer penetrates.

g) As soon as cracks start to appear in the material being worked on, and the tool starts to appear from the bushing, stop the hammer at once. Do not raise the hammer from the material until it has stopped completely.

h) If cracks in the material do not appear in **30 seconds**, move to a new position along the grain of the material, perhaps working on a smaller section or edge of the material. Always look for advantageous weak points in the material (e.g. cracks, bumps, veins) at which to start. This saves undue stress on the breaker.



i) In a quarry, or when breaking oversized rocks, position the material to be broken on a hard base to minimize vibrations of the material.

SUMMARY OF INSTRUCTIONS

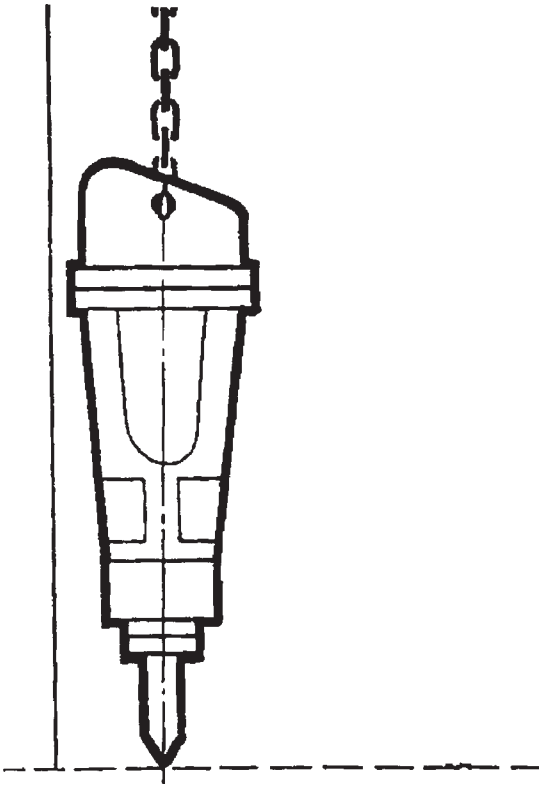
a) Maintain even pressure on the hammer.
b) Follow the hammer during penetration of the material.
c) Always maintain a constant optimal pressure level.
d) Correct loading ensures hammer productivity and avoids damage to its component.

REGULAR MAINTENANCE

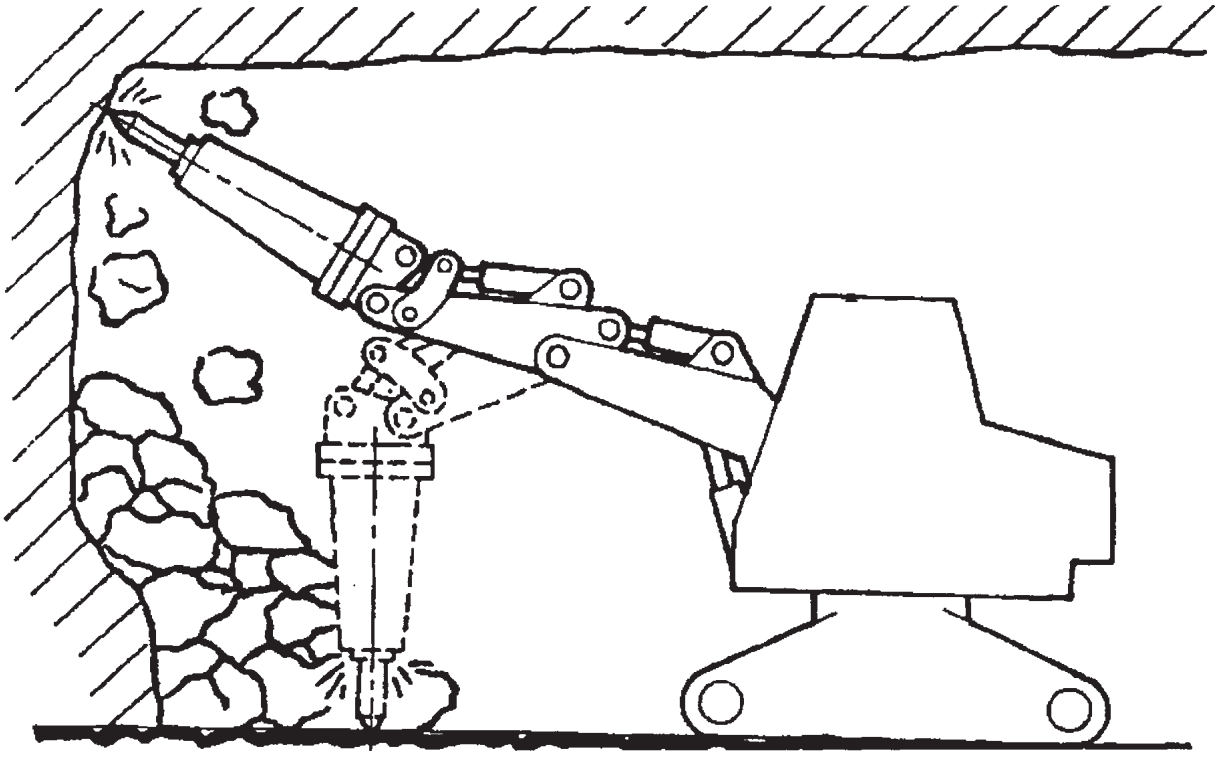
a) If the breaker is operating at temperatures below -15° Celsius, increase the nitrogen charge pressure by 20% of the value recommended in normal conditions (notify your supervisor). Disassemble the tool and store it in a place where the temperature is above 0ÿ Celsius. DONOT heat up the tool with a torch or other device before operation. Operate the tool slowly for the first 15 feet of excavation in order to gradually warm up the tool. Never leave the tool exposed to inclement weather, as this will oxidate the bushing contact area.

b) The hydraulic oil feed viscosity must not be below 15 CST. The maximum oil temperature during operation should not exceed 75° Celsius (160° Fahrenheit).

c) When the hammer is not in use, it must be kept in a vertical position. This will allow any water or condensation to run off of the piston and prevent rusting which may cause seal failure and leakage.

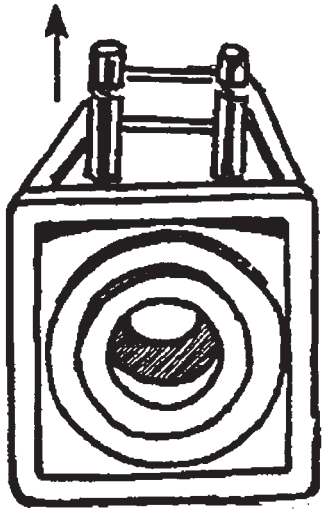


d) In the case of horizontal or upside-down operations (e.g. tunnels), once every hour the operator should lower the hammer to a vertical position, so that any particles of rock which have collected in the hammer can fall out. (Operator can alternate hammering up and down.) If this is not done, the hammer impact will be wasted on the rock particles, and in addition will create thermal energy in the particles and hammer, causing overheating. Prolonged overheating will cause the hammer materials to lose their original mechanical resistance. In order to keep particles out of the hammer, an air hose may be installed in the same way as would be done for underwater usage.

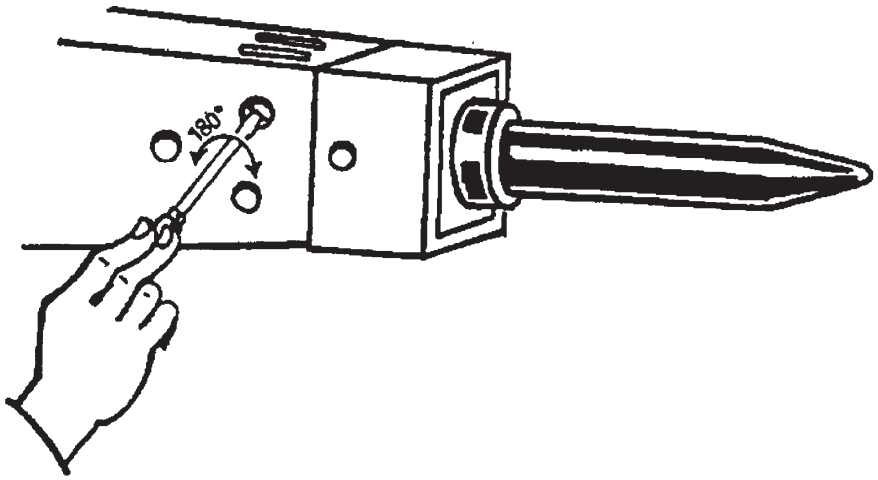


TOOL REPLACEMENT

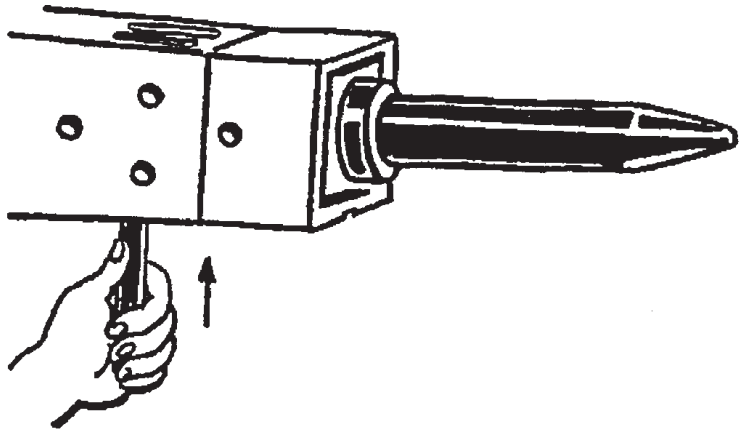
a) In order to install the tool, insure that the retaining axles are **not** in their locked position.



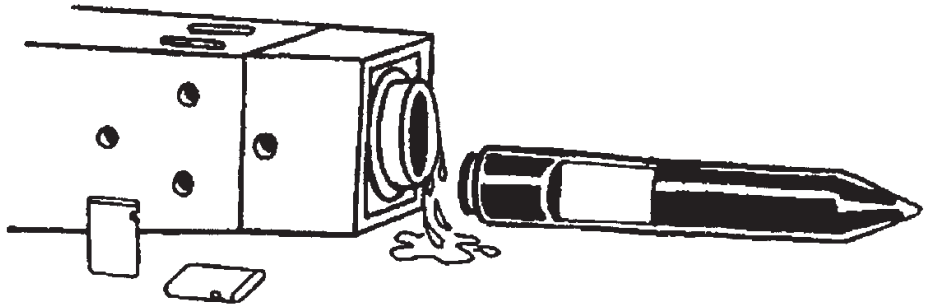
b) With the aid of a screw driver or similar instrument, push down the lock bolt located on the side of the hammer. Turn it 180° to its resting position.
Note: Newer lock bolts only turn in one direction.



c) With a screwdriver or tool, push the retaining axle out from the opposite side. Repeat the operation on the second retaining axle. Remove the tool. **Warning: the tool may be hot if the breaker was just being used.**



d) Grease the new tool well. Insure the cavity is clean and the bush is lubricated. Slide it in so that the side notches are in line with the axle slots and push in snugly.



e) Slide in the retaining axles with the indents facing the front of the hammer. Push in snugly and turn the lock bolt 180° to secure the retaining axle.

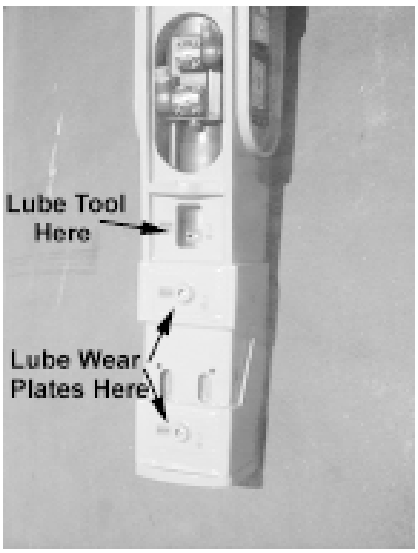
BREAKER LUBRICATION

It is essential to lubricate the tool using the grease chart below as a guideline. If working in dusty conditions, the tool should be greased even more frequently (See the picture below for proper greasing points). The tool should also be removed weekly and the cavity cleaned and packed with new grease. The tool must always have grease on the hammer contact area. **YOU CAN SAVE TIME AND ENERGY BY USING AN INDECO POWER LUBE SYSTEM TO AUTOMATICALLY CARRY OUT THIS FUNCTION.**

INDECO Breaker Greasing Schedule

WARNING!!! Failure to follow these recommendations may result in low production and increased tool failure.
(All recommendations are minimums and tool lubrication must be increased in dusty conditions.)

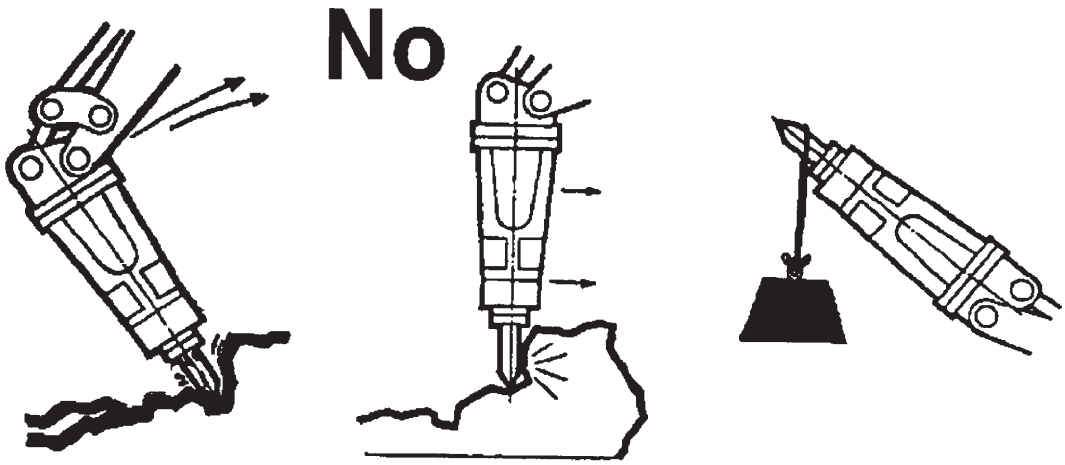
Model	Tool Lube Rate with Grease Gun	Wear Plates Lube Rate with Grease Gun
MES 181 thru 553	Every 2 hours - Approximately 15 pumps of grease.	Once per day - Approximately 2 - 3 pumps each wearplate.
MES 621 thru 1200	Every 2 hours - Approximately 30 pumps of grease.	Once per day - Approximately 2 - 3 pumps each wearplate.
MES 1500 thru 2000	Every 2 hours - Approximately 40 pumps of grease.	Once per day - Approximately 2 - 3 pumps each wearplate.
MES 2500 thru 3500	Every 2 hours - Approximately 60 pumps of grease.	Once per day - Approximately 2 - 3 pumps each wearplate.
MES 5000 and larger	Use of an INDECO Power Lube Syste is Recommended.	Once per day - Approximately 2 - 3 pumps each wearplate.



Lube Point

COMMON CAUSES OF BREAKER DAMAGE

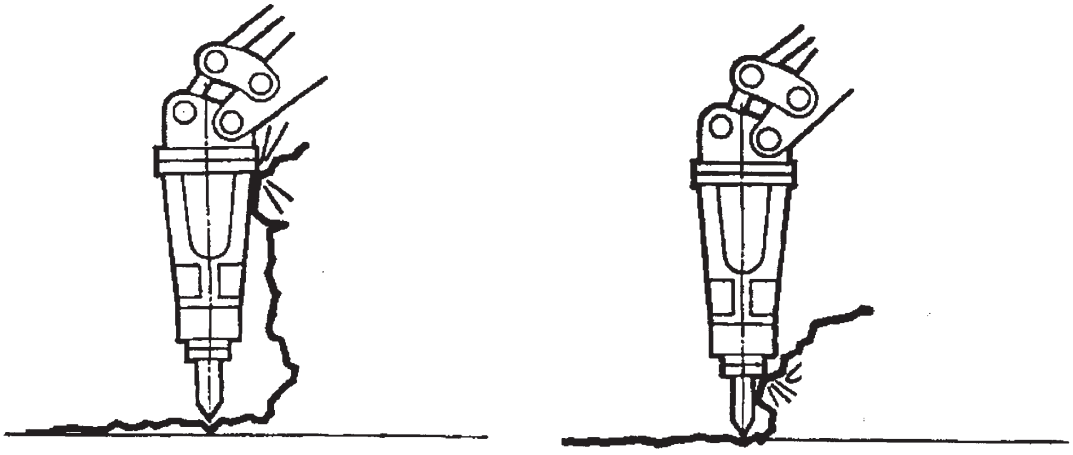
a) The hammer must not be used as a ripper, nor should it be used as a lever. Under no circumstances should the tool be used as a hook to lift weights. This could cause serious damage to the tool, the bushing and the housing.



b) The hammer must operate perpendicular to the work. This ensures that: the tools are not forcibly stressed; bending stress does not occur; and the specific pressures in the contact areas are maintained. This will greatly extend the life of the tool and the bushings.

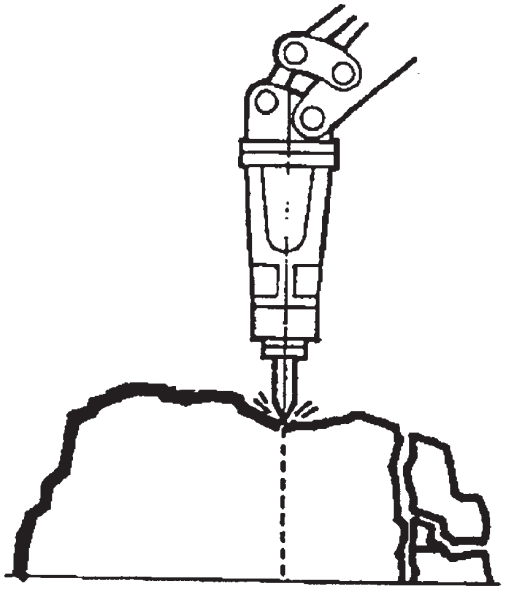
c) Check that the **tool contact areas (especially the chuck housing) are well lubricated and smooth.** A properly lubricated tool will show streaks of grease below the lower bushing on the tool shank. Remove any bumps or rough areas with a soft grinding wheel and wire brush. The point of a chisel tool can be re-sharpened in the same way. Tools should be rotated 180° to evenly distribute the wear.

d) The hammer must be free to operate without any obstructions, chafing or interference. There should also be no obstruction between the hammer and the tool.

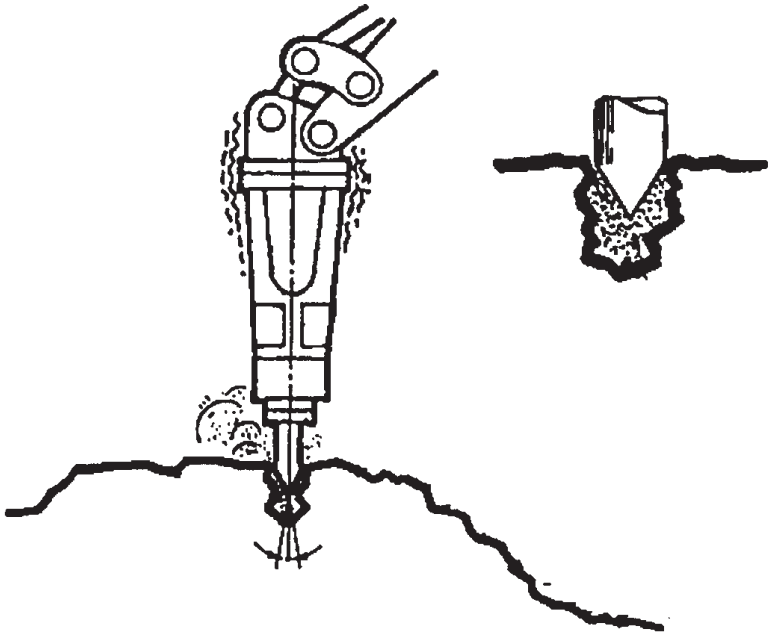


e) When breaking large blocks of rock, any protrusions should be broken off first, in order to reduce the overall size of the block.

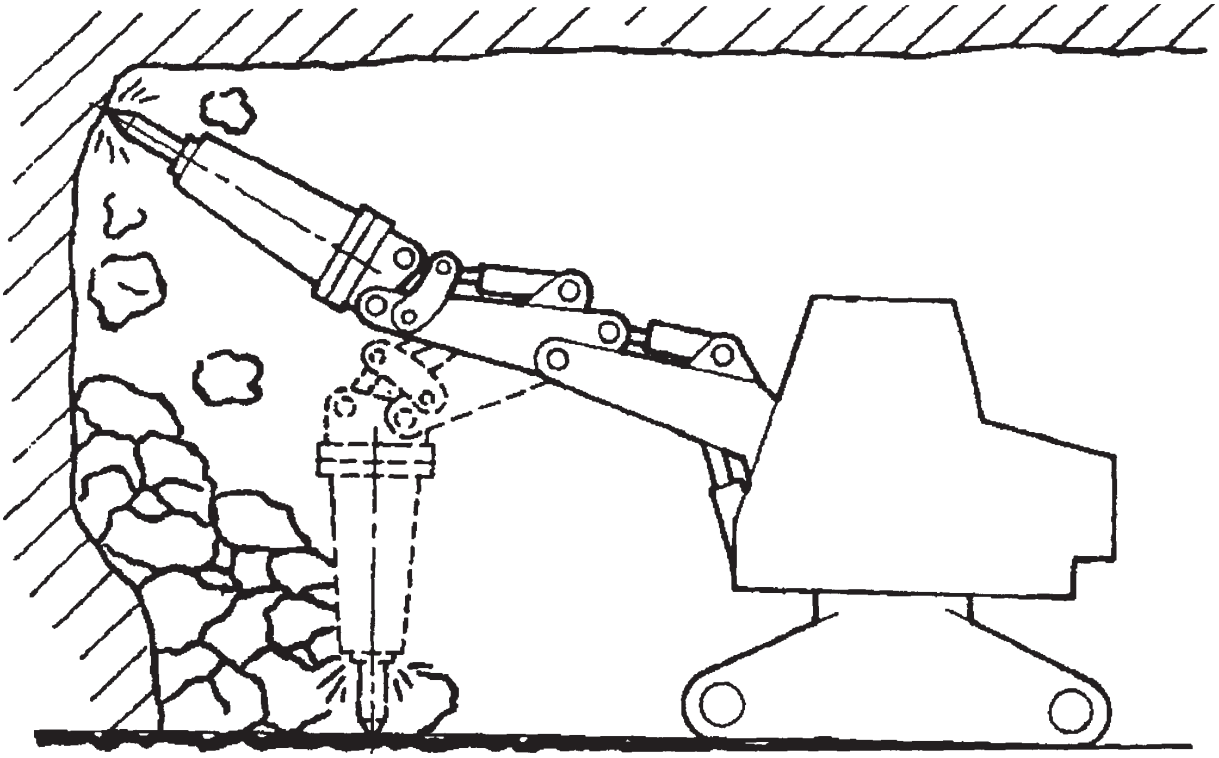
f) For secondary demolition, before starting the hammer, adjust the material to be broken so that it is on a hard, stable surface.



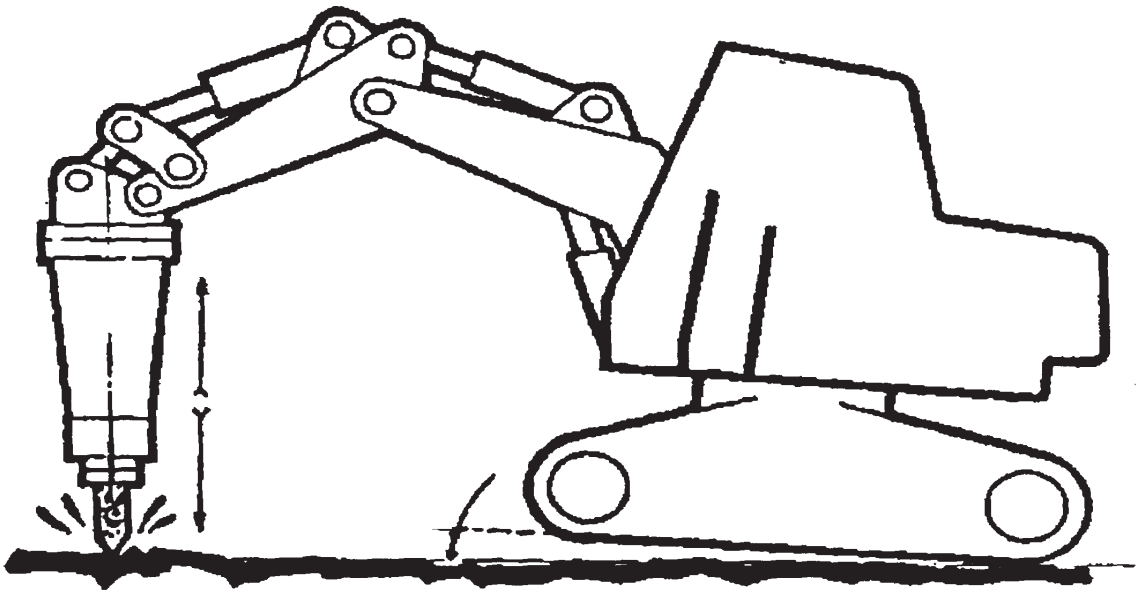
g) A small pocket of rock dust can sometimes occur in the"well" formed by the tool. The hammer impact may be released on this, therefore not breaking the rock. The tool will then overheat and may deform. The solutions to this are either to make another parallel hole nearby, or to carry out small movements of the hammer to disburse the rock dust. **Do not** continue in the same spot. This will waste the hydraulic power and damage the tool.



h) When using the hammers in these positions, the tool should be removed every 8 hours, and the internal faces of the bush cleaned with a wire brush or lubricant cleaner. If the hammer is very full of rock particles, remove the appropriate plug from the side of the chuck housing, and blow out the hammer with compressed air.

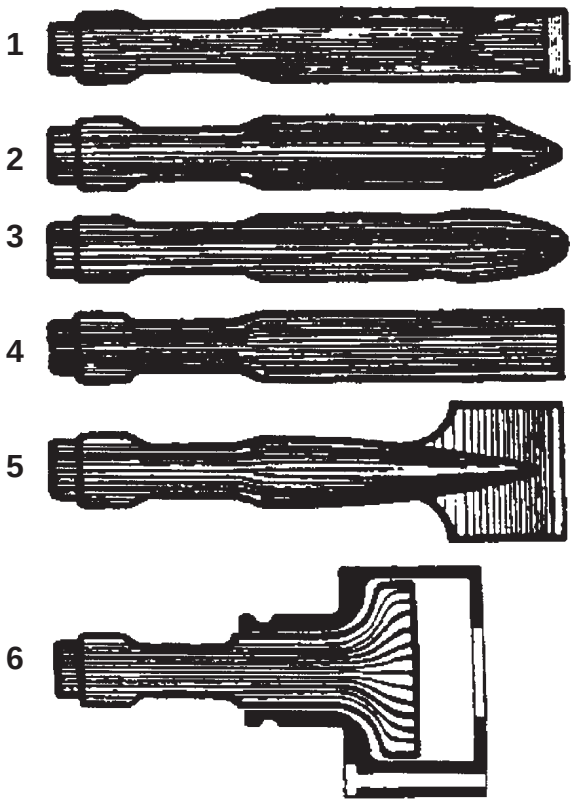


i) Do not use the tool of the hammer to rotate the carrier. This causes superficial cuts on the contact areas which could cause breakage under stress.



BREAKER TOOL SELECTION

Choose the most suitable tool for the operation required. For the breaking of boulders, use **MOIL or OLGIVE** points. In restricted areas, such as trenches, use **CHISEL** points and proceed in-line with the work face. In particularly narrow places, progress gradually, through small sections of material, making the most of the regularity of the striking fre quency. Keep the front of the hammer parallel to the operator, with the machine arm drawn up. This will avoid damage to the tool, especially during cutting and squaring orks. The **COBRA** point is recommended for EARTH-MOVING jobs, or for particularly difficult materials.



Point and Recommended Use

1) Chisel All earth-moving duties or excavations in narrow trenches or stratified soil or rock up to medium rock.

2) Moil Demolition of rocks and materials, not stratified rock, up to medium hardness.

3) Olgive Demolition of hard to very hard rock.

4) Blank or Blunt Demolition of rocks up to medium hardness to be broken into smaller pieces.

5) Asphalt Cutter or Spade Cutting of concrete paving, brick walls or turf.

6) Pole or Pipe Cutter Driving pipes, poles or preshaped metal objects (IE. shaped metal gaurdrail poles) into different materials.

TOOL BREAKAGE ANALYSIS

DESCRIPTION OF TYPICAL STRESS

IN ORDER TO UNDERSTAND THE COMPLEXITY OF THE STRESS PHENOMENA THAT RESULTS IN TOOL BREAKAGE, SOME GENERAL INFORMATION NEEDS TO BE ADDRESSED. THE TOOL IS CONSIDERED AN ELASTIC ELEMENT DESIGNED TO TRANSMIT SHOCK OR KINETIC ENERGY FROM THE HAMMER PISTON TO THE MATERIAL TO BE DEMOLISHED.

* The typical tool break starts as a small fracture in the surface of the tool that is the most stressed area. Eventually a surface crack is created from: micro-welds from surface work hardening; localized heating and cooling on the tool surface; and tension and

compression on opposite sides of the tool. The surface crack then grows in a series of concentric rings until the section weakens and can no longer support the stresses imposed. Complete failure occurs at this time.

* Stress per blow is not as critical as the frequency of blows. The stress level in the tool becomes more critical with higher blows per minute and changes in the blows per minute.

* For the same phenomena, longer tools at equal energy and frequency bear more stress than shorter ones.

* Breakers working at higher frequencies must be lubricated more often due to the above-mentioned stress on the tool as well as the thermal damage created by the friction of the tool and lower bushing.

* Matching a small breaker to a carrier larger than hammer specification creates high stress conditions on the tool.

* Operators are not always skillful in using the breaker. Visibility problems, site conditions and the use of the point to move materials can set up surface fractures in the tool. Breakage may not occur immediately but the conditions are now in place for a future failure.

METHOD TO REDUCE THESE EFFECTS & INCREASE TOOL LIFE

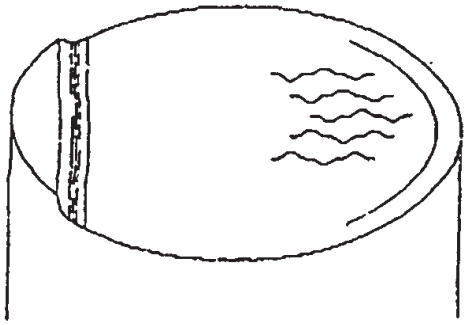
* To drastically reduce the undesirable stresses on the tool, the breaker should be positioned perpendicular to the material to be worked. Slight arching-in of the hammer toward the operator while firing and following the progression of the tool into the material will deliver uniform pressure on the bushing in the contact areas. This will also allow the lubricating grease to flow around and cool the tool, thus avoiding seizures, micro-welding, and the creation of localized hot spots detrimental to the heat-treating of the tool.

* All attempts must be made to eliminate prying with the tool or moving the carrier while the weight is on the tool. Do not pivot the carrier on the tool!

* Overheating of the tool should be avoided on the point or chisel end. This occurs when the tool works in an area longer than 30 seconds, creating a “dust pocket” between the tool and hard material.

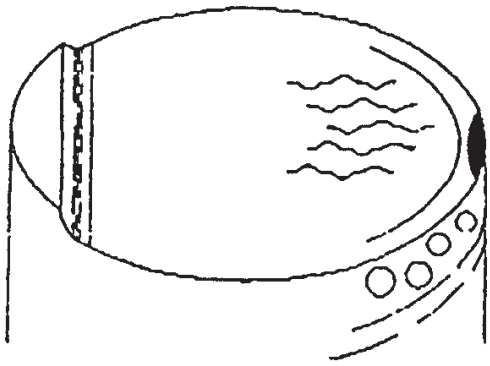
* The tool should be constantly lubricated with INDECO Supreme 1000 grease. You can never over-grease the lower end of the breaker!! Attention to this fact will add longevity to your tool and bushing life.

TYPICAL TOOL FAILURES



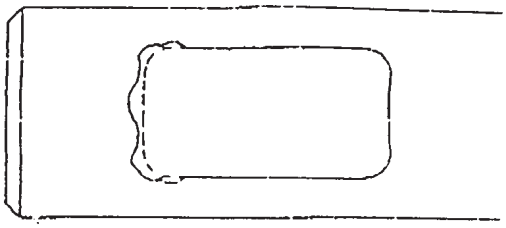
Misalignment or Pry Break

The bending stress exceeds the materials strength and the tool snaps. Caused by working at an incorrect angle or using the tool for mechanical leverage. The failure usually occurs near the tool bushing's front face. This failure can also be caused by the breaker slipping while hammering at angles not perpendicular to the surface of the material being broken. The failure type is a brittle type and typically has a lip formation.



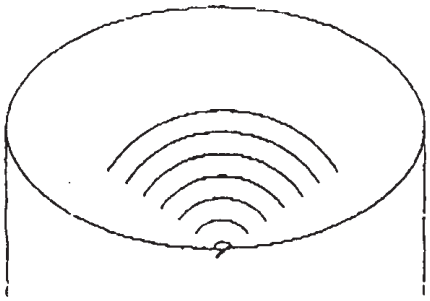
Seizing in the Tool Bushing

Strong side loading and striking the tool at the same time causes the tool and bushing surface to be damaged. This failure is cause by incorrect or insufficient lubrication. The failure generally occurs in the front tool bushing area. The failure type is a fatigue fracture starting at the surface of the tool.



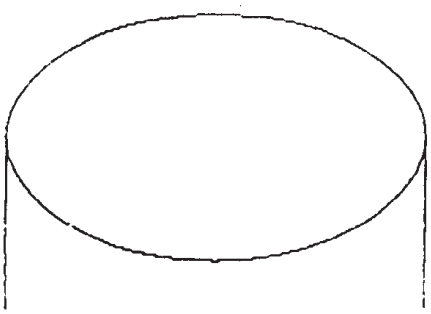
Blank or Dry Firing

Occurs when the working end of the tool is not in proper contact with the material being broken. The failure can also occur when breaking through the material and the breaker strikes the tool a last time. When struck without resistance at the working end the tool , the tool stops abruptly when it is stopped by the retainers instead of the material. This results in breaking and deformation in the retaining groove.



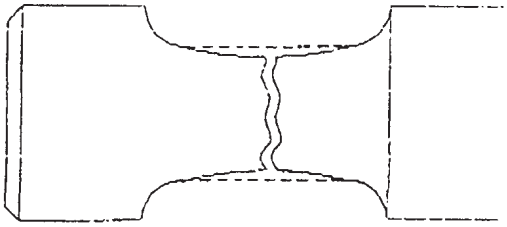
Mechanical Damage on the Tool"s Surface

This is caused by heavy scratching on the tools surface. The failure usually occurs outside the tool bushing. The failure is generally a fatigue type fracture.



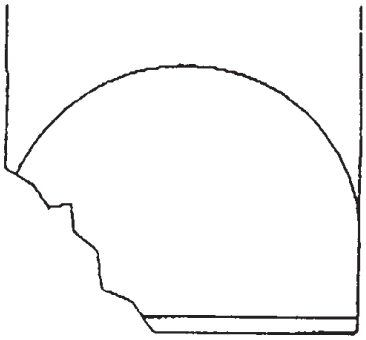
Cold Fracture

Cold temperatures can cause the tool to become brittle and break. This failure can be avoided by warming the tool when working in cold temperatures.



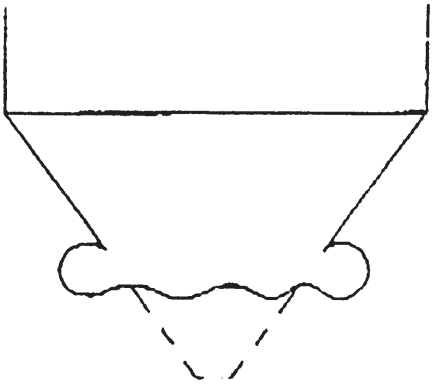
Break at Retaining Groove

This failure is a result of using a tool with worn or damaged retainers. Any time a tool is replaced the tool retainers should be inspected for wear and replaced if worn or damaged.



Breaking of Chisel Tip

This failure is caused by the improper contact between the tool and the material being broken.



Mushrooming of Tip

This failure is caused by hammering too long without penetration of the material. This generates extreme heat and softens the tools materials which then mushrooms. Once a tool has been overheated, the properties of the tool's materials are permanently altered. This change of properties can then lead to premature failure of the tool. This damage can be prevented by proper lubrication and operation.

BLANK

CHAPTER 8

TRANSPORTING

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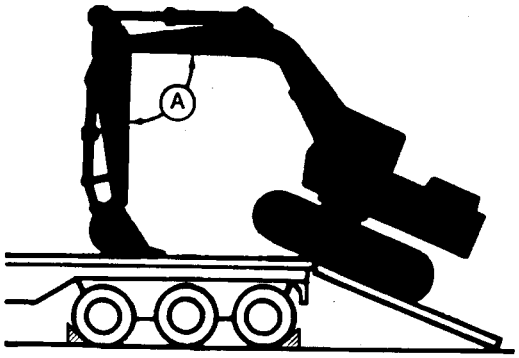
LOADING MACHINE ON A TRAILER



T7405BI –UN–29NOV90

WARNING: The M870 and M870A1 trailers may be used to haul/transport the John Deere Hydraulic Excavator Model 330LCR providing the following precautions are adhered to:

- **Position the longitudinal centerline of the hydraulic excavator as near as possible over the longitudinal centerline of the trailer, i.e., overhang of the hydraulic excavator tracks to be equal on both left and right outriggers.**
- **An M870 or M870A1 trailer shall be limited to primary and secondary roads (paved and gravel) when hauling a hydraulic excavator.**
- **The truck/tractor shall reduce its top speed by 50% when hauling an M870 or M870A1 trailer loaded with a hydraulic excavator.**
- **An M870 or M870A1 trailer loaded with a hydraulic excavator shall not be operated on roads with side slopes greater than 10%.**

1. Keep trailer bed clean.
2. Put chocks against trailer wheels.
3. Use a ramp or loading dock. Ramps must be strong enough and have a low angle of 10—15°.

CAUTION: Prevent possible injury from unexpected machine movement. Turn auto-idle switch off and turn H/P mode switch off when loading or unloading the machine.

4. Turn auto-idle switch off and turn H/P mode switch off.
5. Load and unload machine on a level surface.
6. Drive machine onto ramps slowly.
7. The centerline of the machine should be over the centerline of the trailer.
8. Position bucket with flat surface resting on trailer. Angle (A) of arm to boom should be 90°.

Continued on next page

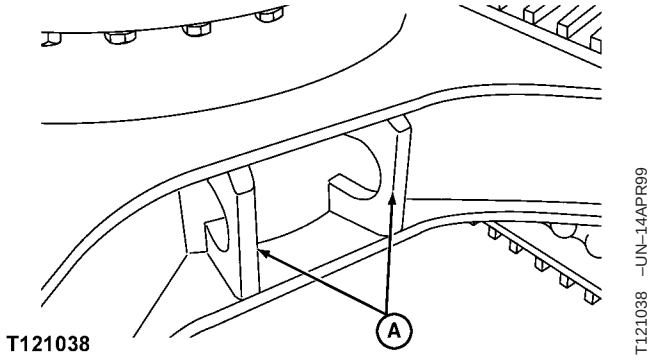
IMPORTANT: To prevent machine or trailer damage, do not allow machine to impact trailer with bucket.

9. Bucket must be resting on trailer before machine begins to tip forward onto trailer.

TX,40,DH5074 –19–01JUL96–2/2

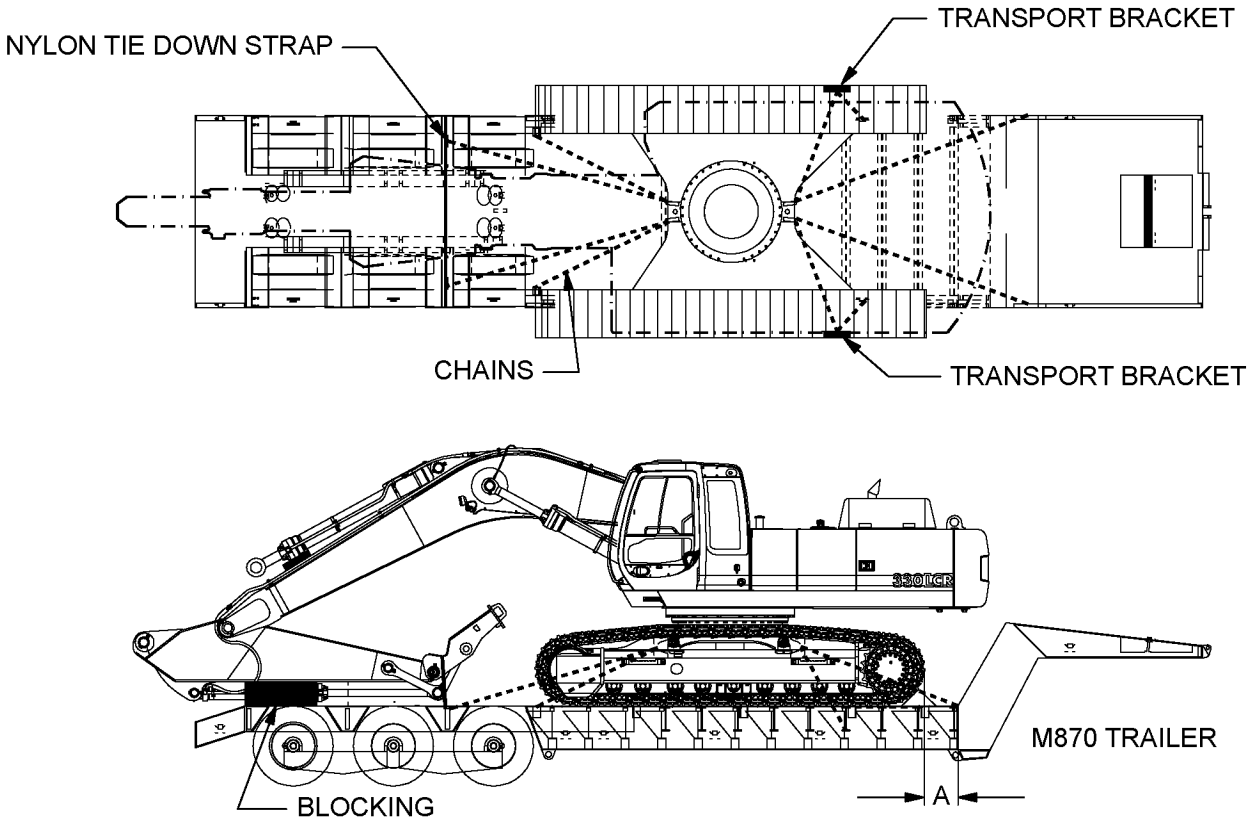
TIEDOWNS

Tiedown loops (A) are located on the front and rear frame of the machine. The tiedown are used to secure the machine to the transport medium.



TX,OUOE042,18 –19–02MAR99–1/1

FASTEN MACHINE TO TRAILER



T125163 –19–03NOV99

T125163

Before leaving the operator's seat, perform steps 1—9.

1. Position machine on trailer so that dimension (A) is 432 mm (17 in.).
2. Extend bucket cylinder fully.
3. Extend arm cylinder fully.
4. Lower the boom.

Continued on next page

TX,40,DH5642 –19–26MAR97–1/2

If machine cannot be transported with arm fully retracted, remove bucket or attachment and retract arm.

5. Lower bucket onto blocks.

IMPORTANT: Turbocharger may be damaged if engine is not properly shut down.

6. Run engine at 1/2 speed without load for 2 minutes.

7. Move engine speed rpm dial to slow idle position.

8. Turn key switch to OFF. Remove key from switch.

9. Pull pilot control shut-off lever to locked position.

IMPORTANT: Prevent cab electrical component damage from bad weather. Always close windows, roof vent, and cab door.

10. Close windows, roof vent, and cab door.

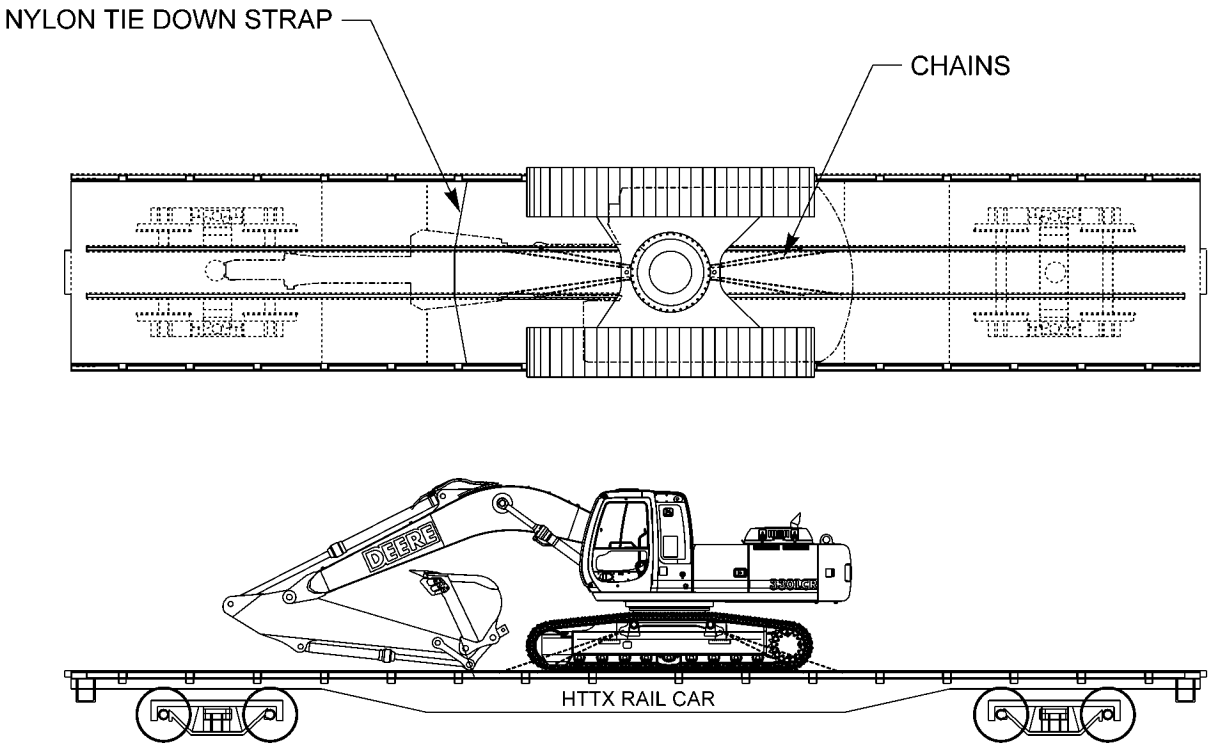
11. Cover exhaust opening to prevent entry of wind and water.

IMPORTANT: Prevent possible damage to hydraulic lines, rods, and hoses. Fasten chains to machine frame.

12. Install chock blocks, 2 transport brackets over track shoes, and blocking under arm. Fasten machine to trailer with 8 chains and nylon strap.

TX,40,DH5642 –19–26MAR97–2/2

FASTEN MACHINE TO RAIL CAR



T125164

MODEL 330LCR ON RAIL CAR

T125164 –19–28OCT99

Before leaving the operator's seat, perform steps 1—8.

1. Extend bucket cylinder fully.
2. Extend arm cylinder fully.
3. Lower the boom.

If machine cannot be transported with arm fully retracted, remove bucket or attachment and retract arm.

4. Lower bucket onto deck.

Continued on next page

CED,OUOE042,41 –19–18OCT99–1/2

IMPORTANT: Turbocharger may be damaged if engine is not properly shut down.

5. Run engine at 1/2 speed without load for 2 minutes.
6. Move engine speed rpm dial to slow idle position.
7. Turn key switch to OFF. Remove key from switch.
8. Pull pilot control shut-off lever to locked position.

IMPORTANT: Prevent cab electrical component damage from bad weather. Always close windows, roof vent, and cab door.

9. Close windows, roof vent, and cab door.
10. Cover exhaust opening to prevent entry of wind and water.

IMPORTANT: Prevent possible damage to hydraulic lines, rods, and hoses. Fasten chains to machine frame.

11. Fasten machine to rail car with 16 chains and nylon strap.

CED,OUOE042,41 –19–18OCT99–2/2

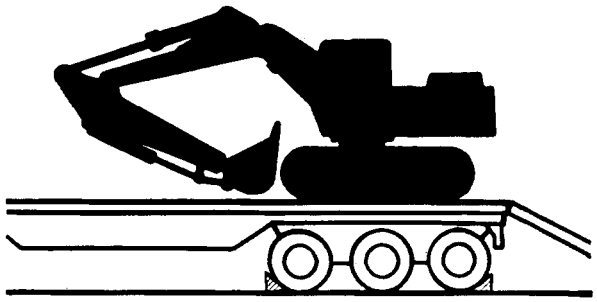
UNLOADING MACHINE FROM TRAILER

CAUTION: Prevent possible injury from unexpected machine movement. Turn auto-idle switch off and turn H/P mode switch off when loading or unloading the machine.

1. Turn auto-idle switch off, turn H/P mode switch off, and move propel speed switch to slow speed.

CAUTION: Prevent possible injury from machine tipping while upper structure is rotating. Keep arm tucked under and rotate upperstructure slowly for best stability.

2. Raise bucket slightly off trailer. Keeping arm tucked under, slowly rotate upperstructure 180°.



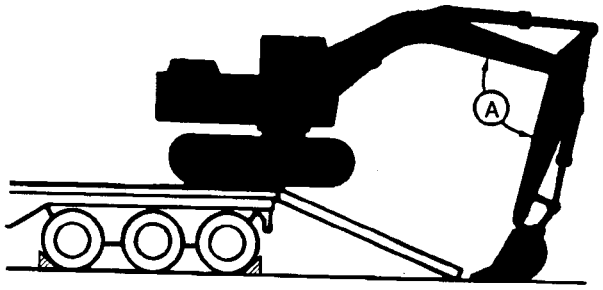
T7405BJ –UN–29NOV90

Continued on next page

TX,40,DH5146 –19–10AUG96–1/3

IMPORTANT: Prevent possible damage to front-end attachment. Always position arm at 90° to boom when unloading machine. Unloading machine with arm tucked may cause machine damage.

3. To move machine over end of trailer onto ramp, position bucket on ground with flat surface of bucket resting on ground. Angle (A) of arm to boom should be 90°.



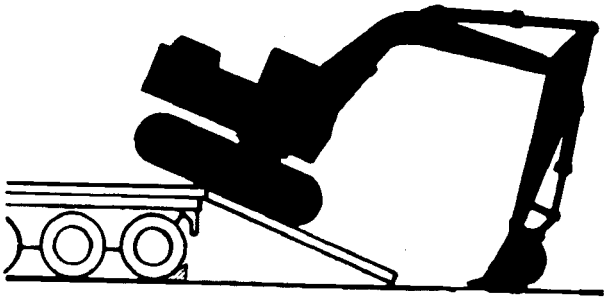
T7405BK –UN–29NOV90

TX,40,DH5146 –19–10AUG96–2/3

IMPORTANT: Prevent possible damage to hydraulic cylinders. Do not allow machine to impact ground with bucket.

4. Bucket must be on ground before machine begins to tip forward.

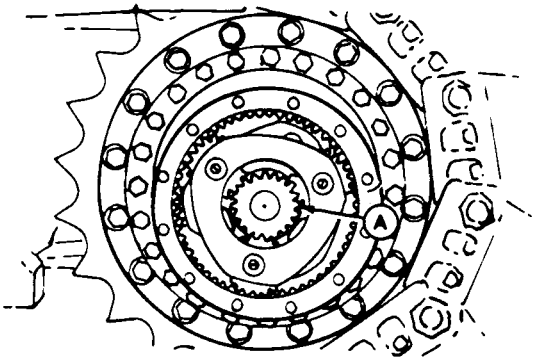
5. As machine moves forward, raise the boom and extend arm until machine is completely off ramp.



T7405BL –UN–29NOV90

TX,40,DH5146 –19–10AUG96–3/3

TOWING MACHINE



T6879EG –UN–06DEC88

CAUTION: Prevent possible injury from unexpected machine movement. Block both tracks when disconnecting propel gearboxes. When propel gearboxes are disconnected, machine has no brakes and can move. The machine will roll free on a slope or while being towed.

1. Block tracks.
2. Drain oil from each propel gearbox. (See Change Propel Gearbox Oil in Maintenance—Every 2000 Hours chapter.)
3. Remove cover from each gearbox.
4. Remove sun gear (A) from each gearbox.
5. Install cover. Fill gearbox with oil.

TX,40,FF2193 –19–06JUL94–1/1

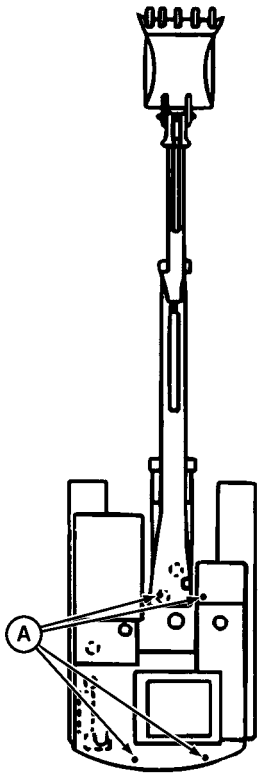
LIFTING THE MACHINE

Use all four lifting rings (A) to lift the machine.

CAUTION: Prevent possible injury from unexpected machine movement when lifting the machine. Check lifting capacity of crane before lifting the excavator. Lift load only as high as necessary.

Keep all people clear of raised load.

Approximate weight of machine, less bucket, is 31 715 kg (69,920 lb).



T120447

T120447 –UN–25MAR99

TX,OUOE042,24 –19–14DEC99–1/1

CHAPTER 9

FUELS AND LUBRICANTS

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Fuels and Lubricants

DIESEL FUEL

Consult your local fuel distributor for properties of the diesel fuel available in your area.

In general, diesel fuels are blended to satisfy the low temperature requirements of the geographical area in which they are marketed.

Diesel fuels specified to A-A-52557, EN 590 or ASTM D975 are recommended.

In all cases, the fuel shall meet the following properties:

- **Cetane Number 40** minimum. Cetane number greater than 50 is preferred, especially for temperatures below -20°C (-4°F) or elevations above 1500 m (5000 ft).
- **Cold Filter Plugging Point**(CFPP) below the expected low temperature OR **Cloud Point** at least 5°C (9°F) below the expected low temperature.
- **Fuel Lubricity** should pass a minimum of 3100 gram load level as measured by the SL BOCLE scuffing test.
- **Sulfur content:**
  - Sulfur content should not exceed 0.5% Sulfur content less than 0.05% is preferred.
  - If diesel fuel with sulfur content greater than 0.5% sulfur content is used, reduce the service interval for engine oil and filter by 50%.
  - DO NOT use diesel fuel with sulfur content greater than 1.0%.

Bio-diesel fuels with properties and meeting DIN 51606 or equivalent specifications may be used.

Aviation fuel Grade JP-8 may be used.

DO NOT mix used engine oil or any other type of lubricant with diesel fuel.

CED,OUOE020,2 –19–11FEB99–1/1

LUBRICITY OF DIESEL FUELS

Diesel fuel must have adequate lubricity to ensure proper operation and durability of fuel injection system components.

Diesel fuels for highway use in the United States and Canada now require sulfur content less than 0.05%. Diesel fuel in the European Union will require sulfur content less than 0.05% by 1 October 1996.

Experience shows that some low sulfur diesel fuels may have inadequate lubricity and their use may reduce performance in fuel injection systems due to inadequate lubrication of injection pump components. The lower concentration of aromatic compounds in these fuels also adversely affects injection pump seals and may result in leaks.

Use of low lubricity diesel fuels may also cause accelerated wear, injection nozzle erosion or corrosion, engine speed instability, hard starting, low power, and engine smoke.

Fuel lubricity should pass a minimum of 3100 gram load level as measured by the SL BOCLE scuffing test.

A-A-52557, ASTM D975 and EN 590 specifications do not require fuels to pass a fuel lubricity test.

If fuel of low or unknown lubricity is used, add John Deere PREMIUM DIESEL FUEL CONDITIONER or Inhibitor, Corrosion/Lubricity Improver, Fuel Soluble (MIL-PRF-25017) at the recommended concentration. John Deere PREMIUM DIESEL FUEL CONDITIONER is available in winter and summer formulas. Consult your John Deere engine distributor or servicing dealer for more information.

TX,45,JC1771 –19–08JAN97–1/1

LOW SULFUR DIESEL FUEL CONDITIONER

When possible, use existing fuel formulations for engines used off-highway. This fuel will not require any additives to provide good performance and engine reliability. However, many local fuel distributors will not carry both low and regular sulfur diesel fuels.

If only low sulfur fuel is available, Inhibitor, Corrosion/Lubricity Improver, Fuel Soluble should be added at the recommended concentration (MIL-PRF-25017). Nearly all other diesel fuel conditioners only improve cold weather flow and stabilize long-term fuel storage. They do not contain the lubrication additives needed by rotary fuel injection pumps.

TX,45,DH5857 –19–15AUG97–1/1

DIESEL FUEL STORAGE

Proper fuel storage is critically important. Use clean storage and transfer tanks. Periodically drain water and sediment from bottom of tank. Store fuel in a convenient place away from buildings.

IMPORTANT: DO NOT store diesel fuel in galvanized containers. Diesel fuel stored in galvanized containers reacts with zinc coating on container to form zinc flakes. If fuel contains water, a zinc gel will also form. The gel and flakes will quickly plug fuel filters, damage injection nozzles and injection pump.

DO NOT use brass-coated containers for fuel storage. Brass is an alloy of copper and zinc.

Store diesel fuel in plastic, aluminum, and steel containers specially coated for diesel fuel storage.

Avoid storing fuel over long periods of time. If fuel is stored for more than a month prior to use, or there is a slow turnover in fuel tank or supply tank, add a fuel conditioner such as John Deere PREMIUM DIESEL FUEL CONDITIONER or fuel conditioner meeting MIL-S-53021 to stabilize the fuel and prevent microbial growth in the fuel. John Deere PREMIUM DIESEL FUEL CONDITIONER is available in winter and summer formulas. Fuel conditioner also reduces fuel gelling and controls wax separation during cold weather.

Consult your John Deere engine distributor or servicing dealer for recommendations and local availability. Always follow manufacturer's directions on label.

TX,45,JC1772 –19–08JAN97–1/1

FUEL TANK

CAUTION: Handle fuel carefully. If the engine is hot or running, do not fill the fuel tank. Do not smoke while you fill fuel tank or work on fuel system.

To avoid condensation, fill the fuel tank at the end of each day's operation. Capacity is 560 L (148 gal).

Fuel Tank—Specification

Capacity	560 L (148 gal)

CED,TX14740,6018 –19–28JAN98–1/1

DO NOT USE GALVANIZED CONTAINERS

IMPORTANT: Diesel fuel stored in galvanized containers reacts with zinc coating on the container to form zinc flakes. If fuel contains water, a zinc gel will also form. The gel and flakes will quickly plug fuel filters and damage fuel injectors and fuel pumps.

DO NOT USE a galvanized container to store diesel fuel.

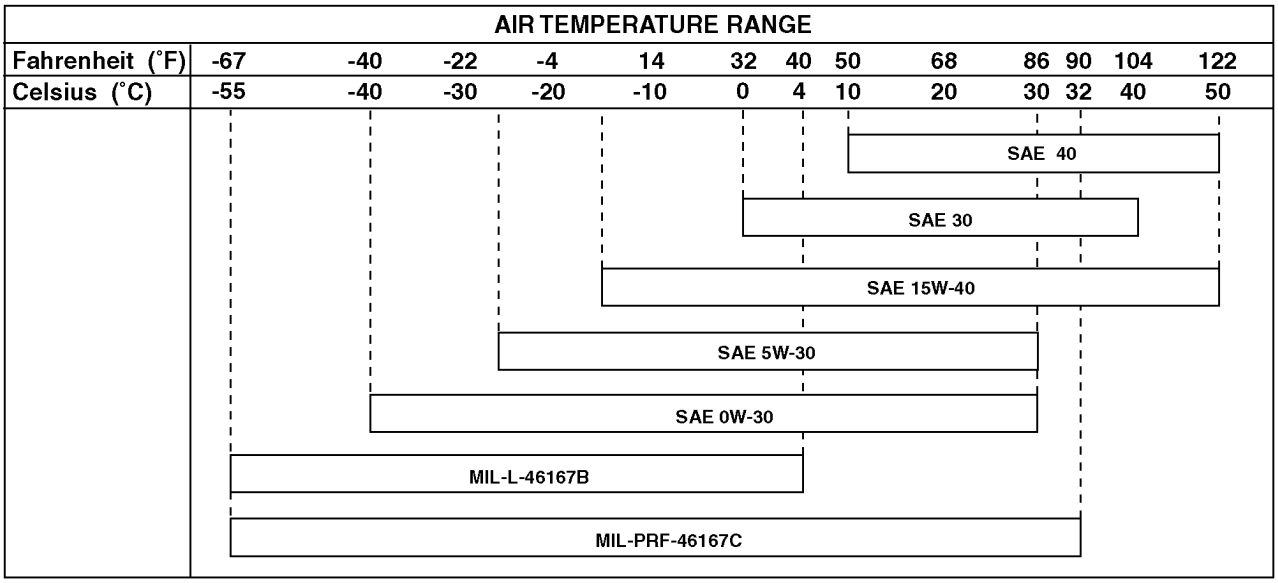
Store fuel in:

- plastic containers.
- aluminum containers.
- specially coated steel containers made for diesel fuel.

DO NOT USE brass-coated containers: brass is an alloy of copper and zinc.

DX,FLBT,C –19–04JUN90–1/1

DIESEL ENGINE AND PUMP GEARBOX OILS



T125427

T125427 –19–28OCT99

Use oil viscosity based on the expected air temperature range during the period between oil changes.

Other oils may be used if they meet one or more of the following:

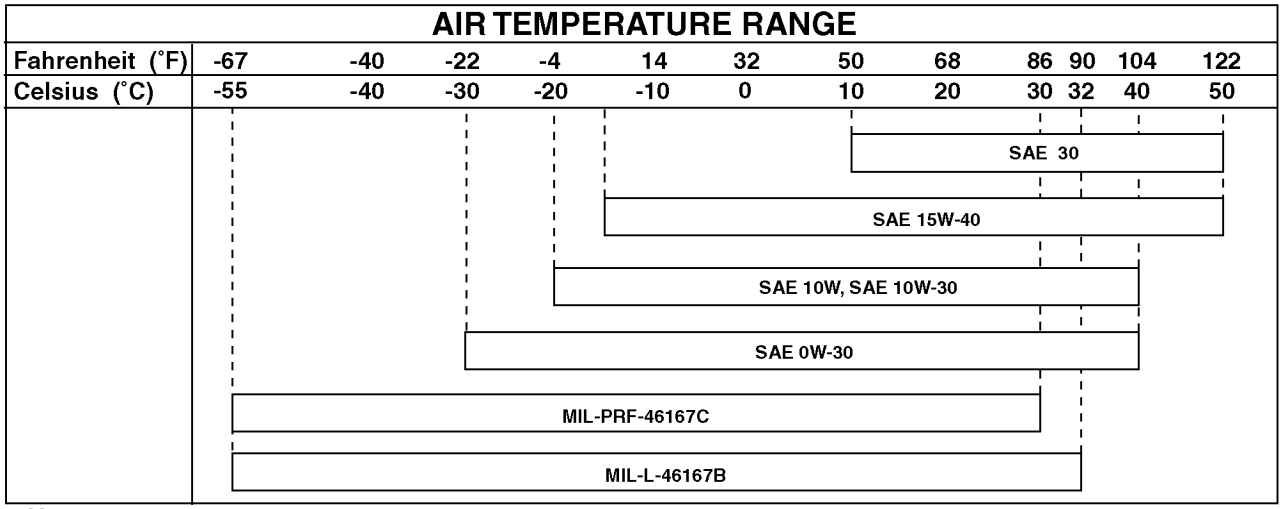
- MIL-PRF-2104G
- MIL-L-46167B
- MIL-PRF-46167C
- API CG-4
- API CF-4

Multi-viscosity diesel engine oils are preferred.

If diesel fuel with sulfur content greater than 0.5% is used, reduce the service interval by 50%.

CED,OUOE020,3 –19–12FEB99–1/1

HYDRAULIC OIL



T125428

T125428 –19–17NOV99

Depending upon the expected air temperature range between oil changes, use oil viscosity shown on the temperature chart above.

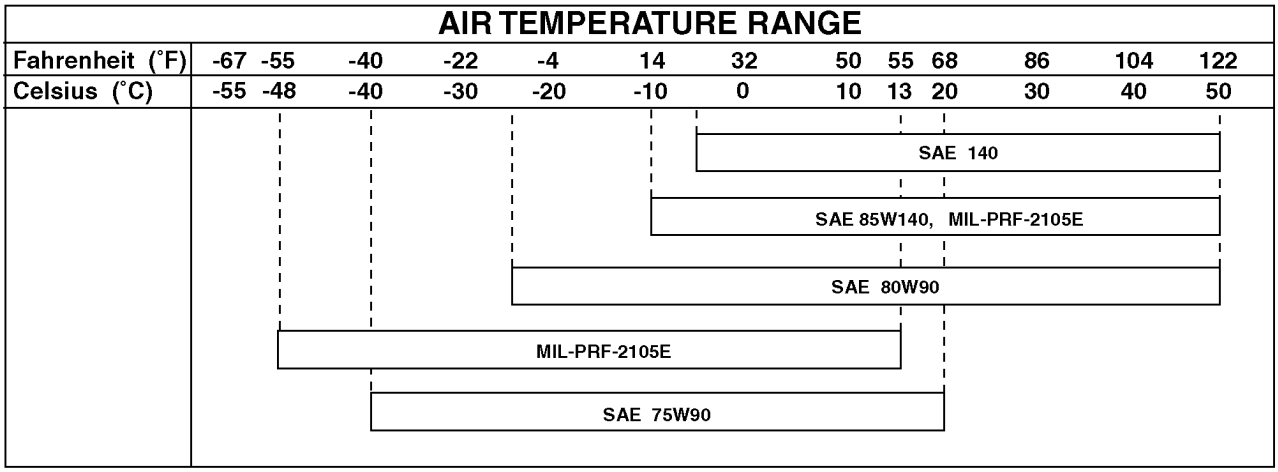
Use oils meeting one or more of the following:

- MIL-PRF-2104G[1]
- MIL-L-46167B
- MIL-PRF-46167C
- API CG-4[1]
- API CF-4[1]

[1]Must contain a minimum zinc additive of 0.09 percent.

CED,OUOE020,4 –19–12FEB99–1/1

SWING GEARBOX AND PROPEL GEARBOX OILS



T125429

T125429 –19–17NOV99

Depending upon the expected air temperature range between oil changes, use oil viscosity shown on the temperature chart above.

The following oils are recommended:

- Oils meeting MIL-PRF-2105. MIL-PRF-2105E is updated.
- Oils meeting API Service GL-5 (MIL-L-2105E).

CED,OUOE020,5 –19–12FEB99–1/1

TRACK ROLLER, FRONT IDLER, AND CARRIER ROLLER OIL

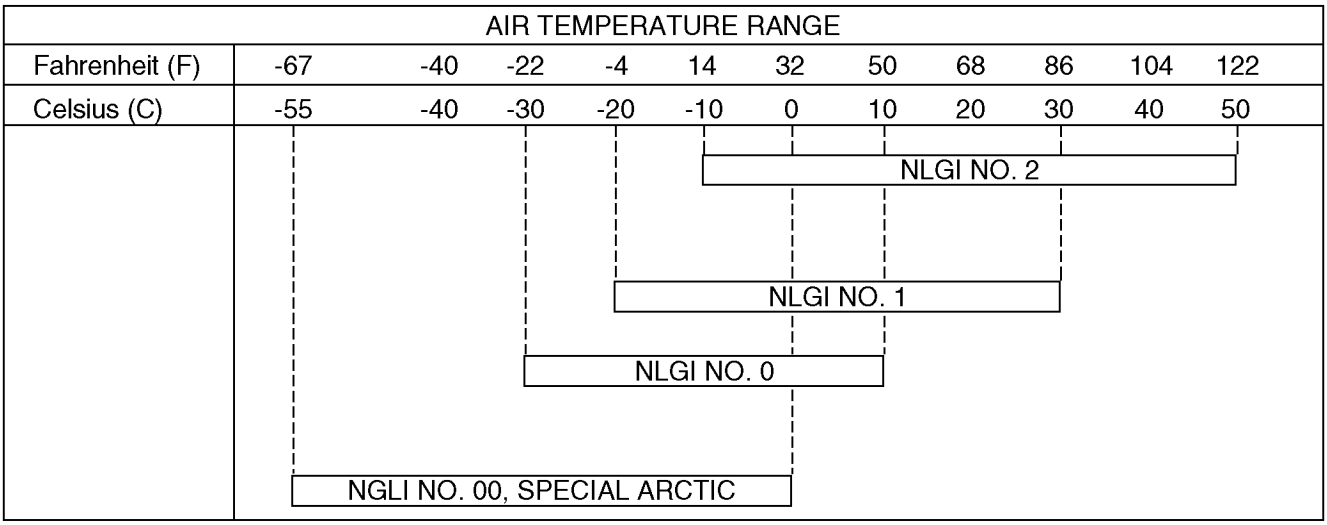
Use oil viscosity based on the expected air temperature range during the period between oil changes.

The following oils are recommended:

- MIL-PRF-2105E (80W90).
- API Service Classification GL-5 gear oil (SAE 80W90).
- Arctic oil such as MIL-PRF-2105E (75W) should be used at temperatures below -30°C (-11°F).

CED,OUOE020,6 –19–12FEB99–1/1

TRACK ADJUSTER, WORKING TOOL PIVOT, SWING BEARING, AND SWING BEARING GEAR GREASE



T120320

T120320 –19–25MAR99

Use grease based on NLGI consistency numbers and the expected air temperature range during the service interval.

Use greases meeting MIL-PRF-10924G.

Lithium complex grease containing high temperature, extreme pressure properties with 3-5 percent molybdenum disulfide is preferred, although those without the molybdenum disulfide are acceptable.

CED,OUOE020,7 –19–12FEB99–1/1

OIL FILTERS

Filtration of oils is critical to proper operation and lubrication. Always change filters regularly as specified in this manual.

Use filters meeting John Deere performance specifications.

DX,FILT –19–18MAR96–1/1

LUBRICANT STORAGE

Your equipment can operate at top efficiency only when clean lubricants are used.

Use clean containers to handle all lubricants.

Whenever possible, store lubricants and containers in an area protected from dust, moisture, and other contamination. Store containers on their side to avoid water and dirt accumulation.

Make certain that all containers are properly marked to identify their contents.

Properly dispose of all old containers and any residual lubricant they may contain.

DX,LUBST –19–18MAR96–1/1

ALTERNATIVE AND SYNTHETIC LUBRICANTS

Conditions in certain geographical areas may require lubricant recommendations different from those printed in this manual. Some John Deere brand coolants and lubricants may not be available in your location. Consult your John Deere dealer to obtain information and recommendations.

Synthetic lubricants may be used if they meet the performance requirements as shown in this manual.

The temperature limits and service intervals shown in this manual apply to both conventional and synthetic oils.

Re-refined base stock products may be used if the finished lubricant meets the performance requirements.

DX,ALTER –19–18MAR96–1/1

MIXING OF LUBRICANTS

In general, avoid mixing different brands or types of oil. Oil manufacturers blend additives in their oils to meet certain specifications and performance requirements. Mixing different oils can interfere with the proper functioning of these additives and degrade lubricant performance.

Consult your John Deere dealer to obtain specific information and recommendations.

DX,LUBMIX –19–18MAR96–1/1

FACTORY/INITIAL FILL LUBRICANTS

The acceptable air temperature ranges for the initial fill lubricants are as follows:

Engine ..... -25°C (-13°F) to 40°C (104°F)
Pump Gearbox ..... -25°C (-13°F) to 50°C (122°F)
Hydraulic Oil ..... -29°C (-20°F) to 50°C (122°F)
Swing and Propel Gearbox ..... -20°C (-4°F) to 50°C (122°F)

CED,OUOE020,51 –19–13APR99–1/1

BLANK

CHAPTER 10

PERIODIC MAINTENANCE

BLANK

Periodic Maintenance

SERVICE YOUR MACHINE AT SPECIFIED INTERVALS

Lubricate, make service checks, and make adjustments at intervals shown on the periodic maintenance chart (A) and on the following pages.

Perform service on items at multiples of the original requirement. For example, at 500 hours also service those items (if applicable) listed under 250 hours, 100 hours, 50 hours and 10 hours or daily.

T102298 –UN–30JUL96

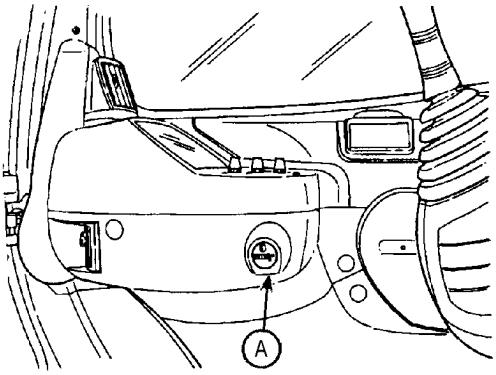
A—Periodic Maintenance Chart

TX,50,DH5147 –19–10AUG96–1/1

CHECK THE HOUR METER REGULARLY

Check the hour meter (A) to determine when your machine needs periodic maintenance.

Intervals on the periodic maintenance chart are for operating in normal conditions. If you operate your machine in difficult conditions, you should service it at SHORTER INTERVALS.



T101639 –UN–26JUN96

A—Hour Meter

TX,50,DH5063 –19–24JUN96–1/1

USE CORRECT FUELS AND LUBRICANTS

IMPORTANT: To prevent machine damage, when servicing your machine use correct fuels and lubricants. (See Fuels and Lubricants chapter.)

TX,50,DH5112 –19–12JUL96–1/1

PREPARE MACHINE FOR MAINTENANCE

Before performing maintenance procedures given in the following chapters and before leaving the operator's seat, park the machine as described below unless another position is specified in the procedure.

1. Park machine on a level surface.
2. Lower bucket to the ground.
3. Turn auto-idle switch off.

IMPORTANT: Turbocharger may be damaged if engine is not properly shut down.

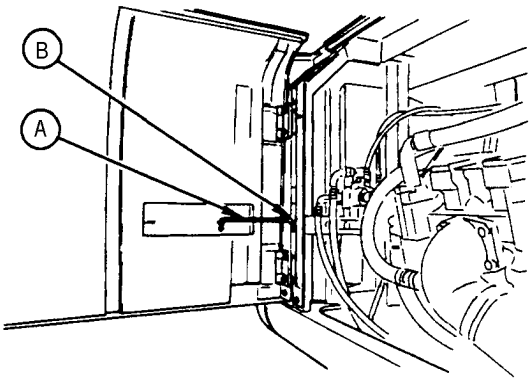
4. Run engine with engine rpm dial at 1/3 position without load for 2 minutes.
5. Move engine rpm dial to slow idle position.
6. Turn key switch to OFF. Remove key from switch.
7. Pull pilot control shut-off lever to locked position.

TX,50,DH5079 –19–02JUL96–1/1

OPEN ACCESS DOORS FOR SERVICE

CAUTION: Prevent possible injury from door closing. Secure door in the OPEN position.

To hold door open, remove rod from stored position (A) and insert in tab (B) on door.



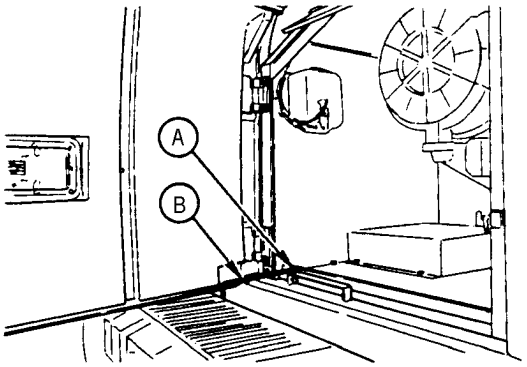
T102125 –UN–26JUL96

Right Side Access Door

A—Stored Position
B—Door Tab

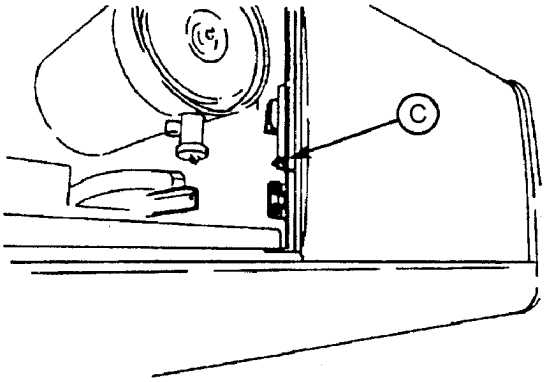
Continued on next page

TX,50,DH5095 –19–22APR98–1/2



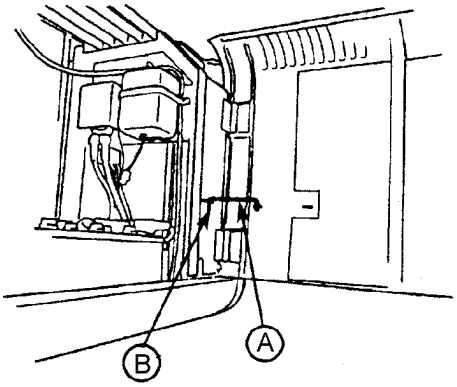
T102126 –UN–26JUL96

Front Left Side Access Door



T115020 –UN–24APR98

Rear Left Side Access Door Release Latch



T115022 –UN–24APR98

Rear Left Side Access Door

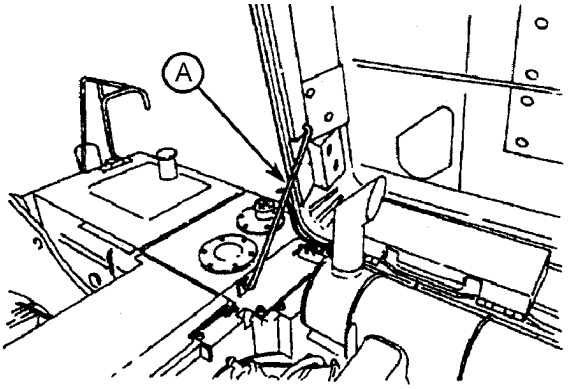
A—Stored Position
B—Door Tab
C—Release Latch

TX,50,DH5095 –19–22APR98–2/2

OPEN HOOD FOR SERVICE

CAUTION: Prevent possible injury. Unlock latches. Pull open latches to unlock hood. Raise the hood until the end of the bar is securely locked into catch.

Raise hood using handle on hood until the end of the rod (A) is securely locked into catch.



Engine Hood

A—Engine Hood Rod

CED,TX14740,6098 –19–22APR98–1/1

CHAPTER 11

MAINTENANCE—AS REQUIRED

BLANK

Maintenance—As Required

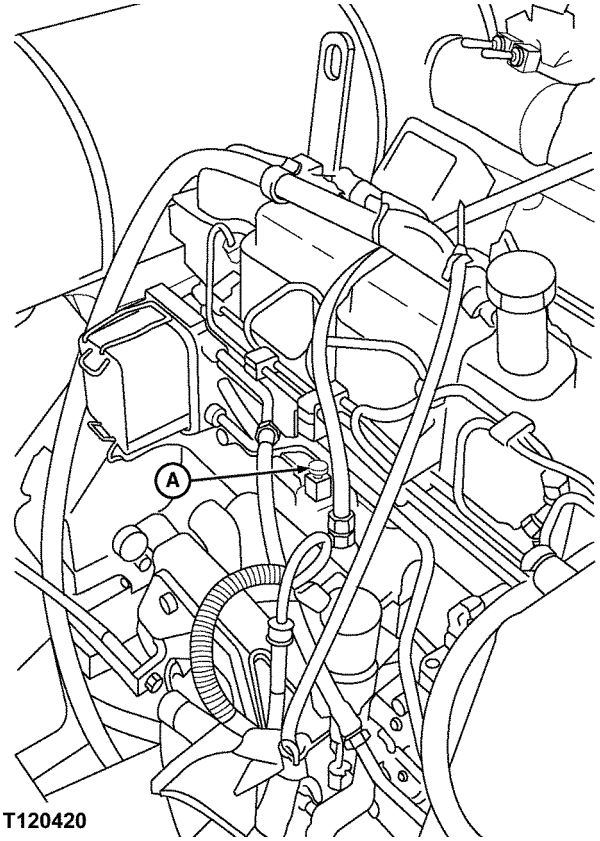
SAMPLING ENGINE OIL

NOTE: Sample engine oil every 50 hours or 90 days.

1. Run engine to warm oil.
2. Park machine on a level surface.
3. Lower bucket to the ground.

IMPORTANT: Turbocharger may be damaged if engine is not properly shut down.

4. Run engine with engine rpm dial at 1/3 position without load for 2 minutes.
5. Move engine rpm dial to slow idle position.
6. Attach a “Do Not Operate” tag on the right control lever.
7. Pull pilot control shut-off lever to locked position.
8. Open engine hood and secure hood in open position.
9. Clean valve (A) and use to sample engine oil.

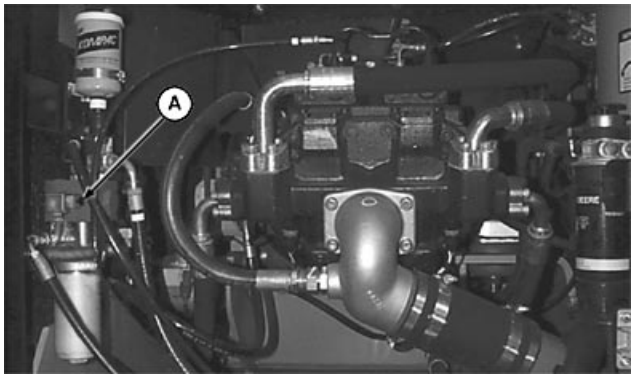


T120420

T120420 –UN–28OCT99

CED,OUOE020,19 –19–17DEC99–1/1

SAMPLING HYDRAULIC OIL



IMPORTANT: Prevent damage to hydraulic system components. DO NOT run engine without oil in hydraulic tank.

NOTE: Sample hydraulic oil once a year.

1. Park machine on a level surface.
2. Position machine with arm cylinder fully retracted and bucket cylinder fully extended.
3. Lower bucket to the ground.

IMPORTANT: Turbocharger may be damaged if engine is not properly shut down.

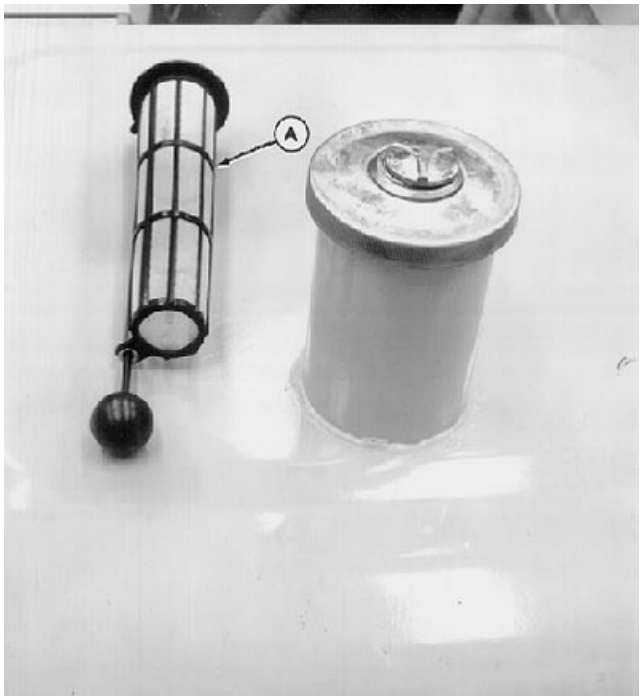
4. Run engine with engine rpm dial at 1/3 position without load for 2 minutes.
5. Move engine rpm dial to slow idle position.
6. Attach a “Do Not Operate” tag on the right control lever.
7. Pull pilot control shut-off lever to locked position.
8. Open rear right side access door and secure door in open position.
9. Clean valve (A), located on pilot filter housing assembly, and use to sample hydraulic oil.

CED,OUOE042,42 –19–17DEC99–1/1

CLEAN FUEL TANK INLET SCREEN

Clean screen (A) to remove any debris. Use solvent or diesel fuel.

Replace screen if damaged.



T102894 –UN–07AUG96

A—Fuel Tank Inlet Screen

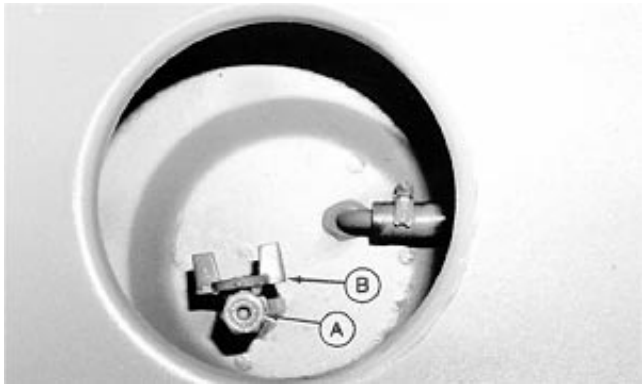
TX,55,DH5138 –19–08AUG96–1/1

DRAIN FUEL TANK SUMP

1. Park machine on a level surface. Rotate upperstructure 90° for easier access.
2. Remove fuel tank fill cap.

NOTE: Plug is installed in drain cock to prevent vandalism.

3. Remove plug (A) and open drain cock (B) for several seconds to drain water and sediment into a container. Dispose of waste properly. Close drain cock.
4. Install and tighten plug.
5. Install fill cap.



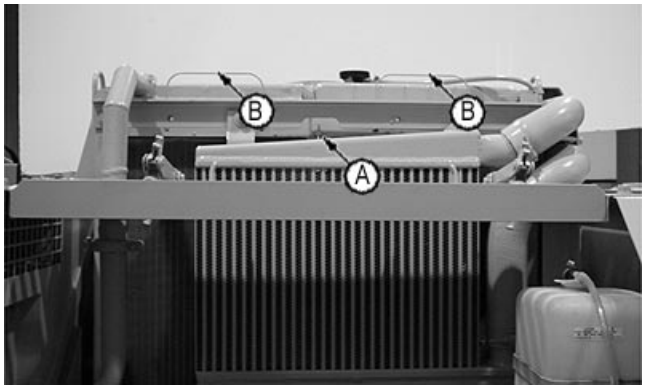
T7396CI –UN–18OCT90

A—Plug
B—Drain Cock

TX,55,DH5081 –19–02JUL96–1/1

CLEAN RADIATOR AIR INLET SCREENS

Remove wing nut (A) and pull up on handles (B) to slide screens up for cleaning. Use pressurized air (30 psi max.) or low pressure water.



T108113B –UN–27MAR97

A—Wing Nut
B—Handles

TX,55,DH5569 –19–02JUL96–1/1

DRAIN WATER SEPARATOR

1. Open right access door to access water separator.
2. Open drain valve (A) and press pump (B) to extract water from fuel system. Collect waste in a container and dispose of it properly.
3. Close drain valve.

T102299 –UN–30JUL96

A—Drain Valve
B—Pump

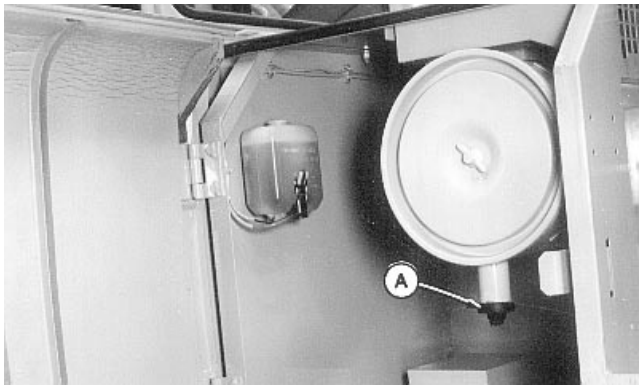
TX,55,DH5083 –19–02JUL96–1/1

CLEAN AIR CLEANER DUST UNLOADER VALVE

IMPORTANT: A missing, damaged, or hardened dust unloader valve will make the dust cup precleaner ineffective, causing very short element life. Valve should suck closed above 1/3 engine speed.

Squeeze dust valve (A) to remove dust from the air cleaner.

If operating in high dust conditions, squeeze dust valve every couple of hours of operation to release dust.



T101488 –UN–15JUL96

A—Air Cleaner Dust Unloader Valve

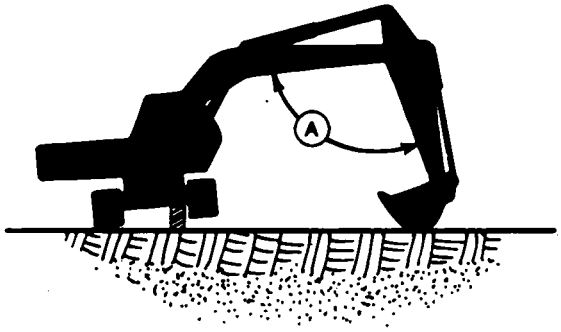
TX,55,DH5084 –19–02JUL96–1/1

CHECK TRACK SAG

1. Swing upperstructure 90° and lower bucket to raise track off ground.
2. Keep the angle (A) between boom and arm 90—110° and position the bucket's round side on the ground.

CAUTION: Prevent possible injury from unexpected machine movement. Place blocks under machine frame to support machine while measuring track sag.

3. Place blocks under machine frame to support machine.
4. Rotate track forward two full rotations and then in reverse two full rotations.



T6879AT –UN–06DEC88

A—Boom-To-Arm Angle

Continued on next page

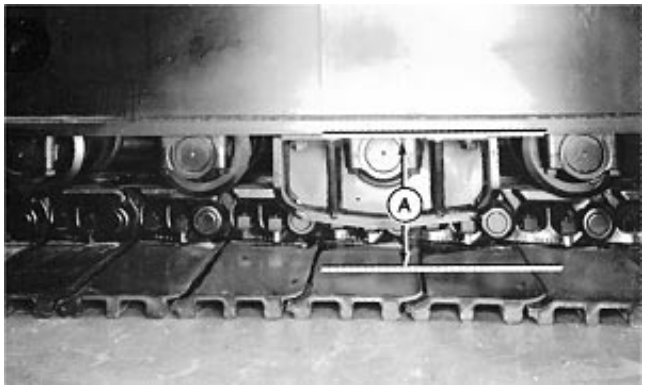
TX,55,DH5720 –19–25APR97–1/2

5. Measure distance (A) at middle track roller from bottom of track frame to top surface of track shoe.

Track—Specification

Sag ..... 340—380 mm (13-3/8—15.0 in.)

For general information on track sag, see Maintenance chapter.



T7869AP –UN–22OCT92

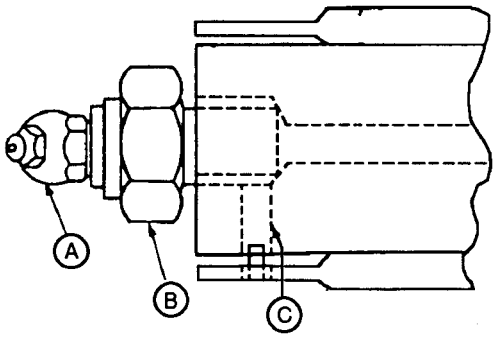
A—Track Roller Distance

TX,55,DH5720 –19–25APR97–2/2

ADJUSTING TRACK SAG

IMPORTANT: Prevent possible damage to track components. DO NOT use the grease fitting on the track adjusting cylinder for lubrication. Use this fitting ONLY for track adjustment.

To tighten track, connect a grease gun to grease fitting (A) (located through access hole (D) in track frame. Add grease until sag is within recommended limits.



T7396DZ –UN–28NOV90

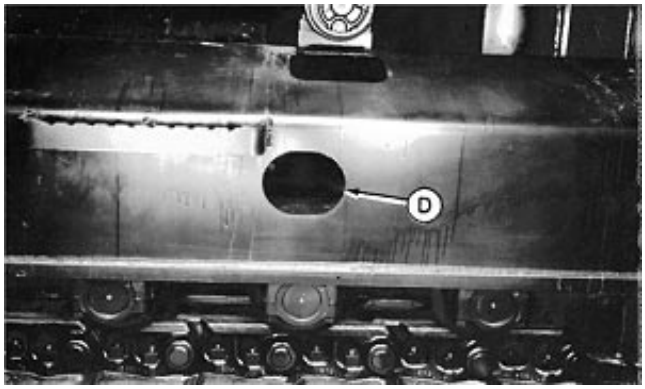
CAUTION: Prevent possible injury from high pressure grease. Do not remove grease fitting (A) from nut (B).

To loosen, slowly turn nut (B) counterclockwise; grease will escape through the bleed hole (C).

Fitting—Specification

Torque ..... 147 N•m (108 lb-ft)

When amount of track sag is satisfactory, turn nut clockwise to tighten.



T7869AQ –UN–22OCT92

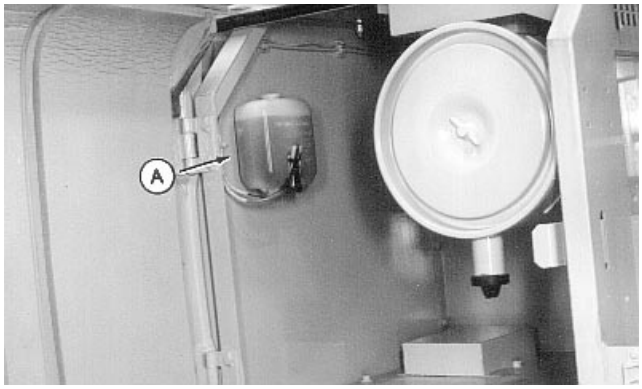
A—Grease Fitting
B—Nut
C—Bleed Hole
D—Access Hole

TX,55,FF2991 –19–29OCT92–1/1

WINDSHIELD WASHER FLUID LEVEL

Check fluid in windshield washer tank (A). If necessary, remove fill cap to add fluid.

During winter season, use all season windshield washer fluid which will not freeze.



A—Windshield Washer Tank

TX,55,DH5086 –19–02JUL96–1/1

BLANK

CHAPTER 12

MAINTENANCE—EVERY 10 HOURS OR DAILY

BLANK

Maintenance—Every 10 Hours or Daily

CHECK ENGINE OIL LEVEL

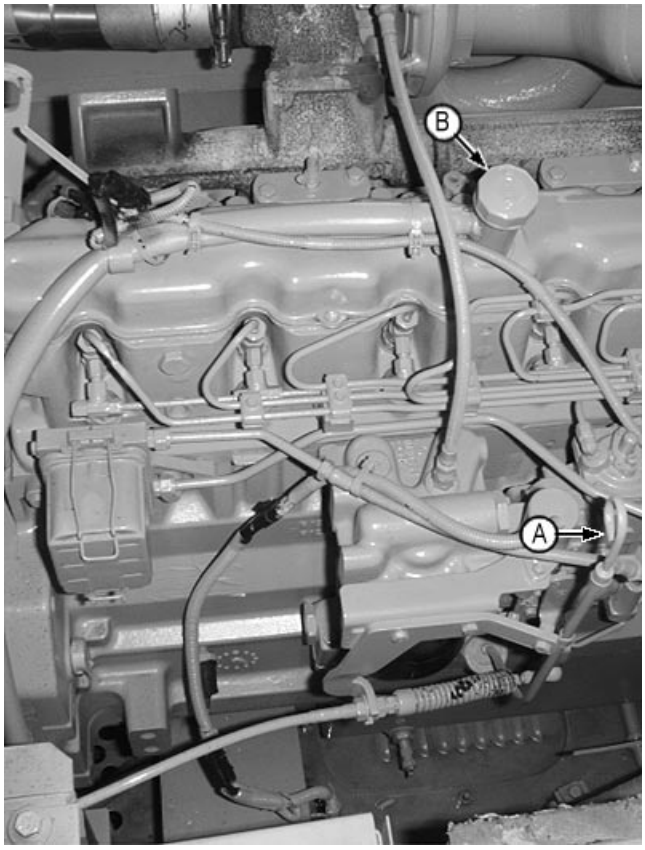
IMPORTANT: Prevent engine damage. Do not run engine when oil level is below the ADD mark.

The most accurate oil level reading is obtained when the engine is cold before starting the engine for the day's operation.

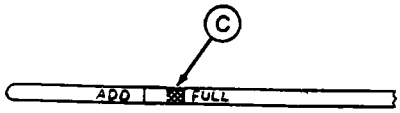
1. Make sure dipstick (A) is fully seated.
2. Remove dipstick to check oil level.

   BEFORE THE ENGINE IS STARTED: The engine is full when oil level is in the cross-hatch area (C). It is acceptable to run the engine when the oil level is above the ADD mark.

   AFTER THE ENGINE HAS BEEN RUN: Allow the oil to drain into the oil pan for 10 minutes before checking the oil level. Ten minutes after shutdown the engine oil level must be above the ADD mark.
3. If necessary, remove filler cap (B) to add oil. (See Fuels and Lubricants chapter.)



T115148B –UN–30APR98



RG5421 –UN–15DEC88

A—Dipstick
B—Filler Cap
C—Cross-Hatch Area

CED,TX14740,6106 –19–30APR98–1/1

CHECK RECOVERY TANK COOLANT LEVEL

With the engine cold, coolant level must be at the FULL mark on the recovery tank (A).

If coolant is below the FULL mark, add coolant to the recovery tank.

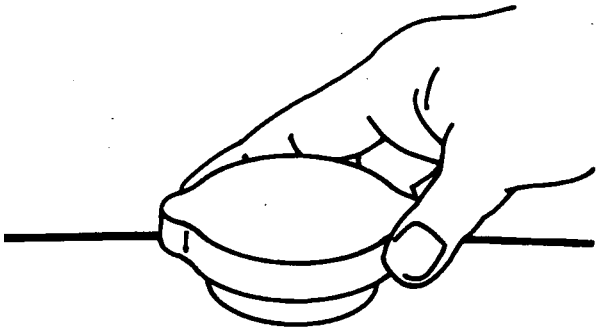
CAUTION: Prevent possible injury from hot spraying water. DO NOT remove radiator filler cap unless engine is cool. Then turn cap slowly to the stop. Release all pressure before you remove cap.

If recovery tank is empty, check for leaks. Repair as required. Add coolant to the radiator and the recovery tank.

NOTE: If recovery tank is full and radiator is low, check for leaks in radiator cap and hose connections between radiator and coolant recovery tank.

Coolant level must be at bottom of the filler neck.

T108115B –UN–27MAR97



T6274AQ –UN–18OCT88

A—Recovery Tank

TX,60,DH5570 –19–17SEP96–1/1

CHECK HYDRAULIC OIL LEVEL

IMPORTANT: Prevent damage to hydraulic system components. DO NOT run engine without oil in hydraulic tank.

T6811AI –UN–18OCT88

1. Park machine on a level surface.
2. Position machine with arm cylinder fully retracted and bucket cylinder fully extended.
3. Lower bucket to the ground.
4. Turn auto-idle switch off.

IMPORTANT: Turbocharger may be damaged if engine is not properly shut down.

5. Run engine with engine rpm dial at 1/3 position without load for 2 minutes.
6. Move engine rpm dial to slow idle position.
7. Turn key switch to OFF. Remove key from switch.
8. Attach a "Do Not Operate" tag on the right control lever.
9. Pull pilot control shut-off lever to locked position.

TX,60,DH5096 –19–08JUL96–1/5

10. Check oil level window (A) on hydraulic tank. Oil must be between marks on window.

    If necessary, add oil. (See Fuels and Lubricants chapter.)

    To add oil:

T102301 –UN–30JUL96

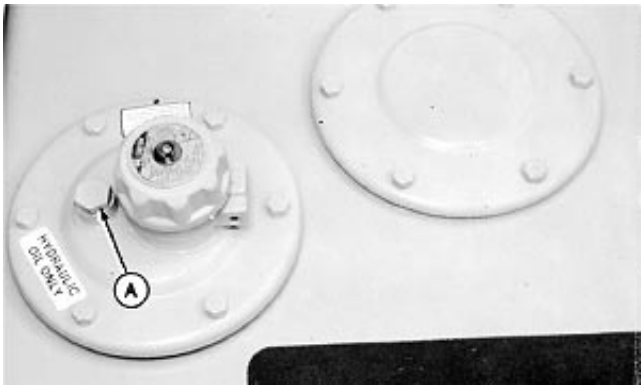
A—Hydraulic Oil Level Window

Continued on next page

TX,60,DH5096 –19–08JUL96–2/5

CAUTION: High pressure release of oil from pressurized system can cause serious burns or penetrating injury. The hydraulic tank is pressurized. Do not remove vent plug (A). Release pressure by loosening vent plug.

11. Loosen vent plug (A) to release hydraulic pressure.



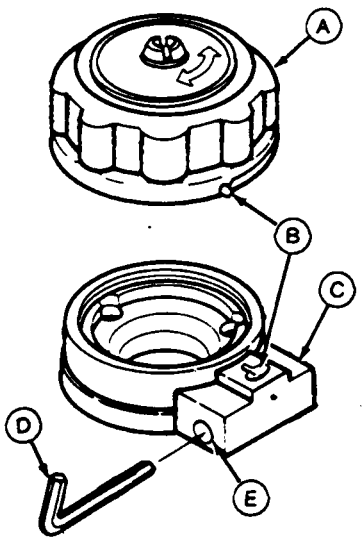
T7869AT –UN–12NOV92

A—Vent Plug

Continued on next page

TX,60,DH5096 –19–08JUL96–3/5

12. Insert 4mm (0.15 in.) hex wrench (D) into hole (E) and turn counterclockwise.
13. Slowly turn cap (A) counterclockwise. Remove cap.
14. Add oil. (See Fuels and Lubricants chapter.)
15. Install cap to case assembly (C) by aligning marks (B) and turning cap clockwise to lock position.



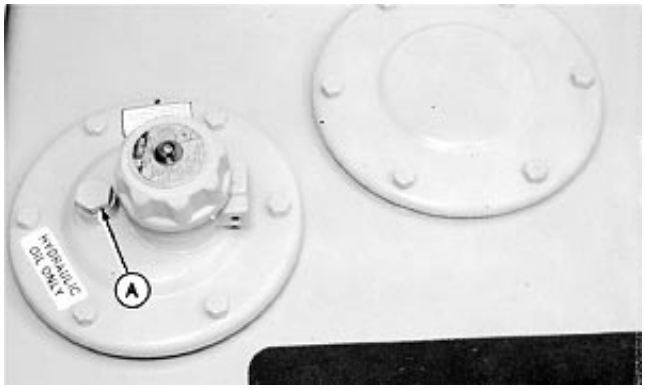
T6457EI –UN–18OCT88

A—Cap
B—Aligning Marks
C—Case Assembly
D—Hex Wrench
E—Hole

Continued on next page

TX,60,DH5096 –19–08JUL96–4/5

16. Tighten plug (A).



T7869AT –UN–12NOV92

A—Vent Plug

TX,60,DH5096 –19–08JUL96–5/5

CHAPTER 13

MAINTENANCE—EVERY 50 HOURS

BLANK

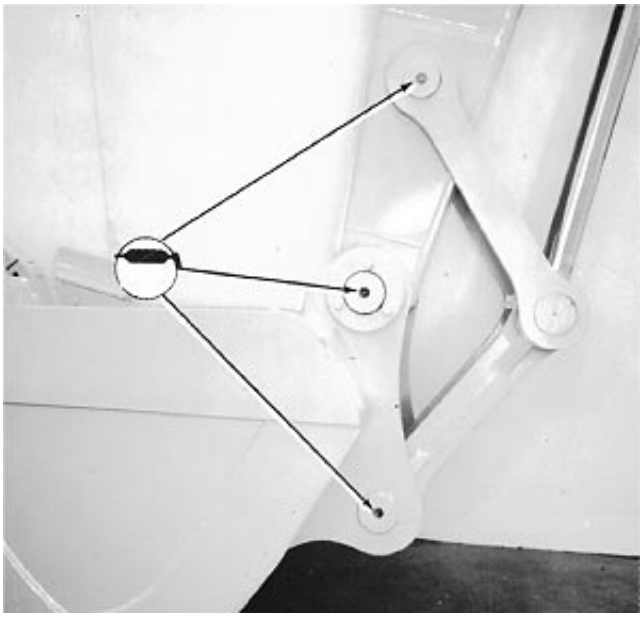
Maintenance—Every 50 Hours

GREASE WORKING TOOL PIVOTS

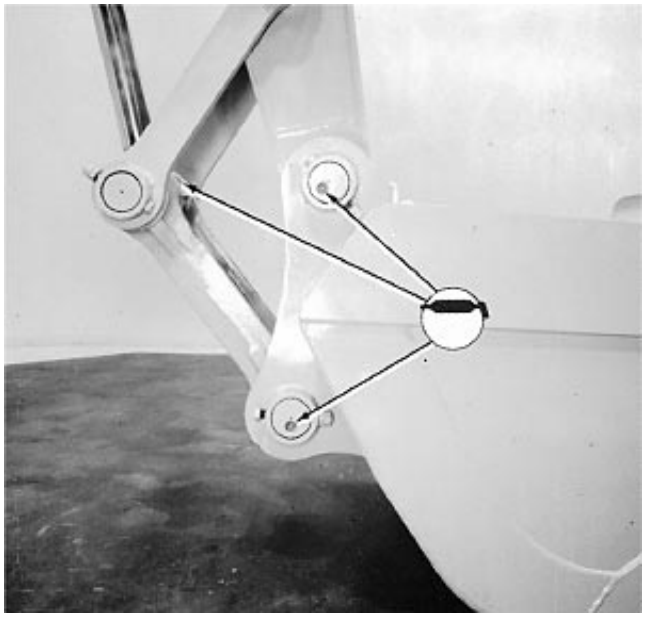
Grease working tool pivots (20 points) until grease escapes from joints. Grease every 4 hours for first 20 hours. Grease every 10 hours during first 30—100 hours and when working in mud and water. (See Fuels and Lubricants chapter.)

Continued on next page

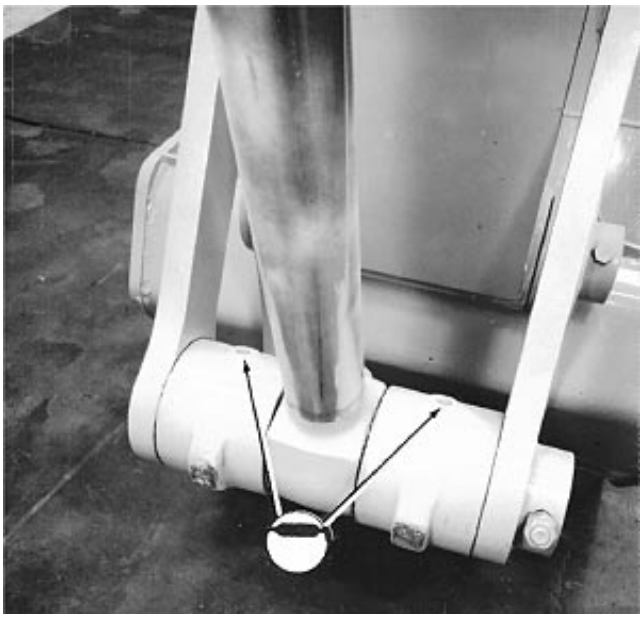
CED,OUOE020,25 –19–10MAR99–1/3



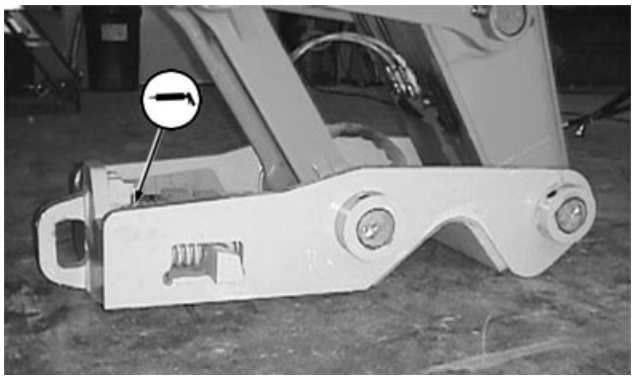
Three Points



Three Points



Two Points



One Point

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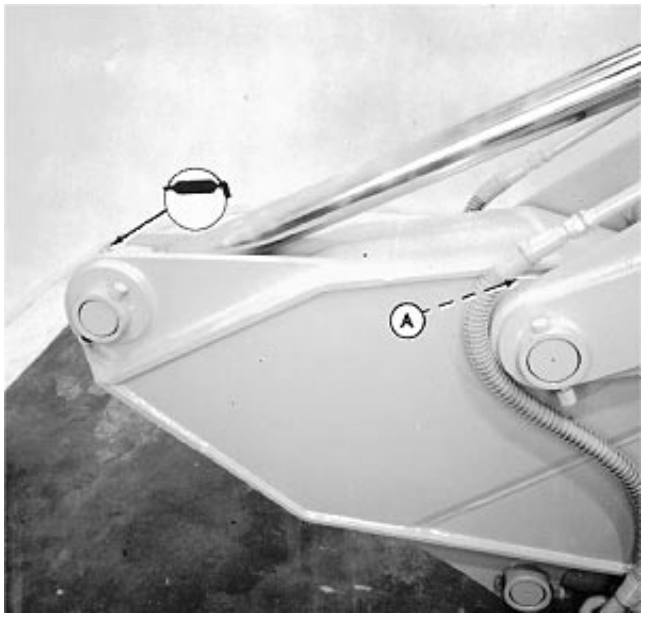
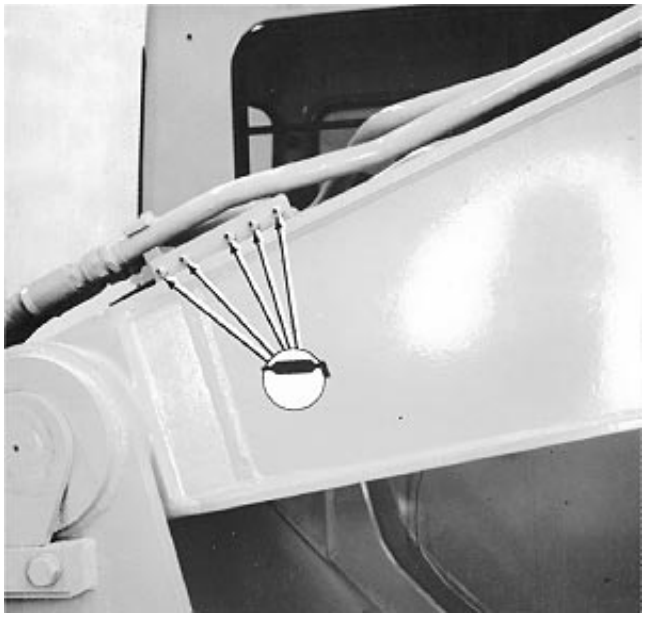
CED,OUOE020,25 –19–10MAR99–2/3

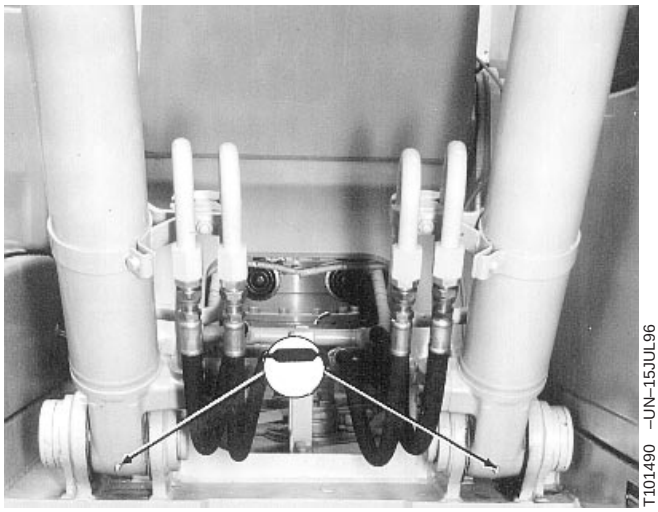


Three Points, A—Left Side Shown



Five Points

One Point



Two Points

CED,OUOE020,25 –19–10MAR99–3/3

BLANK

CHAPTER 14

MAINTENANCE—EVERY 250 HOURS

BLANK

Maintenance—Every 250 Hours

CHECK SWING GEARBOX OIL LEVEL

1. Park machine on a level surface.
2. Remove dipstick (A). Oil must be in the operating range.
3. If oil is needed, remove filler cap (B) and add oil. (See Fuels and Lubricants chapter.)
4. Check oil level.

T101491 –UN–15JUL96

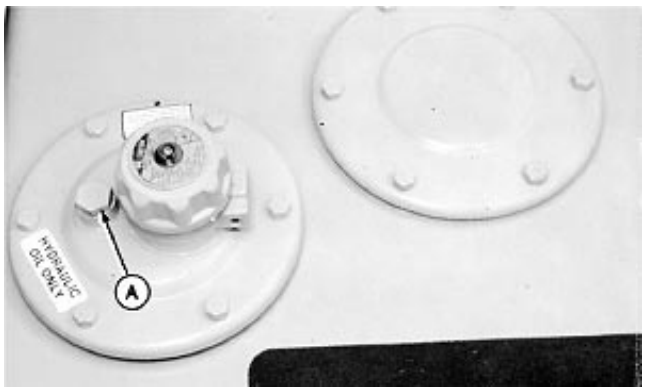
A—Dipstick
B—Filler Cap

TX,75,DH5088 –19–03JUL96–1/1

DRAIN HYDRAULIC TANK SUMP

CAUTION: High pressure release of oil from pressurized system can cause serious burns or penetrating injury. The hydraulic tank is pressurized. Do not remove vent plug (A). Release pressure by loosening vent plug.

1. Loosen vent plug (A) to release hydraulic pressure.



T7869AT –UN–12NOV92

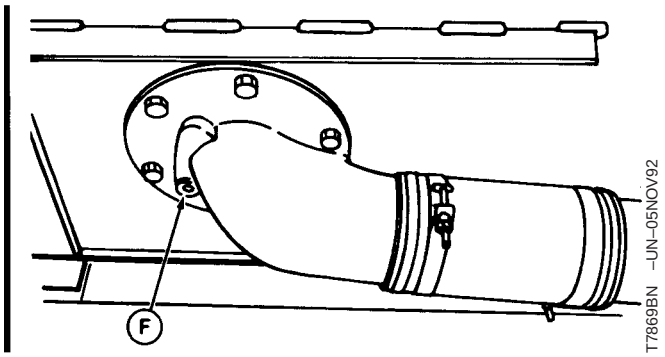
A—Vent Plug

Continued on next page

TX,75,DH5108 –19–11JUL96–1/2

2. Loosen plug (F) for several seconds to drain water and sediment into a container. Do not remove plug completely. Dispose of waste properly.

3. Tighten sump plug and vent plug.



F—Hydraulic Sump Drain Plug

TX,75,DH5108 –19–11JUL96–2/2

CHECK PUMP DRIVE GEARBOX OIL LEVEL

To check oil:

1. Remove dipstick (A) to release air pressure.

2. Wipe dipstick clean and insert completely into tube.

3. Pull dipstick.

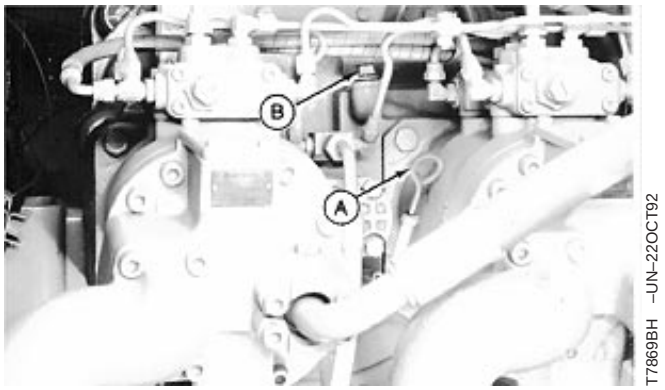
4. Oil must be approximately halfway below the "H" (level) mark.

To add oil:

1. Remove filler cap (B).

2. Add oil. (See Fuels and Lubricants chapter.)

3. Install filler cap.



A—Pump Drive Gearbox Oil Dipstick
B—Pump Drive Gearbox Oil Filler Cap

CED,TX14740,6099 –19–23APR98–1/1

CHANGE ENGINE OIL AND REPLACE FILTER

IMPORTANT: If fuel sulfur content exceeds 0.5 percent, change the engine oil at 1/2 the normal interval.

NOTE: If engine has not run 250 hours before the season changes, change oil.

1. Run engine to warm oil.
2. Park machine on a level surface.
3. Lower bucket to the ground.
4. Turn auto-idle switch off.

IMPORTANT: Turbocharger may be damaged if engine is not properly shut down.

5. Run engine with engine rpm dial at 1/3 position without load for 2 minutes.
6. Move engine rpm dial to slow idle position.
7. Turn key switch to OFF. Remove key from switch.
8. Attach a "Do Not Operate" tag on the right control lever.
9. Pull pilot control shut-off lever to locked position.

Continued on next page

10. Remove cover from under the engine. Remove drain plug (A) from bottom of engine oil pan, or open drain valve on side of engine oil pan. Allow oil to drain into a container. Dispose of waste oil properly.
11. Turn filter (B) counterclockwise to remove. Clean mounting surface on base.
12. Apply thin film of oil to rubber gasket of new filter.
13. Install new filter. Turn filter clockwise by hand until gasket touches mounting surface.
14. Tighten filter 1/2—3/4 turn more.
15. Install drain plug or close drain valve.
16. Remove fill cap (C).

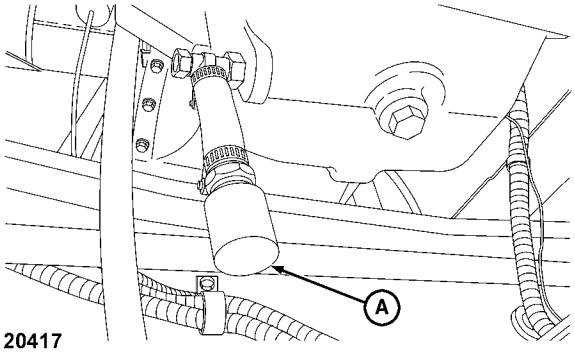
Oil—Specification

Capacity..... 19 L (20 qt)

17. Fill engine with oil. (See Fuels and Lubricants chapter.)
18. Install fill cap.
19. Start engine.

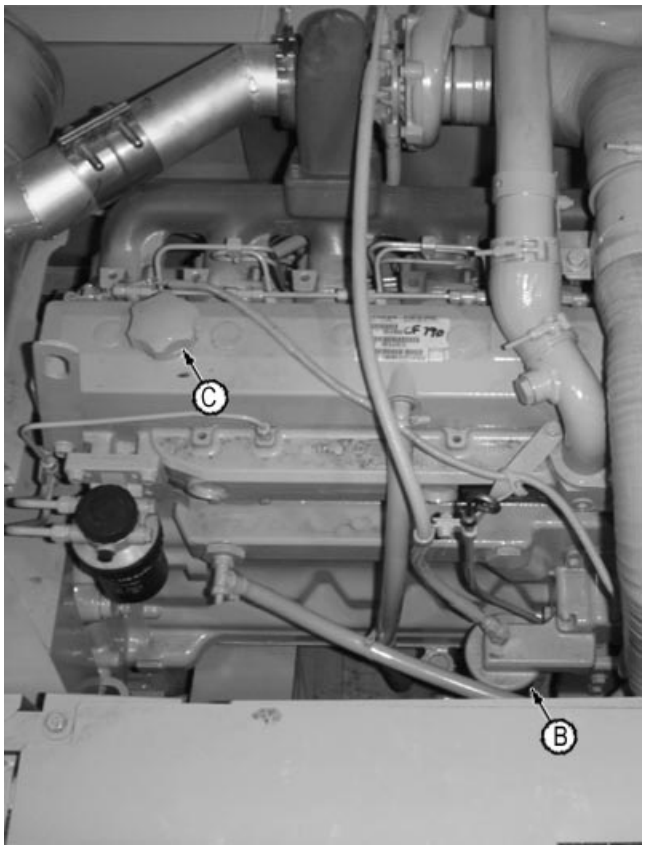
    Engine oil pressure indicator on monitor must go out within 15-20 seconds. If not, stop engine immediately and find the cause.

20. Stop engine. Check oil level.
21. Check for any leakage at filter. Tighten filter just enough to stop leakage.
22. Install cover from under the engine.



T120417

T120417 –UN–25MAR99



T108262B –UN–27MAR97

A—Drain Hose
B—Filter
C—Fill Cap

AG,OUOE042,26 –19–08MAR99–2/2

CHECK SURGE TANK COOLANT LEVEL

CAUTION: Prevent possible injury from hot spraying water. DO NOT remove filler cap unless engine is cool. Then turn cap slowly to the stop. Release air to relieve all pressure before you remove cap.

1. Slowly remove cap. Coolant level must be at bottom of the filler neck.

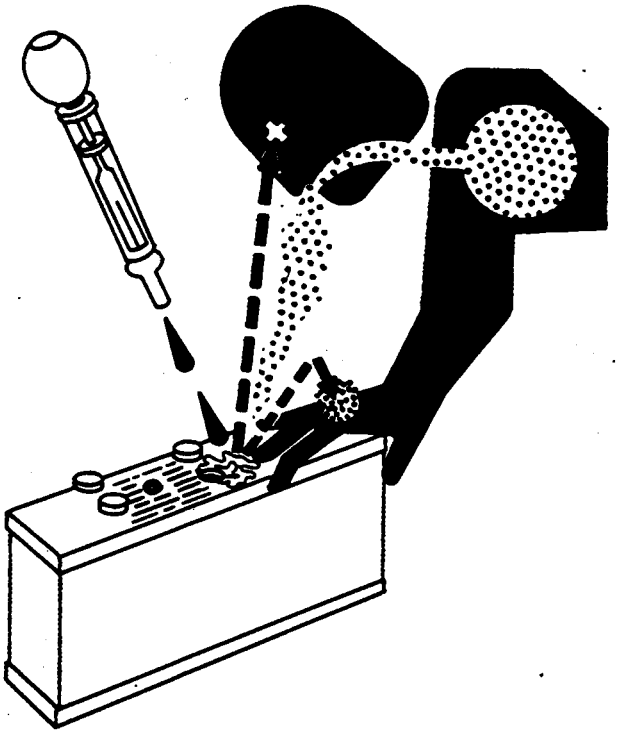
NOTE: If coolant level is low, check for leaks on surge tank filler cap and radiator cap, and hose connections between radiator and coolant recovery tank.

2. Add coolant, if necessary.

3. Install filler cap.

CED,TX14740,6114 –19–13MAY98–1/1

CHECK BATTERY ELECTROLYTE LEVEL AND TERMINALS



TS203 –UN–23AUG88

CAUTION: Battery gas can explode. Keep sparks and flames away from batteries. Use a flashlight to check battery electrolyte level.

NEVER check battery charge by placing a metal object across the posts. Use a voltmeter or hydrometer.

ALWAYS remove grounded (-) battery clamp first and replace it last.

Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skin, eat holes in clothing, and cause blindness if splashed into eyes.

Avoid the hazard by:

1. **Filling batteries in a well-ventilated area.**
2. **Wearing eye protection and rubber gloves.**
3. **Avoiding breathing fumes when electrolyte is added.**
4. **Avoiding spilling or dripping electrolyte.**
5. **Use proper jump start procedure.**

If you spill acid on yourself:

1. **Flush your skin with water.**
2. **Apply baking soda or lime to help neutralize the acid.**
3. **Flush your eyes with water for 15—30 minutes. Get medical attention immediately.**

If acid is swallowed:

1. **Do not induce vomiting.**
2. **Drink large amounts of water or milk, but do not exceed 1.9 L (2 quarts).**
3. **Get medical attention immediately.**

IMPORTANT: If water is added to batteries during freezing weather, batteries must be charged after water is added to prevent batteries from freezing. Charge battery using a battery charger or by running the engine.

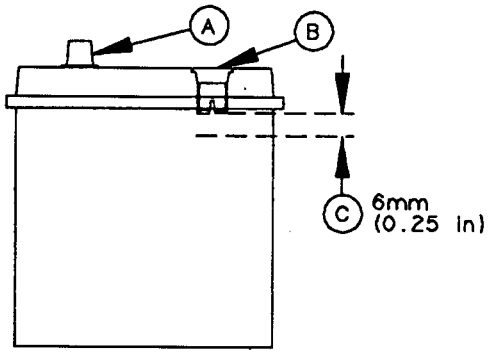
1. Remove hold-down clamps and battery covers.

Continued on next page

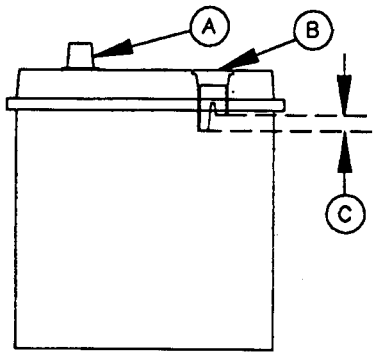
2. Fill each cell to within specified range with distilled water. DO NOT overfill.

CAUTION: Avoid possible injury. Always remove grounded (-) battery clamp first and replace it last.

3. Disconnect battery clamps, grounded clamp first.



T6996DB –UN–10FEB89



T6996DA –UN–10FEB89

A—Battery Post
B—Fill Tube
C—Electrolyte Level Range

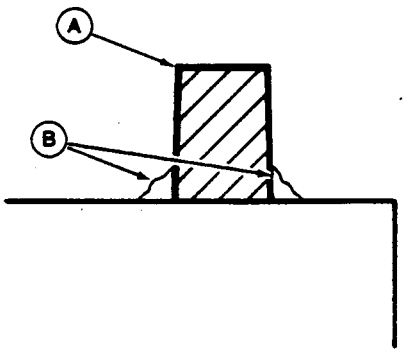
TX,75,DH5593 –19–05MAY94–2/3

4. Clean battery terminals (A) and clamps with a stiff brush.

5. Apply lubricating grease (B) around battery terminal base only.

6. Install and tighten clamps, grounded clamp last.

7. Install battery covers and hold-down clamps.



T6758AA –UN–21OCT88

A—Battery Terminals
B—Grease

TX,75,DH5593 –19–05MAY94–3/3

CHECK PROPEL GEARBOX OIL LEVEL

1. Park the machine on level ground rotating propel gearbox until bottom of the oil level check plug is even with the horizontal centerline.
2. Lower bucket to the ground.
3. Turn auto-idle switch off.

IMPORTANT: Turbocharger may be damaged if engine is not properly shut down.

4. Run engine with engine rpm dial at 1/3 position without load for 2 minutes.
5. Move engine rpm dial to slow idle position.
6. Turn key switch to OFF. Remove key from switch.
7. Attach a "Do Not Operate" tag on the right control lever.
8. Pull pilot control shut-off lever to locked position.

Continued on next page

TX,75,DH5098 –19–08JUL96–1/2

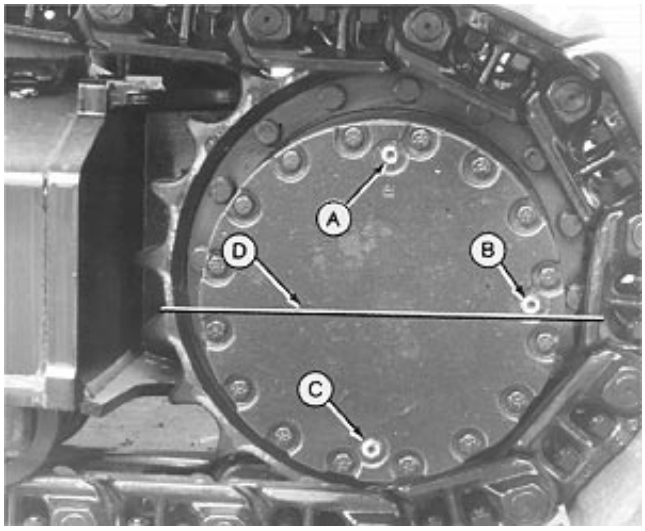
CAUTION: High pressure release of fluids from pressurized system can cause serious burns. Wait for propel gearbox oil to cool. Keep body and face away from check plug. Gradually loosen check plug to release air to relieve pressure.

9. After propel gearbox has cooled, slowly loosen check plug (B) to release air to relieve pressure.
10. Remove check plug. Oil must be to bottom of hole.
11. If necessary, add oil until oil flows out of oil level check plug hole. (See Fuels and Lubricants chapter.)
12. Wrap threads of plug with sealing-type tape. Install plug. Tighten plug to 49 N•m (36 lb-ft).

Plug—Specification

Torque ..... 49 N•m (36 lb-ft)

13. Check second propel gearbox oil level.



T7396CG –UN–18OCT90

A—Fill Plug
B—Check Plug
C—Drain Plug
D—Horizontal Centerline

TX,75,DH5098 –19–08JUL96–2/2

CLEAN DUSTY PRIMARY ELEMENT

T47764 –UN–09NOV88

1. Tap element with the palm of your hand, NOT ON A HARD SURFACE.

CAUTION: Prevent possible injury from flying chips if compressed air is more than 210 kPa (2.1 bar) (30 psi). Reduce compressed air to less than 210 kPa (2.1 bar) (30 psi) when using for cleaning purposes. Clear area of bystanders, guard against flying chips, and wear personal protection equipment including eye protection.

2. If this does not remove dust, use compressed air under 210 kPa (2.1 bar) (30 psi).

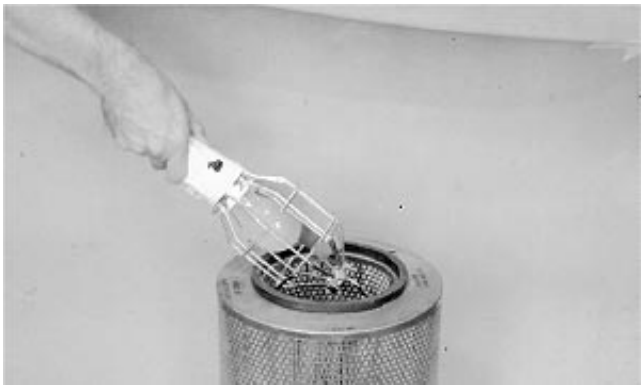
Compressed Air—Specification

Pressure	Under 210 kPa (2.1 bar) (30 psi)

3. Direct air up and down the pleats from inside to outside. Be careful not to make a break in the element.

03T,55,MM11 –19–18NOV92–1/1

INSPECT ELEMENT


T90684 –UN–10NOV88

IMPORTANT: A damaged or dirty element may cause engine damage.

Install a new primary element:

1. **If the element shows damage.**
2. **If element will not clean.**
3. **After 1000 hours service or annually.**

Install a new secondary element:

1. **If the primary element is damaged and needs to be replaced.**
2. **If the element is visibly dirty.**
3. **After 1000 hours service or annually.**

DO NOT clean a secondary element. Install a new element carefully centering it in the canister.

1. Inspect element and gasket for damage.

2. Air restriction indicator will not signal correctly if an element has a break or is not correctly sealed in air cleaner housing. Throw away element that has the slightest damage. If gasket is broken or missing, install a new element.

03T,55,C67 –19–24JUL91–1/1

BLANK

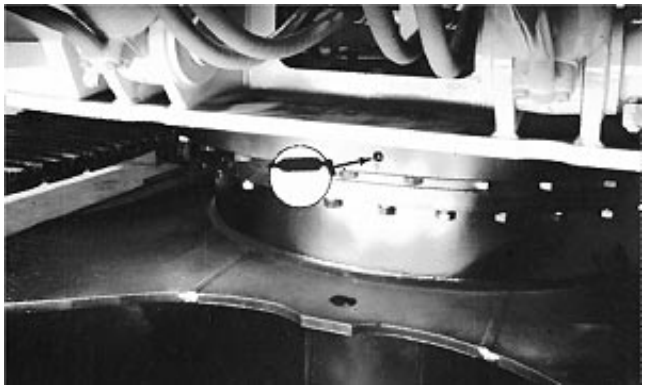
CHAPTER 15

MAINTENANCE—EVERY 500 HOURS

BLANK

Maintenance—Every 500 Hours

GREASE SWING BEARING


T7869BM –UN–22OCT92

CAUTION: Prevent possible injury from unexpected machine movement if controls are moved by another person. Lubricating swing bearing and rotating the upperstructure must be done by one person. Before you lubricate swing bearing, clear the area of all persons.

1. Park machine on a level surface.
2. Lower bucket to the ground.
3. Turn auto-idle switch off.

IMPORTANT: Turbocharger may be damaged if engine is not properly shut down.

4. Run engine with engine rpm dial at 1/3 position without load for 2 minutes.
5. Move engine rpm dial to slow idle position.
6. Turn key switch to OFF. Remove key from switch.
7. Attach a "Do Not Operate" tag on the right control lever.
8. Pull pilot control shut-off lever to locked position.
9. Lubricate swing bearing with ten shots of grease at both grease fittings. (See Fuels and Lubricants chapter.)
10. Start engine. Raise bucket several inches off the ground and turn upperstructure 45 degrees.
11. Repeat steps 2—9 three times.

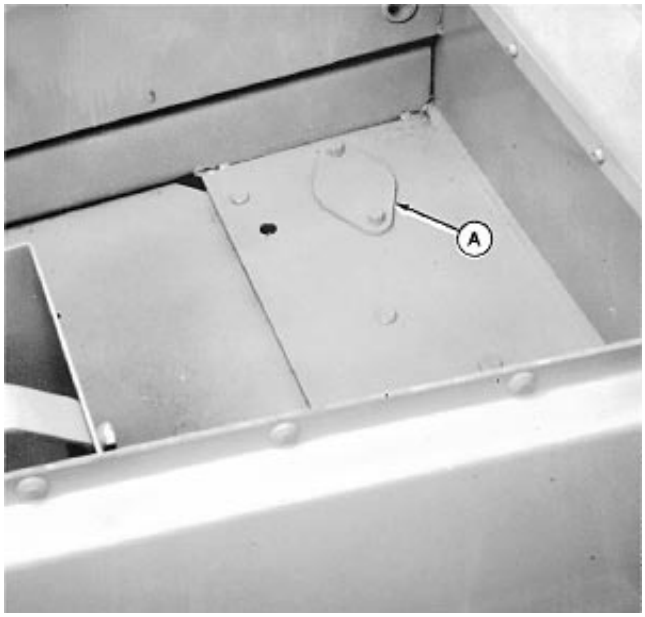
NOTE: It is not necessary to start the engine the last time.

TX,80,DH5099 –19–08JUL96–1/1

GREASE SWING BEARING GEAR

CAUTION: Prevent possible injury from unexpected machine movement if controls are moved by another person. Lubricating swing bearing gear and rotating the upperstructure must be done by one person.

1. Remove access cover (A) to swing gear.



T7869BJ –UN–22OCT92

Located In Tool Box

A—Access Cover

CED,TX14740,6100 –19–23APR98–1/2

2. Grease must be 13—25 mm (1/2—1 in.) (B) deep measured from the bottom of the ring gear. The grease must also be free of contamination by dirt and water.

   If the grease is contaminated, remove grease and replace with clean grease.

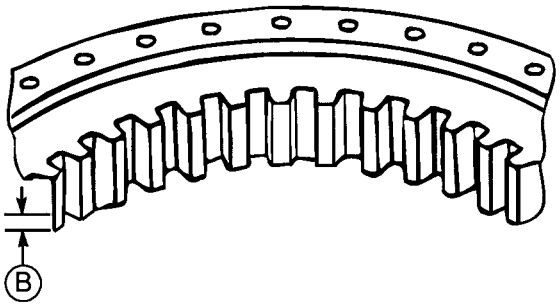
IMPORTANT: If water or mud is found in swing gear area, see Operating in Water and Mud in Operating the Machine chapter.

3. Add grease as required (approximately 0.113 kg (1/4 lb) every 90°). (See Fuels and Lubricants chapter.)

IMPORTANT: Excessive grease can damage the swing gearbox seal.

4. Remove excessive grease that extrudes over the top of the swing drive pinion.

5. Install access cover.



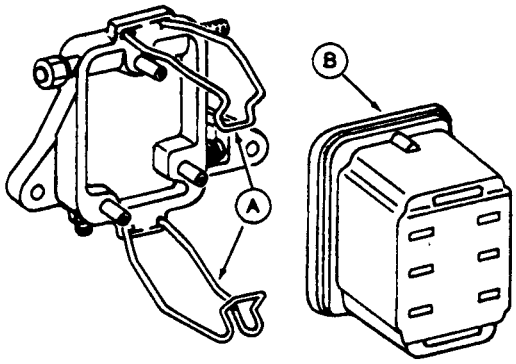
T8156AE –UN–13JAN94

B—Grease Depth

CED,TX14740,6100 –19–23APR98–2/2

REPLACE FINAL FUEL FILTER

1. Loosen clamps (A) to remove filter (B). Allow sediment to drain into a container. Dispose of waste properly.
2. Clean filter base.
3. Install new filter. Follow instructions on filter.
4. Bleed fuel system. (See Bleeding Fuel System in Maintenance chapter



T7034AH –UN–01MAY89

A—Clamps
B—Filter

CED,TX14740,6105 –19–30APR98–1/1

REPLACE PRIMARY FUEL FILTER (WATER SEPARATOR)

1. Turn retaining ring (A) counterclockwise to remove filter (B). Allow sediment to drain into a container. Dispose of waste properly.
2. Turn sediment bowl (C) counterclockwise to remove from filter assembly. Clean bowl.
3. Remove hand primer from fuel filter base. Disassemble hand primer assembly.

T102466 –UN–30JUL96

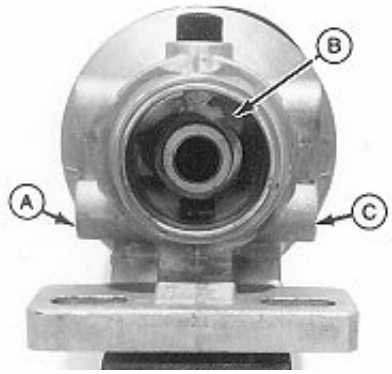
T8387AE –UN–17DEC94

A—Retaining Ring
B—Filter
C—Sediment Bowl

Continued on next page

TX,80,DH5123 –19–26JUL96–1/2

4. Remove fuel inlet line (A) and plug (C).
5. Flush any debris from filter base (B).
6. Install fuel inlet plug and fuel inlet line.
7. Assemble primer assembly and install onto fuel filter base.
8. Install new filter. (Follow instructions on filter.)
9. Install sediment bowl.
10. Bleed fuel system. (See Bleeding Fuel System in Maintenance chapter.)



T8387AD –UN–17DEC94

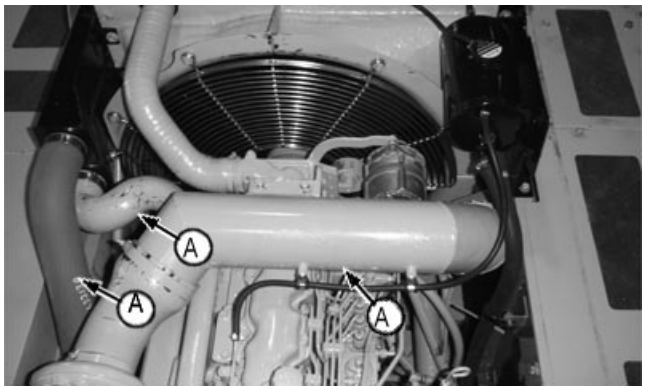
A—Fuel Inlet Line
B—Filter Base
C—Plug

TX,80,DH5123 –19–26JUL96–2/2

CHECK AIR INTAKE HOSES

Check hoses (A) for cracks. Replace as necessary.

Tighten clamps.



T115433B –UN–15MAY98

A—Air Intake Hose

CED,TX14740,6118 –19–15MAY98–1/1

REPLACE HYDRAULIC OIL FILTER

1. Park machine on a level surface.
2. Position machine with arm cylinder fully retracted and bucket cylinder fully extended.
3. Lower bucket to the ground.
4. Turn auto-idle switch off.

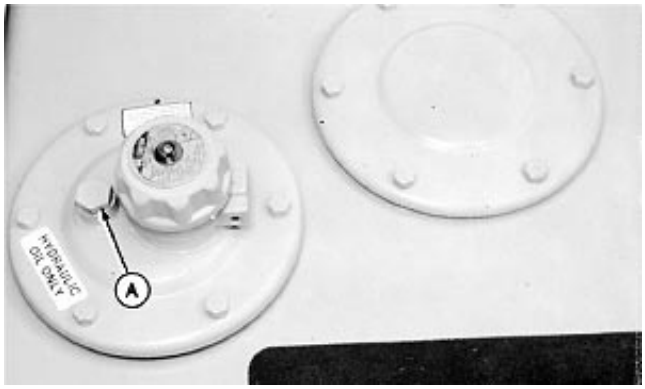
IMPORTANT: Turbocharger may be damaged if engine is not properly shut down.

5. Run engine with engine rpm dial at 1/3 position without load for 2 minutes.
6. Move engine rpm dial to slow idle position.
7. Turn key switch to OFF. Remove key from switch.
8. Attach a "Do Not Operate" tag on the right control lever.
9. Pull pilot control shut-off lever to locked position.

TX,80,DH5100 –19–08JUL96–1/4

CAUTION: High pressure release of oil from pressurized system can cause serious burns or penetrating injury. The hydraulic tank is pressurized. Do not remove vent plug (A). Release pressure by loosening vent plug.

10. Loosen vent plug (A) to release hydraulic pressure.



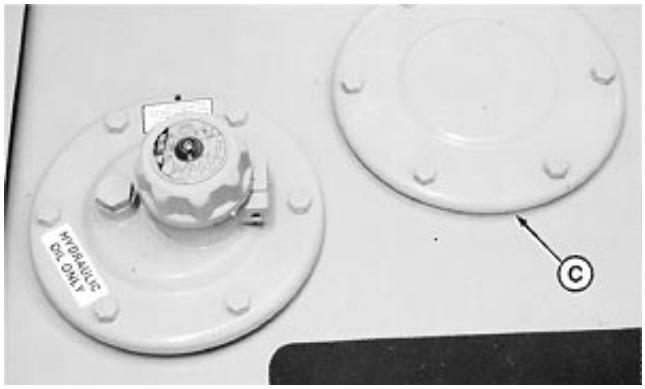
T7869AT –UN–12NOV92

A—Vent Plug

Continued on next page

TX,80,DH5100 –19–08JUL96–2/4

11. Hold down filter cover (C) against light spring load when removing the last two cap screws.



T7869AL –UN–12NOV92

C—Filter Cover

Continued on next page

TX,80,DH5100 –19–08JUL96–3/4

12. Remove spring (C), valve (E), and element (D).

13. Remove filter case and discard element and O-ring (F).

CAUTION: Prevent possible injury from flying chips if compressed air is more than 210 kPa (2.1 bar) (30 psi). Reduce compressed air to less than 210 kPa (2.1 bar) (30 psi) when using for cleaning purposes. Clear area of bystanders, guard against flying chips, and wear personal protection equipment including eye protection.

NOTE: Remove element and inspect for metal particles and debris in bottom of filter can. Excessive amounts of brass and steel particles can indicate a hydraulic pump, motor, or valve malfunction, or a malfunction in process. A rubber type of material can indicate cylinder packing problem.

14. Clean filter case with diesel fuel and dry with compressed air.

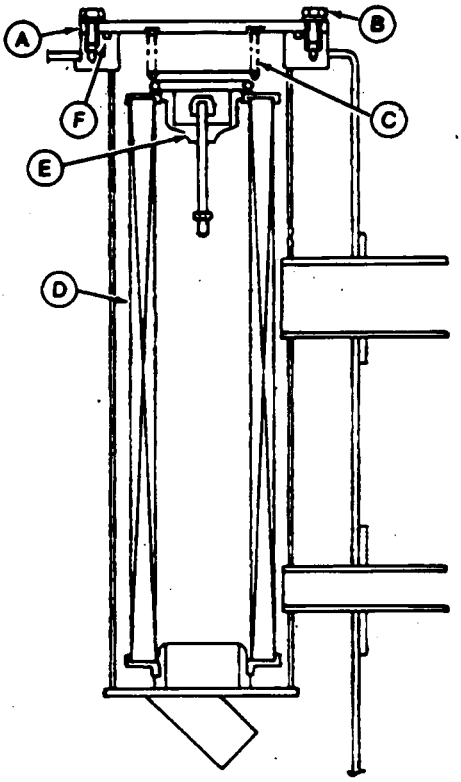
15. Install filter case, valve (E), and spring (C) in reservoir.

16. Install cover (A) and tighten cap screws (B).

Cap Screw—Specification

Torque ..... 49 N•m (36 lb-ft)

17. Tighten vent plug.

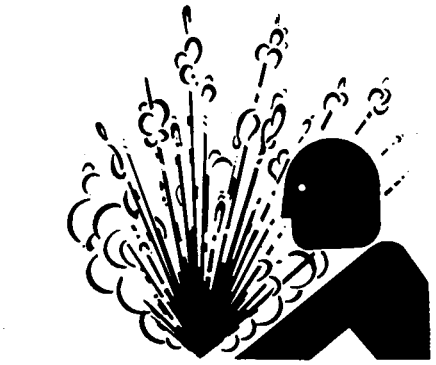


T6457ED –UN–18OCT88

A—Cover
B—Cap Screw
C—Spring
D—Element
E—Valve
F—O-Ring

TX,80,DH5100 –19–08JUL96–4/4

CHECK COOLANT IN RADIATOR

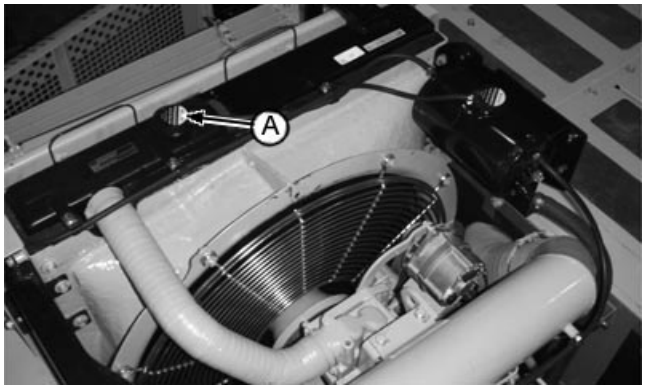


TS281 –UN–23AUG88

CAUTION: Explosive release of fluids from pressurized cooling system can cause serious burns.

Only remove filler cap when engine is cold or when cool enough to touch with bare hands. Slowly loosen cap to first stop to relieve pressure before removing completely.

IMPORTANT: John Deere Liquid Coolant Conditioner does not protect against freezing. Coolant conditioner prevents rust, scale, and liner cavitation.



T115432D –UN–02NOV98

NOTE: Check coolant every 500 hours or 6 months, or when replacing 1/3 or more of coolant. Add coolant conditioner as necessary.

1. Remove radiator cap (A) and test coolant solution. Use one of the following kits to check coolant.

CED,TX14740,6268 –19–02NOV98–1/3

3—WAY Heavy Duty Coolant Test Kit (TY16175)

Coolant test strips provide an effective method to check freeze point and additive levels of engine coolant. See your authorized dealer for 3—WAY Heavy Duty Coolant Test Kit and follow instructions on kit.

T111110 –UN–13AUG97

3-Way Test Kit

Continued on next page

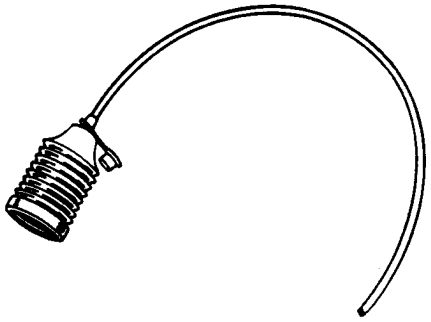
CED,TX14740,6268 –19–02NOV98–2/3

COOLSCAN PLUS

For a more thorough evaluation of coolant, perform COOLSCAN PLUS analysis, where available. See your authorized dealer for information about COOLSCAN PLUS.

2. Add TY16004 John Deere Coolant Conditioner or equivalent non-chromatic conditioner/rust inhibitor as necessary. Follow instructions on container for amount.

3. Install cap.



T111109 –UN–13AUG97

COOLSCAN Plus

Cooling system—Specification

Capacity	approx. 30.0 L (32.0 qt)

CED,TX14740,6268 –19–02NOV98–3/3

CHAPTER 16

MAINTENANCE—EVERY 1000 HOURS

BLANK

Maintenance—Every 1000 Hours

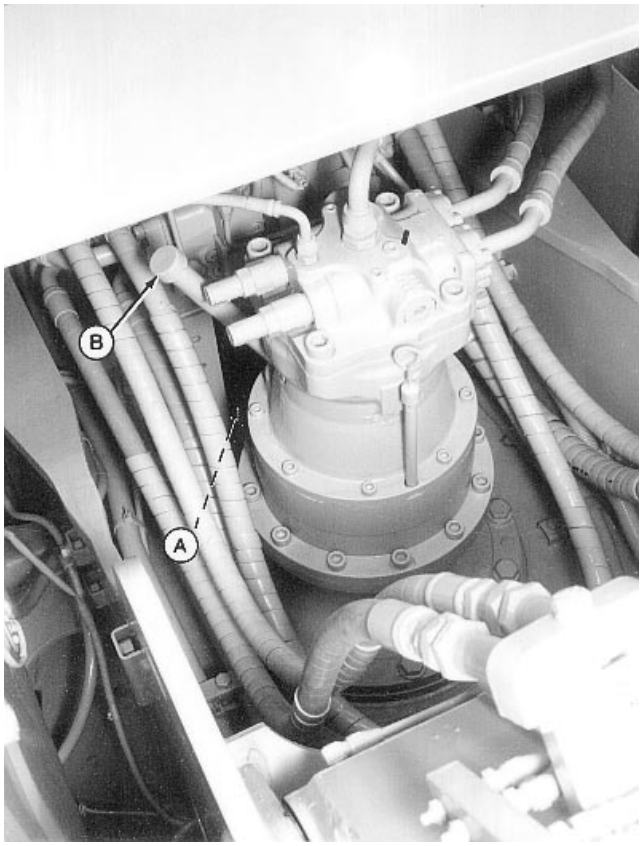
CHANGE SWING GEARBOX OIL

1. Remove plug (A) mounted on end of drain pipe to drain oil into a container. Dispose of waste oil properly.

Swing gearbox—Specification

Oil Capacity ..... 14 L (15 qt)

2. Install plug.
3. Remove filler cap (B) and add oil.
4. Install filler cap.
5. Check oil level on dipstick.



T102305 –UN–30JUL96

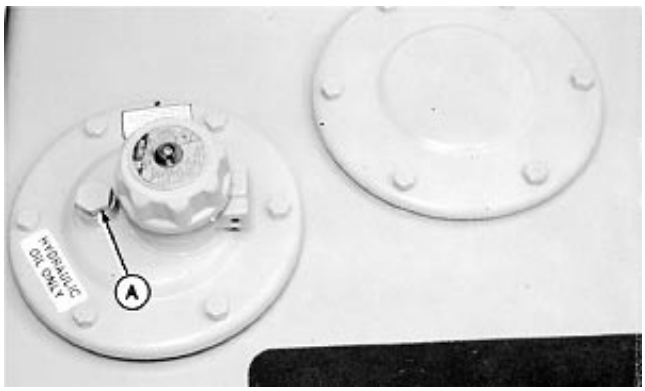
A—Drain Plug
B—Filler Cap

TX,85,DH5540 –19–08JUL96–1/1

CHANGE PILOT CONTROL OIL FILTER

CAUTION: High pressure release of oil from pressurized system can cause serious burns or penetrating injury. The hydraulic tank is pressurized. Do not remove vent plug (A). Release pressure by loosening vent plug.

1. Loosen vent plug (A) to relieve air pressure.



T7869AT –UN–12NOV92

A—Vent Plug

Continued on next page

CED,TX14740,6101 –19–23APR98–1/3

2. Remove filter case (A).

T7869BO –UN–05NOV92

A—Filter Case

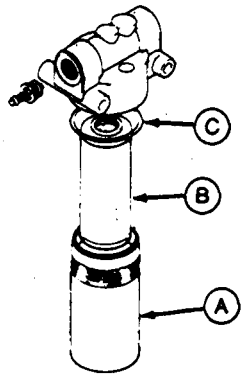
CED,TX14740,6101 –19–23APR98–2/3

3. Unscrew filter element (B).
4. Remove O-ring (C)
5. Install new O-ring and filter element.

Filter Case—Specification

Torque ..... 20-30 N•m (15-22 lb-ft)

6. Install filter case (A).
7. Tighten vent plug.



T6457ES –UN–19OCT88

A—Filter Case
B—Filter Element
C—O-ring

CED,TX14740,6101 –19–23APR98–3/3

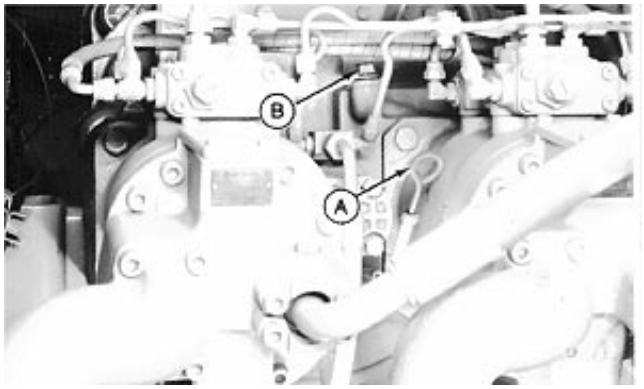
CHANGE PUMP DRIVE GEARBOX OIL

1. Remove plastic cap and filler plug (B).
2. Remove drain plug (C). Allow oil to drain into a container. Dispose of waste oil properly.
3. Apply Liquid TEFLON Pipe Thread Sealant to drain plug. Install plug.

Pump Drive Gearbox—Specification

Oil Capacity ..... 1.0 L (1.3 qt)

4. Add oil. (See Fuels and Lubricants chapter.)
5. Pull dipstick (A) and check oil level. Oil level must be approximately halfway below "H" (level) mark.
6. Install filler cap. Install dipstick.



T7869BH –UN–22OCT92

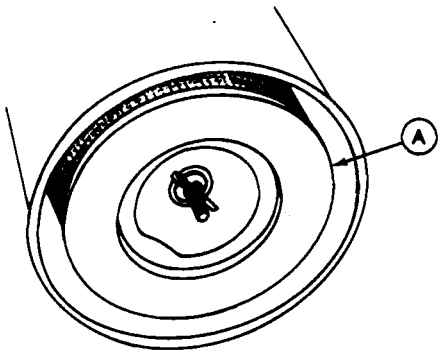
T7869BI –UN–22OCT92

A—Dipstick
B—Filler Plug
C—Drain Plug

CED,TX14740,6102 –19–23APR98–1/1

CHANGE AIR CLEANER ELEMENTS

1. Open left front service door.
2. Loosen wing nut to remove cover.
3. Remove wing nut and primary element (A).



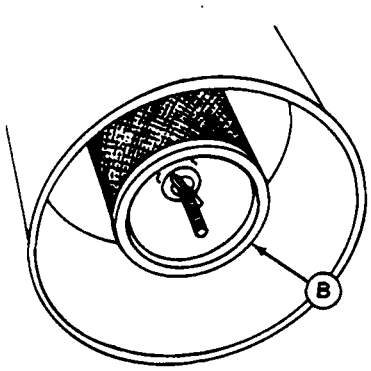
T6119AF –UN–01NOV88

A—Primary Element

Continued on next page

TX,85,FF2318 –19–01NOV91–1/2

4. Remove wing nut and secondary element (B).
5. Install elements, making sure the secondary element is centered in canister.
6. Install cover.



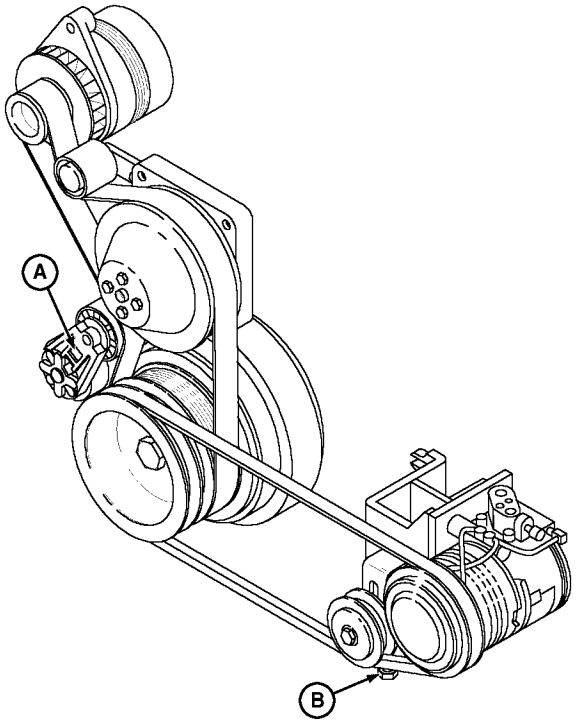
T6119AG –UN–01NOV88

B—Secondary Element

TX,85,FF2318 –19–01NOV91–2/2

INSPECT FAN BELT

1. Check belt regularly for wear, especially for cracks at the bottom of grooves and for frayed edges.
2. If necessary, replace belt.
3. Loosen adjusting screw (B). Remove air conditioning belt.
4. Install breaker bar in square drive hole (A).
5. Hold tension adjuster away from belt while removing old belt and installing a new one.
6. Slowly release wrench tension to allow tension adjuster to move clockwise against new belt. Tension is automatically adjusted.
7. Remove breaker bar.
8. Install air conditioning belt. Tighten adjusting screw (B).



T115779 –UN–17JUN98

T115779

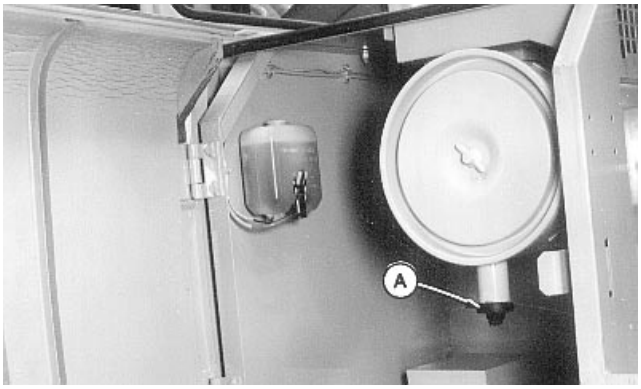
A—Square Drive Hole
B—Adjusting Screw

CED,OUOE020,23 –19–08MAR99–1/1

REPLACE AIR CLEANER DUST VALVE

NOTE: A missing, damaged, or hardened dust valve will cause the air filter elements to be ineffective.

Replace dust valve (A).



A—Dust Valve

TX,85,DH5094 –19–08JUL96–1/1

BLANK

CHAPTER 17

MAINTENANCE—EVERY 2000 HOURS

BLANK

Maintenance—Every 2000 Hours

CHANGE PROPEL GEARBOX OIL

1. Park the machine on level ground rotating propel gearbox until bottom of the oil level check plug (B) is even with the horizontal centerline.
2. Lower bucket to the ground.
3. Turn auto-idle switch off.

IMPORTANT: Turbocharger may be damaged if engine is not properly shut down.

4. Run engine with engine RPM dial at 1/3 position without load for 2 minutes.
5. Move engine RPM dial to slow idle and turn key switch to OFF. Remove key from switch.
6. Attach a "Do Not Operate" tag on the right control lever.
7. Pull pilot control shut-off lever to locked position.

CAUTION: High pressure release of fluids from pressurized system can cause serious burns. Wait for propel gearbox oil to cool. Keep body and face away from check plug. Gradually loosen check plug to release pressure.

8. After propel gearbox has cooled, slowly loosen check plug to release pressure.
9. Remove drain plug (C). Allow oil to drain into a container. Dispose of waste oil properly.

Propel Gearbox—Specification

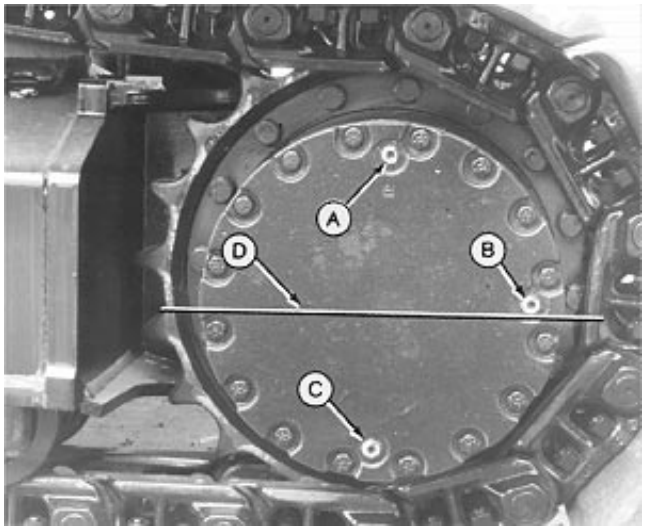
Oil Capacity (Each) ..... 7.5 L (8.0 qt)

10. Wrap threads of drain plug with a sealing-type tape. Install plug. Tighten plug to 49 N•m (430 lb-in.).

Plug—Specification

Torque ..... 49 N•m (430 lb-in.)

11. Remove oil fill plug (A).



T7396CG –UN–18OCT90

A—Fill Plug
B—Check Plug
C—Drain Plug
D—Horizontal Centerline

Continued on next page

CED,TX14740,6016 –19–02JUN98–1/2

12. Add oil until oil flows out of oil level check plug hole. (See Fuels and Lubricants chapter.)

13. Wrap threads of check plug and fill plug with sealing-type tape. Install plugs. Tighten plugs to 49 N•m (36 lb-ft).

Plug—Specification

Torque ..... 49 N•m (430 lb-in.)

14. Change oil of second propel gearbox.

CED,TX14740,6016 –19–02JUN98–2/2

CHANGE HYDRAULIC OIL

IMPORTANT: DO NOT run engine without oil in the tank.

T6811AJ –UN–18OCT88

1. Park machine on level surface with upperstructure rotated 90° for easier access.

2. Position machine with arm cylinder fully retracted and bucket cylinder fully extended.

3. Lower bucket to the ground.

4. Turn auto-idle switch off.

IMPORTANT: Turbocharger may be damaged if engine is not properly shut down.

5. Run engine with engine RPM dial at 1/3 position without load for 2 minutes.

6. Move engine RPM dial to slow idle position.

7. Turn key switch to OFF to stop engine. Remove key from switch.

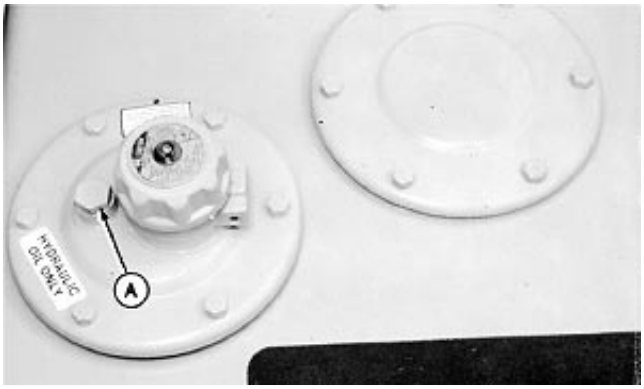
8. Pull pilot control shut-off lever to locked position.

Continued on next page

TX,OUOE042,29 –19–08MAR99–1/7

CAUTION: High pressure release of oil from pressurized system can cause serious burns or penetrating injury. The hydraulic tank is pressurized. Do not remove vent plug (A). Release pressure by loosening vent plug.

9. Loosen vent plug (A) to relieve air pressure.



T7869AT –UN–12NOV92

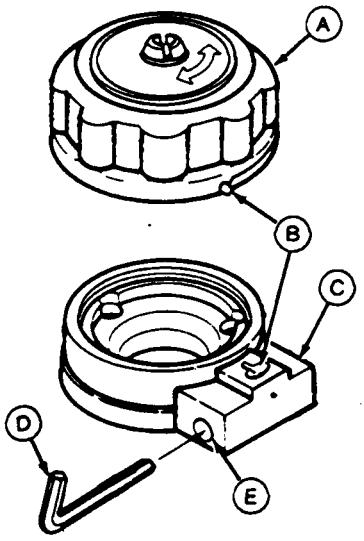
TX,OUOE042,29 –19–08MAR99–2/7

10. Insert 4 mm (0.15 in.) hex wrench (D) into hole (E) and turn counterclockwise.

11. Slowly turn cap (A) counterclockwise. Remove cap.

Hydraulic oil tank—Specification

Capacity	148 L (39 gal)



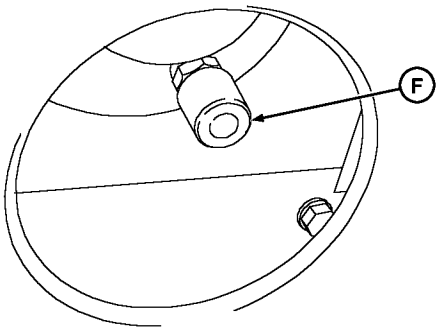
T6457EI –UN–18OCT88

A—Cap
B—Aligning Marks
C—Case Assembly
D—Hex Wrench
E—Hole

Continued on next page

TX,OUOE042,29 –19–08MAR99–3/7

12. Remove drain plug (F). Allow oil to drain into a container. Dispose of waste oil properly.

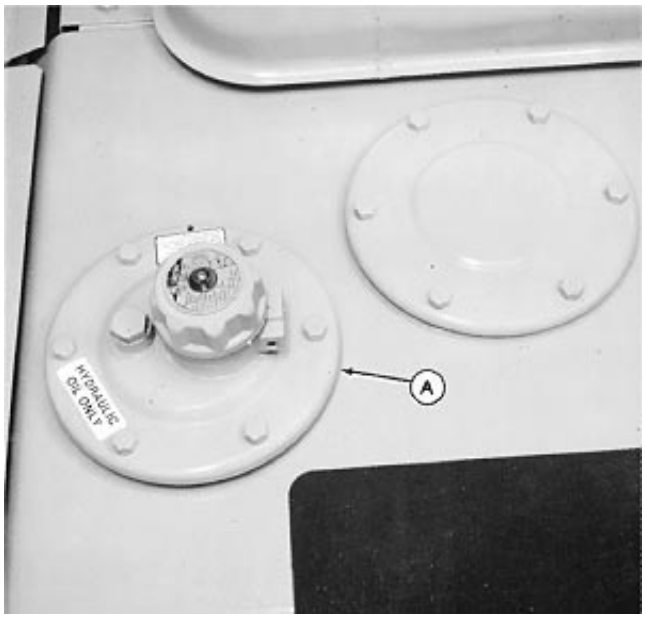


T120418

T120418 –UN–25MAR99

TX,OUOE042,29 –19–08MAR99–4/7

13. Remove cover (A) with suction filter.
14. Clean inside of tank and suction filter.
15. Change hydraulic oil filter. (See Maintenance-Every 500 Hours chapter.)
16. Change pilot control oil filter. (See Maintenance-Every 1000 Hours chapter.)



T7869BP –UN–12NOV92

Continued on next page

TX,OUOE042,29 –19–08MAR99–5/7

17. Install suction screen with cover. Suction screen must seal against outlet pipe in bottom of tank. If necessary, loosen nut (B) to adjust rod length

Suction Screen Rod—Specification

Length (A) ..... 670 mm (26.4 in.)

Suction Screen Rod Nut—Specification

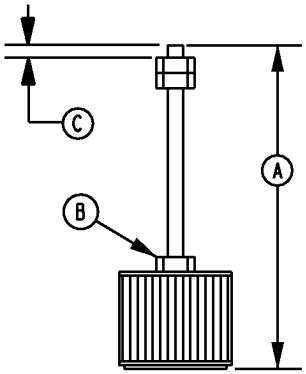
Torque (B) ..... 17 N•m (12.5 lb-ft) (150 lb-in.)

Top of Rod to Top of Rod Nut—Specification

Length (C) ..... 20 mm (0.8 in.)

Cover Cap Screw—Specification

Torque ..... 49 N•m (36 lb-ft)



T108541

T108541 –UN–24MAR97

18. Install tank drain plug and bottom guard.

19. Add oil until it is between marks on sight glass. (See Fuels and Lubricants chapter.)

TX,OUOE042,29 –19–08MAR99–6/7

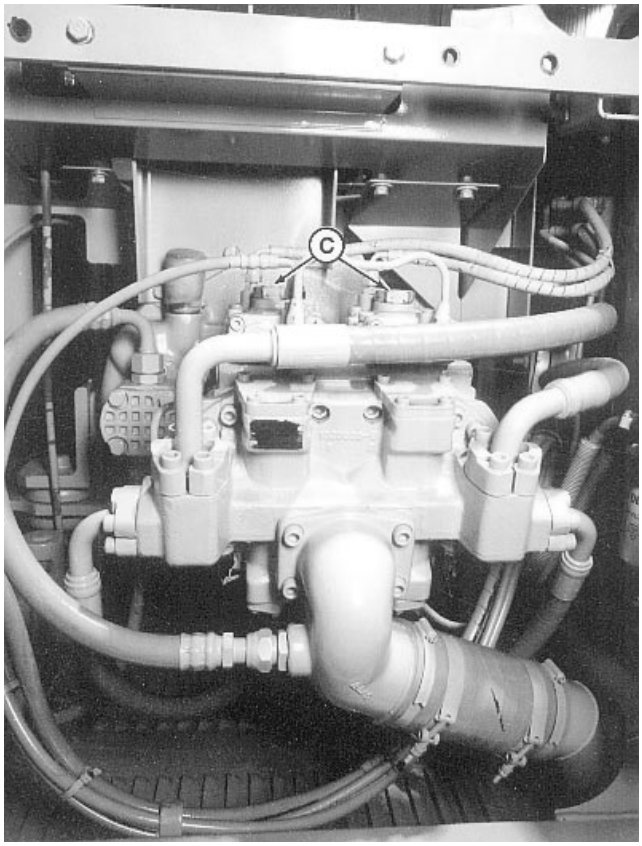
IMPORTANT: If the hydraulic pump is not filled with oil, it will be damaged when the engine is started.

20. Remove air bleed plugs (C) from hydraulic pump until oil flows from bleed holes.

21. Install air bleed plugs in hydraulic pump.

22. Check oil level in sight glass. Add oil, if necessary. Install tank cap. Tighten vent plug.

23. Purge air from cylinders and swing motor by cycling hydraulic functions.

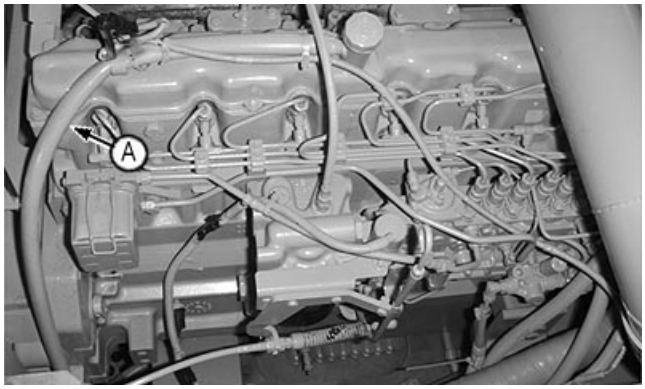


T101875 –UN–15JUL96

TX,OUOE042,29 –19–08MAR99–7/7

CLEAN THE ENGINE CRANKCASE VENTILATION TUBE

Clean the engine crankcase ventilation tube (A) when you measure and adjust engine valve clearance (lash).



A—Engine Crankcase Ventilation Tube

CED,TX14740,6109 –19–30APR98–1/1

CHECK AND ADJUST ENGINE VALVE LASH (CLEARANCE)

CAUTION: Prevent accidental starting of engine while performing valve adjustments. Always disconnect NEGATIVE (—) battery terminal.

IMPORTANT: Valve clearance MUST BE checked and adjusted with engine COLD.

1. Remove rocker arm cover and engine crankcase ventilation tube. Clean tube with solvent or diesel fuel. Check that O-ring in rocker arm cover is in good condition.

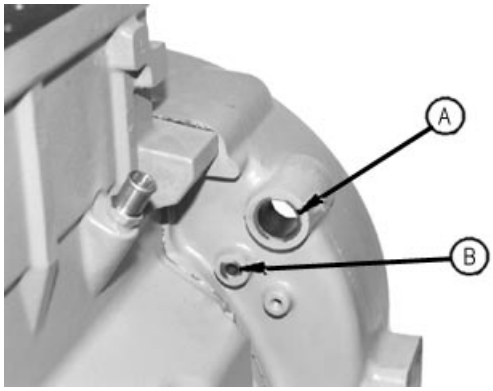
Continued on next page

TX,86,DH5104 –19–09JUL96–1/3

IMPORTANT: Visually inspect contact surfaces of valve tips and rocker arm wear pads. Check all parts for excessive wear, breakage, or cracks. Replace parts that show visible damage.

Rocker arms that exhibit excessive valve clearance should be inspected more thoroughly to identify damaged parts.

2. Remove plug (A). Install JDG 820 Flywheel Turning Tool. Remove cap screw (B). Install JDE-81-4 Timing Pin.



RG7408 –UN–06AUG96

A—Plug
B—Cap Screw

TX,86,DH5104 –19–09JUL96–2/3

3. Turn flywheel until timing pin goes into hole in flywheel.

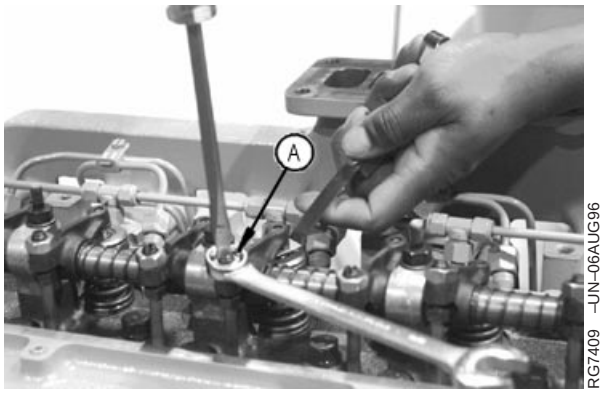
4. Using engine rotation tool, rotate engine flywheel in running direction (clockwise viewed from front) until No. 1 cylinder is at “TDC” Compression stroke.

   If No. 1 cylinder rocker arms are loose, the engine is at No. 1 “TDC” Compression. If No. 1 cylinder rocker arms are not loose, rotate engine one full revolution (360°) to No. 1 “TDC” Compression

   To change piston position, remove timing pin and rotate flywheel.

5. Check and adjust valve clearance to specifications as directed in the following procedures.

6. Loosen jam nut (A) and adjust clearance with a screwdriver, as shown.



RG7409 –UN–06AUG96

A—Jam Nut

TX,86,DH5104 –19–09JUL96–3/3

FIRING ORDER 6—CYLINDER ENGINE:

NOTE: Firing order is 1—5—3—6—2—4

1. Adjust No. 1, 3, and 5 exhaust valves and No. 1, 2, and 4 intake valves.

Exhaust Valves (E)—Specification

VALVE CLEARANCE ..... 0.46 mm (0.018 in.)

Intake Valves (I)—Specification

VALVE CLEARANCE ..... 0.36 mm (0.014 in.)

2. Rotate engine 360° and repeat step 7 for the remaining intake and exhaust valves.

3. Tighten jam nut to 27 N•m (20 lb-ft).

Jam Nut—Specification

Torque ..... 27 N•m (20 lb-ft)

4. Clean cylinder head and rocker arm cover mating surfaces.

5. Install rocker arm cover gasket. Do not use sealant on the gasket

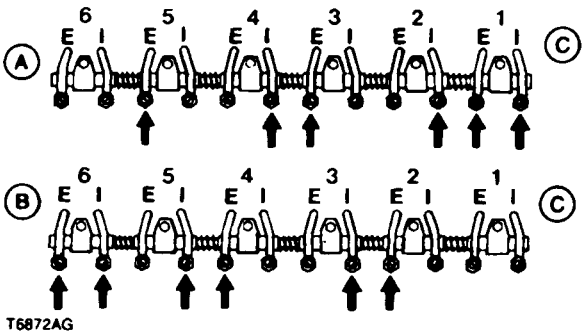
6. Install rocker arm cover. Tighten cap screws to 35 N•m (26 lb-ft). Do not over tighten cap screws.

Cap Screws—Specification

Torque ..... 35 N•m (26 lb-ft)

7. Remove turning tool and timing pin.

8. Install parts. Center muffler to turbocharger inlet tube before fastening muffler into place.



T6872AG –UN–18MAY94

A—No. 1 TDC Compression Stroke
B—No. 1 TDC Exhaust Stroke
C—Fan End of Engine

TX,85,DH5514 –19–18DEC96–1/1

CHECK ENGINE SPEEDS

1. Warm engine to normal operating temperature.

2. Connect a tachometer to check engine speeds

Engine Speed—Specification

Slow idle ..... 1000 ± 100 rpm
Fast Idle In Standard Mode ..... 2050 ± 75 rpm

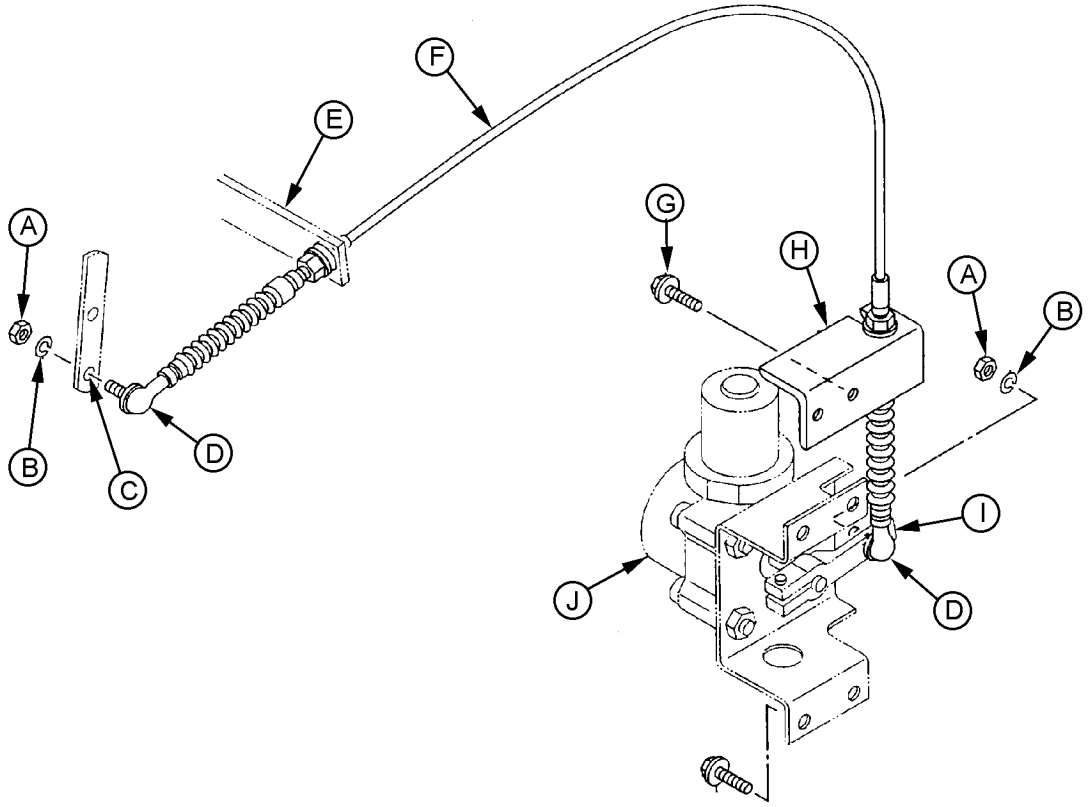
NOTE: Turn engine RPM dial to slow idle to check slow idle speed

Turn engine RPM dial to fast idle to check fast idle speed.

If engine speeds need adjustment, see your authorized dealer.

CED,TX14740,6036 –19–02MAR98–1/1

ENGINE SPEED CONTROL CABLE ADJUSTMENT



T105226

T105226 –UN–26NOV96

A—Nut (2 used)
B—Lock Washer (2 used)
C—Injection Pump Lever
D—Ball Joint (2 used)
E—Bracket
F—Speed Control Cable
G—Cap Screw and Lock Washer (6 used)
H—Bracket
I—Engine Control Motor Arm
J—Engine Control Motor

IMPORTANT: The ball joints (D) are installed on the cable to full thread engagement. A ball joint can be used to lengthen a cable end, if needed, but must have at least 6 mm (1/4 in.) of thread engagement to avoid stripping the threads on cable end.

1. Install ball joints (D) to full thread engagement. Tighten nuts.

2. Install speed control cable (F) in brackets (E and H). Initially, tighten nuts so threaded portions of cable are centered in brackets. As needed, adjust cable in brackets to connect ball joint to lever or arm.

3. Connect ball joint to the outer hole of engine control motor arm (I).

4. Do Engine Control Motor Adjustment and then the Engine Speed Learning Procedure. (See procedures in this chapter.)

CED,TX14740,6096 –19–20APR98–1/1

ENGINE CONTROL MOTOR AND SENSOR ADJUSTMENT

When the following components are repaired or replaced, or when engine speeds deviate from specification, the engine control motor adjustment and engine speed learning procedure must be performed.

- Engine
- Engine speed control cable
- Engine control motor and angle sensor
- Engine and pump controller

1. Check that fast and slow idle stop screws on the injection pump are adjusted to specification.
2. Turn key switch to ON.
3. Turn the engine rpm dial to slow idle.

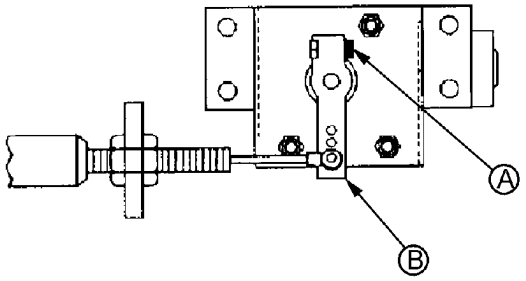
CED,TX14740,6097 –19–20APR98–1/2

4. Loosen cap screw (A) in engine control motor arm (B).
5. Adjust the arm on the shaft so the injection pump lever just contacts the slow idle stop screw.
6. Tighten cap screw to 13 N•m (115 lb-in.).

Cap Screw—Specification

Torque ..... 13 N•m (115 lb-in.)

7. Do Engine Speed Learning Procedure in this group.



T109243

T109243 –UN–24APR97

CED,TX14740,6097 –19–20APR98–2/2

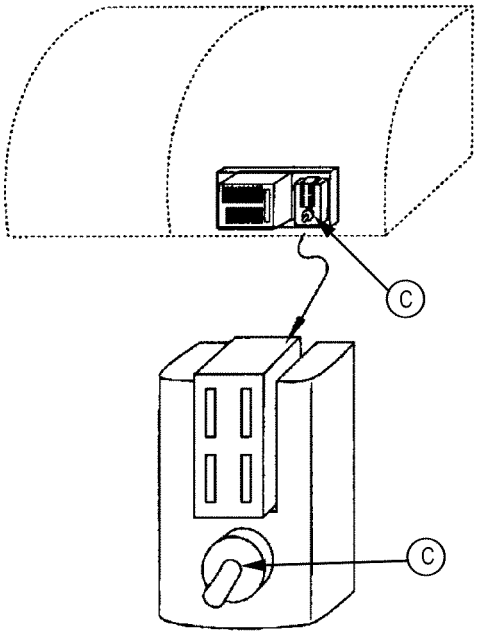
ENGINE SPEED LEARNING PROCEDURE

1. Stop engine.
2. Push engine learning switch (C) up to top position. The switch is a three position switch. Make sure it is in the top position.
3. Turn key switch ON. Wait for 5 seconds.
4. Turn key switch OFF. Wait for 5 seconds.
5. Push engine learning switch to middle position.
6. Check engine speeds.

Engine Speed—Specification

Slow Idle	1000 ± 100 rpm
Auto-Idle	1200 ± 100 rpm
E (Economy) Mode	1900 ± 100 rpm
Fast Idle In Standard Mode	2050 ± 75 rpm

NOTE: If engine RPM is not to specifications, see your authorized dealer.



T103674

T103674 –UN–11SEP96

C—Engine Learning Switch

CED,TX14740,6035 –19–02MAR98–1/1

CHAPTER 18

MAINTENANCE

BLANK

DRAIN COOLING SYSTEM

Drain and flush cooling system using commercial products, replace thermostats, radiator cap, and refill with new coolant.

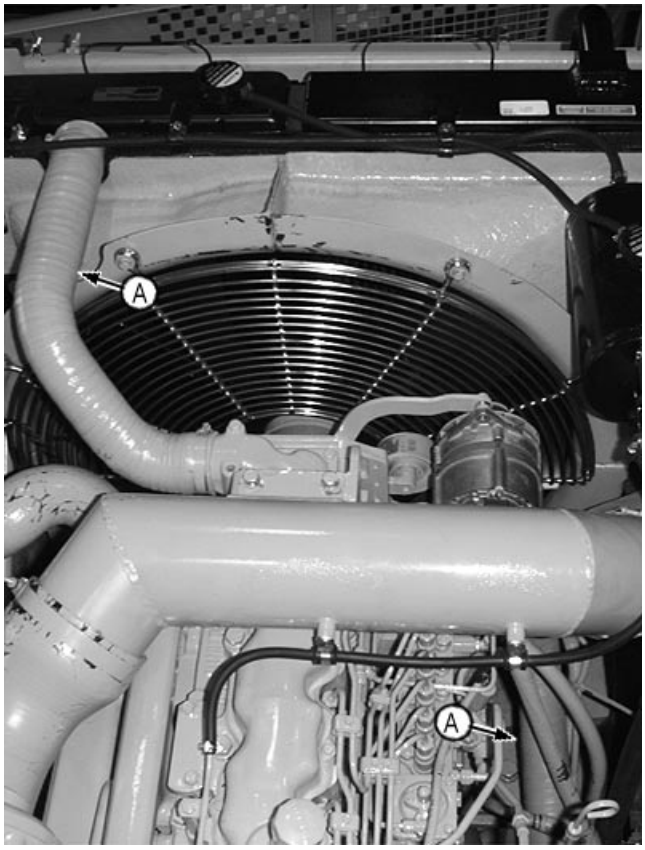
1. Check coolant hoses (A) for cracks and leaks. Replace if necessary.
2. Tighten clamps.
3. Check radiator and oil cooler for dirt, grease, leaks, and loose or broken mountings. Clean radiator and oil cooler fins.

CAUTION: Prevent possible injury from hot spraying water. DO NOT remove radiator filler cap unless engine is cool. Then turn cap slowly to the stop.

4. Release air to relieve pressure. Remove filler cap.

Cooling System—Specification

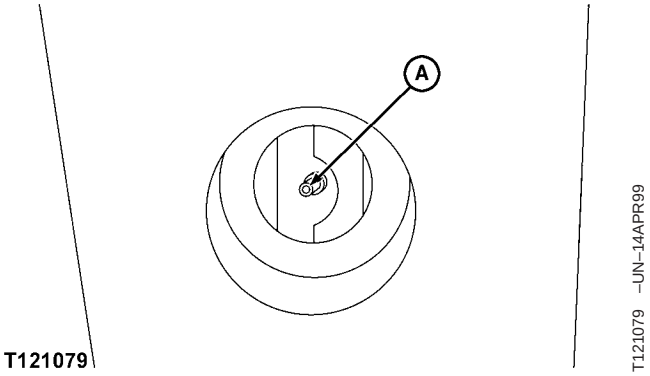
Capacity..... Approx. 30 L (32 qt)



A—Coolant Hoses

CED,OUOE042,73 –19–07APR99–1/3

5. Turn radiator petcock (A) counterclockwise to open valve. Allow coolant to drain into a container. Dispose of waste coolant properly.



A—Radiator Petcock

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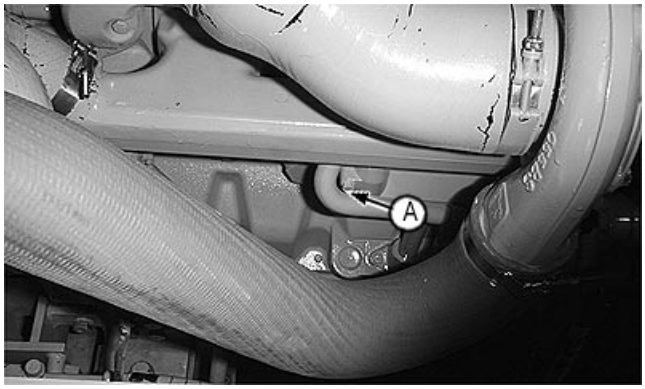
CED,OUOE042,73 –19–07APR99–2/3

6. Turn engine block drain cock (A) counterclockwise to drain engine block. Drain coolant into a container. Dispose of waste properly.



A—Engine Block Drain Cock

CED,OUOE042,73 –19–07APR99–3/3

DIESEL ENGINE COOLANT

The engine cooling system is filled to provide year-round protection against corrosion and cylinder liner pitting, and winter freeze protection to -37°C (-34°F).

The following engine coolant is preferred for service:

- CID A-A-52624 Type 1 is a fully formulated ethylene glycol-based engine coolant concentrate.
- CID A-A-52624 Type 1P is a prediluted (60% by vol. Glycol) fully formulated ethylene glycol-based engine coolant.
- CID A-A-52624 Type 11 is a fully formulated propylene glycol-based engine coolant concentrate.
- CID A-A-52624 Type 1 and Type 11 require dilution with water before use.
- CID A-A-52624 Type 1P is ready to use as packaged.
- John Deere PREDILUTED ANTIFREEZE/SUMMER COOLANT.
- John Deere COOL-GARD™, where available.

John Deere ANTIFREEZE/SUMMER COOLANT CONCENTRATE in a 40 to 60% mixture of concentrate with quality water is also recommended.

Other low silicate ethylene glycol base coolants for heavy-duty engines may be used if they meet one of the following specifications:

- ASTM D6210 (prediluted coolant)
- ASTM D6211 (coolant concentrate) in a 40 to 60% mixture of concentrate with quality water

Coolants meeting these specifications require use of supplemental coolant additives, formulated for heavy-duty diesel engines, for protection against corrosion and cylinder liner erosion and pitting.

A 50% mixture of ethylene glycol engine coolant in water provides freeze protection to -37°C (-34°F). If protection at lower temperatures is required, consult your John Deere dealer for recommendations.

Water quality is important to the performance of the cooling system. Distilled, deionized, or demineralized water is recommended for mixing with ethylene glycol base engine coolant concentrate.

IMPORTANT: Do not use cooling system sealing additives or antifreeze that contains sealing additives.

Coolant drain intervals

Drain and flush the cooling system and refill with fresh coolant every 24 months.

When John Deere PREDILUTED ANTIFREEZE/SUMMER COOLANT is used, the service interval may be extended to 60 months.

COOL-GARD is a trademark of Deere & Company.

CED,TX14740,5978 –19–09DEC99–1/1

COOLING SYSTEM FILL AND DEAERATION PROCEDURE

IMPORTANT: Use only permanent-type low silicate ethylene glycol base antifreeze in coolant solution. Other types of antifreeze may damage cylinder seals.

FREEZING TEMPERATURES: Fill with permanent-type, low silicate, ethylene glycol antifreeze (without stop-leak additive) and clean, soft water.

FILL

Fill radiator to the bottom of the radiator fill neck.

Cooling System—Specification

Capacity..... Approx. 30 L (32 qt)

Fill surge tank to bottom of fill neck.

Fill the recovery tank to FULL mark.

DEAERATION

The cooling system requires several warm-up and cool down cycles to deaerate. It will NOT deaerate during normal operation. Only during warm-up and cool down cycles will the system deaerate.

1. Start engine. Run engine until coolant reaches a warm temperature.
2. Stop engine. Allow coolant to cool.
3. Check coolant level at recovery tank.
4. Repeat Steps 1—3 until recovery tank coolant level is repeatedly at the same level (stabilized).

NOTE: The level of the coolant in the cooling system MUST BE repeatedly checked after all drain and refill procedures to insure that all air is out of the system which allows the coolant level to stabilize. Check coolant level only when the engine is cold.

5. If necessary, fill recovery tank to FULL mark.

Continued on next page

6. Install recovery tank and radiator caps.

CED,TX14740,6020 –19–29JAN98–2/2

DO NOT SERVICE INJECTION NOZZLES

IMPORTANT: Do not service or remove injection nozzles. The service life of the injection nozzles may be shortened by:

- **Overheating**
- **Improper operation**
- **Poor quality fuel**
- **Excessive idling**

If injection nozzles are not working correctly or are dirty, the engine will not run normally. (See your authorized dealer for service.)

TX,90,FF3116 –19–18NOV92–1/1

DO NOT ADJUST INJECTION PUMP

IMPORTANT: Never steam clean or pour cold water on an injection pump while the pump is running, or while it is still warm. To do so may cause seizure of pump parts.

Clean trash regularly from under injection pump.

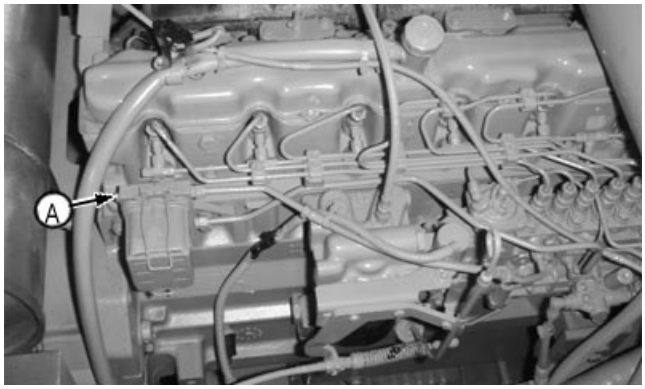
Changing the injection pump in any way not approved by the manufacturer will end the warranty. (See your copy of the John Deere warranty on this machine.)

Do not service an injection pump that is not operating correctly. (See your authorized injection pump service center.)

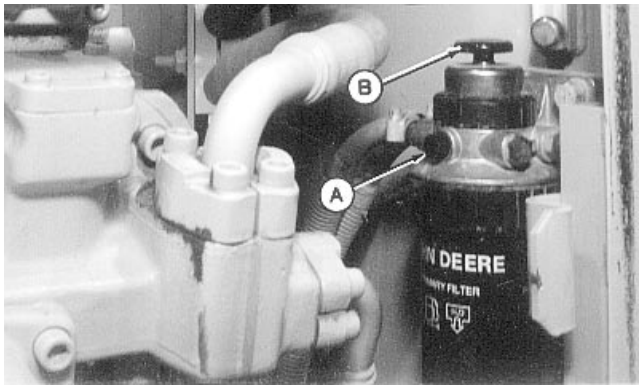
CED,TX14740,6009 –19–23JAN98–1/1

BLEEDING THE FUEL SYSTEM

1. Open bleed screws (A) on fuel filter and on water separator.
2. Pump water separator primer (B) until fuel fills separator bowl and until fuel escapes from water separator bleed screw.
3. Tighten water separator bleed screw.
4. Pump water separator primer (B) until fuel escapes from final fuel filter bleed screw.
5. Tighten final fuel filter bleed screw.



T115148D –UN–30APR98



T102673 –UN–02AUG96

A—Bleed Screws
B—Water Separator Primer

CED,TX14740,6108 –19–30APR98–1/1

PRECAUTIONS FOR ALTERNATOR AND REGULATOR

When batteries are connected, follow these rules:

1. Disconnect negative (-) battery cable when you work on or near alternator or regulator.
2. DO NOT TRY TO POLARIZE ALTERNATOR OR REGULATOR.
3. Be sure alternator wires are correctly connected BEFORE you connect batteries.
4. Do not ground alternator output terminal.
5. Do not disconnect or connect any alternator or regulator wires while batteries are connected or while alternator is operating.
6. Connect batteries or a booster battery in the correct polarity (positive [+] to positive [+] and negative [-] to negative [-]).
7. Do not disconnect the batteries when engine is running and alternator is charging.
8. Disconnect battery cables before you connect battery charger to the batteries.

T82,EXMA,I –19–03AUG92–1/1

SERVICE BATTERIES CAREFULLY

TS204 –UN–23AUG88

CAUTION: Battery gas can explode. Keep sparks and flames away from batteries. Use a flashlight to check battery electrolyte level.

Never check battery charge by placing a metal object across the posts. Use a voltmeter or hydrometer.

Always remove grounded (-) battery clamp first and replace it last.

Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skin, eat holes in clothing, and cause blindness if splashed into eyes.

Avoid the hazard by:

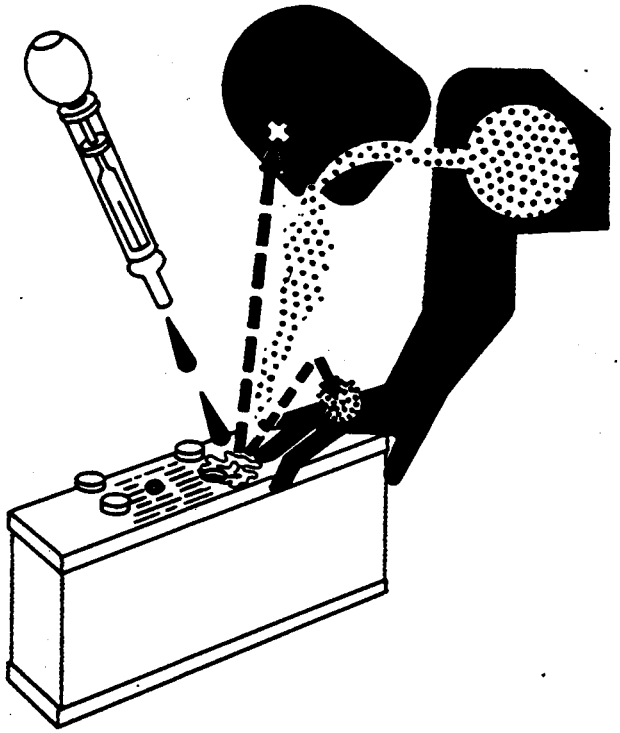
1. **Filling batteries in a well-ventilated area.**
2. **Wearing eye protection and rubber gloves.**
3. **Avoiding breathing fumes when electrolyte is added.**
4. **Avoiding spilling or dripping electrolyte.**
5. **Use proper jump start procedure.**

If you spill acid on yourself:

1. **Flush your skin with water.**
2. **Apply baking soda or lime to help neutralize the acid.**
3. **Flush your eyes with water for 15—30 minutes. Get medical attention immediately.**

If acid is swallowed:

1. **Do not induce vomiting.**
2. **Drink large amounts of water or milk, but do not exceed 1.9 L (2 quarts).**
3. **Get medical attention immediately.**



TS203 –UN–23AUG88

If electrolyte spills on the floor, use one of the following mixtures to neutralize the acid: 0.5 kg (1 lb) baking soda in 4 L (1 gal) water, or 0.47 L (1 pt) household ammonia in 4 L (1 gal) water.

Continued on next page

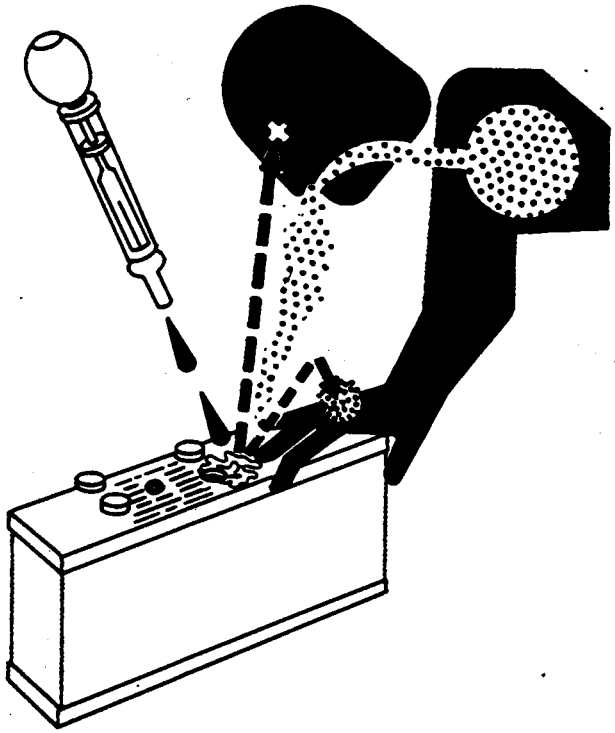
TX,90,DH1018 –19–30APR94–1/2

IMPORTANT: Electrolyte can damage paint and metal surfaces of your machine. Do not overfill the battery cells.

TX,90,DH1018 –19–30APR94–2/2

CHECKING ELECTROLYTE SPECIFIC GRAVITY

TS204 –UN–23AUG88



TS203 –UN–23AUG88

CAUTION: Battery gas can explode. Keep sparks and flames away from batteries. Use a flashlight to check battery electrolyte level.

Never check battery charge by placing a metal object across the posts. Use a voltmeter or hydrometer.

Always remove grounded (-) battery clamp first and replace it last.

Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skin, eat holes in clothing, and cause blindness if splashed into eyes.

Avoid the hazard by:

1. **Filling batteries in a well-ventilated area.**
2. **Wearing eye protection and rubber gloves.**
3. **Avoiding breathing fumes when electrolyte is added.**
4. **Avoiding spilling or dripping electrolyte.**
5. **Use proper jump start procedure.**

If you spill acid on yourself:

1. **Flush your skin with water.**
2. **Apply baking soda or lime to help neutralize the acid.**
3. **Flush your eyes with water for 15—30 minutes. Get medical attention immediately.**

If acid is swallowed:

1. **Do not induce vomiting.**
2. **Drink large amounts of water or milk, but do not exceed 1.9 L (2 quarts).**
3. **Get medical attention immediately.**

Check the specific gravity of electrolyte in each battery cell.

Continued on next page

See your John Deere dealer for JT05460 SERVICEGARD™ battery and coolant tester. Follow directions included with the tester.

A fully charged battery will have a corrected specific gravity reading of 1.260. If the reading is below 1.200, charge the battery.

NOTE: In tropical areas, use 1.225 for the full charge reading. In cold areas, use 1.280 for the full-charge reading.

T85402 –UN–10NOV88

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CED,TX14740,6030 –19–17FEB98–2/2

USING BATTERY CHARGER

CAUTION: Disconnect battery ground before you charge batteries in the machine to prevent damage to electrical components.

A battery may explode if charged when it is frozen. Warm battery to 16°C (60°F) before charging.

A battery charger may be used as a booster to start engine.

IMPORTANT: Do not use battery charger as a booster if a battery has a 1.150 specific gravity reading or lower. Turn off charger before connecting or disconnecting it.

TS204 –UN–23AUG88

T82,EXMA,G –19–03AUG92–1/1

REPLACING BATTERIES

Your machine has two 12 volt batteries with negative (-) ground. Batteries must meet one of the specifications below.

Battery—Specification

Cold Cranking Amps At -18°C (0°F) 1400
Minutes Reserve Capacity At 25 Amps 440

If one battery in a 24-volt system has failed but the other is still good, replace the failed battery with one of the same type. For example, replace a failed maintenance-free battery with a new maintenance-free battery. Different types of batteries may have different rates of charge. This difference could overload one of the batteries and cause it to fail.

CED,OUOE020,49 –19–13APR99–1/1

REMOVING BATTERIES

1. Remove two wing nuts from battery cover.
2. Disconnect negative (-) battery cables first, then positive (+) cables.
3. Remove hold down brackets.
4. Lift batteries out of compartment.

TX,90,DH5154 –19–10AUG96–1/1

WELDING ON MACHINE

IMPORTANT: Disconnect battery ground strap or turn battery disconnect switch to "OFF" to prevent voltage spikes through alternator or monitor.

If machine is equipped with a controller (microprocessor) like Main Controller, disconnect harness connector from controller to prevent voltage spikes through microprocessor.

Connect welder ground clamp close to each weld area so electrical current does not arc inside any bearings.

TX,90,DH5140 –19–08AUG96–1/1

ADDING 12—VOLT ACCESSORIES

IMPORTANT: This machine has a 24-volt electrical system. Installing 12-volt accessories without addition of 24-volt to 12-volt converter may cause battery failure.

When possible, use 24-volt accessories. If 12-volt accessories are added, use a 24-volt to 12-volt converter. Converters are available from your authorized dealer. (See the Industrial Equipment Attachment Guide.)

Converter capacity requirements depend on the load of the accessories installed. Follow electronic dealer and manufacturer's recommendations to determine the capacity of the converter required and its installation requirements.

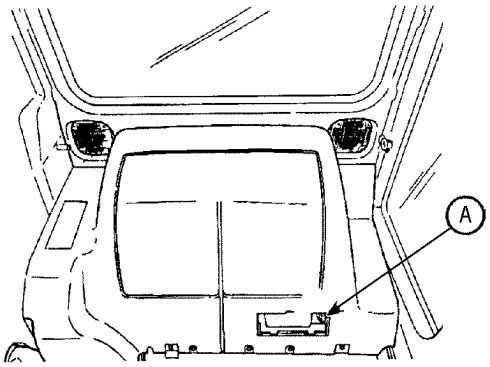
IMPORTANT: DO NOT connect an accessory to one battery. Connecting a 12-volt accessory to one battery will cause one battery to overcharge, and the other battery to undercharge, causing battery failure.

TX,90,DH3734 –19–18AUG95–1/1

REPLACING FUSES

The fuse box is located behind the seat.

Remove cover (A).



T105381 –UN–26NOV96

A—Fuse Box Cover

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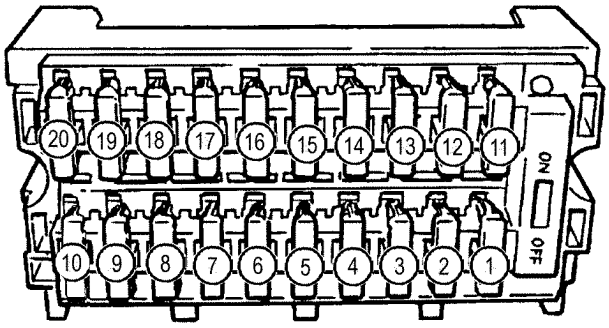
TX,90,DH5331 –19–26NOV96–1/2

IMPORTANT: Install fuse with correct amperage rating to prevent electrical system damage from overload.



T101638 –UN–26JUN96

1—5 Amp—Back up
2—10 Amp—Controller
3—10 Amp—EC Motor
4—5 Amp—Solenoid
5—10 Amp—Pow. on
6—5 Amp—Sw box
7—5 Amp
8—10 Amp
9—5 Amp
10—5 Amp—Travel
11—20 Amp—Lamp
12—10 Amp—Wiper
13—20 Amp—Heater
14—5 Amp—Air con
15—10 Amp—Horn
16—5 Amp—Radio
17—10 Amp—Lighter
18—5 Amp—Room Lamp
19—10 Amp—Auxiliary
20—20 Amp—Lamp

TX,90,DH5331 –19–26NOV96–2/2

FUSE (BLADE-TYPE) COLOR CODES

Amperage Rating	Color
1	Black
3	Violet
4	Pink
5	Tan
7-1/2	Brown
10	Red
15	Light Blue
20	Yellow
25	Natural (White)
30	Light Green

04T,90,J22 –19–28SEP92–1/1

CHECKING TRAVEL ALARM SYSTEM

1. Propel machine forward.

   Travel alarm must sound.

2. Stop machine.

   Travel alarm must stop.

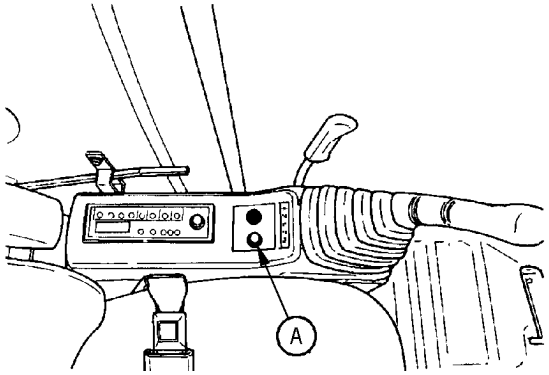
3. Propel machine forward.

4. Depress travel alarm cancel switch (A).

   After an initial 12 second alarm, alarm must stop.

5. Repeat test with machine traveling in reverse.

6. If the travel alarm does not operate properly, do not operate machine. See your authorized dealer.



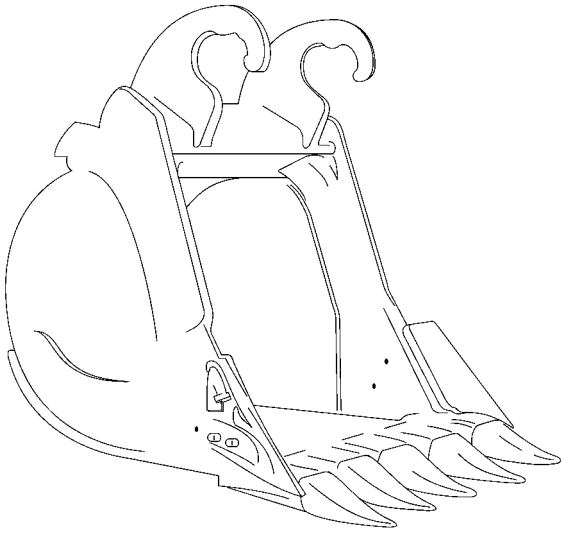
T102893 –UN–07AUG96

A—Travel Alarm Cancel Switch

TX,90,DH5141 –19–08AUG96–1/1

REMOVING THE BUCKET

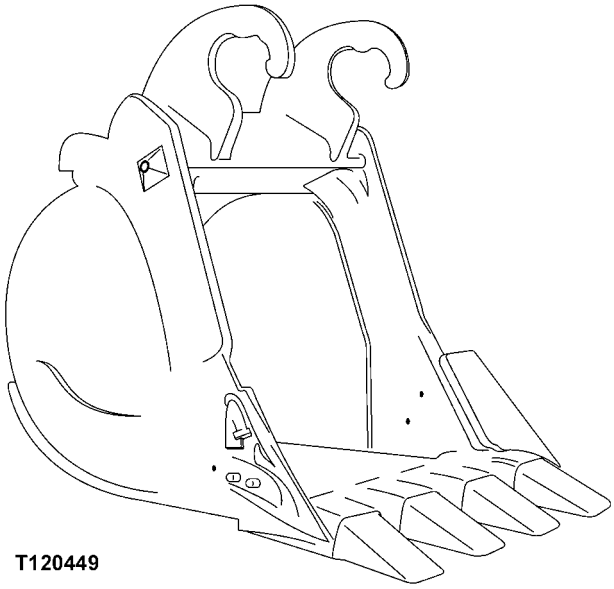
Remove bucket. (See Using Quick-Disconnect Hitch in this manual.)



T120450

T120450 –UN–25MAR99

42 Inch Bucket



T120449

T120449 –UN–25MAR99

48 Inch Bucket

CED,OUOE012,143 –19–18MAR99–1/1

REPLACING BUCKET TEETH


T95784 –UN–10NOV88

CAUTION: Guard against injury from flying pieces of metal; wear goggles or safety glasses.

IMPORTANT: Angle the drift toward the bucket to avoid damaging the rubber pin lock.

1. Use a hammer and drift to drive out locking pin.

NOTE: Alternate buckets may use different tooth assemblies.

2. Remove tooth.

04T,90,M16 –19–05APR91–1/3

3. Inspect rubber pin lock (A) for damage. Replace if necessary.

4. If rubber pin lock has moved, reposition in slot in adapter tooth shank.

T95785 –UN–10NOV88

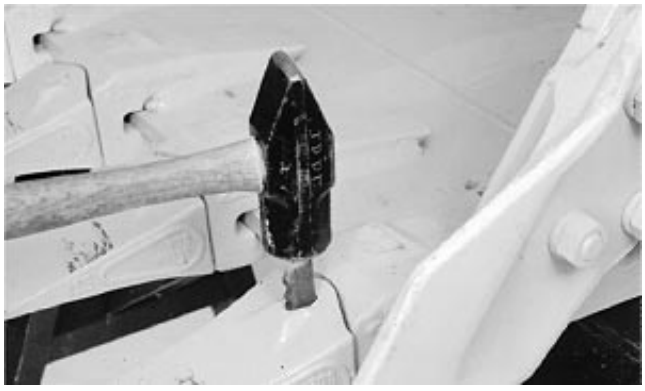
A—Rubber Pin Lock

04T,90,M16 –19–05APR91–2/3

5. Position the new tooth over the tooth shank.

6. Drive the locking pin into the hole fully.

NOTE: Check bucket teeth periodically so that wear does not extend to the bucket tooth shank.


T95786 –UN–10NOV88

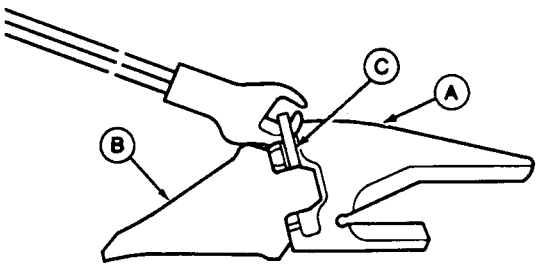
04T,90,M16 –19–05APR91–3/3

REPLACING BUCKET TOOTH TIP—HEAVY-DUTY BUCKET

1. Clean tooth (A) and tooth tip (B).
2. Insert lock removal tool under U-shaped pin (C).

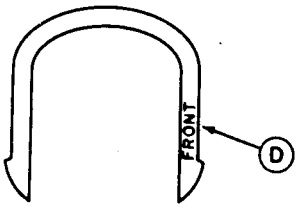
CAUTION: Avoid possible injury. Pin may fly after it is released from tooth tip. Keep a firm grip on pin to prevent injury.

3. Remove pin.
4. Turn tooth tip counterclockwise and pull it towards you to remove.
5. Clean tooth shank.
6. Replace U-shaped pin at same time you replace tooth tip.
7. Insert tooth tip on shank turning tip clockwise.
8. Install U-shaped pin. Side of pin marked "FRONT" (D) must face tooth tip. Make sure pin is firmly engaged over tooth tip.



T6879EE

T6879EE –UN–06DEC88



T7527DO –UN–27JUN91

A—Tooth
B—Tooth Tip
C—Pin
D—"Front" Mark

04T,90,K273 –19–28JAN92–1/1

DO NOT SERVICE CONTROL VALVES, CYLINDERS, PUMPS OR MOTORS

Special tools and information are needed to service control valves, cylinders, pumps, or motors.

If these parts need service, see your authorized dealer.

TX,90,FF3114 –19–18NOV92–1/1

TRACK SAG GENERAL INFORMATION

To maximize undercarriage life, keep track sag within specification. Tracks may require adjustment several times during a working day due to changing soil type and moisture content.

Adjust tracks in the actual operating conditions.

TIGHT TRACK: Packing causes a tight track. If material packs in the undercarriage, adjust tracks with the material packed in the components.

While the track spring will recoil and the machine can continue to operate with a tight track, continued operation will result in excessive pin and bushing wear, sprocket popping, tooth tip wear, and excessive loads on the entire undercarriage and propel drive system.

Machine productivity and fuel consumption are also adversely affected because increased horsepower is needed to move the machine.

LOOSE TRACK: A loose track has more side to side motion, increasing side wear on the links, rollers and front idler. An excessively loose track will slap at high ground speeds, resulting in high impact loads on the sprocket teeth, bushings, and carrier rollers.

04T,90,M197 –19–07NOV90–1/1

HARDWARE TORQUE SPECIFICATIONS

Check cap screws and nuts to be sure they are tight. If hardware is loose, tighten to torque shown on the following charts unless a special torque is specified.

T82,SKMA,AT –19–01AUG94–1/1

CHECK TRACK SHOE TORQUE

Track shoe cap screw torque should be periodically checked. If the cap screws do not meet the minimum torque specifications, remove the shoes and clean the mating surfaces of the shoes and links before tightening the cap screws.

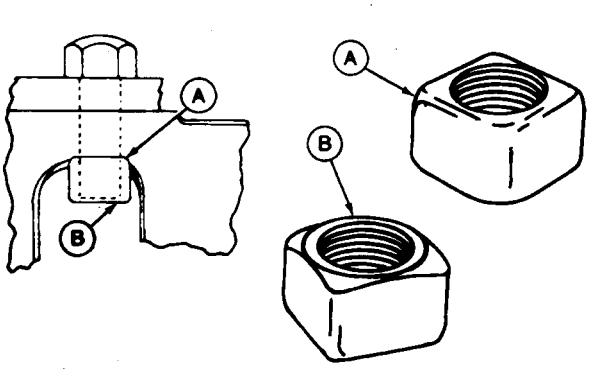
If unit is operated with loose track shoes, the cap screw holes in the shoes and links will wear and it may be difficult to keep the track shoes tight. Loose shoes can also cause hardware failure and loss of track shoes.

Install all track shoe nuts with rounded edges (A) against the link and chamfered edges (B) away from the link. Be sure nut is properly positioned in the link so there is full contact area between the nut and the link.

Cap Screw—Specification

Torque ..... 298 N•m (220 lb-ft) Plus 1/2 turn (180°)

T82862 –UN–08NOV88



T6794AM –UN–23FEB89

A—Rounded Edge
B—Chamfered Edge

TX,90,FF,294 –19–09APR92–1/1

UNIFIED INCH BOLT AND CAP SCREW TORQUE VALUES

SAE Grade and Head Markings	NO MARK	1 or 2[b]	5 5.1 5.2	8 8.2
SAE Grade and Nut Markings	NO MARK	2	5	8

Size	Grade 1				Grade 2[b]				Grade 5, 5.1, or 5.2				Grade 8 or 8.2			
	Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]	
	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft
1/4	3.7	2.8	4.7	3.5	6	4.5	7.5	5.5	9.5	7	12	9	13.5	10	17	12.5
5/16	7.7	5.5	10	7	12	9	15	11	20	15	25	18	28	21	35	26
3/8	14	10	17	13	22	16	27	20	35	26	44	33	50	36	63	46
7/16	22	16	28	20	35	26	44	32	55	41	70	52	80	58	100	75
1/2	33	25	42	31	53	39	67	50	85	63	110	80	120	90	150	115
9/16	48	36	60	45	75	56	95	70	125	90	155	115	175	130	225	160
5/8	67	50	85	62	105	78	135	100	170	125	215	160	240	175	300	225
3/4	120	87	150	110	190	140	240	175	300	225	375	280	425	310	550	400
7/8	190	140	240	175	190	140	240	175	490	360	625	450	700	500	875	650
1	290	210	360	270	290	210	360	270	725	540	925	675	1050	750	1300	975
1-1/8	400	300	510	375	400	300	510	375	900	675	1150	850	1450	1075	1850	1350
1-1/4	570	425	725	530	570	425	725	530	1300	950	1650	1200	2050	1500	2600	1950
1-3/8	750	550	950	700	750	550	950	700	1700	1250	2150	1550	2700	2000	3400	2550
1-1/2	1000	725	1250	925	990	725	1250	930	2250	1650	2850	2100	3600	2650	4550	3350

DO NOT use these values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only. Check tightness of fasteners periodically.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical grade.

Fasteners should be replaced with the same or higher grade. If higher grade fasteners are used, these should only be tightened to the strength of the original.

Make sure fasteners threads are clean and that you properly start thread engagement. This will prevent them from failing when tightening.

Tighten plastic insert or crimped steel-type lock nuts to approximately 50 percent of the dry torque shown in the chart, applied to the nut, not to the bolt head. Tighten toothed or serrated-type lock nuts to the full torque value.

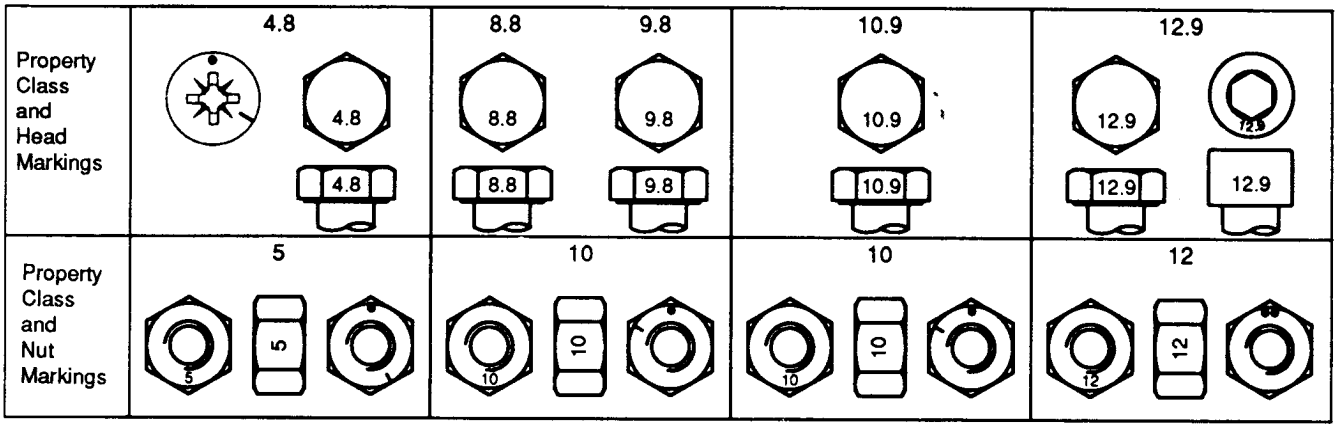
[a] *"Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings. "Dry" means plain or zinc plated without any lubrication.*

[b] *Grade 2 applies for hex cap screws (not hex bolts) up to 152 mm (6-in.) long. Grade 1 applies for hex cap screws over 152 mm (6-in.) long, and for all other types of bolts and screws of any length.*

TS1656 –19–02APR97

DX,TORQ1 –19–20JUL94–1/1

METRIC BOLT AND CAP SCREW TORQUE VALUES



Size	Class 4.8				Class 8.8 or 9.8				Class 10.9				Class 12.9			
	Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]	
	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft
M6	4.8	3.5	6	4.5	9	6.5	11	8.5	13	9.5	17	12	15	11.5	19	14.5
M8	12	8.5	15	11	22	16	28	20	32	24	40	30	37	28	47	35
M10	23	17	29	21	43	32	55	40	63	47	80	60	75	55	95	70
M12	40	29	50	37	75	55	95	70	110	80	140	105	130	95	165	120
M14	63	47	80	60	120	88	150	110	175	130	225	165	205	150	260	190
M16	100	73	125	92	190	140	240	175	275	200	350	255	320	240	400	300
M18	135	100	175	125	260	195	330	250	375	275	475	350	440	325	560	410
M20	190	140	240	180	375	275	475	350	530	400	675	500	625	460	800	580
M22	260	190	330	250	510	375	650	475	725	540	925	675	850	625	1075	800
M24	330	250	425	310	650	475	825	600	925	675	1150	850	1075	800	1350	1000
M27	490	360	625	450	950	700	1200	875	1350	1000	1700	1250	1600	1150	2000	1500
M30	675	490	850	625	1300	950	1650	1200	1850	1350	2300	1700	2150	1600	2700	2000
M33	900	675	1150	850	1750	1300	2200	1650	2500	1850	3150	2350	2900	2150	3700	2750
M36	1150	850	1450	1075	2250	1650	2850	2100	3200	2350	4050	3000	3750	2750	4750	3500

DO NOT use these values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only. Check tightness of fasteners periodically.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical property class.

Fasteners should be replaced with the same or higher property class. If higher property class fasteners are used, these should only be tightened to the strength of the original.

Make sure fasteners threads are clean and that you properly start thread engagement. This will prevent them from failing when tightening.

Tighten plastic insert or crimped steel-type lock nuts to approximately 50 percent of the dry torque shown in the chart, applied to the nut, not to the bolt head. Tighten toothed or serrated-type lock nuts to the full torque value.

[a] *"Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings. "Dry" means plain or zinc plated without any lubrication.*

TS1657 –19–02APR97

DX,TORQ2 –19–20JUL94–1/1

ADDITIONAL METRIC CAP SCREW TORQUE VALUES

CAUTION: Use only metric tools on metric hardware. Other tools may not fit properly. They may slip and cause injury.

Check tightness of cap screws periodically. Torque values listed are for general use only. Do not use these values if a different torque value or tightening procedure is listed for a specific application.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical grade.

Fasteners should be replaced with the same or higher grade. If higher grade fasteners are used, these should only be tightened to the strength of the original.

Make sure fastener threads are clean and you properly start thread engagement. This will prevent them from failing when tightening.

Tighten cap screws having lock nuts to approximately 50 percent of amount shown in chart.

T6873AA

T6873AA –UN–18OCT88

T6873AB

T6873AB –UN–18OCT88

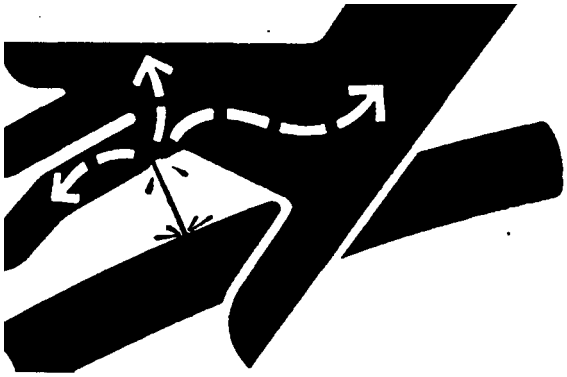
T6873AC

T6873AC –UN–18OCT88

METRIC CAP SCREW TORQUE VALUES[a]						
	T-Bolt		H-Bolt		M-Bolt	
Nominal Dia	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft
8	29	21	20	15	10	7
10	63	46	45	33	20	15
12	108	80	88	65	34	25
14	176	130	137	101	54	40
16	265	195	206	152	78	58
18	392	289	294	217	118	87
20	539	398	392	289	167	125
22	735	542	539	398	216	159
24	931	687	686	506	274	202
27	1372	1012	1029	759	392	289
30	1911	1410	1421	1049	539	398
33	2548	1890	1911	1410	735	542
36	3136	2314	2401	1772	931	687
[a]Torque tolerance is ±10%.						

04T,90,M170 –19–01AUG94–1/1

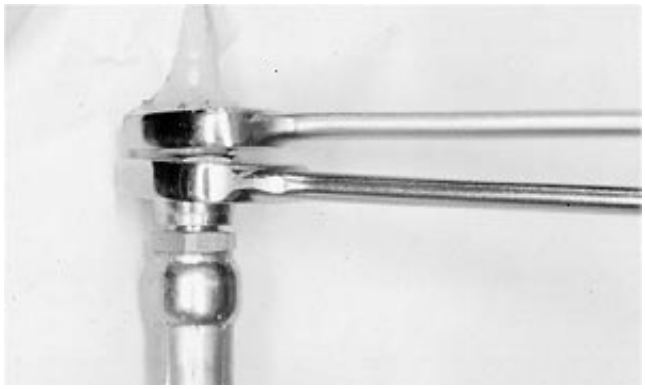
CHECK OIL LINES AND FITTINGS



X9811 –UN–23AUG88

CAUTION: Escaping fluid under pressure can penetrate the skin causing serious injury. Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure. Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.

If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury may call the Deere & Company Medical Department in Moline, Illinois, or other knowledgeable medical source.



T85401 –UN–24JAN89

Check all oil lines, hoses and fittings regularly for leaks or damage. Make sure all clamps are in position and tight. Make sure hoses are not twisted or touching machine parts which are moving.

Tubing with dents may cause the oil to overheat. If you find tubing with dents, install new tubing immediately.

IMPORTANT: Tighten fittings as specified in torque chart.

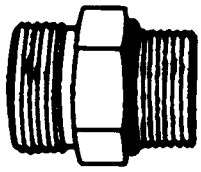
When you tighten connections, use two wrenches to prevent bending or breaking tubing and fittings.

T82,FLMA,AI –19–14MAR90–1/1

SERVICE RECOMMENDATIONS FOR O-RING BOSS FITTINGS

STRAIGHT FITTING

1. Inspect O-ring boss seat for dirt or defects.
2. Lubricate O-ring with petroleum jelly. Place electrical tape over threads to protect O-ring. Slide O-ring over tape and into O-ring groove of fitting. Remove tape.
3. Tighten fitting to torque value shown on chart.



T6243AE –UN–18OCT88

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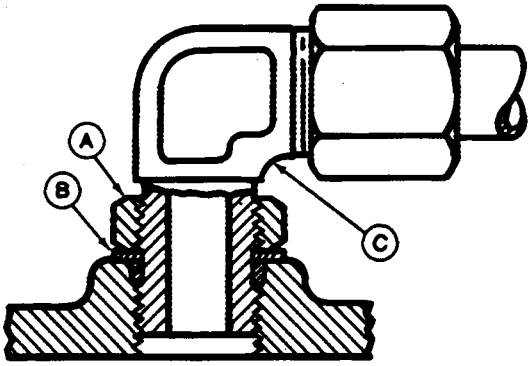
04T,90,K66 –19–19MAR96–1/2

ANGLE FITTING



T6520AB –UN–18OCT88

1. Back-off lock nut (A) and back-up washer (B) completely to head-end (C) of fitting.
2. Turn fitting into threaded boss until back-up washer contacts face of boss.
3. Turn fitting head-end counterclockwise to proper index (maximum of one turn).

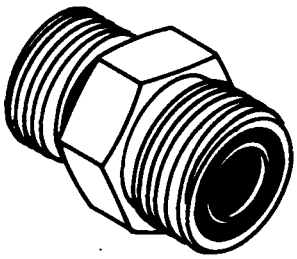
NOTE: Do not allow hoses to twist when tightening fittings.

4. Hold fitting head-end with a wrench and tighten locknut and back-up washer to proper torque value.

STRAIGHT FITTING OR SPECIAL NUT TORQUE CHART		
Thread Size	**N•m**	**lb-ft**
3/8-24 UNF	8	6
7/16-20 UNF	12	9
1/2-20 UNF	16	12
9/16-18 UNF	24	18
3/4-16 UNF	46	34
7/8-14 UNF	62	46
1-1/16-12 UN	102	75
1-3/16-12 UN	122	90
1-5/16-12 UN	142	105
1-5/8-12 UN	190	140
1-7/8-12 UN	217	160
NOTE: Torque tolerance is ± 10%.		

04T,90,K66 –19–19MAR96–2/2

SERVICE RECOMMENDATIONS FOR FLAT FACE O-RING SEAL FITTINGS



T6243AD –UN–18OCT88

1. Inspect the fitting sealing surfaces. They must be free of dirt or defects.
2. Inspect the O-ring. It must be free of damage or defects.
3. Lubricate O-rings and install into groove using petroleum jelly to hold in place.
4. Push O-ring into the groove with plenty of petroleum jelly so O-ring is not displaced during assembly.
5. Index angle fittings and tighten by hand pressing joint together to insure O-ring remains in place.
6. Tighten fitting or nut to torque value shown on the chart per dash size stamped on the fitting. Do not allow hoses to twist when tightening fittings.

FLAT FACE O-RING SEAL FITTING TORQUE

Nominal Tube O.D.				Swivel Nut		Bulkhead Nut	
mm	in.	Dash Size	Thread Size in.	N•m	lb-ft	N•m	lb-ft
6.35	0.250	-4	9/16-18	16	12	5.0	3.5
9.52	0.375	-6	11/16-16	24	18	9.0	6.5
12.70	0.500	-8	13/16-16	50	37	17.0	12.5
15.88	0.625	-10	1-14	69	51	17.0	12.5
19.05	0.750	-12	1 3/16-12	102	75	17.0	12.5
22.22	0.875	-14	1 3/16-12	102	75	17.0	12.5
25.40	1.000	-16	1 7/16-12	142	105	17.0	12.5
31.75	1.250	-20	1 11/16-12	190	140	17.0	12.5
38.10	1.500	-24	2-12	217	160	17.0	12.5

NOTE: Torque tolerance is +15 -20%.

04T,90,K67 –19–01AUG94–1/1

SERVICE RECOMMENDATIONS FOR 37° FLARE AND 30° CONE SEAT CONNECTORS

1. Inspect flare and flare seat. They must be free of dirt or obvious defects.
2. Defects in tube flare cannot be repaired. Overtightening a defective flared fitting will not stop leaks.
3. Align tube with fitting before attempting to start nut.
4. Lubricate male threads with hydraulic fluid or petroleum jelly.
5. Index angle fittings and tighten by hand.
6. Tighten fitting or nut to torque value shown on torque chart. Do not allow hoses to twist when tightening fittings.

T6234AC –UN–18OCT88

STRAIGHT FITTING OR SPECIAL NUT TORQUE CHART		
Thread Size	**N•m**	**lb-ft**
3/8 - 24 UNF	8	6
7/16 - 20 UNF	12	9
1/2 - 20 UNF	16	12
9/16 - 18 UNF	24	18
3/4 - 16 UNF	46	34
7/8 - 14 UNF	62	46
1-1/16 - 12 UN	102	75
1-3/16 - 12 UN	122	90
1-5/16 - 12 UN	142	105
1-5/8 - 12	190	140
1-7/8 - 12 UN	217	160
NOTE: Torque tolerance is ± 10%.		

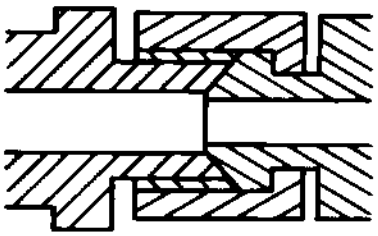
T82,BHMA,EL –19–19MAR96–1/1

SERVICE RECOMMENDATIONS FOR FLARED CONNECTIONS—STRAIGHT OR TAPERED THREADS

1. Inspect flare and flare seat. They must be free of dirt or obvious defects.
2. Defects in the tube flare cannot be repaired. Overtightening a defective flared fitting will not stop leaks.
3. Align the tube with the fitting before attempting to start the nut.
4. Lubricate the male threads with hydraulic fluid or petroleum jelly.
5. Index angle fittings and tighten by hand.
6. Tighten fitting or nut to torque value shown on the chart. Do not allow hoses to twist when tightening fittings.

TORQUE CHART [a]				
	Straight Thread [b]		Tapered Thread	
Thread Size	N•m	lb-ft	N•m	lb-ft
1/8	15	11		
1/4	20	15	45	33
3/8	29	21	69	51
1/2	49	36	93	69
3/4	69	51	176	130
1	157	116	343	253
1-1/2	196	145	539	398
2	255	188	588	434
[a]Torque tolerance is ±10%.				
[b]With seat face.				

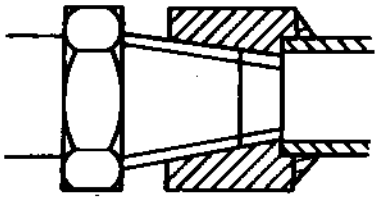
NOTE: If female thread is cast iron (control valves, brake valves motors, etc.), torque must be reduced approximately 10%.



T6873AE

T6873AE –UN–18OCT88

Straight Thread



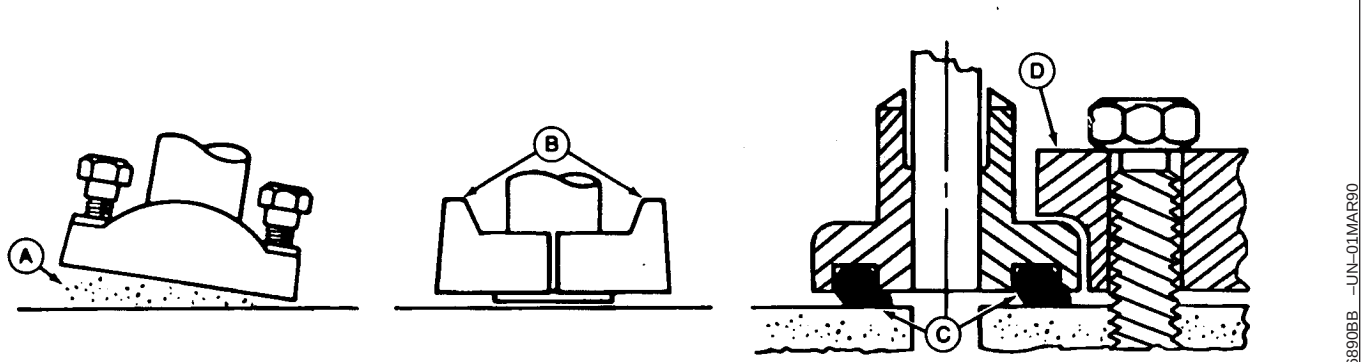
T6873AD

T6873AD –UN–18OCT88

Tapered Thread

04T,90,M171 –19–28JAN92–1/1

SERVICE RECOMMENDATIONS FOR INCH SERIES FOUR BOLT FLANGE FITTINGS



T6890BB –UN–01MAR90

A—Sealing Surface **B—Split Flange** **C—Pinched O-Ring** **D—Single Piece Flange**

1. Clean sealing surfaces (A). Inspect. Scratches cause leaks. Roughness causes seal wear. Out-of-flat causes seal extrusion. If defects cannot be polished out, replace component.

2. Install O-ring (and backup washer if required) into groove using petroleum jelly to hold it in place.

3. Split flange: Loosely assemble split flange (B) halves. Make sure split is centrally located and perpendicular to port. Hand tighten cap screws to hold parts in place. Do not pinch O-ring (C).

4. Single piece flange (D): Place hydraulic line in center of flange and install cap screws. Flange must be centrally located on port. Hand tighten cap screws to hold flange in place. Do not pinch O-ring.

5. Tighten one cap screw, then tighten the diagonally opposite cap screw. Tighten two remaining cap screws. Tighten all cap screws as specified in the chart below.

   DO NOT use air wrenches. DO NOT tighten one cap screw fully before tightening the others. DO NOT over tighten.

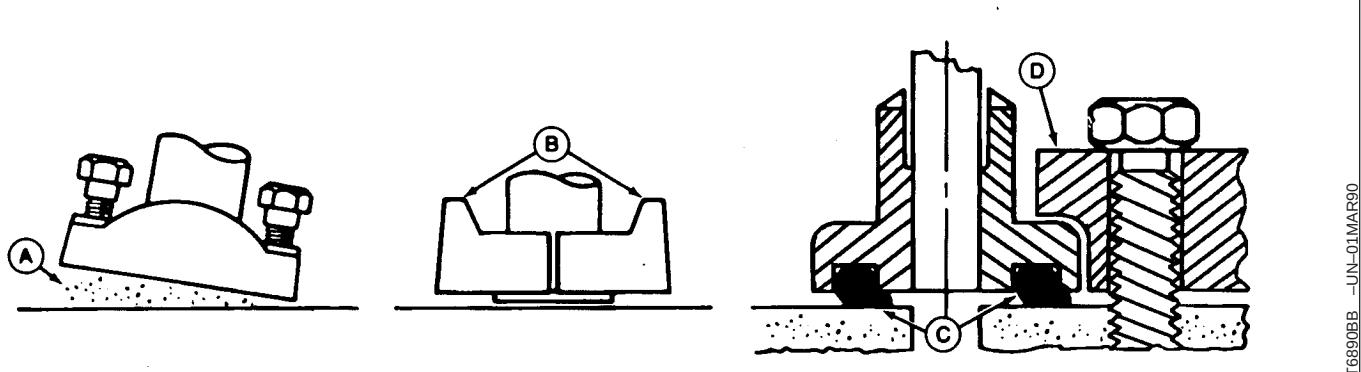
Continued on next page

TORQUE CHART [a]						
			N•m		lb-ft	
Nominal Flange Size	**Cap Screw Size**		**Min**	**Max**	**Min**	**Max**
1/2	5/16-18	UNC	20	31	15	23
3/4	3/8-16	UNC	28	54	21	40
1	3/8-16	UNC	37	54	27	40
1-1/4	7/16-14	UNC	47	85	35	63
1-1/2	1/2-13	UNC	62	131	46	97
2	1/2-13	UNC	73	131	54	97
2-1/2	1/2-13	UNC	107	131	79	97
3	5/8-11	UNC	158	264	117	195
3-1/2	5/8-11	UNC	158	264	117	195
4	5/8-11	UNC	158	264	117	195
5	5/8-11	UNC	158	264	117	195

[a]Tolerance ± 10%. The torques given are enough for the given size connection with the recommended working pressure. Torques can be increased to the maximum shown for each cap screw size if desired. Increasing cap screw torque beyond this maximum will result in flange and cap screw bending and connection failures.

04T,90,K174 –19–01AUG94–2/2

SERVICE RECOMMENDATIONS FOR METRIC SERIES FOUR BOLT FLANGE FITTING



T6890BB –UN–01MAR90

A—Sealing Surface **B—Split Flange** **C—Pinched O-Ring** **D—Single Piece Flange**

1. Clean sealing surfaces (A). Inspect. Scratches cause leaks. Roughness causes seal wear. Out-of-flat causes seal extrusion. If defects cannot be polished out, replace component.

2. Install the correct O-ring (and backup washer if required) into groove using petroleum jelly to hold it in place.

3. Split flange: Loosely assemble split flange (B) halves. Make sure split is centrally located and perpendicular to the port. Hand tighten cap screws to hold parts in place. Do not pinch O-ring (C).

4. Single piece flange (D): Place hydraulic line in center of flange and install four cap screws. Flange must be centrally located on port. Hand tighten cap screws to hold flange in place. Do not pinch O-ring.

5. After components are properly positioned and cap screws are hand tightened, tighten one cap screw, then tighten the diagonally opposite cap screw. Tighten two remaining cap screws. Tighten all cap screws as specified in the chart below. DO NOT use air wrenches. DO NOT tighten one cap screw fully before tightening the others. DO NOT over tighten.

TORQUE CHART[a]		
Thread[b]	**N•m**	**lb-ft**
M6	12	9
M8	30	22
M10	57	42
M12	95	70
M14	157	116
M16	217	160
M18	334	246
M20	421	318

[a]Tolerance ± 10%. The torques given are enough for the given size connection with the recommended working pressure. Increasing cap screw torque beyond these amounts will result in flange and cap screw bending and connection failures.

[b]Metric standard thread.

04T,90,K175 –19–05JAN96–1/1

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CHAPTER 19

OPERATIONAL CHECKOUT

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Operational Checkout

OPERATIONAL CHECKOUT

Use this procedure to check all systems and functions on the machine. It is designed so you can make a quick check of machine operation while doing a walk around inspection and performing specific checks from the operator's seat.

Should you experience a problem with your machine, you will find helpful diagnostic information in this checkout that will pinpoint the cause. This information may allow you to perform a simple adjustment yourself which will reduce the down time of your machine. Use the table of contents to help find adjustment procedures.

The information you provide after completing the operational checkout will allow you or your authorized dealer to pinpoint a specific test or repair needed to restore the machine to design specifications.

A location will be required which is level and has adequate space to complete the checks. No tools or equipment are needed to perform the checkout.

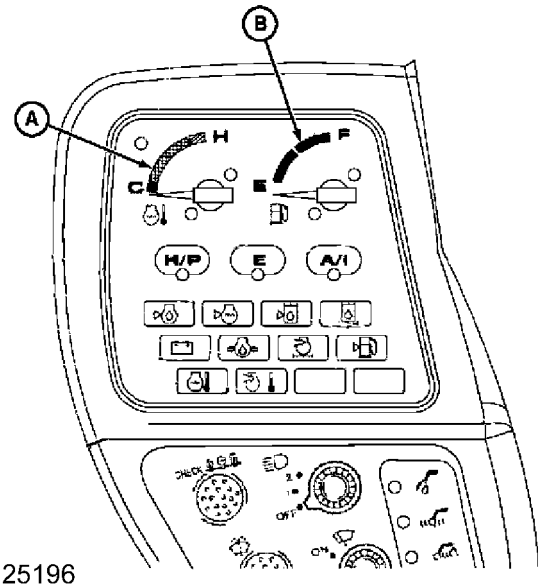
Complete the necessary visual checks (oil levels, oil condition, external leaks, loose hardware, linkage, wiring, etc.) prior to doing the checkout. The machine must be at operating temperature for many of the checks.

Start at the top of the left column and read completely down column before performing check. Follow this sequence from left to right. In the far right column, if no problem is found, you will be instructed to go to next check. If a problem is indicated, you will be referred to either a section in this manual or to your authorized dealer for repair.

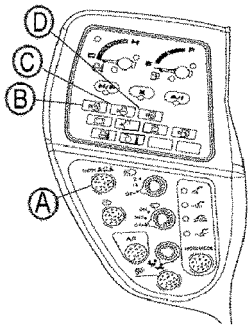
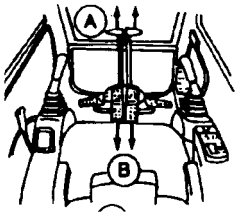
CED,OUOE042,69 –19–10DEC99–1/1

❶ OPERATOR STATION CHECKS—KEY SWITCH ON, ENGINE OFF

– – –1/1

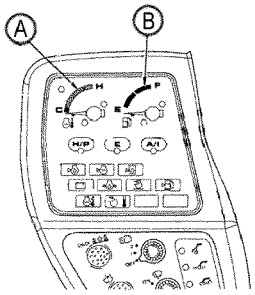
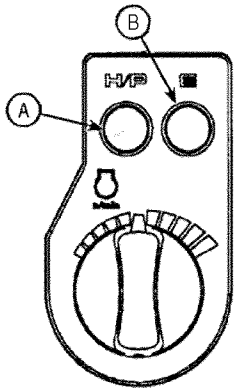
GAUGES, MONITOR, AND BATTERY DISCONNECT RELAY CHECKS	 T125196 T125196 –UN–29OCT99 **A—Engine Temperature Gauge** **B—Fuel Gauge** *NOTE: Monitor buzzer is not checked during this procedure.* *NOTE: If engine coolant temperature is below 30°C (86°F) engine temperature gauge needle may not move to the right. Run engine a few minutes to warm coolant before check.* Engine OFF. Key switch ON. Does battery relay click? Do engine temperature gauge (A) and fuel gauge (B) needles move to the right? Do all (10) monitor lights come on and after 2—3 seconds only the alternator indicator and engine oil pressure indicator remain on?	**YES:** Go to next check. **NO:** Check monitor fuse. **NO:** Check and replace bulb if any bulb fails to come on. Go to your authorized dealer.

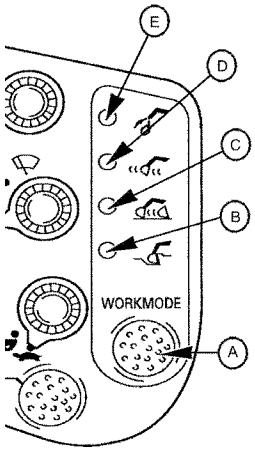
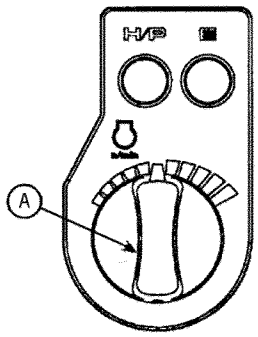
– – –1/1

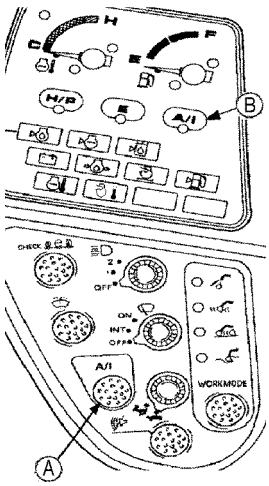
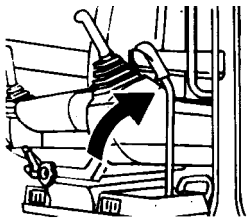
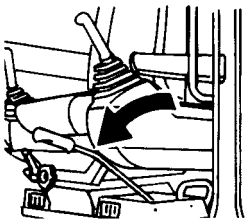
FLUID LEVEL (COOLANT, HYDRAULIC OIL, AND ENGINE OIL) INDICATOR CIRCUIT CHECKS	 T107699 –UN–27FEB97	**A—Level Check Switch** **B—Hydraulic Oil Level Indicator** **C—Coolant Level Indicator** **D—Engine Oil Level Indicator** Engine OFF. Key switch ON. Push and hold level check switch (A). Are the hydraulic oil level (B), coolant level (C), and engine oil level (D) indicator lights ON?	**YES:** Go to next check. **NO:** Check fluid levels in radiator, recovery tank, hydraulic reservoir, or engine. If ok, check fluid level sensing switch for wiring. Check monitor fuse. If fuse is OK, go to your authorized dealer. – – –1/1
PROPEL LEVER AND PEDAL CUSHION CYLINDER CHECKS	 T7531AO –UN–07JUN91	**A—Propel Lever And Pedal Forward** **B—Propel Lever And Pedal Rearward** Engine OFF. Push each propel lever and pedal forward (A), then release. Pull each propel lever and pedal rearward (B), then release. Does each lever and pedal have equal effort to operate forward and reverse? Does each lever and pedal return to neutral at the same time when released?	**YES:** Go to next check. **NO:** Go to your authorized dealer. – – –1/1

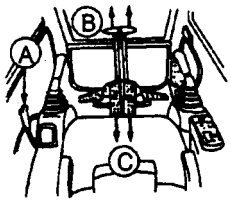
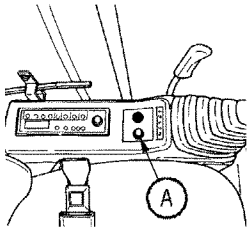
OPERATOR STATION CHECKS—ENGINE ON

– – –1/1

MONITOR CIRCUIT, GAUGE CHECKS	 T107698 –UN–27FEB97	**A—Coolant Temperature Gauge Needle** **B—Fuel Gauge** Start engine. Are all monitor indicator lights OFF after engine starts? Is coolant temperature gauge needle (A) in normal operating zone after a few minutes? Does fuel gauge (B) indicate fuel level? Stop engine.	**YES:** Go to next check. **NO:** Check alternator belt if battery light is on after engine starts. Go to your authorized dealer. – – –1/1
POWER MODE CIRCUIT CHECKS	 T102098 –UN–26JUL96	**A—High Power Mode Switch** **B—Economy Mode Switch** Start engine. Auto-idle switch OFF. Propel speed switch in fast position. Pilot shut-off lever in LOCKED position. Push power mode select switches (A) and (B) one at a time. Do corresponding indicator lights come on as each switch is pushed?	**YES:** Go to next check. **NO:** Check controller fuse. Go to your authorized dealer. – – –1/1

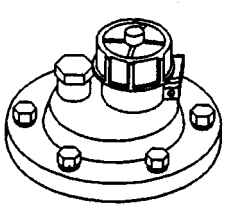
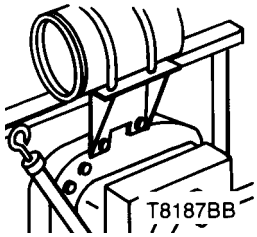
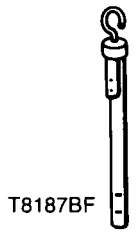
WORK MODE CIRCUIT CHECKS	 T102099 –UN–26JUL96	**A—Mode Selection Switch** **B—Dig Mode** **C—Grading Mode** **D—Precision Mode** **E—Attachment Mode** Start engine. Auto-idle switch OFF. Pilot shut-off lever in LOCKED position. Push work mode select switch (A) to select desired work mode. Do corresponding indicator lights come on as switch is pushed?	**YES:** Go to next check. **NO:** Check fuse. Go to your authorized dealer. – – –1/1
ENGINE RPM DIAL CHECKS	 T102100 –UN–26JUL96	**A—Engine RPM Dial** Start engine. Auto-idle switch OFF. Pilot shut-off lever in LOCKED position. Move engine RPM dial (A) clockwise. Does engine speed increase? Move engine RPM dial counterclockwise. Does engine speed decrease?	**YES:** Go to next check. **NO:** Go to your authorized dealer. – – –1/1

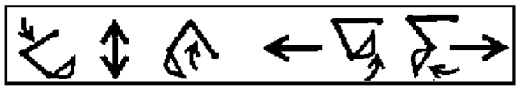
AUTO-IDLE CIRCUIT CHECK	 T107700 –UN–27FEB97	**A—Auto-Idle Switch** **B—Auto-Idle Indicator** Run engine at fast idle. Mode select switch in H/P mode. Auto-idle switch OFF. Pilot shut-off lever in UNLOCKED position. Push auto-idle switch (A) to ON. Does auto-idle indicator (B) come on? Does engine speed decrease after 4 to 6 seconds? Slowly actuate any dig function control lever. Does engine speed return to fast idle?	**YES:** Go to next check. **NO:** Check fuse. Go to your authorized dealer. – – –1/1
PILOT SHUT-OFF VALVE CHECKS	 T7351CC –UN–22AUG90	**CAUTION: Machine may move during this check. Make sure area is clear, and large enough to operate all controls.** Run engine at slow idle. Pilot shut-off lever in LOCKED (rearward) position. Actuate all dig and propel function controls. Do any dig or propel functions operate?	**YES:** Go to your authorized dealer. **NO:** Continue check, – – –1/1
PILOT SHUT-OFF VALVE CHECKS—(CONTINUED)	 T7351CB –UN–22AUG90	Move pilot shut-off lever to UNLOCKED position (forward). Operate all dig and propel functions. Do all functions operate?	**YES:** Go to next check. **NO:** Go to your authorized dealer. – – –1/1

TRAVEL ALARM CHECK	 T7850AF –UN–22OCT92	**A—Pilot Shut-Off Lever** **B—Propel Pedals Or Levers Forward** **C—Propel Pedals Or Levers Rearward** **CAUTION: Machine will move during this check. Make sure area is clear, and large enough to operate all controls.** Engine running. Pilot shut-off lever (A) in UNLOCKED position (forward). Push propel pedals or levers forward (B). Does travel alarm sound? Pull propel pedals or levers rearward (C). Does travel alarm sound?	**YES:** Go to next check. **NO:** Check motion alarm fuse. Go to your authorized dealer. – – –1/1
TRAVEL ALARM STOP CIRCUIT	 T102919 –UN–08AUG96	**A—Travel Alarm Cancel Switch** **CAUTION: Machine will move during this check. Make sure area is clear, and large enough to operate all controls.** *NOTE: Travel alarm must operate for this check.* Push propel pedals or levers and allow travel alarm to operate for a minimum of 12 seconds. While continuing travel, push travel alarm cancel switch (A). Does travel alarm stop sounding?	**YES:** Go to next check> **NO:** Go to your authorized dealer. – – –1/1

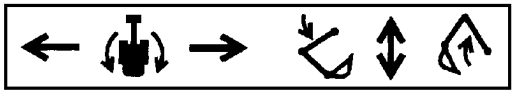
HYDRAULIC SYSTEM CHECKS

– – –1/1

PRESSURIZED RESERVOIR CHECK	 T7884AG –UN–12NOV92	Raise boom to full height, then lower boom to ground. *NOTE: Ensure that engine is properly shut down.* Slowly loosen vent plug on hydraulic reservoir. Is air heard escaping from vent plug? *NOTE: The pressurized reservoir creates pressure at the inlet to the hydraulic pumps. If filler cap does not seal, hydraulic pumps could cavitate and be damaged.*	**YES:** Go to next check. **NO:** Replace cap. Go to your authorized dealer. – – –1/1
PUMP GEARBOX OIL LEVEL CHECK	 T8187BB –UN–08MAR94	*NOTE: Ensure that engine is properly shut down.* Pull dipstick from tube, check oil level. Is oil level halfway below “H” (level) mark?	**YES:** Go to next check. **NO:** Add oil if low. – – –1/1
SWING GEARBOX OIL LEVEL CHECK	 T8187BF –UN–08MAR94	*NOTE: Ensure that engine is properly shut down.* Pull dipstick from tube, check oil level. Is oil between marks?	**YES:** Go to next check. **NO:** Add oil if low. – – –1/1

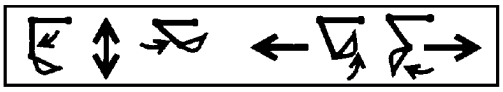
PILOT CONTROLLER PATTERN CHECK (SAE PATTERN)	 T102070 –UN–16JUL96 Left Control Lever  T102071 –UN–16JUL96 Right Control Lever Engine at slow idle. Operate machine in clear area. Move pilot shut-off lever to UNLOCKED position. Slowly move hydraulic levers to all positions on decals. Do bucket, boom, arm, and swing move as decals show? *NOTE: See John Deere control lever pattern in Operating the Machine chapter.*	**YES:** Go to next test. **NO:** Install decals for pattern (operator preference). Go to your authorized dealer. – – –1/1

PILOT CONTROLLER PATTERN CHECK (JOHN DEERE PATTERN)



T102197 –UN–19JUL96

Left Control Lever



T102198 –UN–19JUL96

Right Control Lever
Engine at slow idle.

Operate machine in clear area.

Move pilot shut-off lever to UNLOCKED position. Slowly move hydraulic levers to all positions on decals.

Do bucket, boom, arm, and swing move as decals show?

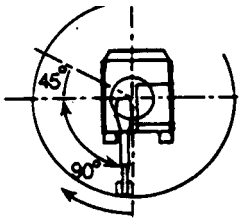
NOTE: See John Deere control lever pattern in Operating the Machine chapter.

YES: Go to next test.

NO: Install decals for pattern (operator preference). Go to your authorized dealer.

– – –1/1

(DYNAMIC) SWING BRAKE CHECK



T6479AY –UN–19OCT88

CAUTION: Make sure area is clear and large enough to swing extended bucket. Machine must be on level ground.

Position upperstructure with boom in front.

Put boom, arm and bucket in fully extended position with bucket 900 mm (3 ft) above ground level.

Operate engine at fast idle.

Actuate swing control valve to full stroke. Swing around 90 degrees and release lever.

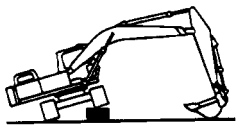
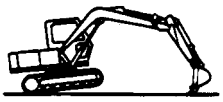
Does upperstructure stop within 45 degrees (1/8 turn) after releasing lever?

Repeat procedure in opposite direction.

YES: Go to next check.

NO: Go to your authorized dealer.

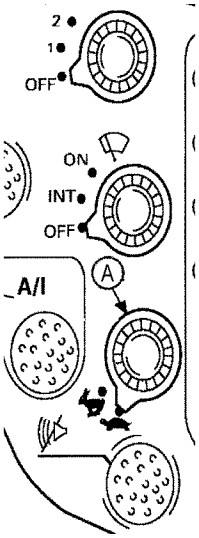
– – –1/1

SWING CIRCUIT LEAKAGE CHECK	 T6479AZ –UN–19OCT88	Engine at slow idle. Position machine on a side hill or raise one side of machine 300 mm (1 ft) with the boom and ease block under track. Position bucket 300 mm (1 ft) off the ground at maximum reach. Bottom bucket cylinder and hold lever in the actuated position. *NOTE: Actuating the bucket function releases the mechanical swing brake.* Does upperstructure move only slightly?	**YES:** Go to next check. **NO:** Go to your authorized dealer. – – –1/1
DIG FUNCTION DRIFT CHECK	 T6290AF –UN–19OCT88	Engine at slow idle. Fill bucket with dirt and position bucket at maximum reach with bucket 2 in. (50 mm) above ground. Observe bucket for 1 minute. Does bucket drift down to ground within 1 minute?	**YES:** Go to your authorized dealer. **NO:** Go to next check. – – –1/1
CONTROL VALVE LIFT CHECK TEST	 T6292AZ –UN–19OCT88	Engine at slow idle. Position machine as illustrated. Slowly actuate pilot controller to lower boom, extend arm (retract cylinder), and dump bucket (retract cylinder). Do functions move in opposite direction as control levers are moved, then change direction as levers are moved further?	**YES:** If functions move in opposite direction first, a leak within the cylinder or lift check valve is indicated. Go to your authorized dealer. **NO:** Go to next check. – – –1/1

PROPEL SYSTEM TRACKING CHECKS (PROPEL ONLY)	Engine at fast idle. Propel speed switch in fast position. Propel machine at full speed forward on a flat and level area. Repeat procedure in reverse. Do both tracks move and machine does not mistrack excessively in forward or reverse?	**YES:** Go to next check. **NO:** Note which track does not move or if machine mistracks note the mistrack pattern. Go to your authorized dealer. – – –1/1

PROPEL SYSTEM TRACKING CHECKS (WHILE OPERATING A DIGGING FUNCTION)	Engine at fast idle. Propel speed switch in fast position. Propel machine at full speed forward on a flat and level area. After machine is moving, slowly move the arm control lever from neutral to full actuation to extend the arm. Does machine mistrack excessively when the arm is extended? *NOTE: Machine will slow down during this test.*	**YES:** Go to your authorized dealer. **NO:** Go to next check. – – –1/1

PROPEL SYSTEM MANEUVERABILITY CHECK	Engine at fast idle. Propel speed switch in fast position. Propel machine at full speed forward down a slope. Turn in each direction. Repeat the procedure in reverse. Does each track slow down in response to pedal/lever movement in order to turn?	**YES:** Go to next check. **NO:** Counterbalance valve malfunction. Go to your authorized dealer. – – –1/1

PROPEL SPEED SELECTION CHECK	 T102104 –UN–26JUL96 **A—Propel Speed Switch** Engine at fast idle. Turn propel speed switch (A) to slow speed (turtle). Actuate propel function to full speed. Turn propel speed switch to fast position (rabbit). Does machine travel speed increase? Actuate a dig function and then return to neutral. Does machine travel speed decrease and then increase? Turn propel speed switch to slow speed (turtle). Does machine travel speed decrease?	**YES:** Go to next check. **NO:** Go to your authorized dealer. – – –1/1

CYCLE TIMES CHECK	**CAUTION: Make sure area is clear and large enough to operate all functions of machine.** Warm hydraulic oil to operating temperature for this check. Engine at fast idle. Work mode selector in dig mode. E mode switch OFF. HP mode switch OFF. Auto-idle switch OFF. BOOM  T6477AQ –UN–19OCT88	– – –1/2

T7884AE –UN–10NOV92

ARM, BUCKET, SWING, PROPEL
Move machine to position shown for each test.

Record cycle time for each function.

Boom Raise (Cylinder Extend)—Specification

Cycle Time (Seconds) ..... 3.1 ± 0.3

Boom Lower (Cylinder Retract)—Specification

Cycle Time (Seconds) ..... 2.8 ± 0.3

Arm In (Cylinder Extend)—Specification

Cycle Time (Seconds) ..... 3.9 ± 0.3

Arm Out (Cylinder Retract)—Specification

Cycle Time (Seconds) ..... 3.3 ± 0.3

Bucket Load (Cylinder Extend)—Specification

Cycle Time (Seconds) ..... 4.6 ± 0.3

Bucket Dump (Cylinder Retract)—Specification

Cycle Time (Seconds) ..... 2.7 ± 0.3

Swing Left or Right-3 Revolutions From a Running Start—Specification

Cycle Time (Seconds) ..... 16.5 ± 1.0

Propel 20 m (65 ft) From A Running Start (Check In Forward And Reverse With Propel Speed Switch In FAST Position)—Specification

Cycle Time (Seconds) ..... 13.1 ± 1.0

Propel 20 m (65 ft) From A Running Start (Check In Forward And Reverse With Propel Speed Switch In SLOW Position)—Specification

Cycle Time (Seconds) ..... 20.0 ± 2.0

Does machine perform within specifications?

YES: Go to next check.

NO: Go to your authorized dealer.

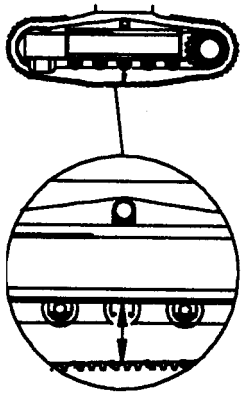
– – –2/2

❹ UNDERCARRIAGE CHECKS

– – –1/1

TRACK SAG ROLLER AND IDLER LEAKAGE CHECKS

T6915AN –UN–07APR89



T7850AI –UN–22OCT92

Track—Specification

Sag ..... 340—380 mm (13-3/8—15.0 in.)

Swing upperstructure to side and raise track off ground.Operate track in reverse.

Stop engine.

Measure distance between top of track shoe to center of lower surface of track frame.

Check rollers and idlers for oil leaks.

Is oil leaking from rollers or idlers?

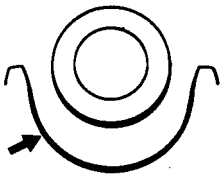
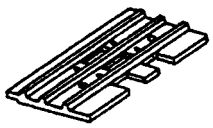
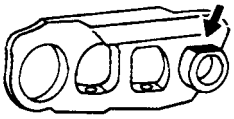
Raise other side of machine and repeat checks.

NOTE: If track sag is less than specified, track chain wear will be accelerated. If it is less than specified on one side only, the machine may mistrack.

YES: Go to your authorized dealer for repair if oil leakage is noted from idlers or rollers.

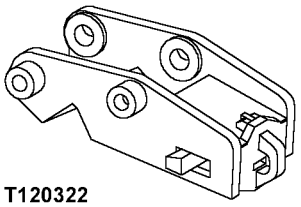
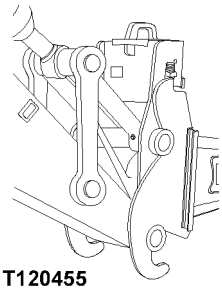
NO: Go to next check.

– – –1/1

SPROCKET WEAR CHECK	 T6981AC –UN–13MAR89	Inspect drive sprocket. Is tooth wear excessive? *NOTE: Do not evaluate sprocket by condition of tooth tip. Tooth tip wear does not affect sprocket operation if it does not extend into the bushing contact area.* *NOTE: Reverse drive side wear is generally more than forward drive side wear.*	**YES:** Go to your authorized dealer. **NO:** Go to next check. – – –1/1
GROUSER WEAR, BENT TRACK SHOE, AND LOOSE HARDWARE CHECKS	 T7322AF –UN–21JUN90	Inspect for worn grousers, bent track shoes, and loose shoe hardware. Are grouser bars worn excessively? Are track shoes bent? Is track shoe width appropriate for ground condition? Is track shoe hardware loose? *NOTE: Excessive grouser wear weakens track shoes and may result in track shoes bending.*	**YES:** If shoe hardware is loose, remove shoe and clean joint before tightening. Go to Check Track Shoe Torque in Maintenance chapter. **NO:** Go to next check. – – –1/1
TRACK LINK ROLLER AND FRONT IDLER WEAR CHECKS	 T6484AZ –UN–19OCT88	Inspect track links for pin boss wear. Do link pin boss areas indicate contact with roller flanges or track guides? *NOTE: Some contact or wear is normal. Excessive contact or wear indicates excessive rail wear.* Inspect front idler flanges. Do idler flanges contact bushings? *NOTE: Idler contact with bushings indicates excessive chain rail wear and idler tread surface wear.*	**YES:** Go to your authorized dealer for additional track component information. **NO:** Go to next check. – – –1/1

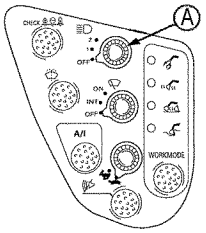
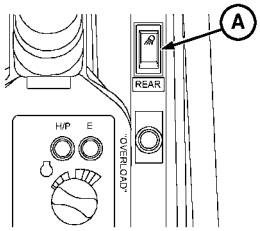
5 QUICK-DISCONNECT HITCH CHECKS

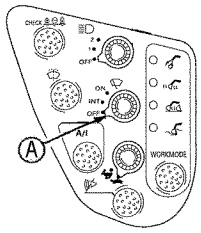
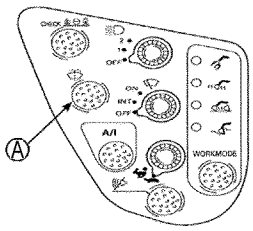
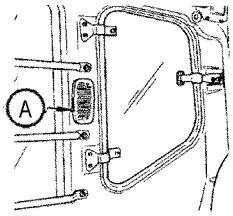
– – –1/1

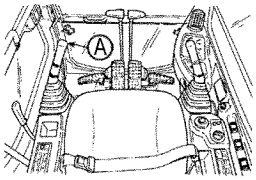
5a HITCH CHECK	 **T120322** T120322 –UN–29MAR99 Inspect hitch. Is there damage or weld cracks?	**YES:** Go to your authorized dealer. **NO:** Go to next check. – – –1/1
5b LATCH CYLINDER, HOSES, AND CONNECTIONS CHECKS	 **T120455** T120455 –UN–25MAR99	Check latch cylinder, hoses, and connections for leaks. Is oil leaking from latch cylinder, hoses, or connections?	**YES:** Go to your authorized dealer for repair if oil leakage is noticed. **NO:** Go to next check. – – –1/1

ACCESSORIES CHECKS

– – –1/1

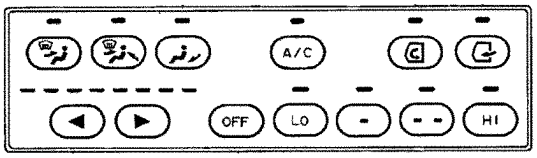
LIGHT CIRCUIT CHECKS	 T102105 –UN–26JUL96	**A—Light Switch** **IMPORTANT: All accessories are powered from the fuse block. If any accessories do not function, check fuses in fuse block.** Turn key switch ON. Turn light switch (A) to 1st on position. Are monitor panel back lights on? Turn light switch to 2nd position. Do work lights on boom come on also?	**YES:** Go to next check. **NO:** Check fuse and/or monitor panel back light bulbs. Go to your authorized dealer. – – –1/1
REAR LIGHT CIRCUIT CHECKS	 **T121043** T121043 –UN–14APR99	**IMPORTANT: All accessories are powered from the fuse block. If any accessories do not function, check fuses in fuse block.** Turn key switch ON. Turn light switch (A) to the on position. Are the rear lights on?	**YES:** Go to next check. **NO:** Check fuse and/or monitor panel back light bulbs. Contact maintenance shop. – – –1/1

WINDSHIELD WIPER CIRCUIT CHECK	 T102106 –UN–26JUL96	**A—Windshield Wiper Switch** Key switch ON. Turn wiper switch (A) to INT position. Does wiper operate intermittently? Turn wiper switch to ON position. Does wiper operate continuously? Move wiper switch to OFF position. Does wiper arm stop in park position?	**YES:** Go to next check. **NO:** Check if wiper harness and/or fuse is connected. Go to your authorized dealer. – – –1/1
WINDSHIELD WASHER CIRCUIT CHECK	 T102107 –UN–26JUL96	**A—Windshield Washer Switch** **IMPORTANT: Washer motor may be damaged if washer switch is held for more than 20 seconds, or continually operated with no fluid in the windshield washer tank** Key switch ON Push washer switch (A) Does washer fluid squirt on windshield?	**YES:** Go to next check. **NO:** Check washer fluid level and check wiper fuse. Go to your authorized dealer. – – –1/1
CAB DOME LIGHT CIRCUIT CHECK	 T102183 –UN–26JUL96	**A—Dome Light Switch** Key switch ON. Move switch (A) to on position. Does cab dome light come on?	**YES:** Go to next check. **NO:** Check fuse. Go to your authorized dealer. – – –1/1

LEFT CONTROL LEVER HORN CIRCUIT CHECK	 T102195 –UN–26JUL96 **A—Horn Button** Key switch ON. Press horn button (A) on top of left control lever. Does horn sound?	**YES:** Go to next check. **NO:** Check fuse. Go to your authorized dealer. – – –1/1

❼ AIR CONDITIONING CHECKS

– – –1/1

AIR CONDITIONER	 T103130 T103130 –19–29AUG96 Start engine and run at fast idle. Turn air conditioner switch to ON position. Turn blower switch to high speed. Wait for any warm air in duct system to dissipate. Is air from ducts cool?	**YES:** Check complete. **NO:** Go to your authorized dealer – – –1/1

Operational Checkout

ALL LINES AND HOSES	Engine OFF. Inspect all lines and hoses. Are lines and hoses straight, NOT kinked or worn from rubbing on other machine parts or "weather checked"? Are hose and line connections clean NOT showing signs of leakage, such as oil or dust accumulation at fittings? All hose and line clamps must be in place and tight. Clamps must have rubber inserts or cushions in place to prevent clamps from crushing or wearing into hoses or lines?	**YES:** Check complete. **NO:** Reposition hoses or lines and tighten or replace clamps. Tighten fittings or replace O-rings in fittings. Replace hoses or lines as required. – – –1/1

EVAPORATOR CORE CHECK	Engine ON. Blower switch on high. Is air from ducts cool and air flow good? Is water dripping from evaporator drain hose?	**YES:** Check complete. **NO:** Repair, replace or clean evaporator. – – –1/1

CONDENSER CHECK	Engine OFF. Inspect condenser cores. Is condenser core free of dirt or debris? Does condenser show signs of leakage, dust accumulation or oily areas? Are condenser fins straight, not bent or damaged? Inspect engine fan. Are fan blades in good condition, not worn, bent, broken or missing?	**YES:** Check complete. **NO:** Clean, repair or replace condenser core. Replace engine fan. – – –1/1

Operational Checkout

COMPRESSOR CLUTCH CHECK	Engine OFF. Key switch ON. Blower switch on LOW. Air conditioner switch ON. Does compressor clutch "click" as switch is pushed?	**YES:** Check complete. **NO:** Replace compressor clutch.

– – –1/1

RECEIVER DRYER CHECK	Engine OFF. Check hoses for damage and fittings for looseness. Are hoses not showing signs of leakage and fittings tight?	**YES:** Check complete. **NO:** Tighten fittings. Replace hoses, as required.

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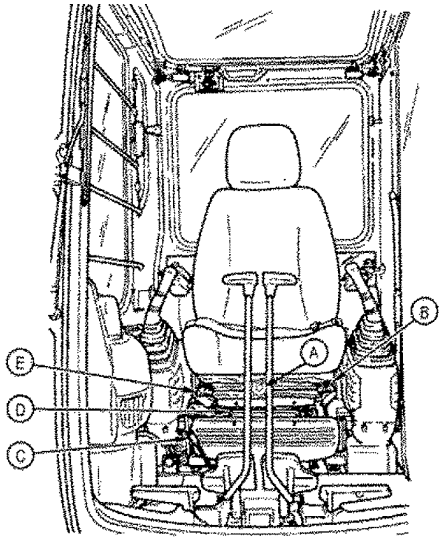
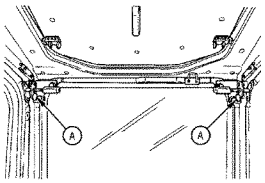
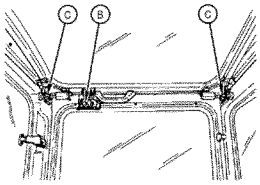
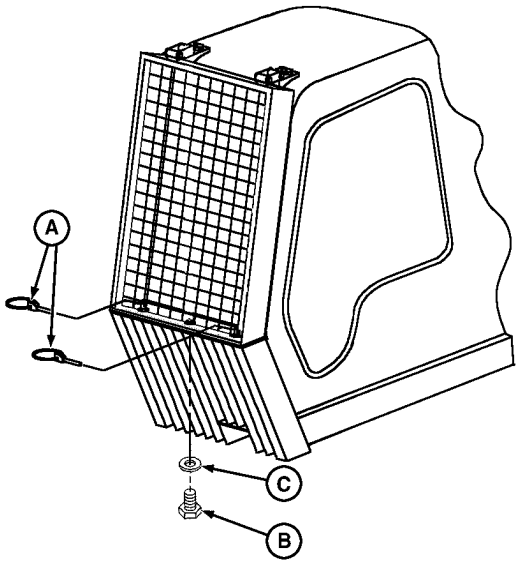
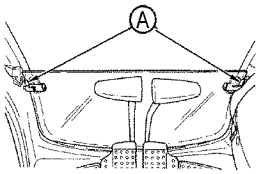
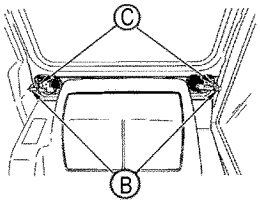
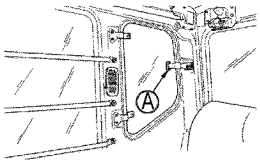
SEAT, DOORS, WINDOWS, LATCHES, AND LOCKS CHECKS

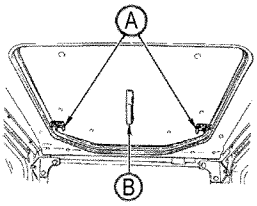
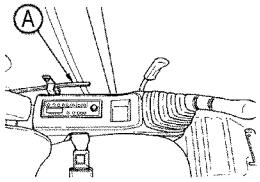
– – –1/1

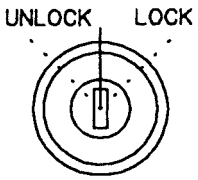
SEAT CONTROL CHECKS	 T102507 –UN–29JUL96 **A—Weight Adjustment Knob** **B—Seat Height And Angle Adjustment** **C—Console And Seat Fore-Aft Adjustment Lever** **D—Seat Fore-Aft Adjustment** **E—Backrest Adjustment** Push down lever (B) and raise and lower seat. Does seat raise and lower easily? Push down lever (B) and adjust angle of seat. Does seat angle change easily? Push down lever (C). Move seat and both side consoles forward and rearward. Release lever to lock seat and side consoles in position. Does lever unlock easily and then lock to hold seat and consoles in position? Pull up lever (D). Move seat forward and rearward. Release lever to lock seat in any position. Does lever move easily to unlock seat support? Does seat move forward and rearward easily? Does lever lock seat support in position when released? Pull up lever (E). Tilt seat back forward and rearward. Release lever to lock seat back in any position. Does seat back tilt forward and rearward easily? Does lever unlock and lock easily to hold seat back in position?	**YES:** Go to next check. **NO:** Inspect linkage and repair. Go to your authorized dealer. – – –1/1

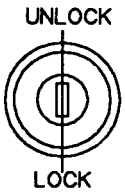
UPPER FRONT WINDOW CHECK	 T102109 –UN–26JUL96  T102110 –UN–26JUL96 **A—Lock Pins** **B—Latch** **C—Lock Pins** Move lock pins (A) toward center of window. Pull window up and back until it catches in latch (B) for convenient storage overhead. Slide the two lock pins (C) into the cab frame boss holes and turn to lock. Do pins move smoothly to lock and unlock window? Does rear latch operate freely? Do pins engage rear holes and lock window securely in full open position?	**YES:** Go to next check. **NO:** Inspect. Repair. – – –1/1

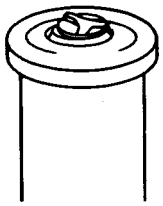
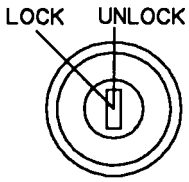
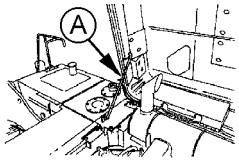
WINDOW PROTECTION KIT CHECK	 **T121078** T121078 –UN–14APR99 Upper screen: Remove center cap screws (B) and washer (C). Remove two lynch pins (A). Raise upper screen. Does screen move freely?	**YES:** Go to next check. **NO:** Inspect. Repair. – – –1/1

LOWER FRONT WINDOW STORAGE CHECK	 T102111 –UN–26JUL96  T106163 –UN–07JAN97 **A—Lock Pins** **B—Brackets** **C—Holes** *NOTE: Upper front window must be raised before lower window can be removed from window frame.* Pull in on lock pins (A) to unlock window. Lift the lower front window from the frame. Insert tabs on bottom of window into brackets (B) and lock the pins into holes (C). Does window lock securely into holding bracket?	**YES:** Go to next check. **NO:** Inspect. Repair. – – –1/1
RIGHT SIDE AND LEFT SIDE WINDOW CHECKS	 T102113 –UN–26JUL96 **A—Lock** Right rear side window: Unlatch lock (A). Push joint part of lock to open window. Does latch operate smoothly? Does window remain opened when latched open? Left side cab window: Slide both window panes open and closed? Do both window panes slide freely to left and right?	**YES:** Go to next check. **NO:** Inspect. Repair. Go to your authorized dealer. – – –1/1

ROOF EXIT COVER CHECK	 T102205 –UN–26JUL96	**A—Lock Pins** **B—Handle** Move lock pins (A) toward center of roof exit cover. Push on handle (B) until roof exit cover is in a secured position. Hold handle and pull cover down until pins lock in position. Does cover open and close freely? Does cylinder hold roof cover in the open position?	**YES:** Go to next check. **NO:** Inspect. Repair. – – –1/1
CAB DOOR LATCH CHECK	 T102114 –UN–26JUL96	**A—Lever** Open cab door. Lock cab door in open position. Push down on lever (A) to release door from locked open position. Close door. Does door unlatch easily, lock in open position securely, unlock from open position easily, and latch closed securely?	**YES:** YES Go to next check. **NO:** Go to your authorized dealer. – – –1/1

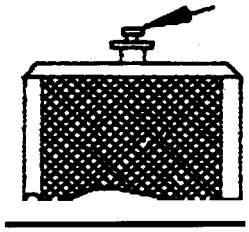
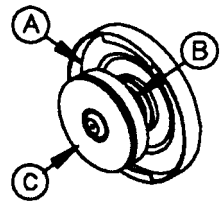
CAB DOOR LOCK CHECK	 T7425AH –UN–10DEC90	From outside cab, close cab door. Insert ignition key into door lock, turn clockwise 1/4 turn to lock. Allow key to return to vertical. Try to open door. Turn key 1/4 turn counterclockwise to unlock. Allow key to return to vertical. Remove key from lock. Does lock turn easily? Does lock prevent door from opening when locked?	**YES:** Go to next check. **NO:** Inspect. Repair. – – –1/1

LEFT AND RIGHT ACCESS DOORS LOCK CHECK	 T7425AG –UN–28NOV90	Insert ignition key into lock and turn 180° clockwise to lock. Turn key 180° counterclockwise to unlock. Does lock turn easily and lock door and cap in position? Are all parts free of any visible damage?	**YES:** Go to next check. **NO:** Inspect. Repair. – – –1/1

FUEL CAP LOCK CHECK	 T7351AH –UN–22AUG90  T7425AF –UN–04DEC90 Turn lock cover to expose lock. Insert ignition key into fuel cap lock. Turn key 45° counterclockwise to lock fuel cap. Does lock prevent cap from being removed? Turn key 45° clockwise to unlock fuel cap. Does lock turn easily to lock and unlock?	**YES:** Go to next check. **NO:** Replace fuel cap. – – –1/1
HOOD CHECK	 T115131 –UN–30APR98 **A—Hold-Open Rod** Unlock hood latch with ignition key. Release latches. Open hood. Engage hold-open rod (A). Does rod hold hood open? Close hood and engage latches. Do latches operate easily? Do latches hold hood closed?	**YES:** Go to next check. **NO:** Inspect. Repair. – – –1/1

COOLANT CHECKS

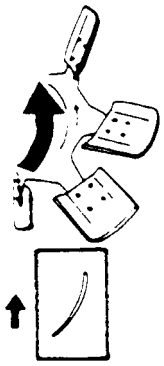
– – –1/1

SURGE TANK CAP	 T6488FY –UN–19OCT88  T7690AB –UN–23JAN92	**A—Gasket** **B—Spring** **C—Seal** **CAUTION: Prevent possible injury. DO NOT remove radiator cap unless engine is cool. When engine is hot and cap is removed, hot coolant or steam will spray out causing serious burns.** Engine OFF and cool. Remove surge tank cap. If coolant is warmer than surrounding air temperature is, a "whoosh" sound heard when cap is loosened? Does cap have a stop position that requires it to be pushed down to remove? Does cap have a good seal (C) and gasket (A)? **A—Gasket** **B—Spring** **C—Seal** Is spring (B) in good condition?	**YES:** Go to next check. **NO:** Replace surge tank cap. – – –1/1
COOLANT LEVEL AND COOLANT CONDITION IN RECOVERY TANK CHECKS	 T6488FX –19–21MAR89	Engine OFF and cool. Open radiator access door. Inspect coolant level and coolant condition in recovery tank. Is coolant level between FULL and LOW marks on recovery tank? Is coolant clear, not oily, foamy, or rust colored?	**YES:** Go to next check. **NO:** Add or replace coolant. (See Check Coolant Level in Maintenance-Every 10 Hours or Daily chapter.) – – –1/1

COOLANT LEVEL AND COOLANT CONDITION IN RADIATOR CHECKS	**CAUTION: Prevent possible injury. DO NOT remove cap unless engine is cool.** Engine OFF and cool. Remove surge tank cap. Inspect coolant level. Inspect coolant condition. Is coolant level at bottom of fill neck on surge tank? Is coolant clear, not oily, foamy or rust colored?	**YES:** Go to next check. **NO:** Add or replace coolant. (See Check Coolant Level in Maintenance-Every 250 Hours chapter.) – – –1/1

COOLANT HOSES AND CLAMPS CHECKS	Are radiator and heater hoses free of twists, kinks, cracks, leaks, or wear from rubbing on adjacent parts? Are hose clamps tight and installed correctly?	**YES:** Go to next check. **NO:** Replace hoses as required. Tighten or reinstall hose clamps. – – –1/1

FAN SHROUD AND FAN GUARD CHECKS	 T6488GN –UN–19OCT88 Check fan to fan shroud clearance. Is fan centered in shroud? Is guard free of damage? Are all mounting brackets and hardware tight?	**YES:** Go to next check. **NO:** Adjust fan shroud to center fan. Repair or replace guard. Tighten loose hardware. Replace fan shroud if needed. – – –1/1

FAN DIRECTION CHECK	 T6171CB –UN–25MAY89	Is fan installed correctly with concave (cupped) side (Arrow) of fan blade towards engine? *NOTE: If fan is installed backwards, about 50% of its capacity is lost.*	**YES:** Check complete. **NO:** Install fan correctly. – – –1/1
RADIATOR OUTSIDE AIR FLOW CHECK	Inspect radiator screen for mud and debris. Inspect radiator fins for mud and debris. Inspect radiator for bent or damaged fins. Are radiator fins free of mud, leaves, grass, and other debris? Are fins straight, not broken or cracked?		**YES:** Go to next check. **NO:** Clean screen. Clean outside of radiator. Straighten fins. Replace radiator if severely damaged. – – –1/1
FAN BELT CHECK	Is fan belt free of oil or grease? Is inside surface of belt free of cracks or frayed edges? Is belt aligned with pulleys?		**YES:** Check complete. **NO:** Replace belt if oily, greasy, cracked, or otherwise damaged. – – –1/1

CHAPTER 20

TROUBLESHOOTING

BLANK

Troubleshooting

USING TROUBLESHOOTING CHARTS

NOTE: Troubleshooting charts are arranged from the simplest to verify, to least likely, more difficult to verify. When diagnosing a problem, use all possible means to isolate the problem to a single component or system. Use the following steps to diagnose problems:

Step 1. Operational Checkout Procedure.

Step 2. Troubleshooting charts.

Step 3. Adjustments.

Step 4. See your authorized dealer.

CED,TX14740,6023 –19–10FEB98–1/1

ENGINE

Symptom	Problem	Solution
Engine Cranks But Will Not Start Or Hard To Start	No fuel	Add fuel. Bleed air.
	Wrong fuel	Use correct fuel.
	Fuel filter clogged	Replace filter. Bleed air. Clean fuel tank strainer.
	Leaks in fuel system	Check fuel system connections.
	Contaminated fuel	Drain tank. Clean tank strainer. Add clean fuel.
	Air in fuel system	Bleed air.
	Low battery power	Charge or install new batteries.
	Slow cranking speed (poor electrical connection)	Clean and tighten battery and starter connections.
	Wrong engine oil	Use correct oil.
	Air filter clogged	Clean or replace elements.
	Injection pump linkage	Go to your authorized dealer.
	Injection nozzles	Go to your authorized dealer.
	Injection pump	Go to your authorized dealer.
	Starter	Replace starter.
	Engine compression low	Go to your authorized dealer.
Engine Knocks, Runs Irregularly, Or Stops	Air filter clogged	Clean or replace elements. Clean system.
	Fuel filter clogged	Replace filter. Bleed air. Clean fuel tank strainer.
	Engine oil level low	Add oil.

Continued on next page

Symptom	Problem	Solution
	Contaminated fuel	Drain tank. Clean tank strainer. Add clean fuel.
	Injection pump out of time	Go to your authorized dealer.
	Wrong valve clearance	Check and adjust valves.
	Injection nozzles	Go to your authorized dealer.
	Coolant temperature low	Thermostat not operating within correct temperature range. Replace thermostat or go to your authorized dealer.
	Injection pump	Go to your authorized dealer.
Engine Not Developing Full Power	Air filters clogged	Clean or replace filter elements.
	Fuel filter clogged	Change filter. Bleed air.
	Contaminated fuel	Drain fuel tank. Clean tank strainer. Add clean fuel.
	Wrong fuel	Use correct fuel.
	Fuel line restricted	Repair or replace fuel line.
	Clogged vent in fuel tank cap	Clean or install new cap.
	Injection pump linkage adjustment	Adjust or go to your authorized dealer.
	Intake system leakage	Go to your authorized dealer.
	Exhaust restriction	Remove muffler and run engine.
	Wrong valve clearance	Check and adjust valves.
	Engine too hot or cold	See below.
	Wrong oil	Use correct oil.
	Injection nozzles	Go to your authorized dealer.

Continued on next page

Symptom	Problem	Solution
	Turbocharger	Go to your authorized dealer.
	Injection pump	Go to your authorized dealer.
	Engine malfunction	Go to your authorized dealer.
	Charge air cooler core clogged	Clean.
Engine Overheats	Coolant level low	Add coolant.
	Thermostat	Go to your authorized dealer.
	Radiator screen clogged	Remove and clean screen.
	Radiator core or oil cooler core clogged	Clean radiator and oil cooler.
	Charge air cooler core clogged	Clean.
	Air filter clogged	Clean or replace elements.
	Radiator cap	Install new cap.
	Surge tank cap	Install new cap.
	Fan belt malfunction	Go to your authorized dealer.
	Fan	Replace fan.
	Alternator/fan belt loose	Go to your authorized dealer.
	Engine overloaded	Check hydraulic relief valves.
	Cooling system passages dirty	Flush cooling system.
	Temperature gauge or sending unit	Go to your authorized dealer.
	Injection pump	Go to your authorized dealer.
	Pulley grooves worn	Replace pulleys.
Coolant Temperature Too Low	Thermostat	Go to your authorized dealer.
	Temperature gauge or sending unit	Go to your authorized dealer.

Continued on next page

Symptom	Problem	Solution
Low Engine Oil Pressure	Oil level low	Add oil.
	Oil filter clogged	Install new oil filter.
	Oil pump intake screen clogged	Go to your authorized dealer.
	Wrong oil	Use correct oil.
	Oil leaks	Check for leaks.
	Engine oil pump or pump drive	Go to your authorized dealer.
	Engine oil pressure regulating valve	Go to your authorized dealer.
	Oil diluted with fuel or coolant	Go to your authorized dealer.
	Engine temperature too high	Check cooling system.
Engine Uses Too Much Oil	Wrong oil	Use correct oil.
	Oil leaks	Check engine oil drain plug.
	Engine temperature too high	Check cooling system.
	Air cleaner clogged	Clean element or install new element.
	Internal engine component wear	Go to your authorized dealer.
Engine Uses Too Much Fuel	Clogged or dirty air intake system	Clean air intake system.
	Wrong fuel	Use correct fuel.
	Hydraulic pump regulators set incorrectly	Go to your authorized dealer.
	Fuel injection nozzles	Go to your authorized dealer.
	Injection pump	Go to your authorized dealer.
Excessive Black Or Gray Exhaust Smoke	Wrong fuel	Use correct fuel.
	Hydraulic pump regulators set incorrectly	Go to your authorized dealer.

Continued on next page

Symptom	Problem	Solution
	Clogged or dirty air intake or exhaust system	Clean air intake and exhaust system.
	Charge air cooler core clogged	Clean.
	Injection pump	Go to your authorized dealer.
	Injection nozzles	Go to your authorized dealer.
	Engine	Go to your authorized dealer.
Exhaust Gas Is White	Wrong fuel	Use correct fuel.
	Cold engine	Run engine until warm.
	Thermostat faulty or too "cool"	Go to your authorized dealer.
	Injection pump	Go to your authorized dealer.
	Coolant leakage into engine cylinder	Go to your authorized dealer.
Turbocharger Excessively Noisy Or Vibrates	Bearings not lubricated	Insufficient oil pressure. Check for restricted turbocharger oil line.
	Worn bearings	Go to your authorized dealer.
	Air leak in engine, intake, or exhaust manifold	Inspect, repair.
	Improper clearance between turbine wheel and turbine housing	Go to your authorized dealer.
	Broken blades on turbine	Remove exhaust elbow and air inlet hose and inspect.
Oil Dripping From Turbocharger Adapter	Damaged or worn bearings and/or worn seals	Go to your authorized dealer.
	Excessive crankcase pressure	Check vent tube to ensure tube is not clogged. Clean.
	Turbocharger oil return line carbon buildup where line passes exhaust manifold	Remove line. Inspect, clean.

Continued on next page

Symptom	Problem	Solution
Excessive Drag In Turbocharger Rotating Members	Carbon buildup behind turbine wheel caused by combustion deposits	Inspect, clean.
	Dirt buildup behind compressor wheel caused by air intake leaks	Inspect, clean.
	Bearing seizure or dirty or worn bearings, caused by excessive temperature, unbalanced wheel, dirty oil, oil starvation, or insufficient lubrication	Go to your authorized dealer.

TX,100,DH5155 –19–10AUG96–6/6

ELECTRICAL SYSTEM

Symptom	Problem	Solution
Nothing Works	Battery	Recharge or replace.
	Fusible link	Replace fusible link.
	Battery cables making poor connections	Clean connections.
Batteries Undercharged	Loose or corroded connections	Clean and tighten or replace batteries.
	Alternator/fan belt tension adjuster	Go to your authorized dealer.
	Alternator not charging	Go to your authorized dealer.
	Fuse	Replace fuse.
	Key switch	Replace key switch.
Batteries Will Not Take A Charge	Loose or corroded connections	Clean and tighten.
	Low battery power	Install new batteries.
	Alternator not charging	Go to your authorized dealer.
Battery Uses Too Much Water	Cracked battery case	Replace battery.
	High ambient temperature	Refill with water.
	Shorted cell	Check if one or more cells take more water than the others. Check specific gravity.
	Battery being overcharged	Go to your authorized dealer.
Cracked Battery Case	No battery hold down clamp	Replace battery and install hold down clamp.
	Loose battery hold down clamp	Replace battery and install hold down clamp.
	Battery hold down clamp too tight	Replace battery and install battery hold down clamp correctly.

Continued on next page

Symptom	Problem	Solution
	Frozen battery	Replace battery. Keep battery fully charged in cold weather.
Low Battery Output	Low water level	Add water.
	Dirty or wet battery top, causing discharge	Clean and wipe battery top dry.
	Corroded or loose battery cables	Clean and tighten battery cables.
	Broken battery post	Wiggle battery post by hand. If post wiggles or turns, replace battery.
	Low battery voltage	Measure "stabilized" battery voltage. Stabilize voltage by actuating horn for 30 seconds. If stabilized voltage is below 24 volts, charge battery.
	Battery cell	Measure specific gravity of each cell. If more than 50 points between cells, replace battery.
Starter Will Not Turn	Battery undercharged or dead	Recharge or replace battery.
	Battery cables making poor connections	Clean connections.
	Fusible link	Replace fusible link.
	Key switch	Go to your authorized dealer.
	Starter relay	Go to your authorized dealer.
	Starter solenoid	Go to your authorized dealer.
	Starter	Repair or replace starter motor.
	Starter pinion jammed in flywheel gear	Repair or replace starter.
	Engine	Go to your authorized dealer.
Starter Solenoid Chatters	Poor connections at batteries or starter	Clean connections.

Continued on next page

Symptom	Problem	Solution
	Low battery charge	Recharge or replace batteries.
	Starter solenoid "hold-in" windings open	Go to your authorized dealer.
Starter Turns But Will Not Crank Engine	Starter pinion gear not engaging flywheel ring gear	Go to your authorized dealer.
	Pinion shift mechanism jammed or malfunctioning	Go to your authorized dealer.
	Pinion gear teeth broken	Go to your authorized dealer.
	Flywheel gear teeth broken	Go to your authorized dealer.
Engine Cranks Slowly	Battery cables damaged or broken internally	Inspect and replace cables.
	Battery or starter cable connections loose or corroded	Clean and tighten connections.
	Battery discharged or will not hold a charge	Recharge or replace battery.
	Starter "dragging"	Go to your authorized dealer.
	Low battery voltage	Recharge or replace battery.
Starter Continues To Run After Engine Starts	Starter relay stuck	Go to your authorized dealer.
	Starter solenoid stuck	Go to your authorized dealer.
	Starter not disengaging	Go to your authorized dealer.
	Key switch	Go to your authorized dealer.
Charging Indicator Light On, Engine Running	Loose or glazed alternator belt	Check belt. Replace if glazed.
	Engine rpm low	Adjust rpm to specifications.
	Excessive electrical load from added accessories	Remove accessories or install higher output alternator.

Continued on next page

Symptom	Problem	Solution
	Loose or corroded electrical connections on battery, ground strap, starter, or alternator	Inspect, clean, or tighten electrical connections.
	Battery voltage low	Charge or replace battery.
	Alternator or regulator	Go to your authorized dealer.
	Indicator circuit	Go to your authorized dealer.
Noisy Alternator	Worn drive belt	Replace belt.
	Worn pulleys	Replace pulleys and belt.
	Pulley misaligned	Adjuster alternator mount.
	Alternator bearing	Loosen alternator belts. Turn pulley by hand. If any roughness is felt, repair alternator.
No Monitor Panel Indicators Work	Fuse	Replace fuse.
	Monitor panel logic module	Go to your authorized dealer.
	Wiring harness	Go to your authorized dealer.
Individual Light In Monitor Panel Is Not Working	Bulb	Replace bulb.
	Fuse	Replace fuse.
	Wiring harness	Go to your authorized dealer.
No Indicators In Gauge Panel Operate	Circuit board	Go to your authorized dealer.
	Wiring harness	Go to your authorized dealer.
	Fuse	Replace fuse.
Indicator Light In Gauge Panel Is Inoperative	Bulb	Replace bulb.
	Fuse	Replace fuse.

Continued on next page

Symptom	Problem	Solution
	Wiring harness	Go to your authorized dealer.
Engine Water Temperature Gauge Does Not Work	Fuse	Replace fuse.
	Gauge	Go to your authorized dealer.
	Gauge sender	Go to your authorized dealer.
	Wiring harness	Go to your authorized dealer.
Indicator Lights Do Not Operate	Fuse	Replace fuse.
	Bulb	Replace bulb.
	Auto-idle switch	Go to your authorized dealer.
	Propel switch	Go to your authorized dealer.
Fuel Gauge Does Not Work	Fuse	Replace fuse.
	Gauge	Go to your authorized dealer.
	Wiring harness	Go to your authorized dealer.
Work Mode Selector Switch Does Not Work	Mode switches	Replace switches.
	Electrical connector	Repair or replace.
	Pilot pressure switch	Go to your authorized dealer.
	Wiring harness	Go to your authorized dealer.
Propel Speed Does Not Function	Speed switches	Go to your authorized dealer.
	Two speed travel solenoid valve	Go to your authorized dealer.
	Propel pilot pressure switch	Go to your authorized dealer.
	Propel motor	Go to your authorized dealer.
	Rotary manifold	Go to your authorized dealer.
Auto-Idle Does Not Work	Fuse	Replace fuse.

Continued on next page

Symptom	Problem	Solution
	Engine speed too low	Increase speed to higher than auto-idle. Press auto-idle switch.
	Switch panel	Go to your authorized dealer.
	Electrical connector	Go to your authorized dealer.
	Wiring harness	Go to your authorized dealer.
Windshield Wiper Does Not Work	Fuse	Replace fuse.
	Upper front right window latch not locked	Lock upper front right window latch.

TX,100,DH5361 –19–19DEC96–6/6

HYDRAULIC SYSTEM

Symptom	Problem	Solution
Control Lever Moves Hard	Corroded joint, worn out pusher	Go to your authorized dealer.
Control Lever Does Nothing	Worn out pusher	Go to your authorized dealer.
	Pilot valve	Go to your authorized dealer.
Control Lever Does Not Return To Neutral	Pilot valve	Go to your authorized dealer.
Too Much Play In Control Lever	Worn out pivot joint	Go to your authorized dealer.
Control Lever Is Not Vertical In Neutral	Pilot valve	Go to your authorized dealer.
No Hydraulic Functions	Lack of hydraulic oil	Add oil.
	Pilot shut-off valve	Go to your authorized dealer.
	Pilot pump	Go to your authorized dealer.
	Pilot pressure regulating valve	Go to your authorized dealer.
	System relief valve	Go to your authorized dealer.
	Pressure switches	Go to your authorized dealer.
	Clogged suction filter	Clean.
	Damaged suction line or hose	Go to your authorized dealer.
	Hydraulic pump	Go to your authorized dealer.
Some Functions Do Not Work	Pilot controller	Go to your authorized dealer.
	Pilot shut-off valve not released	Go to your authorized dealer.
	Pilot controller hoses pinched	Inspect and correct
	Control valve	Go to your authorized dealer.
	Circuit relief valves	Go to your authorized dealer.
	Cylinders	Go to your authorized dealer.

Continued on next page

Symptom	Problem	Solution
Hydraulic Functions Are Slow	Low oil level	Fill reservoir to full mark.
	Wrong oil	Use correct oil.
	Engine speed too slow	Increase speed or see your authorized dealer.
	Pilot circuit	Go to your authorized dealer.
	Worn pump	Go to your authorized dealer.
	Suction screen clogged	Inspect and clean.
	Restricted pump suction line	Go to your authorized dealer.
	Improperly adjusted relief valves	Go to your authorized dealer.
One Function Does Not Work	Pilot controller	Go to your authorized dealer.
	Relief valve pressure low	Go to your authorized dealer.
	Tube or hose damaged	Repair or replace.
	Hydraulic fittings loose	Tighten.
	Damaged O-rings in fittings	Install new O-ring.
	Pilot controller hose pinched	Inspect and correct.
	Cylinder	Go to your authorized dealer.
	Hydraulic pump	Go to your authorized dealer.
	Control valve	Go to your authorized dealer.
One Function Has Little Power	Pilot controller	Go to your authorized dealer.
	Pilot lines	Repair or replace.
	Control valve	Go to your authorized dealer.
	Circuit relief valve	Go to your authorized dealer.
	Cylinder seals leaking	Go to your authorized dealer.

Continued on next page

Symptom	Problem	Solution
	Cylinder rod	Go to your authorized dealer.
Hydraulic Cylinders Operate But Cannot Lift Load	Hydraulic oil level low	Add oil.
	Suction screen clogged	Clean strainer and system.
	System or circuit relief valves	Go to your authorized dealer.
	Pump suction line leaking	Inspect suction line.
	Hydraulic pump worn	Go to your authorized dealer.
		Go to your authorized dealer.
	System relief valve	Go to your authorized dealer.
Low Or No Oil Pressure	No oil in system	Fill with correct oil.
	Wrong oil	Use correct oil.
	Improperly adjusted relief valves	Go to your authorized dealer.
	Worn cylinder packings	Go to your authorized dealer.
	Tank cap	Replace cap.
Hydraulic Oil Overheats	Wrong oil	Use correct oil.
	Clogged radiator or oil cooler	Clean and straighten fins.
	Radiator screen clogged	Remove and clean.
	Clogged filters	Install new filters.
	Low oil level	Fill tank to full mark.
	Oil line restricted	Go to your authorized dealer.
	Contaminated oil	Drain oil and refill.
	Oil cooler bypass	Go to your authorized dealer.
	Relief valve	Go to your authorized dealer.

Continued on next page

Symptom	Problem	Solution
	Air leak in pump suction line	Go to your authorized dealer.
	Worn pump	Go to your authorized dealer.
	Propel motors	Go to your authorized dealer.
Oil Foams	High or low oil level	Correct level.
	Wrong oil	Use correct oil.
	Water in oil	Change oil.
	Kinks or dents in oil lines	Check lines.
	Air leak in line from reservoir to pump	Repair leak.
No Swing Function	Pilot controller	Go to your authorized dealer.
	Swing control valve spool	Go to your authorized dealer.
	Pilot control hoses pinched or kinked	Inspect and correct.
	Swing brake	Go to your authorized dealer.
	Swing motor	Go to your authorized dealer.
Swing Function Is "Jerky"	Lack of grease	Fill with grease
	Swing gear	Go to your authorized dealer.
	Swing brake	Go to your authorized dealer.
	Swing bearing	Go to your authorized dealer.
Slow Propel System, Does Not Propel	Propel brake	Go to your authorized dealer.
	Rotary manifold	Go to your authorized dealer.
Individual Propel Function Is Slow	Rock under pedal	Remove
	Pilot controller hoses pinched or kinked	Inspect and correct.

Continued on next page

Symptom	Problem	Solution
	Pilot controller	Go to your authorized dealer.
	Propel brake	Go to your authorized dealer.
	Rotary manifold	Go to your authorized dealer.
	Propel motor	Go to your authorized dealer.
Propel Is "Jerky"	Track sag	Adjust tension.
	Track idler or rollers	Go to your authorized dealer.
	Track frame bent	Go to your authorized dealer.
	Rocks or mud jammed in track frame	Remove and repair.
	Propel gearbox	Go to your authorized dealer.
	Propel brake not releasing	Go to your authorized dealer.
Engine Stops When Propel Or Control Lever Is Moved	Engine	Go to your authorized dealer.
	Wiring harness	Repair.
	Fuel filter	Replace.
	Engine speed sensor	Go to your authorized dealer.

TX,100,DH3697 –19–18AUG95–5/5

CHAPTER 21

STORAGE

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Storage

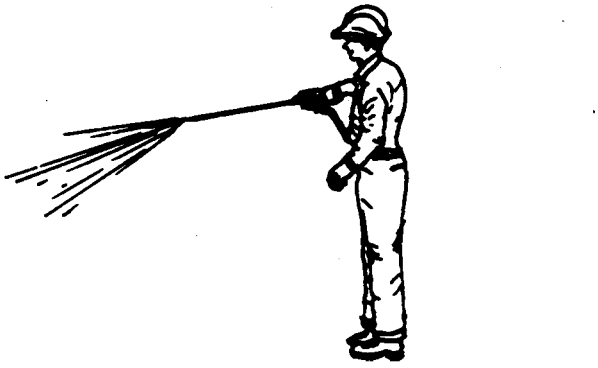
PREPARE MACHINE FOR STORAGE

T47764 –UN–09NOV88

1. Repair worn or damaged parts. Install new parts, if necessary, to avoid needless delays later.
2. Clean primary air cleaner.

TX,105,FF2313 –19–03APR91–1/3

IMPORTANT: High pressure washing [greater than 1379 kPa (13.8 bar) (200 psi)] can damage freshly painted finishes. Paint should be allowed to air dry for 30 days minimum after receipt of machine before cleaning parts or machines with high pressure. Use low pressure wash operations until 30 days have elapsed.



T5813AM –UN–09FEB89

3. Wash the machine. [Use low pressure wash operations (less than 1379 kPa (13.8 bar) (200 psi) until 30 days after receipt of machine have elapsed.] Paint areas to prevent rust. Replace decals, where needed.
4. Apply waste oil to track chains. Run machine back and forth several times. Park machine on a hard surface to prevent tracks from freezing to ground.
5. Store machine in a dry, protected place. If stored outside, cover with a waterproof material.

Continued on next page

TX,105,FF2313 –19–03APR91–2/3

IMPORTANT: LPS 3 Rust Inhibitor can destroy painted finish. Do not spray LPS 3 Rust Inhibitor on painted areas.

6. Park machine as shown. Inspect cylinder rods for evidence of damage or rust. Report deficiencies to your supervisor. Coat exposed cylinder rods (A) with LPS® 3 Rust Inhibitor.

IMPORTANT: Prevent possible machine damage from unauthorized persons operating machine. Attach a "DO NOT OPERATE" tag to right control lever.

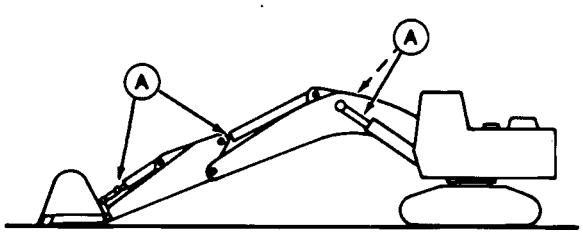
7. Place a "DO NOT OPERATE" tag on the right control lever.

8. Lubricate all grease points.

9. Remove batteries.

10. Remove seat cushion and other perishable items.

11. Remove keys and lock all covers and doors.



T7034AA –UN–18APR89

A—Cylinder Rod Areas

LPS is a trademark of the Holt Lloyd Corporation.

TX,105,FF2313 –19–03APR91–3/3

QUICK-DISCONNECT HITCH STORAGE PROCEDURE

1. Plug cylinder ports.

2. Lubricate wedge bar.

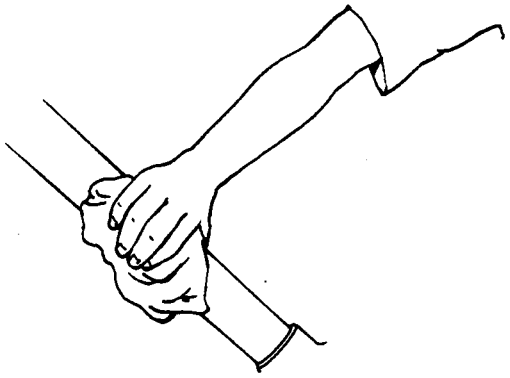
3. Apply light coating of oil to all exposed metal parts.

CED,OUOE020,8 –19–19FEB99–1/1

MONTHLY STORAGE PROCEDURE

CAUTION: Engine exhaust fumes can cause sickness or death. Start engine ONLY in a well-ventilated area.

1. Drain water and sediment from fuel tank when air temperature is above freezing.
2. Remove LPS 3 Rust Inhibitor from cylinder rods with a cleaning solvent.



T6191AA –UN–18OCT88

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TX,105,FF,400 –19–06SEP94–1/4

IMPORTANT: Prevent possible engine damage. During cold temperatures, check viscosity of engine oil on dipstick. If the oil appears waxy and/or jelly-like rather than liquid, DO NOT attempt to start engine. Use external heat source to warm the crankcase until oil appears fluid.

T6181AU –UN–18OCT88

3. Check all fluid levels. If low, check for leaks and add oil as required.
4. Check belt.
5. Check condition of all hoses and connections.
6. Check electrolyte level. Charge and install battery.
7. Fill fuel tank. (See Fuels and Lubricants chapter.)
8. Start engine. Run engine at 1/2 speed for 5 minutes. Do not run at fast or slow idle.
9. Bleed fuel system. If engine fails to start or runs poorly after starting, change fuel filter(s). Bleed fuel system again.

CAUTION: Prevent possible injury from unexpected machine movement. Clear the area of all persons before running machine through the operation procedure.

10. Make sure that area is clear to allow for movement. Operate (cycle) boom, arm, and bucket functions for three complete cycles.
11. Operate the swing function for three complete revolutions in each direction.
12. Check condition of tracks. Check track sag.

Continued on next page

TX,105,FF,400 –19–06SEP94–2/4

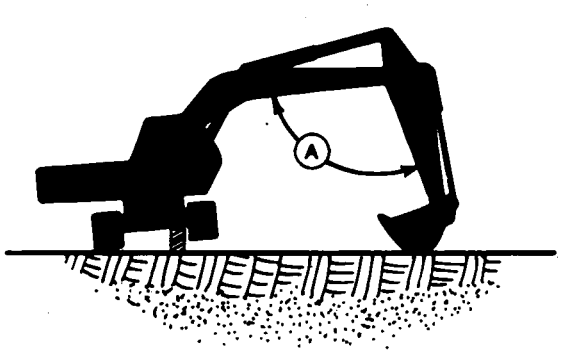
13. Operate the propel functions in forward and reverse directions. This can be performed by one of two methods.

    a. Propelling the machine in forward and reverse for a distance of 30 m (100 ft).

    CAUTION: Prevent possible injury from machine sliding backwards. Keep the angle between boom and arm 90-110°.

    b. If machine is equipped with bucket, raise each track (keeping angle between boom and arm 90-110°) and propel in each direction for three revolutions.

14. Park the machine with cylinder rods retracted.

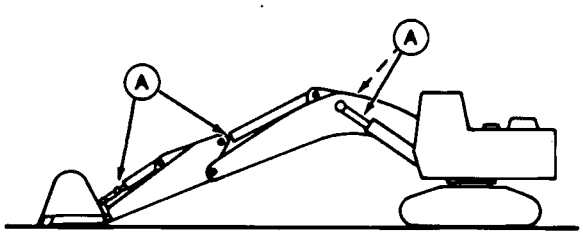


T6879AT –UN–06DEC88

A—Boom-To-Arm Angle

TX,105,FF,400 –19–06SEP94–3/4

15. Apply LPS 3 Rust Inhibitor to the exposed cylinder rod areas (A).



T7034AA –UN–18APR89

A—Cylinder Rod Areas

TX,105,FF,400 –19–06SEP94–4/4

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CHAPTER 22

SPECIFICATIONS

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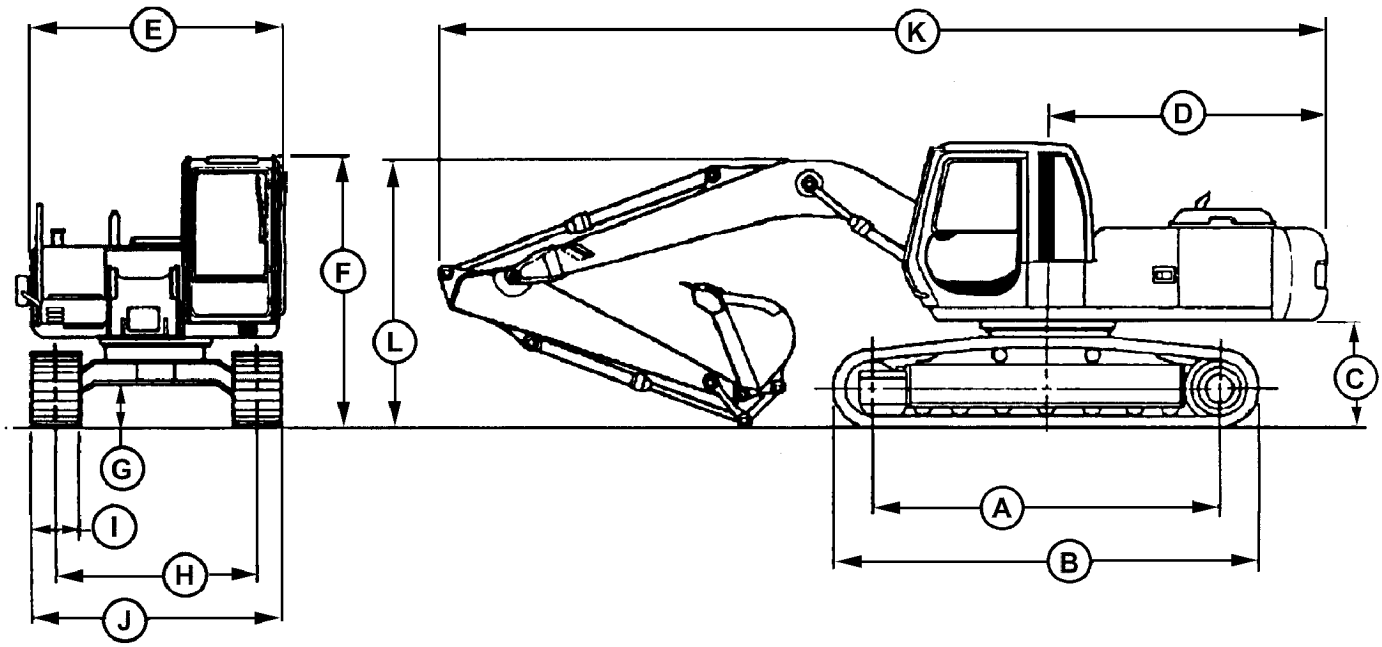
330LCR SPECIFICATIONS



T113215 –UN–03FEB98

A—Sprocket Center To Idler Center
B—Undercarriage Length
C—Counterweight Clearance
D—Rear End Swing Radius
E—Overall Width (Excluding Back Mirrors)
F—Cab Height
G—Minimum Ground Clearance
H—Center Of Sprocket To Center Of Sprocket
I—Track Shoe Width
J—Undercarriage Width
K—Overall Length
L—Transport Height

NOTE: Specifications and design subject to change without notice. Wherever applicable, specifications are in accordance with PCSA and SAE standards. Except where otherwise noted these specifications are based on a machine equipped with 800 mm (32 in.) shoes, counterweight, 3.20 m (10 ft 6 in.) arm, 1161 kg (2560 lb) 1.76 m ^{3} (2.30 yd ^{3}) bucket, full fuel tank, 79 kg (175 lb) operator and standard equipment.

Item	Measurement	Specification
A—Sprocket Center To Idler Center	Distance	4050 mm (13 ft 3 in.)
B—Undercarriage	Length	4940 mm (16 ft 2 in.)
C—Counterweight Clearance	Distance	1160 mm (3 ft 10 in.)
D—Rear End Swing Radius	Distance	3300 mm (10 ft 10 in.)

Continued on next page

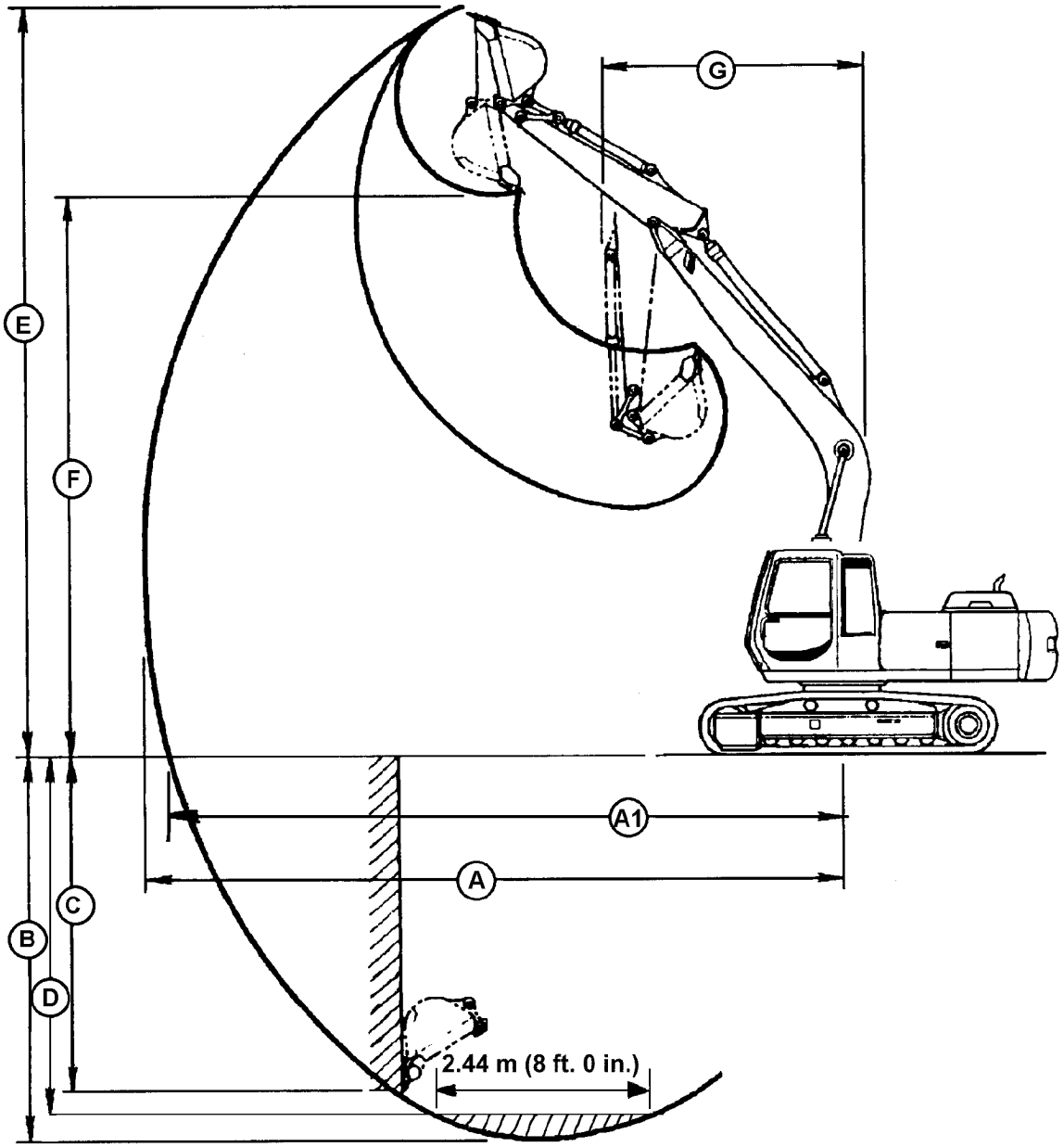
CED,TX14740,5979 –19–02JUN98–1/2

Specifications

Item	Measurement	Specification
E—Overall Width (Excluding Back Mirrors)	Distance	2995 mm (9 ft 10 in.)
F—Cab	Height	3140 mm (10 ft 4 in.)
G—Minimum Ground Clearance	Distance	500 mm (1 ft 8 in.)
H—Center Of Sprocket To Center Of Sprocket	Distance	2590 mm (8 ft 6 in.)
I—Track Shoe	Width	800 mm (32 in.)
J—Undercarriage	Width	3390 mm (11 ft 1 in.)
K—Machine	Overall Length	With 2660 mm (8 ft 9 in.) Arm: 11070 mm (36 ft 4 in.)
L—Machine	Transport Height	With 2660 mm (8 ft 9 in.) Arm: 3460 mm (11 ft 4 in.)
Machine	Operating Weight	33 058 kg (72,800 lb)

CED,TX14740,5979 –19–02JUN98–2/2

330LCR WORKING RANGES



T102389 –UN–24MAR97

A—Maximum Digging Reach
A1—Maximum Digging Reach At Ground Level
B—Maximum Digging Depth
C—Maximum Vertical Wall
D—Maximum Digging Depth (Flat Bottom)
E—Maximum Cutting Height
F—Maximum Dumping Height
G—Minimum Swing Radius

Continued on next page

CED,TX14740,6022 –19–15JUN98–1/2

Item	Measurement	Specification
A—Maximum Digging Reach	Distance	With 2660 mm (8 ft 9 in.) Arm: 10570 mm (34 ft 6 in.)
A1—Maximum Digging Reach At Ground Level	Distance	With 2660 mm (8 ft 9 in.) Arm: 10300 mm (33 ft 9 in.)
B—Maximum Digging Depth	Depth	With 2660 mm (8 ft 9 in.) Arm: 6770 mm (22 ft 2 in.)
C—Maximum Vertical Wall	Depth	With 2660 mm (8 ft 9 in.) Arm: 5540 mm (18 ft 2 in.)
D—Maximum Digging Depth (Flat Bottom)	Depth	With 2660 mm (8 ft 9 in.) Arm: 6570 mm (21 ft 7 in.)
E—Maximum Cutting Height	Height	With 2660 mm (8 ft 9 in.) Arm: 9830 mm (32 ft 3 in.)
F—Maximum Dumping Height	Height	With 2660 mm (8 ft 9 in.) Arm: 6910 mm (22 ft 8 in.)
G—Minimum Swing Radius	Radius	With 2660 mm (8 ft 9 in.) Arm: 4650 mm (15 ft 3 in.)

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330LCR ENGINE SPECIFICATIONS

Item	Measurement	Specification
John Deere PowerTech 8.1	Type	4-Stroke Cycle, Turbocharged
	Bore And Stroke	116 x 129 mm (4.56 x 5.06 in.)
	Cylinders	6
	Displacement	8.1 L (494 cu in.)
	Net Torque @ 1600 RPM	1087 N•m (802 lb-ft)
	Compression Ratio	17:1
	Power At 2000 RPM	175 kW (232 hp) Net SAE
	Cooling Fan	Suction
	Electrical system	24 Volt
	Batteries (2) 12 volt	180 Minutes Reserve Capacity:

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330LCR DRAIN AND REFILL CAPACITIES

Item	Measurement	Specification
Fuel Tank	Capacity	560 L (148 gal)
Cooling System	Capacity	30 L (8 gal)
Engine	Oil Capacity, Including Filter Change	30 L (8 gal)
Hydraulic Tank	Oil Capacity	159 L (42 gal)
Hydraulic System	Oil Capacity	322 L (85 gal)
Swing Gearbox	Oil Capacity	14 L (15 qt)
Propel Gearbox (Each)	Oil Capacity	7.5 L (8 qt)
Pump Drive Gearbox	Oil Capacity	1.0 L (1.3 qt)

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330LCR LIFT CAPACITY—KG (LB)

NOTE: Ratings are at bucket lift hook, using standard counterweight, situated on firm, level, uniform supporting surface.

Figures do not exceed 87 percent of hydraulic capacity or 75 percent of weight needed to tip machine. Figures marked with an (*) are hydraulically-limited capacities. Remaining figures are stability-limited capacities.

LIFTING OVER FRONT—Power Boost On						
Arm: 2.66 m (8 ft 9 in.)		**Bucket: 1161 kg (2560 lb) 1.76 m³ (2.3 yd³)**			**Shoe: 600 mm (24 in.)**	
Load Point Height	**Horizontal Distance from Centerline of Rotation**					
m (ft)	**1.52 (5)**	**3.05 (10)**	**4.57 (15)**	**6.10 (20)**	**7.62 (25)**	**9.14 (30)**
6.10 (20)	7082 (15614)[a]					
4.57 (15)	8846 (19503) [a]	7652 (16870) [a]	6785 (14958)			
3.05 (10)	10665 (23512) [a]	8521 (18786) [a]	6636 (14630)			
1.52 (5)	12182 (26856) [a]	8690 (19159)	6463 (14249)			
Ground (Line)	12050 (26567)	8448 (18625)	6336 (13969)			
-1.52 (-5)	11209 (24712) [a]	11956 (26359)	8348 (18404)	6310 (13912)		
-3.05 (-10)	16452 (36270) [a]	10197 (22481) [a]	11489 (25330) [a]	8406 (18532)		
-4.57 (-15)	11338 (24997) [a]	9131 (20131) [a]				
LIFTING OVER SIDE—Power Boost On						
m (ft)	**1.52 (5)**	**3.05 (10)**	**4.57 (15)**	**6.10 (20)**	**7.62 (25)**	**9.14 (30)**
6.10 (20)	5971 (13164)					
4.57 (15)	8397 (18511)	5735 (12644)	4049 (8927)			
3.05 (10)	7711 (17000)	5406 (11918)	3913 (8626)			
1.52 (5)	7136 (15732)	5092 (11225)	3755 (8277)			
Ground (Line)	6833 (15064)	4874 (10745)	3638 (8021)			
-1.52 (-5)	10738 (23674)	6752 (14885)	4784 (10548)	3614 (7967)		
-3.05 (-10)	16452 (36270) [a]	10197 (22481) [a]	6829 (15055)	4836 (10662)		
-4.57 (-15)	11285 (24880)	7081 (15612)				

[a]Hydraulically-limited capacity

Continued on next page

NOTE: Ratings are at bucket lift hook, using standard counterweight, situated on firm, level, uniform supporting surface.

Figures do not exceed 87 percent of hydraulic capacity or 75 percent of weight needed to tip machine. Figures marked with an (*) are hydraulically-limited capacities. Remaining figures are stability-limited capacities.

LIFTING OVER FRONT—Power Boost On						
Arm: 2.66 m (8 ft 9 in.)		**Bucket: 1161 kg (2560 lb) 1.76 m³ (2.3 yd³)**			**Shoe: 800 mm (32 in.)**	
Load Point Height	**Horizontal Distance from Centerline of Rotation**					
m (ft)	**1.52 (5)**	**3.05 (10)**	**4.57 (15)**	**6.10 (20)**	**7.62 (25)**	**9.14 (30)**
6.10 (20)	7082 (15614) [a]					
4.57 (15)	8846 (19503) [a]	7652 (16870) [a]	7008 (15450)			
3.05 (10)	10665 (23512) [a]	8521 (18786) [a]	6859 (15122)			
1.52 (5)	12182 (26856) [a]	8975 (19786)	6687 (14742)			
Ground (Line)	12441 (27428)	8732 (19251)	6560 (14462)			
-1.52 (-5)	11209 (24712) [a]	12347 (27221)	8632 (19031)	6534 (14405)		
-3.05 (-10)	16452 (36270) [a]	10197 (22481) [a]	11489 (25330) [a]	8690 (19158)		
-4.57 (-15)	11338 (24997) [a]	9131 (20131) [a]				
LIFTING OVER SIDE—Power Boost On						
m (ft)	**1.52 (5)**	**3.05 (10)**	**4.57 (15)**	**6.10 (20)**	**7.62 (25)**	**9.14 (30)**
6.10 (20)	6147 (13551)					
4.57 (15)	8629 (19023)	5911 (13031)	4190 (9238)			
3.05 (10)	7943 (17512)	5581 (12305)	4054 (8937)			
1.52 (5)	7369 (16245)	5267 (11612)	3896 (8588)			
Ground (Line)	7065 (15576)	5050 (11132)	3779 (8331)			
-1.52 (-5)	11082 (24431)	6984 (15397)	4960 (10935)	3755 (8278)		
-3.05 (-10)	16452 (36270) [a]	10197 (22481) [a]	7061 (15567)	5012 (11049)		
-4.57 (-15)	11338 (24997) [a]	7314 (16125)				

[a]Hydraulically-limited capacity

Continued on next page

NOTE: Ratings are at bucket lift hook, using standard counterweight, situated on firm, level, uniform supporting surface.

Figures do not exceed 87 percent of hydraulic capacity or 75 percent of weight needed to tip machine. Figures marked with an (*) are hydraulically-limited capacities. Remaining figures are stability-limited capacities.

LIFTING OVER FRONT—Power Boost Off						
Arm: 2.66 m (8 ft 9 in.)		**Bucket: 1161 kg (2560 lb) 1.76 m³ (2.3 yd³)**			**Shoe: 600 mm (24 in.)**	
Load Point Height	**Horizontal Distance from Centerline of Rotation**					
m (ft)	**1.52 (5)**	**3.05 (10)**	**4.57 (15)**	**6.10 (20)**	**7.62 (25)**	**9.14 (30)**
6.10 (20)	6700 (14772) [a]					
4.57 (15)	8369 (18451) [a]	7239 (15960) [a]	6419 (14151)			
3.05 (10)	10090 (22244) [a]	8062 (17773) [a]	6278 (13841)			
1.52 (5)	11525 (25408) [a]	8222 (18126)	6115 (13481)			
Ground (Line)	11401 (25134)	7993 (17621)	5995 (13216)			
-1.52 (-5)	10605 (23379) [a]	11312 (24938)	7898 (17412)	5970 (13162)		
-3.05 (-10)	15565 (34314) [a]	9647 (21269) [a]	10870 (23964) [a]	7953 (17533)		
-4.57 (-15)	10727 (23649) [a]	8639 (19045) [a]				
LIFTING OVER SIDE—Power Boost Off						
m (ft)	**1.52 (5)**	**3.05 (10)**	**4.57 (15)**	**6.10 (20)**	**7.62 (25)**	**9.14 (30)**
6.10 (20)	5649 (12454)					
4.57 (15)	7944 (17513)	5426 (11962)	3831 (8446)			
3.05 (10)	7295 (16083)	5114 (11275)	3702 (8161)			
1.52 (5)	6751 (14884)	4817 (10620)	3552 (7831)			
Ground (Line)	6465 (14252)	4611 (10166)	3442 (7588)			
-1.52 (-5)	10159 (22397)	6387 (14082)	4526 (9979)	3419 (7537)		
-3.05 (-10)	15565 (34314) [a]	9647 (21269) [a]	6461 (14243)	4575 (10087)		
-4.57 (-15)	10677 (23538)	6700 (14770)				

[a]Hydraulically-limited capacity

Continued on next page

NOTE: Ratings are at bucket lift hook, using standard counterweight, situated on firm, level, uniform supporting surface.

Figures do not exceed 87 percent of hydraulic capacity or 75 percent of weight needed to tip machine. Figures marked with an (*) are hydraulically-limited capacities. Remaining figures are stability-limited capacities.

LIFTING OVER FRONT—Power Boost Off						
Arm: 2.66 m (8 ft 9 in.)		**Bucket: 1161 kg (2560 lb) 1.76 m³ (2.3 yd³)**			**Shoe: 800 mm (32 in.)**	
Load Point Height	**Horizontal Distance from Centerline of Rotation**					
m (ft)	**1.52 (5)**	**3.05 (10)**	**4.57 (15)**	**6.10 (20)**	**7.62 (25)**	**9.14 (30)**
6.10 (20)	6700 (14772) [a]					
4.57 (15)	8369 (18451) [a]	7239 (15960) [a]	6630 (14617)			
3.05 (10)	10090 (22244) [a]	8062 (17773) [a]	6490 (14307)			
1.52 (5)	11525 (25408) [a]	8491 (18719)	6326 (13947)			
Ground (Line)	11770 (25949)	8261 (18213)	6206 (13682)			
-1.52 (-5)	10605 (23379) [a]	11681 (25753)	8167 (18005)	6182 (13628)		
-3.05 (-10)	15565 (34314) [a]	9647 (21269) [a]	10870 (23964) [a]	8221 (18125)		
-4.57 (-15)	10727 (23649) [a]	8639 (19045) [a]				
LIFTING OVER SIDE—Power Boost Off						
m (ft)	**1.52 (5)**	**3.05 (10)**	**4.57 (15)**	**6.10 (20)**	**7.62 (25)**	**9.14 (30)**
6.10 (20)	5815 (12820)					
4.57 (15)	8163 (17997)	5592 (12328)	3964 (8740)			
3.05 (10)	7515 (16568)	5280 (11641)	3835 (8455)			
1.52 (5)	6971 (15369)	4983 (10986)	3685 (8125)			
Ground (Line)	6684 (14736)	4777 (10532)	3575 (7882)			
-1.52 (-5)	10484 (23114)	6607 (14567)	4692 (10345)	3553 (7832)		
-3.05 (-10)	15565 (34314) [a]	9647 (21269) [a]	6681 (14728)	4741 (10453)		
-4.57 (-15)	10727 (23649) [a]	6920 (15255)				

[a]Hydraulically-limited capacity

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APPENDIX A
OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

A-1. GENERAL

Preventive Maintenance Checks and Services (PMCS) are performed to keep the Hydraulic Excavator in operating condition. The checks are used to find, correct, or report problems. Crewmembers are to do the PMCS jobs as shown in the PMCS table. PMCS are done every day the vehicle is operated, using the PMCS table. Pay attention to WARNING and CAUTION statements. A WARNING means someone could be hurt. A CAUTION means equipment could be damaged.

NOTE: As this operator manual is a commercial product supplemented to include Army specific procedures, the manual may advise the operator to perform tasks that would normally not be assigned to the operator level in a DATM. Always follow the limits established in the PMCS.

See also Chapter 3, Break-In, and Chapters 10 through 17, Scheduled Maintenance, for additional information.

Before you begin operating the Hydraulic Excavator, do Before PMCS.

During operation, do During PMCS.

After operation, do After PMCS.

Once a week do Weekly PMCS. If Hydraulic Excavator has not been operated in a week, also do Before PMCS at the same time.

Do Monthly PMCS once a month. If Hydraulic Excavator has not been operated in a month, also do After PMCS at the same time.

If you are operating the Hydraulic Excavator for the first time, do your Weekly and Monthly PMCS the first time you do your Before PMCS.

If you find something wrong when performing PMCS, fix it if you can using troubleshooting procedures and/or maintenance procedures in this manual or notify your supervisor.

The right-hand column of the PMCS table lists conditions that make the Hydraulic Excavator not fully mission capable. Write up items not fixed on DA Form 2404 for unit maintenance. For further information on how to use this form, see DA PAM 738-750.

A-2. LEAKAGE DEFINITION

CAUTION: Equipment operation is allowable with minor leakages (Class I or II) except for fuel leaks. Of course, consideration must be given to the fluid capacity of the item or system being checked. When in doubt, ask your supervisor.

When operating with Class I or II leaks, continue to check fluid levels as required in the PMCS.

Class III leaks should be reported immediately to your supervisor.

It is necessary to know how fluid leakage affects the status of the Hydraulic Excavator. The following are definitions of the classes of leakage an operator or crewmember needs to know to be able to determine the condition of the leak. Learn and then be familiar with them, and REMEMBER-WHEN IN DOUBT, ASK YOUR SUPERVISOR.

Leakage Definitions for Crew/Operator PMCS:

CLASS I-Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.

CLASS II-Leakage of fluid great enough to form drops but not enough to cause drops to drip from item being checked.

CLASS III-Leakage of fluid great enough to form drops that fall from the item being checked.

A-3. INSPECTION

Look for signs of a problem or trouble. Senses help here. You can feel, smell, hear, or see many problems. Be alert when on the Hydraulic Excavator.

Inspect to see if items are in good condition. Are they correctly assembled, stowed, secured, excessively worn, leaking, corroded, or properly lubricated? Correct any problems found or notify unit maintenance.

There are some common items to check all over the Hydraulic Excavator. These include the following:

1. Bolts, clamps, nuts, and screws: Continuously check for looseness. Look for chipped paint, bare metal, rust, or corrosion around bolt and screw heads and nuts. Tighten them when you find them loose. If tools are not available, notify unit maintenance.

2. Welds: Many items on the Hydraulic Excavator are welded. To check these welds, look for chipped paint, rust, corrosion, or gaps. When these conditions exist, notify unit maintenance on DA Form 2404.

3. Electrical wires, connectors, and harnesses: Tighten loose connectors. Look for cracked or broken insulation, bare wires, and broken connectors. If any are found, notify unit maintenance.

4. Hoses and fluid lines: Look for wear, damage, and leaks, and make sure clamps and fittings are tight. Wet spots mean a leak. A stain by a fitting or connector can also mean a leak. When you find a leak, notify unit maintenance.

A-4. LUBRICATION SERVICE INTERVALS-NORMAL CONDITIONS

For safer, more trouble-free operations, make sure that the Hydraulic Excavator is serviced in accordance with the proper lubrication and service intervals specified in the PMCS.

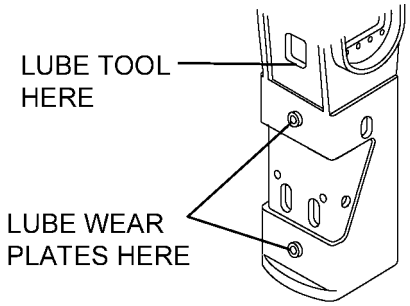
A-5. LUBRICATION SERVICE INTERVALS-UNUSUAL CONDITIONS

The Hydraulic Excavator will require extra service and care when you operate under unusual conditions. High or low temperatures, long periods of hard use, or continued use, in sand, water, mud, or snow will break down the lubricant requiring you to add or change lubricant more often.

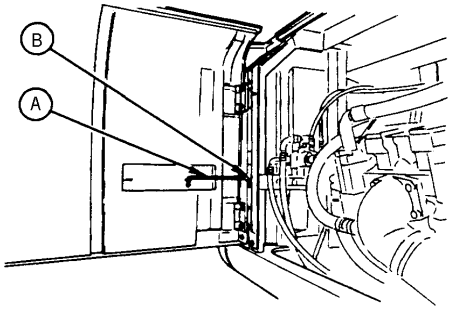
OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR HYDRAULIC EXCAVATOR 330LCR

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE: DO THE PMCS AND HAVE ITEM REPAIRED, FILLED, OR ADJUSTED AS NEEDED	EQUIPMENT IS NOT READY/AVAILABLE IF:
		WARNING: Always remember the CAUTIONS, WARNINGS, and NOTES before operating this machine and prior to PMCS. PREPARE MACHINE FOR MAINTENANCE Before performing PMCS and before leaving the operator's seat, park the machine as described below unless another position is specified in the procedure. (1) Park machine on a level surface. (2) Lower bucket to the ground. (3) Turn auto-idle switch off. **CAUTION: Turbocharger may be damaged if engine is not properly shut down.** (4) Run engine with engine rpm dial at 1/3 position without load for 2 minutes. (5) Move engine rpm dial to slow idle position. (6) Turn key switch to OFF. Remove key from switch. (7) Pull pilot control shut-off lever to locked position. Perform all weekly and before operations PMCS if: (1) You are the assigned operator and have not operated the machine since the last weekly. (2) You are operating the machine for the first time. WALK-AROUND CHECKS/INSPECTION Inspect machine daily before starting and after operation. **NOTE: If leakage is detected, further investigation is needed to determine the location and cause of the leak.**	

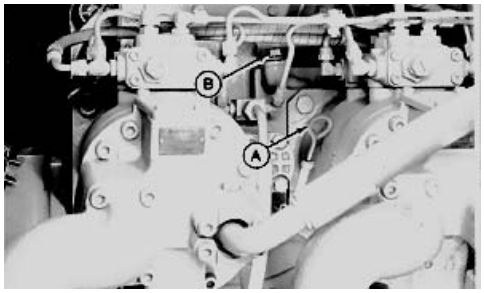
OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR HYDRAULIC EXCAVATOR 330LCR

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE: DO THE PMCS AND HAVE ITEM REPAIRED, FILLED, OR ADJUSTED AS NEEDED	EQUIPMENT IS NOT READY/AVAILABLE IF:
1	Before	Check Fuel Tank (Fill at End of Day)	
2	Before After	Inspect Boom, Bucket, Arm, Cylinders, and Hoses for Bent, Broken, Loose, Leaking, or Missing Parts	Any damage that will prevent operation
3	Before During	Lubricate Breaker and Wear Plates **NOTE: Lubricate the tool every 2 hours. If working in dusty conditions, lubricate tool more frequently (every hour). Tool must always have grease on the hammer contact area as required.**  (1) Lubricate tool with approximately 60 pumps of INDECO Supreme 1000 grease (or other HD Moly Grease containing 3 to 5 percent Molybdenum Disulfide) as shown. (2) Lubricate wear plates with approximately 2—3 pumps of INDECO Supreme 1000 grease (or other HD Moly Grease containing 3 to 5 percent Molybdenum Disulfide) for each plate.	
4	Before	Inspect Breaker Cradle and Side Shocks for Loose or Missing Bolts, Cracked Bolts, or Cracks in Cradle	Bolts are loose or missing; cradle or side shocks damaged
5	Before	Check Breaker Tool Retainers, Locking Bolts, and Plug (1) Check tightness of tool retainers in the carrier. (2) Check tightness of locking bolts. (3) Make sure that the under water plug is in place.	 Locking bolts are not tight Under water plug is not in place
6	Before	Inspect Breaker Hydraulic Hoses for Leaks or Chaffing	Hoses are cracked or leaking

OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR HYDRAULIC EXCAVATOR 330LCR

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE: DO THE PMCS AND HAVE ITEM REPAIRED, FILLED, OR ADJUSTED AS NEEDED	EQUIPMENT IS NOT READY/AVAILABLE IF:
7	Before	Inspect Breaker Housing and Side Plate for Damage	Breaker or side plates are damaged
8	Before After	Check Track and Ground Under Machine and Propel Motors for Evidence of Leaks	Any Class III leak evident
		(1) Inspect track for missing or damaged components/parts.	Any damage that will prevent operation
		(2) Look for evidence of leakage.	Any Class III leak evident
9	Before	Clean Dirt and Debris from Quick-Disconnect Hitch Attachment Front Hooks and Rear Saddles	
10	Before	Inspect for Damage and Clean Dirt and Debris from Overload Alarm Proximity Sensor	Damaged sensor
11	Before	Inspect Hydraulic Oil Pump **WARNING: Prevent possible injury from door closing. Secure door in the OPEN position.**  To hold door open, remove rod from stored position (A) and insert in tab (B) on door. (1) Open right-side access door. (2) Look for evidence of hydraulic leaks.	Any Class III leak evident

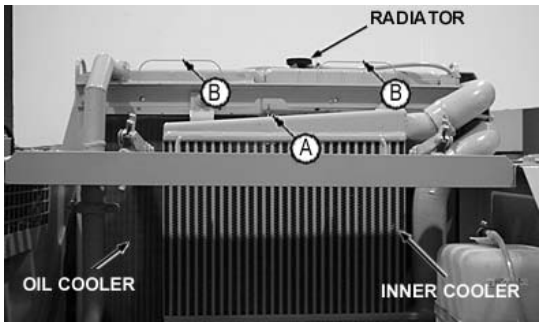
OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR HYDRAULIC EXCAVATOR 330LCR

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE: DO THE PMCS AND HAVE ITEM REPAIRED, FILLED, OR ADJUSTED AS NEEDED	EQUIPMENT IS NOT READY/AVAILABLE IF:
		NOTE: Note the Arm, Boom, and Bucket position on the placard located to the left of the hydraulic sight gauge. This information will be used with the hydraulic oil level check to be performed later. 	
		(3) Check oil level window (A) on hydraulic tank. Oil must be visible in sight gauge within safe operating range as indicated on sight gauge.	No hydraulic oil visible or not within safe operating range
		(4) If empty or low, add oil (see Check Hydraulic Oil Level under During - Start and After-Start Checks).	
12	Before	Check Pump Drive Gearbox Oil Level	
		(1) Pull dipstick (A) from tube, check oil level.	No oil in pump gearbox or below the ADD or SAFE mark on the dipstick
		(2) Add oil if below “H” mark (see Monthly - Check Pump Drive Gearbox Oil Level). 	
		NOTE: Ensure that access door is closed securely after inspection is complete.	

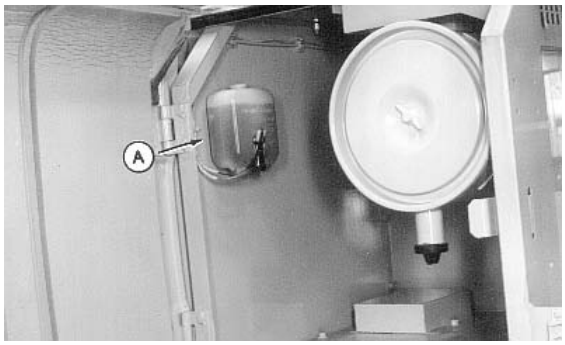
OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR HYDRAULIC EXCAVATOR 330LCR

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE: DO THE PMCS AND HAVE ITEM REPAIRED, FILLED, OR ADJUSTED AS NEEDED	EQUIPMENT IS NOT READY/AVAILABLE IF:
13	Before	Check Recovery Tank Coolant Level  (1) Open left rear access door. (2) With engine cold, coolant level must be at the FULL mark on the recovery tank (A). (3) If coolant is below the FULL mark, add coolant to the recovery tank. **WARNING: Prevent possible injury from hot spraying water. DO NOT remove radiator filler cap unless engine is cool. Then turn cap slowly to the stop. Release all pressure before you remove cap.** **NOTE: If recovery tank is empty, check for leaks. Repair as required. Add coolant to the radiator and the recovery tank.** **NOTE: Coolant level in radiator must be at bottom of the filler neck.** **NOTE: If recovery tank is full and radiator is low, check for leaks in radiator cap and the connections between radiator and recovery tank.**	Coolant does not cover cooling tubes in top of radiator

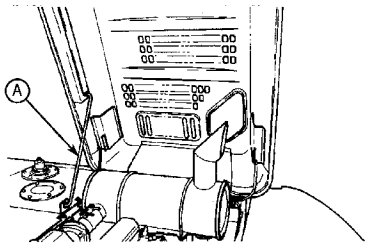
OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR HYDRAULIC EXCAVATOR 330LCR

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE: DO THE PMCS AND HAVE ITEM REPAIRED, FILLED, OR ADJUSTED AS NEEDED	EQUIPMENT IS NOT READY/AVAILABLE IF:
14	Before	Clean Radiator Air Inlet Screens  (1) Remove wing nut (A) and pull handles (B) to slide screens up for cleaning. **WARNING: Compressed air used for cleaning purposes will not exceed 30 psi. Use only with effective chip guarding and personal protective equipment (goggles/shield/gloves, etc.).** (2) Use pressurized air (30 psi maximum) or low-pressure water to clean screens.	
15	Before	Check Radiator and Oil Cooler Fins (1) Check radiator for damage and clean and remove any debris from radiator screens: a. Inner cooler (top center) b. Oil cooler (lower left)	Radiator or oil cooler fins damaged
16	Before	Check Batteries (1) Check batteries for damage and connections for corrosion and secure connections. **NOTE: Ensure that access door is closed securely after inspection is complete.**	Any damage that would prevent operation or batteries will not hold a charge

OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR HYDRAULIC EXCAVATOR 330LCR

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE: DO THE PMCS AND HAVE ITEM REPAIRED, FILLED, OR ADJUSTED AS NEEDED	EQUIPMENT IS NOT READY/AVAILABLE IF:
17	Before	Check Windshield Washer Fluid Level  (1) Open left front access door. (2) Check windshield washer fluid level in tank (A) and fill, if necessary, to full mark with all season windshield washer fluid. **NOTE: Ensure that access door is closed securely after inspection is complete.**	
18	Before	Check Cab, All Glass, Windows, Mirrors, Windshield, and Wipers (1) Check cab and windshield for cracks and/or damage that may impair vision. (2) Check wiper arm and blade for damage. **NOTE: Mount machine using the right side track footstep.**	Broken windows impair vision or missing glass
19	Before	Check that Fire Extinguisher and Window Breaking Tool are Installed in Cab	Fire extinguisher or window breaking tool missing
20	Before	Inspect Seat Belt and Mounting Hardware for Wear or Damage	Any damage that would prevent safe operation

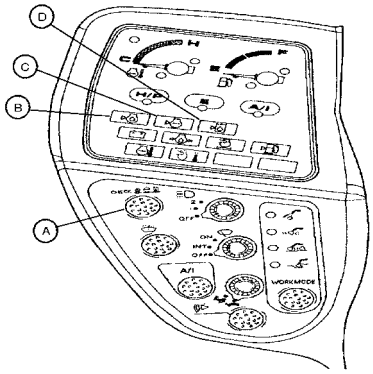
OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR HYDRAULIC EXCAVATOR 330LCR

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE: DO THE PMCS AND HAVE ITEM REPAIRED, FILLED, OR ADJUSTED AS NEEDED	EQUIPMENT IS NOT READY/AVAILABLE IF:
21	Before	Inspect Swing Gearbox Lines and Oil Level	
			
		(1) Remove access panel.	
		(2) Check swing gearbox hydraulic lines for evidence of leaks.	Any Class III leak evident
		(3) Check oil level.	
		a. Pull dipstick (A) from tube and check oil level.	
		b. Add oil (tube B) if level is below the ADD or SAFE mark on the dipstick (see Monthly - Check Swing Gearbox Oil Level).	Oil level is below the ADD or SAFE mark on the dipstick
		NOTE: Ensure that access panel is closed securely after inspection is complete.	
22	Before After	Check Engine Oil	
			
		Use the handle on the hood to raise hood until the end of the rod is securely locked into catch (A).	

OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR HYDRAULIC EXCAVATOR 330LCR

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE: DO THE PMCS AND HAVE ITEM REPAIRED, FILLED, OR ADJUSTED AS NEEDED	EQUIPMENT IS NOT READY/AVAILABLE IF:
		(1) Inspect oil cooling lines and hoses for cracks.	
		(2) Look for evidence of leakage.	Any Class III leak evident
			
		(3) Make sure dipstick (A) is fully seated.	
		(4) Remove dipstick and check oil level.	
		(5) Add oil (filler cap [B]) if level is below the ADD or cross-hatched area mark on the dipstick (see Fuels and Lubricants, Chapter 9).	Oil level is below the ADD mark on the dipstick
		NOTE: BEFORE THE ENGINE IS STARTED: The engine is full when oil level is in the cross-hatched area.	
		AFTER THE ENGINE HAS BEEN RUN: Allow the oil to drain into the oil pan for 10 minutes after engine stops before checking the oil level. The oil level must be above the ADD mark.	
		If necessary, remove oil filler cap (B) and add oil.	
		(6) Inspect engine compartment for loose or damaged components.	Any damage that would prevent operation
		NOTE: Ensure that engine access door is closed securely after inspection is complete.	

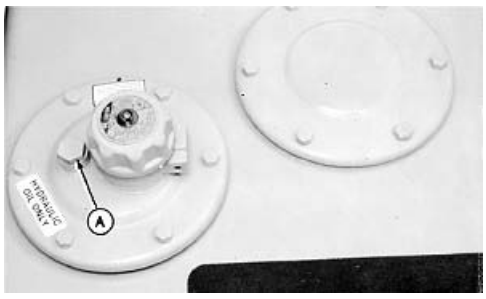
OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR HYDRAULIC EXCAVATOR 330LCR

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE: DO THE PMCS AND HAVE ITEM REPAIRED, FILLED, OR ADJUSTED AS NEEDED	EQUIPMENT IS NOT READY/AVAILABLE IF:
23	Before During	Check Instruments	
		(1) Turn key switch to ON position. All instrument lights should stay on for approximately 3 seconds.	
		(2) Check and replace any bulb that fails to light.	
		(3) Check that gauge indicates fuel level and the coolant gauge does NOT go to the red zone.	Coolant gauge in red zone
24	Before During	Level Check	
		NOTE: The level check does NOT take the place of before operation check at hydraulic oil level window, engine coolant recovery tank, or engine oil level dipstick.	
			
		(1) With key switch in the ON position, press level check switch (A).	
		(2) Check that hydraulic oil level (B) engine coolant (C) and engine oil level light (D) illuminate to indicate levels are adequate for operation.	Any WARNING light fails to function

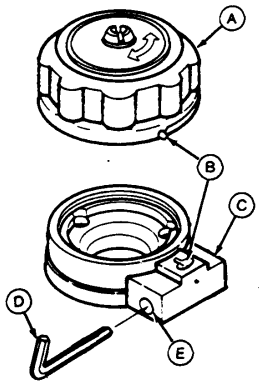
OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR HYDRAULIC EXCAVATOR 330LCR

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE: DO THE PMCS AND HAVE ITEM REPAIRED, FILLED, OR ADJUSTED AS NEEDED	EQUIPMENT IS NOT READY/AVAILABLE IF:
25	During	Start and After-Start Checks (1) Move engine rpm dial to slow idle position. (2) Sound horn to alert nearby personnel. **CAUTION: Prevent starter damage. Never operate starter for more than 20 seconds at a time. If engine fails to start, return key switch to OFF. Wait 2 minutes, then try again. After a false start, do not turn key switch until engine stops.** (3) Turn key switch to START. Release key when engine starts (key should return to ON position). **CAUTION: Prevent possible damage to engine. If indicator lights do not go out after starting engine, IMMEDIATELY STOP THE ENGINE. Find and correct the problem.** (4) Check that all indicator lights go out.	One or more indicator lights do not go out after starting engine
		(5) Check hydraulic oil level. a. Park machine on level surface. b. Position machine with arm cylinder fully retracted, bucket cylinder fully extended, and bucket lowered to the ground. (Reference placard located to the left of the hydraulic sight gauge.) c. Turn auto-idle switch off. d. Run engine with engine rpm dial at 1/3 position without load for 2 minutes. e. Return engine rpm dial to slow idle position. f. Turn key switch OFF and remove key. g. Attach a “Do Not Operate” tag on the right control lever.	

OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR HYDRAULIC EXCAVATOR 330LCR

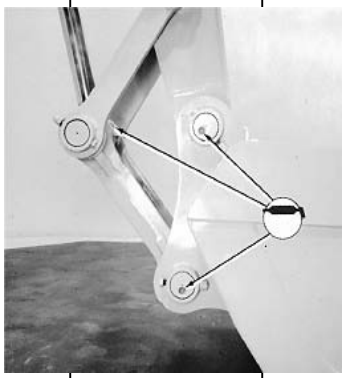
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE: DO THE PMCS AND HAVE ITEM REPAIRED, FILLED, OR ADJUSTED AS NEEDED	EQUIPMENT IS NOT READY/AVAILABLE IF:
		h. Pull pilot control shut-off lever to locked position. i. Open right side access door.  j. Check oil level window (A) on hydraulic tank. (Oil must be visible in sight gauge within safe operating range as indicated on sight gauge.)	No hydraulic oil visible or not within safe operating range
		k. If necessary, add oil. To add oil: **WARNING: High-pressure release of oil from pressurized system can cause serious burns or penetrating injury. The hydraulic tank is pressurized. Do not remove vent plug (A). Release pressure by loosening vent plug.**  (1) Loosen vent plug (A) to release hydraulic pressure.	

OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR HYDRAULIC EXCAVATOR 330LCR

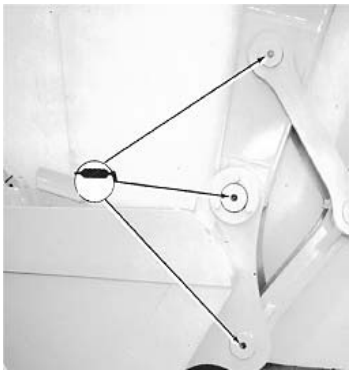
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE: DO THE PMCS AND HAVE ITEM REPAIRED, FILLED, OR ADJUSTED AS NEEDED	EQUIPMENT IS NOT READY/AVAILABLE IF:
			
		(2) Insert 4 mm (0.15-in.) Allen wrench (D) into hole (E) and turn counterclockwise.	
		(3) Slowly turn cap (A) counterclockwise. Remove cap. Add oil (see Fuels and Lubricants, Chapter 9).	
		(4) Install cap to case assembly (C) by aligning marks (B) and turning clockwise to lock position.	
		(5) Tighten vent plug.	
		NOTE: Ensure that access door is closed securely after inspection is complete.	
26	Before During	Perform Operational Checks (See Operational Checkout, Chapter 19.)	
27	Before	Check Decontamination Kit Holder and Holder Strap	
		(1) Check decontamination kit holder strap for fraying, cutting, or wear. Replace if necessary.	Any damage that would prevent safe operation
		(2) Ensure that decontamination kit holder and bolts are tight.	
28	During	Clean Breaker Bush	
		(1) When using the breaker in upward positions, the tool should be removed every 8 hours and the internal faces of the bush cleaned.	

OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR HYDRAULIC EXCAVATOR 330LCR

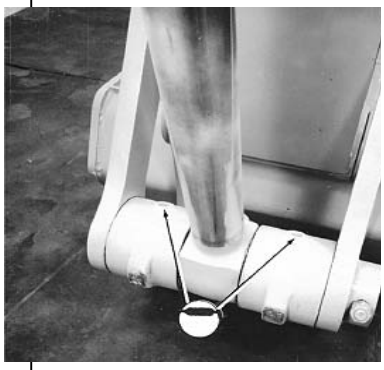
ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE: DO THE PMCS AND HAVE ITEM REPAIRED, FILLED, OR ADJUSTED AS NEEDED	EQUIPMENT IS NOT READY/AVAILABLE IF:
		NOTE: The following checks and services are to be performed weekly <u>or sooner as required</u> by adverse environmental conditions.	
29	Weekly	Inspect Quick-Disconnect Hitch Attachment Points	
		(1) Ensure that attachment is secure in front hooks and rear saddle.	
		(2) Inspect quick-disconnect hitch and wedge for excessive wear, damage, or failure.	Any damage that would prevent operation
30	Weekly	Inspect Quick-Disconnect Hitch Lifting Hook	
		(1) Visually inspect lifting hook for wear or damage.	Any damage that would prevent operation
31	Weekly *As Required	Grease Working Tool Pivots	
		(1) Pump grease (see Fuels and Lubricants, Chapter 9) into the 20 indicated grease points. Grease until grease escapes from joint.	Grease fittings are damaged or missing
		(2) *As required:	
		a. Grease every 4 hours during the first 20 hours.	
		b. Grease daily during the first 30—100 hours and when working in mud and water or sand.	



Three Points

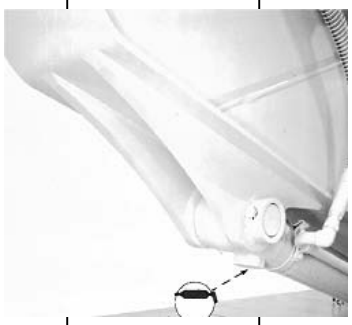
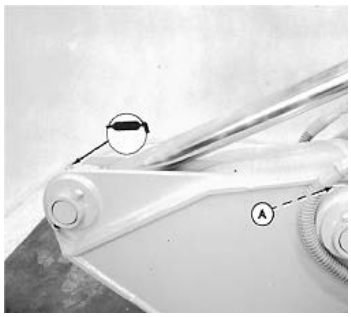
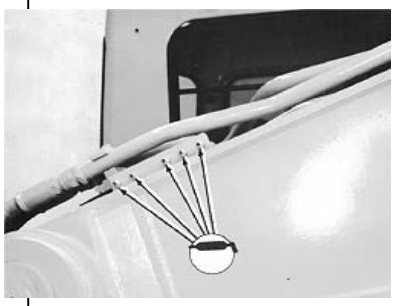
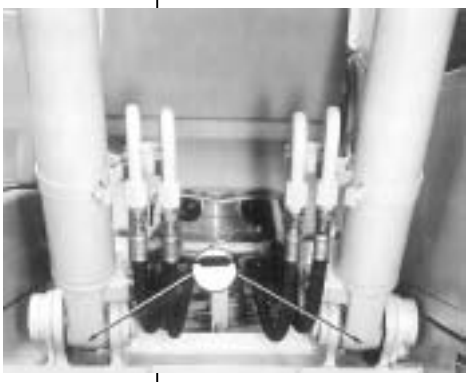
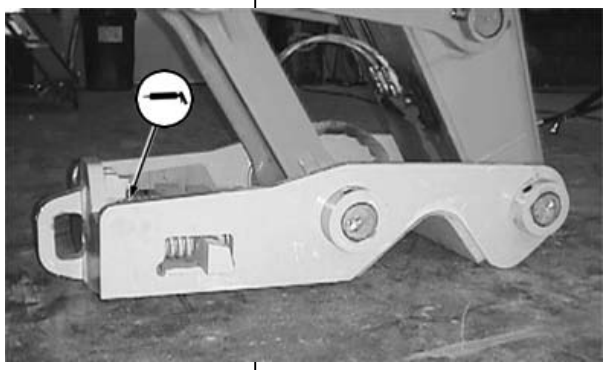


Three Points

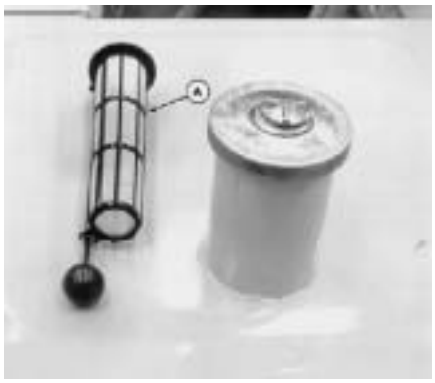


Two Points

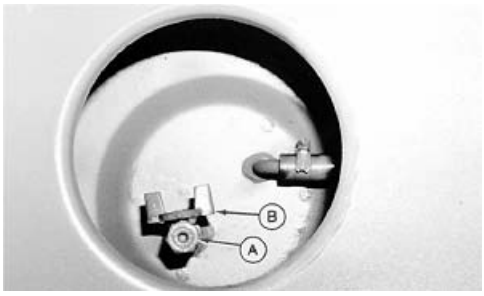
OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR HYDRAULIC EXCAVATOR 330LCR

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE: DO THE PMCS AND HAVE ITEM REPAIRED, FILLED, OR ADJUSTED AS NEEDED	EQUIPMENT IS NOT READY/AVAILABLE IF:
		 One Point	
		 Three Points, A—Left Side Shown	
		 Five Points	
		 Two Points	
		 One Point	
32	*As Required	Check Breaker Tool for Proper Lubrication (1) Check that the tool contact areas (especially the chuck housing) are well lubricated and smooth (see Fuels and Lubricants, Chapter 9).	

OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR HYDRAULIC EXCAVATOR 330LCR

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE: DO THE PMCS AND HAVE ITEM REPAIRED, FILLED, OR ADJUSTED AS NEEDED	EQUIPMENT IS NOT READY/AVAILABLE IF:
33	*As Required	Clean Fuel Tank Inlet Screen  **WARNING: Dry cleaning solvent PD-680 Type III is toxic and flammable. Wear protective goggles and gloves and use only in well-ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flames or excessive heat. The flash point is 200°F (94°C). If you become dizzy while using solvent, get fresh air immediately and get medical aid. If contact with eyes is made, wash your eyes with water and get medical aid immediately.** Use solvent or diesel fuel to clean screen (A).	Screen damaged or missing
34	Before *As Required	Drain Fuel Tank Sump (1) Park machine on level surface. Rotate upper-structure 90° for easier access. (2) Remove fuel tank fill cap.	

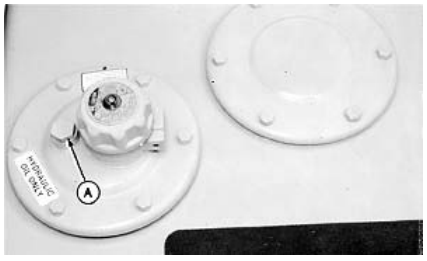
OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR HYDRAULIC EXCAVATOR 330LCR

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE: DO THE PMCS AND HAVE ITEM REPAIRED, FILLED, OR ADJUSTED AS NEEDED	EQUIPMENT IS NOT READY/AVAILABLE IF:
		NOTE: Plug is installed in drain cock to prevent vandalism.  (3) Remove plug (A) and open drain cock (B) for several seconds to drain water and sediment into a container. Dispose of waste properly. Close drain cock. (4) Install and tighten plug. (5) Install fill cap.	
35	Weekly	Check Arctic Starter Fuel Lines (1) Visually check all fuel lines for leaks. Replace damaged, worn, or corroded fuel lines.	Any Class III leak evident
36	*As Required	Bleed Arctic Starter Heater Coolant System (1) Bleed heater coolant system after any service performed on the coolant system.	
37	*As Required	Drain Water Separator (1) Open right access door to access water separator.	

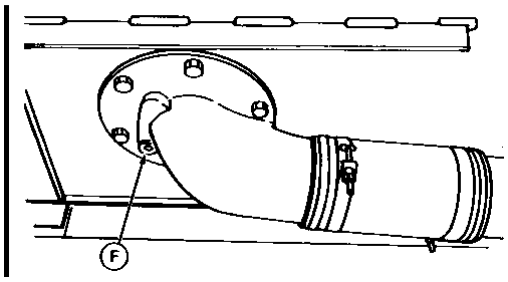
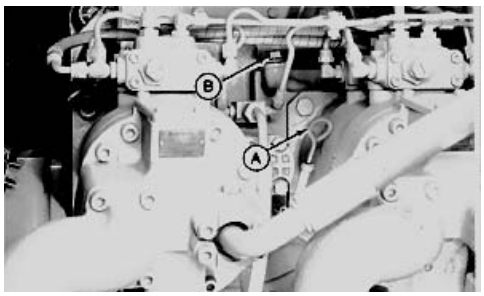
OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR HYDRAULIC EXCAVATOR 330LCR

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE: DO THE PMCS AND HAVE ITEM REPAIRED, FILLED, OR ADJUSTED AS NEEDED	EQUIPMENT IS NOT READY/AVAILABLE IF:
		 (2) Open drain valve (A) and press pump (B) to extract water. Collect waste in a container and dispose of properly. (3) Close drain valve (A). **NOTE: Ensure that access door is closed securely after inspection is complete.**	
38	*As Required	Clean Air Cleaner Dust Unloader Valve **NOTE: A missing, damaged, or hardened dust unloader valve will make the dust cup precleaner ineffective, causing very short air filter life. Valve should suck closed above 1/3 engine speed.**  (1) Squeeze dust valve (A) to remove dust from the air cleaner.	

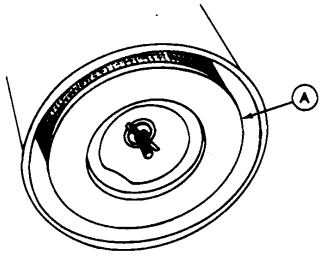
OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR HYDRAULIC EXCAVATOR 330LCR

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE: DO THE PMCS AND HAVE ITEM REPAIRED, FILLED, OR ADJUSTED AS NEEDED	EQUIPMENT IS NOT READY/AVAILABLE IF:
		(2) When operating in high dust/sand conditions, squeeze dust valve every couple of hours of operation to release dust/sand.	
39	Monthly	Check Swing Gearbox Oil Level (1) Park machine on level surface.	
			
		(2) Remove dipstick (A). Oil must be in the operating range.	Oil is below the ADD or SAFE mark on the dipstick
		(3) If oil is needed, remove filler cap (B) and add oil (see Fuels and Lubricants, Chapter 9).	
		(4) Recheck oil level.	
40	Monthly	Drain Hydraulic Tank Sump **WARNING: High-pressure release of oil from pressurized system can cause serious burns or penetrating injury. The hydraulic tank is pressurized. Do not remove plug (A). Release pressure by loosening vent plug.**	
			
		(1) Loosen vent plug (A) to release hydraulic pressure.	

OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR HYDRAULIC EXCAVATOR 330LCR

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE: DO THE PMCS AND HAVE ITEM REPAIRED, FILLED, OR ADJUSTED AS NEEDED	EQUIPMENT IS NOT READY/AVAILABLE IF:
			
		(2) Loosen plug (F) for several seconds to drain water and sediment into a container. Do not remove plug completely. Dispose of waste properly.	
		(3) Tighten sump plug and vent.	
41	Monthly	Check Pump Drive Gearbox Oil Level	
			
		To check oil:	
		(1) Remove dipstick (A) to release air pressure.	
		(2) Wipe dipstick clean and insert completely into tube.	
		(3) Remove dipstick. Oil must be approximately halfway below the “H” (level) mark.	Oil level is below ADD or SAFE mark on dipstick
		To add oil:	
		(1) Remove filler cap (B).	
		(2) Add oil (see Fuels and Lubricants, Chapter 9).	
		(3) Install filler cap.	

OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR HYDRAULIC EXCAVATOR 330LCR

ITEM NO.	INTERVAL	ITEM TO BE INSPECTED PROCEDURE: DO THE PMCS AND HAVE ITEM REPAIRED, FILLED, OR ADJUSTED AS NEEDED	EQUIPMENT IS NOT READY/AVAILABLE IF:
42	Monthly	Run Arctic Starter Heater (1) Switch heater on (for 2 minutes with a "continuous green" LED light) once a month during periods when heater is not used. This will prevent the water pump and combustion engine from seizing.	
43	Monthly	Check Arctic Starter Glow Pin (1) Check glow plug cable and connection. Make sure that connection is not corroded or dirty.	
44	Monthly	Inspect Fire Extinguisher (1) Check gauge on fire extinguisher. Make sure that the dial is within the green area on the gauge. (2) Check tightness of fire extinguisher bracket bolts. (3) Check the fire extinguisher hose for cracks, wear, or damage. Replace if necessary. (4) Check that tamper seal is intact.	Pressure is not within specification
45	Monthly	Inspect Primary Air Cleaner Element (1) Open front service door.  (2) Loosen wing nut to remove cover. (3) Remove wing nut and primary element (A). Clean the primary element. **NOTE: Ensure that front service door is closed securely after inspection is complete.**	Primary element is damaged or dirty

BLANK

APPENDIX B
COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LIST

Section I. INTRODUCTION

B-1. SCOPE

This appendix lists integral components of the end item and basic issue items for the Hydraulic Excavator to help you inventory items required for safe and efficient operation.

B-2. GENERAL

The Components of End Item and Basic Issue Items Lists are divided into the following sections:

a. Section II. COMPONENTS OF END ITEM. This listing is for informational purposes only and is not authority to requisition replacements. These items are part of the end item but are removed and separately packaged for transportation or shipment. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Illustrations are furnished to assist in identifying the items.

b. Section III. BASIC ISSUE ITEMS. These are the minimum essential items required to place the Hydraulic Excavator in operation, to operate it, and to perform emergency repairs. Although shipped separately packaged, BII must be with the Hydraulic Excavator during operation and whenever it is issued or transferred between property accounts. The illustrations will assist you with hard-to-identify items. This manual is your authority to requisition/request replacement BII, based on TOE/MTOE authorization of the end item.

B-3. EXPLANATION OF COLUMNS

The following provides an explanation of columns found in the tabular listings:

a. Column (1) – Illustration Item Number (ILLUST NUMBER). This column indicates the number of the illustration in which the item is shown.

b. Column (2) – NATIONAL STOCK NUMBER. Indicates the National Stock Number assigned to the item and will be used for requisitioning purposes.

c. Column (3) – DESCRIPTION. Indicates the Federal item name and, if required, a minimum description to identify and locate the item. The last line for each item indicates the Contractor And Government Entity (CAGE) code in parentheses, followed by the part number. If the item needed differs for different models of this equipment, the model is shown under the “USABLE ON CODE” heading in this column.

d. Column (4) – Unit of Measure (U/M). Indicates how the item is issued for the National Stock Number shown in Column 2.

e. Column (5) – Quantity Required (QTY RQR). Indicates the quantity required.

Section II. COMPONENTS OF END ITEM

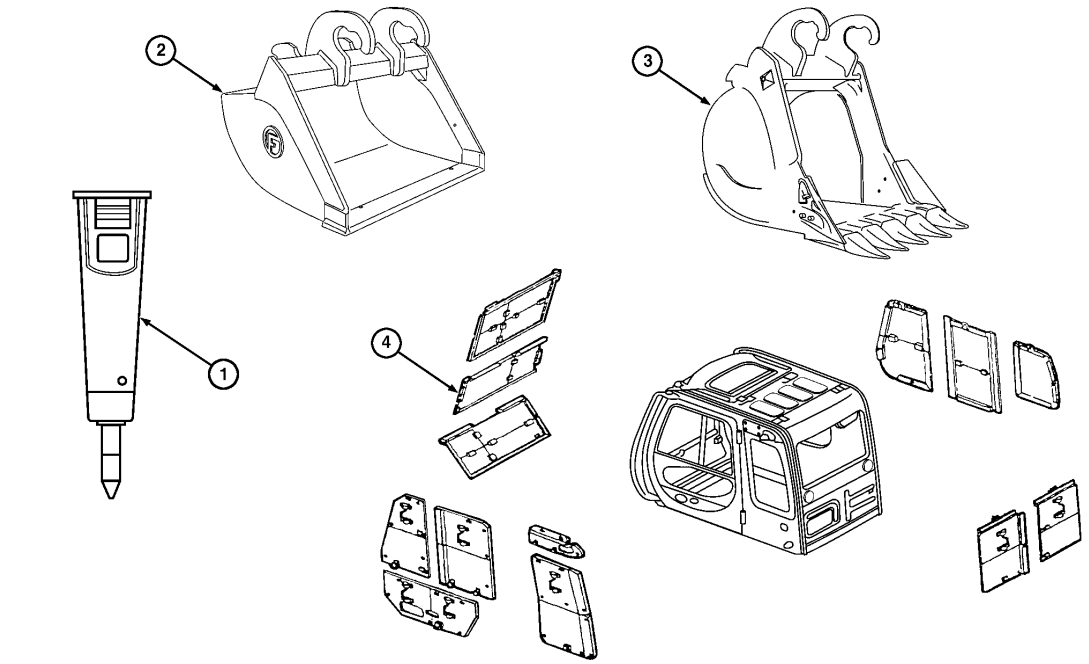
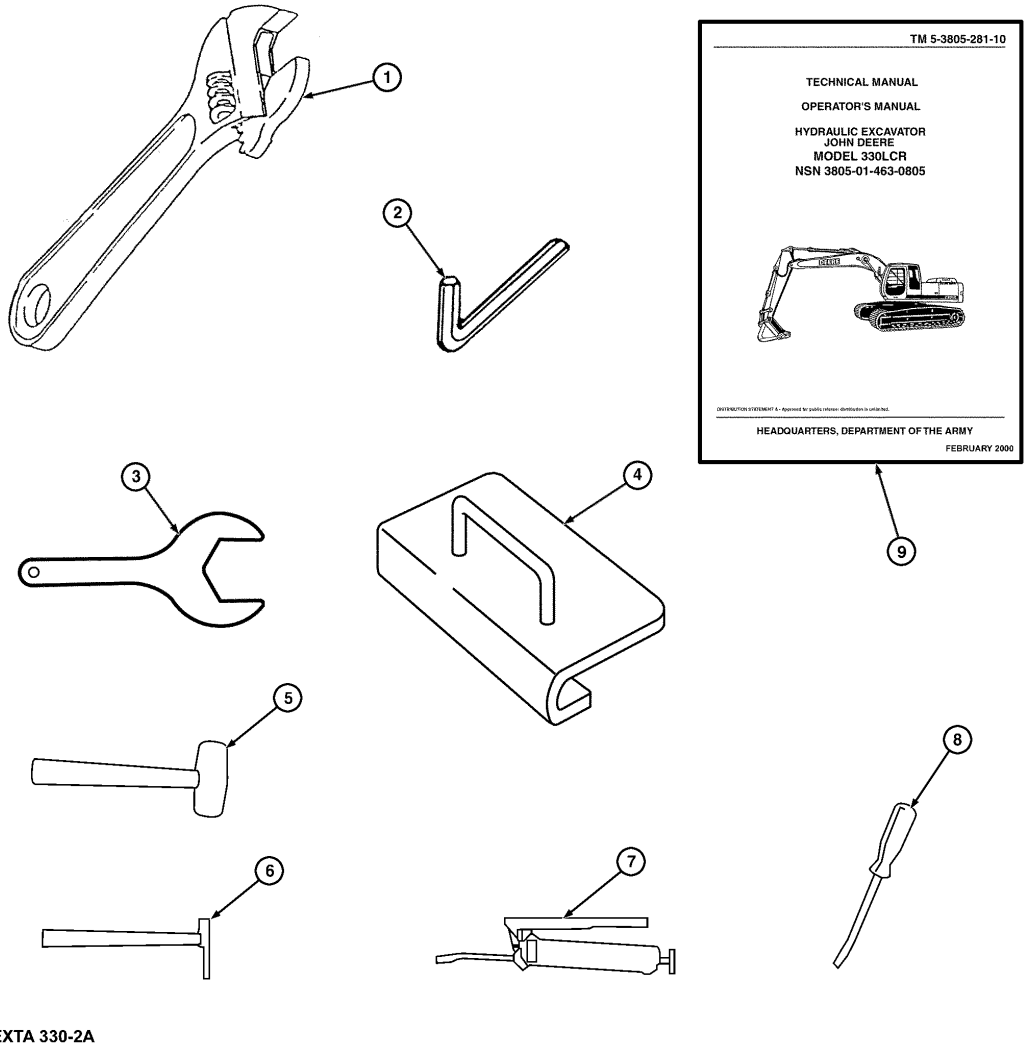


Table 1. Components of End Item

(1) ILLUST NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION CAGE & PART NUMBER	USABLE ON CODE	(4) U/M	(5) QTY RQR
1		Hydraulic Impact Breaker (75755) AT187048		EA	1
2		Rock Bucket, 42 in. (75755) AT188614		EA	1
3		Heavy Duty Bucket, 48 in. (75755) AT188609		EA	1
4		Vandal Protection Kit (75755) AP33356		EA	1

Section III. BASIC ISSUE ITEMS LIST



HYEXTA 330-2A

Table 2. Basic Issue Items List

(1) ILLUST NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION CAGE & PART NUMBER	USABLE ON CODE	(4) U/M	(5) QTY RQR
1	5120-00-240-5328	Wrench, Open End, Adjustable .95 in. jaw opening, 8-in. long (19207) 11655778-3		EA	1
2	5120-01-045-4889	Wrench, Allen 4mm (0.15-in.) (74445) 57124		EA	1

Table 2. Basic Issue Items List (Continued)

(1) ILLUST NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION CAGE & PART NUMBER	USABLE ON CODE	(4) U/M	(5) QTY RQR
3		Wrench, 3 in. (75755) T183966		EA	1
4		Brackets, Track, Transport (75755) AT189507		EA	2
5		Hammer, Wood Handle, 4 3/16 lb, 1 3/4 in. face dia., 9 7/8 in. overall length (75755) 5902A3		EA	1
6		Pin Removal Tool, 5 lb, 18 in. long (75755) PRT290		EA	1
7		Gun, Grease, Lever Action, 23 strokes per oz, 12 in. flexible hose (75755) 1055K14		EA	1
8		Screwdriver, Pry Bar, 12 in. overall length, 7 in. blade length, 1/2 lb, 5/8 in. tip width (75755) 60025A65		EA	1
9		Operator's Manual TM 5-3805-281-10		EA	1

APPENDIX C
REFERENCES

C-1. SCOPE

This appendix lists forms, field manuals, technical manuals, and other publications either referenced in this manual or which apply to the operation and maintenance of the Hydraulic Excavator. Web sites which may be useful are also included in this appendix.

C-2. DEPARTMENT OF THE ARMY PAMPHLETS

Consolidated Index of Army Publications and Blank Forms	DA Pam 25-30
Using Unit Supply System (Manual Procedures)	DA Pam 710-2-1
Functional Users Manual for The Army Maintenance Management System (TAMMS)	DA Pam 738-750

C-3. FORMS

Recommended Changes to Publications and Blank Forms	DA Form 2028
Recommended Changes to Equipment Technical Publications	DA Form 2028-2
Organizational Control Record for Equipment	DA Form 2401
Equipment Inspection and Maintenance Worksheet	DA Form 2404
Equipment Inspection and Maintenance Worksheet (Electronic)	DA Form 5988E
Maintenance Request	DA Form 2407
Preventive Maintenance Schedule and Record	DD Form 314
Product Quality Deficiency Report (NSN 7540-00-105-0078)	SF 368

C-4. FIELD MANUALS

NBC Contamination Avoidance	FM 3-3
NBC Protection	FM 3-4
NBC Decontamination	FM 3-5
NBC Handbook	FM 3-7
Camouflage	FM 20-3
Operation and Maintenance of Ordnance Materiel in Extreme Cold Weather (0° to -65°F)	FM 9-207

Recovery and Battlefield Damage Assessment and Repair	FM 9-43-2
Soldier's Manual for First Aid	FM 21-11
Basic Cold Weather Manual	FM 31-70
Northern Operations	FM 31-71
Army Motor Transport Units and Operators	FM 55-30
Desert Operations (How to Fight)	FM 90-3
Operational Symbols	FM 101-5-1

C-5. SUPPLY BULLETIN

Storage Serviceability Standard – Tracked Vehicles, Wheeled Vehicles, and Component Parts	SB 740-98-1

C-6. TECHNICAL BULLETINS

Equipment Improvement Report and Maintenance Digest (US Army Tank-Automotive Command) Tank-Automotive Equipment	TB 43-001-39-Series
Color, Marking, and Camouflage Painting of Military Vehicles, Construction Equipment, and Materiels Handling Equipment	TB 43-0209
Maintenance in the Desert	TB 43-0239
Use of Antifreeze and Cleaning Compounds in Engine Cooling Systems	TB 750-651
Inspection, Use and Tightening of Metal Fasteners Used on Tank-Automotive Equipment	TB 43-0218

C-7. TECHNICAL MANUALS

Unit Maintenance, Direct Support and General Support Maintenance, Hydraulic Excavator, John Deere Model 330LCR	TM 5-3805-281-24-1 TM 5-3805-281-24-2
Chemical, Biological, and Radiological (CBR) Decontamination	TM 3-220
Inspection, Care, and Maintenance of Antifriction Bearings	TM 9-214
Care and Use of Hand Tools and Measuring Tools	TM 9-243
Materials Used for Cleaning, Preserving, Abrading, and Cementing Ordnance Materiel and Related Items Including Chemicals	TM 9-247
Tool Outfit Hydraulic System Test and Repair Unit (HYSTRU)	TM 9-4940-468-13
Operator, Unit, Direct Support, and General Support Maintenance Manual for Lead Storage Batteries	TM 9-6140-200-14
Preparing Hazardous Materials for Military Air Shipments	TM 38-250

Principals of Automotive Vehicles	TM 9-8000
Painting Instructions for Field Use	TM 43-0139
Procedures for Destruction of Tank-Automotive Equipment to Prevent Enemy Use	TM 750-244-6

C-8. OTHER PUBLICATIONS

Army Logistics Readiness and Sustainability	AR 700-138
Expendable/Durable Items (Except Medical, Class V, Repair Parts, and Heraldic Items)	CTA 50-970
Abbreviations and Acronyms	ASME Y14.38M

C-9. WEB SITES

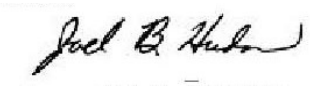
Military Traffic Management Command (MTMC)	http://www.tea.army.mil
Logistical Support Activity (LOGSA)	http://www.logsa.army.mil
US Army Tank-Automotive and Armaments Command (TACOM)	http://www.tacom.army.mil

BLANK

By order of the Secretary of the Army:

ERIC K. SHINSEKI
General United States Army
Chief of Staff

Official:



JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army
9930505

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PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 5-2350-262-34	Date of TM	M9 DS/GS MAINTENANCE MANUAL

BE EXACT . .PIN-POINT WHERE IT IS

PAGE NO.	PARAGRAPH	FIGURE NO.	TABLE NO.	IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
2-2				Fuel tank removal and installation is now a DS/GS task. Delete this task from the unit maintenance list.
4-185	B			There are three clamps securing air cleaner duct, not the two as shown. Suggest changing text and art to show three clamps.
B-5		1		Road wheel jack does not have an NSN or P/N listed and cannot be found on AMDF. Request correct NSN and P/N be furnished.

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBERS
Joe Doe, SFC 555-1212

SIGN HERE: Joe Doe, SFC

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PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 5-3805-281-10		Hydraulic Excavator 330LCR Operator's Manual

BE EXACT. . .PIN-POINT WHERE IT IS				IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.	

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THE METRIC SYSTEM AND EQUIVALENTS

'NEAR MEASURE

. Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
1 Kilometer = 1000 Meters = 0.621 Miles

'VEIGHTS

Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
1 Kilogram = 1000 Grams = 2.2 lb.
1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

SQUARE MEASURE

1 Sq. Centimeter = 100 Sq. Millimeters = 0.155 Sq. Inches
1 Sq. Meter = 10,000 Sq. Centimeters = 10.76 Sq. Feet
1 Sq. Kilometer = 1,000,000 Sq. Meters = 0.386 Sq. Miles

CUBIC MEASURE

1 Cu. Centimeter = 1000 Cu. Millimeters = 0.06 Cu. Inches
1 Cu. Meter = 1,000,000 Cu. Centimeters = 35.31 Cu. Feet

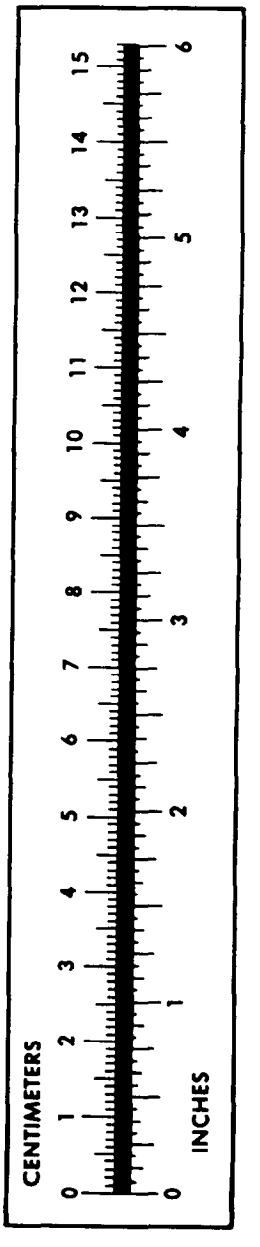
TEMPERATURE

5/9(°F - 32) = °C
212° Fahrenheit is evuivalent to 100° Celsius
90° Fahrenheit is equivalent to 32.2° Celsius
32° Fahrenheit is equivalent to 0° Celsius
9/5C° + 32 =°F

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
ıts	Liters	0.473
arts	Liters	0.946
allons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
ers	Gallons	0.264
ms	Ounces	0.035
ograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pounds-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
lometers per Liter	Miles per Gallon	2.354
meters per Hour	Miles per Hour	0.621



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