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

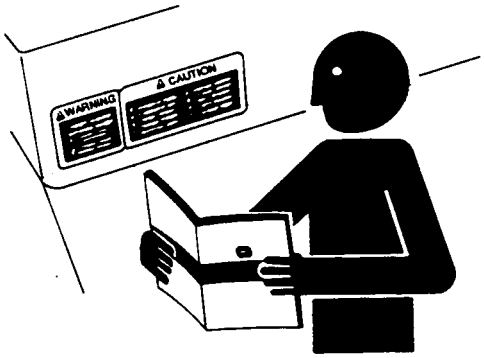
DX,SIGNAL –19–03MAR93–1/1

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.



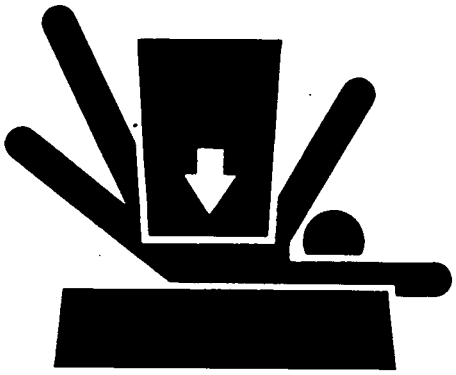
TS201 –UN–23AUG88

TX,05,DY336 –19–15MAY96–1/1

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

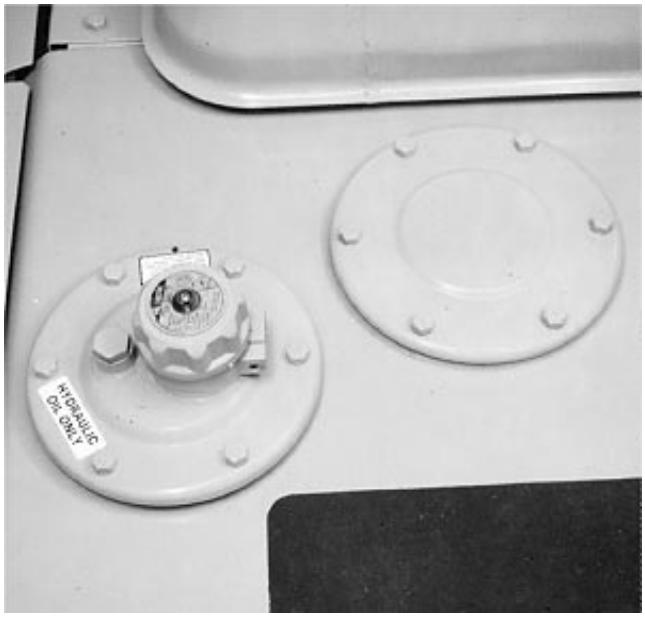
Explosive release of fluids from pressurized cooling system can cause serious burns.

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

T7900AB –19–03DEC92



T7748DK –UN–22OCT92

TX,06,DH5564 –19–22MAR99–8/11

T101279 –19–14MAY96

T7869BZ –UN–05NOV92

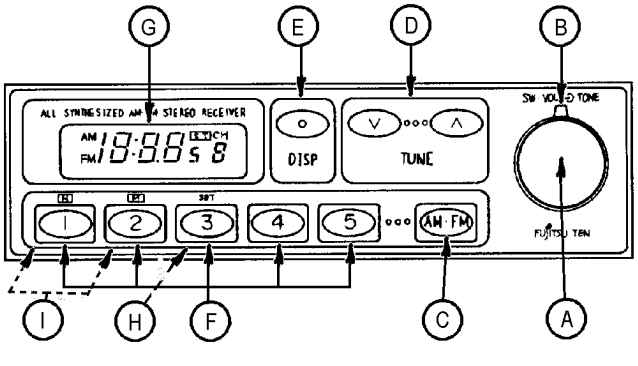
A—Caution Decal Location

Continued on next page

TX,06,DH5564 –19–22MAR99–9/11

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,DH5486 –19–06JUN96–1/1

SETTING THE CLOCK

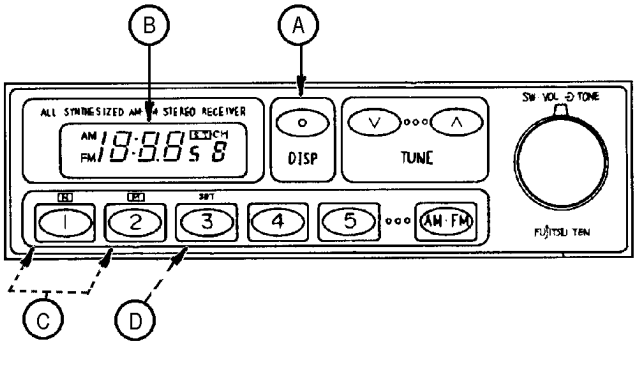
NOTE: In order to set the clock, digital display (B) must be in the time display mode.

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,DH5487 –19–06JUN96–1/1

STARTING THE ARCTIC STARTER

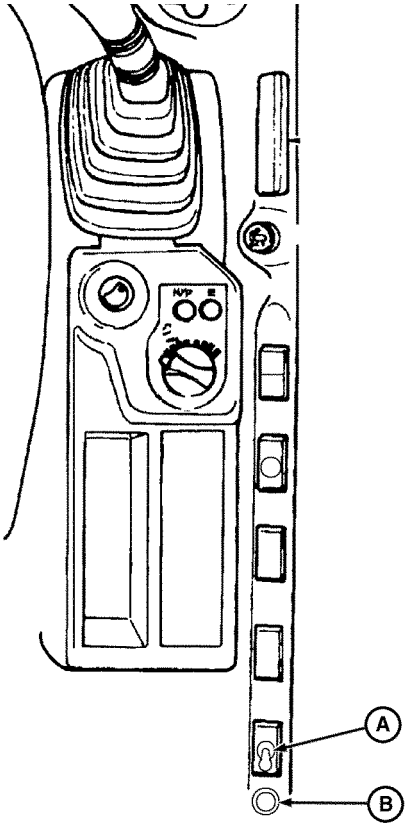
Move switch (A) to ON position.

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 contact maintenance shop.

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

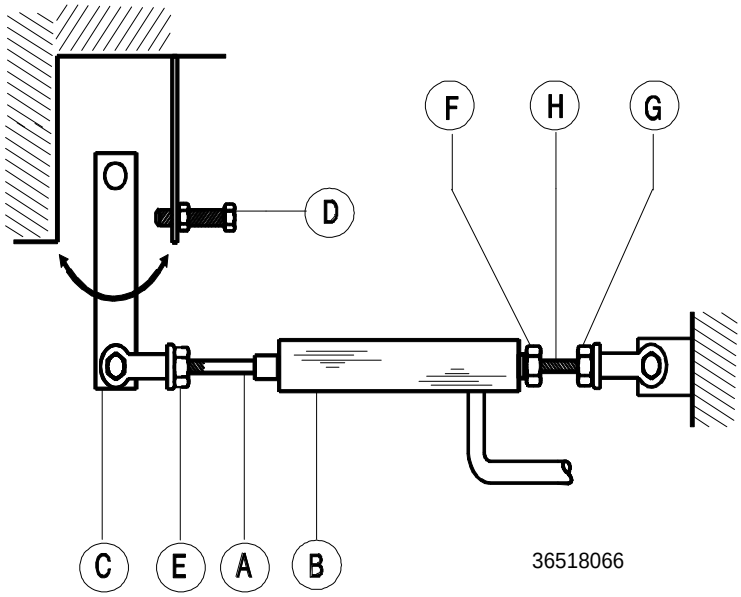
CHECK INSTRUMENTS AFTER STARTING

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

Speed and Pressure Regulation Adjusting Instructions



Normally, regulation requires no adjusting, but if proper adjustment is lost, proceed as follows:

Note: Refer to general data for machine rated speeds and pressure.

Before Starting Unit:

1. Atop separator tank cover at pressure valve, loosen locknut counterclockwise. Turn adjustment screw and locknut counterclockwise until no tension is felt at the screw. turn screw clockwise one full revolution.

After Starting Unit:

2. Allow unit to warm up. Then at control panel, push “Service Air” Button, if equipped.

3. Open and adjust service valve (on outside of the unit) to obtain the rated operating pressure on the discharge pressure gauge.

Note: If the rated operating pressure cannot be maintained with engine at full load speed and rod (A) of air cylinder (B) fully retracted, turn regulator adjustment screw clockwise until throttle air (C) moves against full speed governor stop (D).

4. Insure that pressure is maintained at rated pressure, then turn regulator adjustment screw counterclockwise until throttle arm (C) just begins to move.

Note: Turning regulator adjustment screw clockwise will raise pressure at full speed.

5. Close service valve (engine will slow to idle speed). Loosen jam nut (E) on rod (A). Rotate rod (A) to adjust speed to obtain idle rpm.

6. If necessary, repeat steps 3 and 4.

7. At pressure regulator, tighten lock nut.

8. Limit full load engine speed by loosening jam nut (F) and (G) and rotating rod (H). When proper speed is reached, tighten jam nuts.

9. To obtain maximum CFM at any pressure between 80 PSI (550kPa) and the rated operating pressure, turn adjustment screw of pressure regulator to obtain desired discharge pressure at full load engine speed. Always lock pressure setting of adjusting screw.

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.

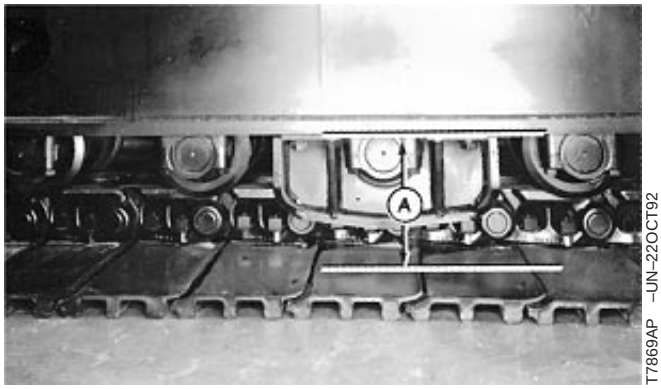
CED,OUOE042,49 –19–19OCT99–2/2

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

Normal Ground Condition—Specification

Track Sag ..... 300—335 mm (11-13/16—13-3/16 in.)

For general information on track sag, see Maintenance chapter.



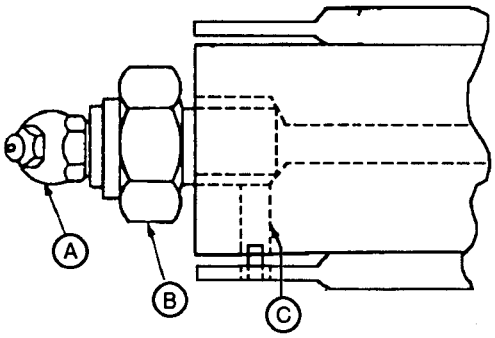
T7869AP –UN–22OCT92

TX,55,DH5447 –19–04MAR97–2/2

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

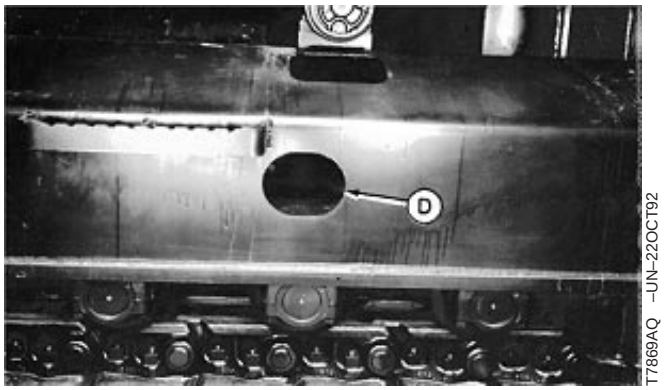
CAUTION: Prevent possible injury from high pressure grease. Do not remove grease fitting (A) from nut (B).

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

Nut—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

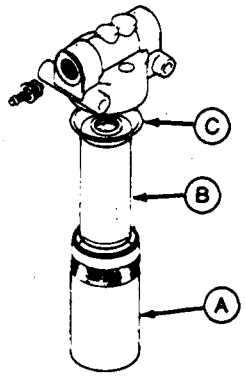
TX,55,FF2991 –19–29OCT92–1/1

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

TX,85,DH5150 –19–10AUG96–3/3

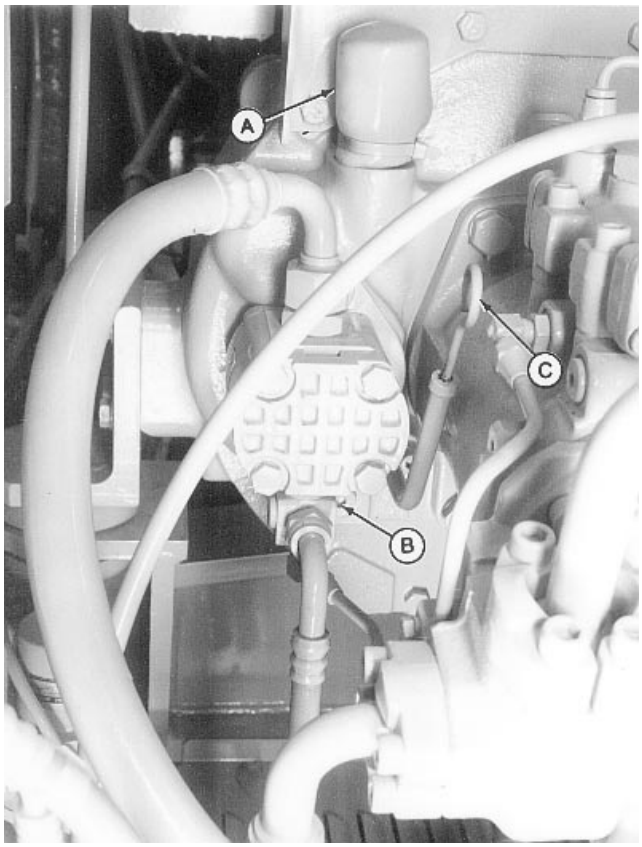
CHANGE PUMP DRIVE GEARBOX OIL

1. Remove plastic cap and filler plug (A).
2. Remove drain plug (B). Allow oil to drain into a container. Dispose of waste oil properly.
3. Apply Liquid TEFLON Pipe Thread Sealant to drain plug. Install plug.
4. Add oil. (See Fuels and Lubricants chapter.)

Pump Gearbox—Specification

Capacity..... 1.0 L (1.1 qt)

5. Pull dipstick (C) and check oil level. Oil level must be approximately halfway below 'H' (level) mark.
6. Install filler cap. Install dipstick.

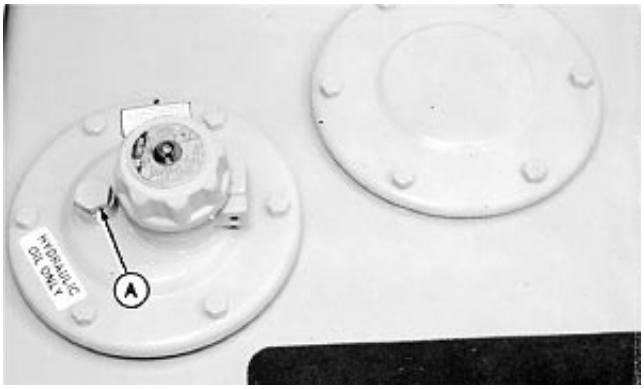


T101494 –UN–15JUL96

TX,85,DH5685 –19–03MAR97–1/1

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

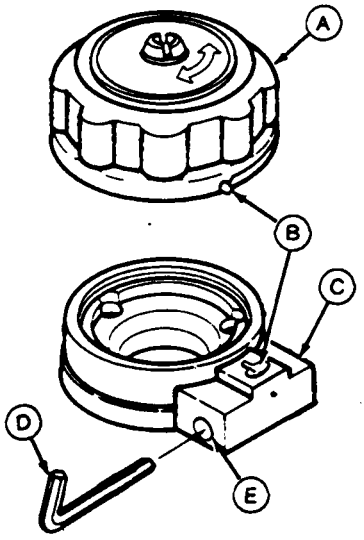
TX,OUOE042,29 –19–08MAR99–2/7

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 Tank Oil—Specification

Capacity..... 148 L (39 gal)



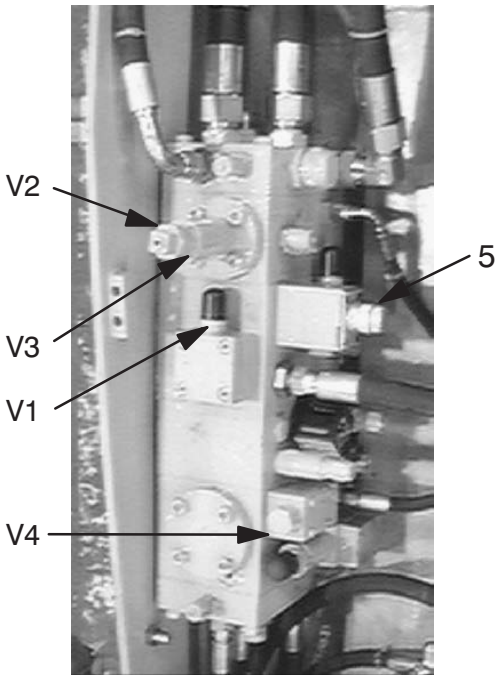
T6457EI –UN–18OCT88

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

Continued on next page

TX,OUOE042,29 –19–08MAR99–3/7

PRESETTING BEFORE DRILLING



Machine off:

12) Unlock safety nut and loosen V3 screw until the internal spring becomes free (V3 screw returns to free rotation).

13) Unlock safety nut and fully tighten V2 screw (hold V3 screw to prevent re−tightening).

14) Set the feed flow regulator 5 on position 10.

15) Remove V4 cap, and fully tighten V4 setting.

Machine running:

16) Press the bit against the rock by acting on feed lever.

17) Preset drilling feed pressure (V1 setting) to 80 − 100 bar (1140 − 1430 psi).

PRESETTING WHILE DRILLING

These settings must be carried out when oil has reached its normal operation temperature.

18) Start drilling (flushing, rotation, percussion, feed) **in homogeneous, non fractured rock** with drifter percussion control in “Auto” position.

19) Set the operating percussion pressure to − 140 − 155 bar (2000− 2215 psi) for Hc 150 (or less depending of the bit size, rod diameters, rock hardness...) by loosening V2 screw. Check the pressure on “P2” gauge.

20) By acting on V1 screw, reset feed pressure for correct coupling motion : about 1 millimeter vibration and coupling temperature less than 100° C.

Control simultaneously penetration rate and coupling temperature.

If coupling temperature is above limit although coupling vibration is correct, reduce operating percussion pressure by tightening V2 screw.

SETTING WHILE DRILLING

Adjust flow regulator on feed return A2

21) While drilling the starter rod (or the rod drilled at the highest drilling rate) progressively close the flow regulator 5 until the feed back−pressure reaches 5 bar (check the pressure on “A2” gauge).

22) Then, re−open the flow regulator 5 by 1 division.

For example : if position 6 creates 5 bar back pressure, re−open the flow regulator to position 7.

V3 drifter power regulator setting

This setting must be carried out when drilling conditions allow maximum percussion pressure and actual feed force (i.e. hard, non fractured rock, feed back pressure “A2” = 0 bar).

23) With a wrench, hold V2 screw in position.

24) Tighten V3, until percussion pressure drops (check the pressure on “P2” gauge).

25) Loosen so as to recover the initial pressure plus an additional 1/4 turn.

26) While drilling with drifter percussion control alternatively in “Auto” and “Manual” positions, verify that the percussion pressure remains the same.

27) Secure all locking nuts.

V4 – Progressive feed control setting.

28) While drilling the last rod (or the rod drilled with the highest rotation torque) **in homogeneous ground**, loosen V4 setting until the feed back pressure slightly increases (check the pressure on “A2” gauge).

29) Then re−tighten V4 setting for 1 turn.

Air flushing valve

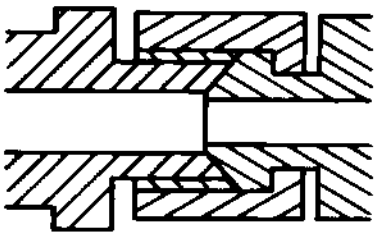
While drilling with the drifter percussion control in “auto” position, switch off air flushing and check the drifter reverses.

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.				

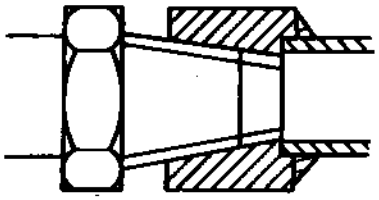
NOTE: If female thread is cast iron (control valves, brake valves motors, etc.), torque must be reduced approximately 10%.



T6873AE

T6873AE –UN–18OCT88

Straight Thread



T6873AD

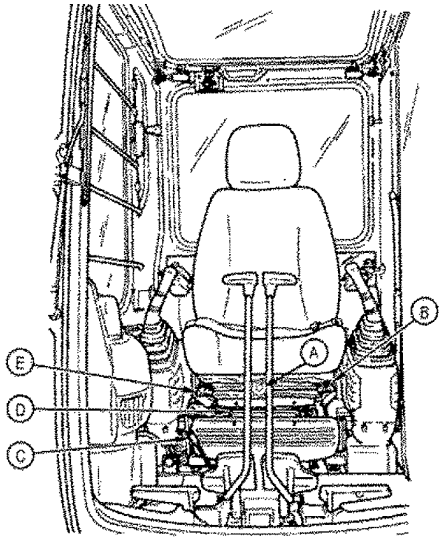
T6873AD –UN–18OCT88

Tapered Thread

04T,90,M171 –19–28JAN92–1/1

SEAT, DOORS, WINDOWS, LATCHES, AND LOCKS CHECKS

– – –1/1

SEAT CONTROL CHECKS	 T102507 –UN–29JUL96 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

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

OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR HYDRAULIC EXCAVATOR 230LCR/230LCRD

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.**	