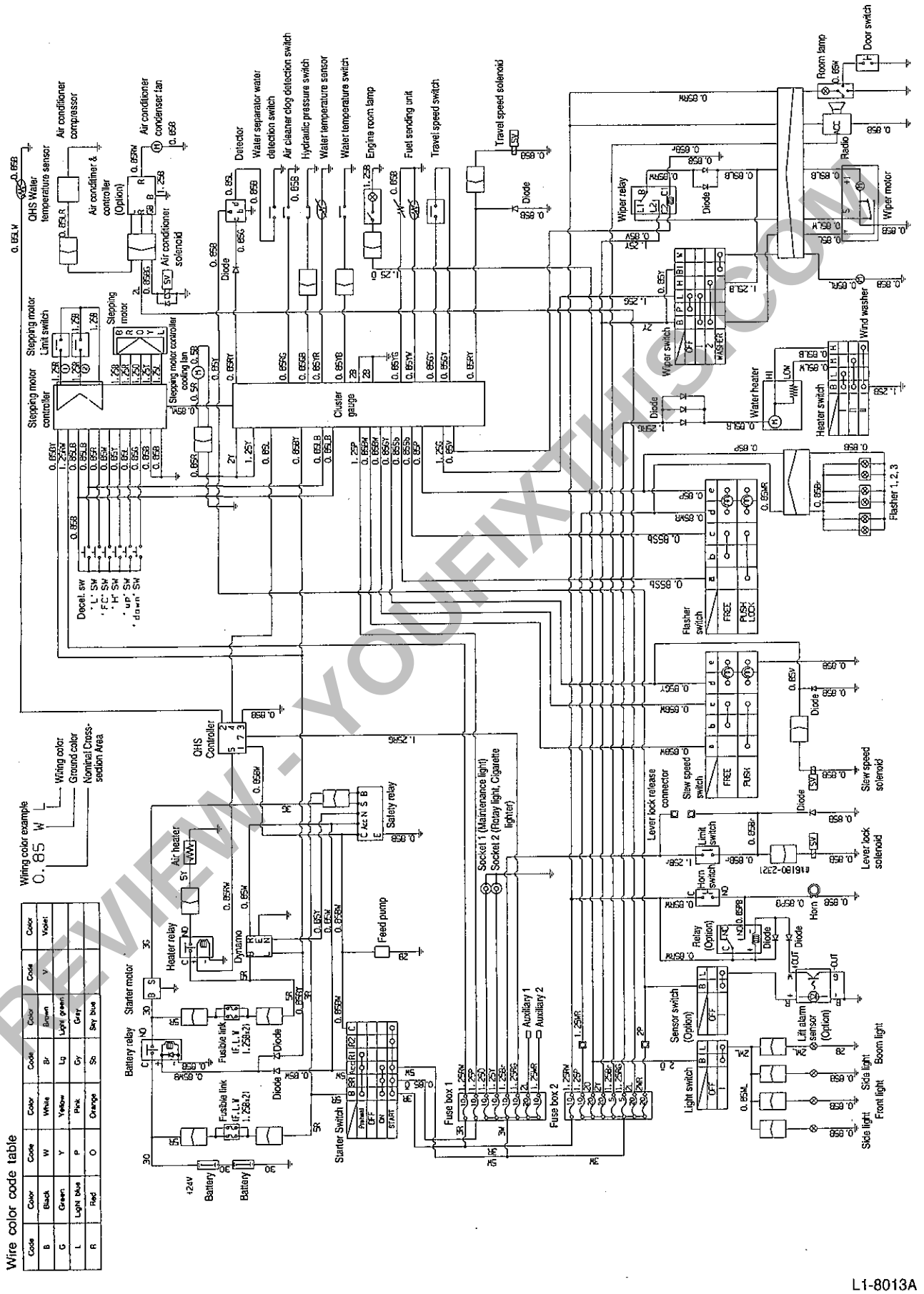
ELECTRICAL SYSTEM DIAGRAM



L1-8013A

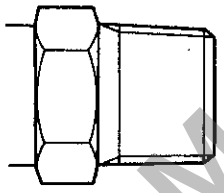
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TIGHTENING TORQUES

Joints for Piping

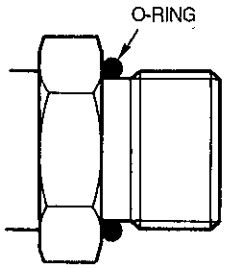
Nominal thread diameter (PT)	Torque			
	Steel		Cast steel	
	N·m	ft-lb	N·m	ft-lb
1/8	$11.8^{\pm1.1}$	$8.7^{\pm0.8}$	$10.8^{\pm1.0}$	$8.0^{\pm0.7}$
1/4	$29.4^{\pm2.9}$	$21.7^{\pm2.1}$	$24.5^{\pm2.4}$	$18.1^{\pm1.7}$
3/8	$54^{\pm5.3}$	$39.8^{\pm3.9}$	$49^{\pm4.9}$	$36.2^{\pm3.5}$
1/2	$88^{\pm8.8}$	$65.1^{\pm6.4}$	$73^{\pm7.3}$	$54.3^{\pm5.3}$
3/4	$147^{\pm14.7}$	$108.5^{\pm10.7}$	$127^{\pm12.7}$	$94.1^{\pm9.3}$
1	$196^{\pm19.6}$	$144.7^{\pm14.3}$	$171^{\pm17.1}$	$126.6^{\pm12.5}$



Y2-A109

Joints for Piping (O-ring seal type)

Nominal thread diameter (PT)	Torque	
	N·m	ft-lb
1/8	$19.6^{\pm1.9}$	$14.5^{\pm1.4}$
1/4	$34^{\pm4.9}$	$25.3^{\pm3.5}$
3/8	$54^{\pm4.9}$	$39.8^{\pm3.5}$
1/2	$64^{\pm4.9}$	$47.0^{\pm3.5}$
3/4	$93^{\pm4.9}$	$68.7^{\pm3.5}$
1	$108^{\pm9.8}$	$79.5^{\pm7.2}$
1-1/4	$117^{\pm9.8}$	$86.8^{\pm7.2}$
1-1/2	$137^{\pm9.8}$	$101.2^{\pm7.2}$



Y2-A110

Nominal thread diameter (UNF)	Torque	
	N·m	ft-lb
7/16 – 20	$16.7^{\pm1.9}$	$12.3^{\pm1.4}$
1/2 – 20	$22.5^{\pm1.9}$	$16.6^{\pm1.4}$
9/16 – 18	$31^{\pm2.9}$	$23.1^{\pm2.1}$
3/4 – 16	$60^{\pm4.9}$	$44.1^{\pm3.5}$
1-1/16 – 12	$102^{\pm5.9}$	$75.2^{\pm4.4}$
1-5/16 – 12	$135^{\pm7.8}$	$99.8^{\pm5.8}$
1-5/8 – 12	$181^{\pm9.8}$	$133.8^{\pm7.2}$

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TIGHTENING TORQUES

BOLTS AND NUTS (for ISO Strength Category 10.9)
Tighten the various bolts and nuts to the torques shown on the table below.
When conducting periodic inspections and daily inspections prior to operation, check for looseness in the bolts and nuts and tighten as necessary. If any bolts and nuts are missing, replace them with the porper types.

Category	Size × Pitch	Torque			
		General Connection Points		Special Connection Points	
		N·m	ft-lb	N·m	ft-lb
Coarse	M 6 × 1.0	$9.8^{\pm 0.5}$	$7.3^{\pm 0.3}$	$11.8^{\pm 0.5}$	$8.7^{\pm 0.3}$
	M 8 × 1.25	$22.5^{\pm 1.1}$	$16.7^{\pm 0.7}$	$26.5^{\pm 1.3}$	$19.6^{\pm 0.8}$
	M10 × 1.5	$47^{\pm 2.3}$	$34.8^{\pm 1.6}$	$55^{\pm 2.7}$	$40.5^{\pm 2.0}$
	M12 × 1.5	$87^{\pm 4.3}$	$64.4^{\pm 3.1}$	$102^{\pm 5.1}$	$75.3^{\pm 3.6}$
	M12 × 1.75	$83^{\pm 4.1}$	$61.5^{\pm 2.9}$	$97^{\pm 4.8}$	$71.6^{\pm 3.5}$
	M14 × 2.0	$134^{\pm 6.6}$	$99.1^{\pm 4.8}$	$156^{\pm 7.7}$	$115.0^{\pm 5.7}$
	M16 × 2.0	$208^{\pm 10}$	$153.3^{\pm 7.5}$	$241^{\pm 12}$	$178.0^{\pm 8.8}$
	M20 × 2.5	$411^{\pm 20}$	$303.1^{\pm 15.0}$	$475^{\pm 23}$	$350.8^{\pm 17.4}$
Fine	M 6 ×	—	—	—	—
	M 8 × 1.0	$24.5^{\pm 1.1}$	$18.1^{\pm 0.8}$	$28.4^{\pm 1.3}$	$21.0^{\pm 0.9}$
	M10 × 1.25	$50^{\pm 2.4}$	$36.9^{\pm 1.7}$	$59^{\pm 2.9}$	$43.4^{\pm 2.1}$
	M12 × 1.25	$91^{\pm 4.5}$	$67.3^{\pm 3.2}$	$106^{\pm 5.3}$	$78.2^{\pm 3.8}$
	M14 × 1.5	$135^{\pm 6.7}$	$99.9^{\pm 4.9}$	$158^{\pm 7.8}$	$116.5^{\pm 5.7}$
	M16 × 1.5	$220^{\pm 11}$	$162.8^{\pm 8.0}$	$256^{\pm 12}$	$188.8^{\pm 9.3}$
	M20 × 1.5	$452^{\pm 22}$	$333.5^{\pm 16.5}$	$524^{\pm 26}$	$387.0^{\pm 19.1}$

1. General Connection Point (Not lubricated)
   - Points other than special connection points.
2. Special Connetion Point (Apply grease with molybdenum disulfide added)
   - Points which are particularly important for function.
   - Other areas deemed necessary in the design.
3. If tightening torques are included in the text, use the specified tightening torques.
4. Tighten the upper and lower, left and right bolts and nuts alternately so that tightening is uniform all around.
5. The tightening torques for the plastic covers differ from the torques shown abobe. Consult a service outlet. Tightening nuts and bolts excessively could break them.

Points where Thread Lock is Used (with Three Bond #1324 applied)
☞ **Do not retighten this connection.**
a . Slew bearing and turntable connection
b . Slew bearing and lower frame connection
c . Slewing motor connection
d . Engine foot connection
e . Pump coupling connection
   - Do not let any screw lock get on rubber parts.

f . Hydraulic tank connection
g . Travel motor connection
h . Drive sprocket connection
i . Track roller connection
j . Carrier roller connection
k . Swivel joint connection
l . Throttle motor connection
m. Side cover / Bonnet lock connection
n . Bonnet stay connection
o . Rod end connections in the lever assembly

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Replacing Rubber Crawler Belts

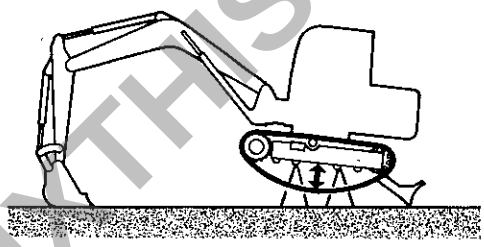
⚠ WARNING

- **Replacements should always be done by two persons, with one person acting as operator and following instructions from the other.**
- **The machine must be elevated before replacing the rubber crawler belts. Be careful not to allow the machine to fall when replacing crawler belts, since this could be extremely dangerous. Slowly lower the machine on the side of the idler and remove the crawler belts.**

This machine uses a hydraulic cylinder to adjust the tension of the crawler belts. Note that it is not necessary to regularly perform adjustments of the tension of the belt itself.

☞ During the replacement procedure, only start the engine when raising and lowering the machine body. Otherwise, always keep the engine off.

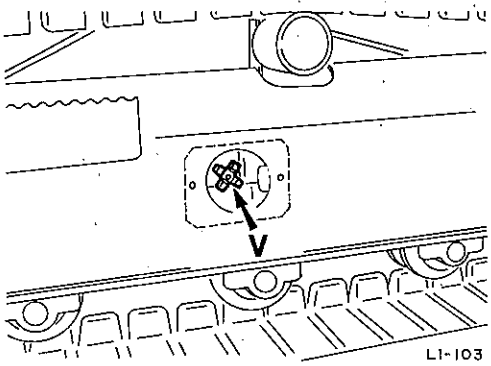
☞ When the travel speed switch is set to the 2nd speed side while the engine is running, the tensioning cylinder rods extend and the crawlers are tightened.



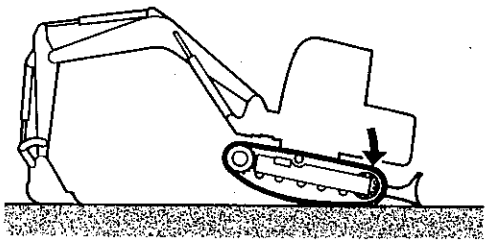
LI-093

Removal

1. Start the engine and raise the machine body 500mm (19.7 in.) with the hoe attachment and dozer blade.
2. Stop the engine.
3. Remove the valve covers at the center of the left and right crawler frames.
   Spanner: 17mm
4. Turn the tensioning cylinder valve (V) counterclockwise to loosen the tension of the crawler. Do the same for the other side.
5. Close both the tensioning cylinder valves (V) before removing the crawlers.
6. Slowly lower the dozer blade side of the machine body, by the dozer blade lever. (Do not start the engine.)
7. Ground the crawlers and lower the machine body so that the crawler slack is maximum.
8. When the crawlers come away from the idlers, slide the crawlers to the outside and remove them.
9. Disengage the crawlers and sprockets, then remove the crawlers from the crawler frames.



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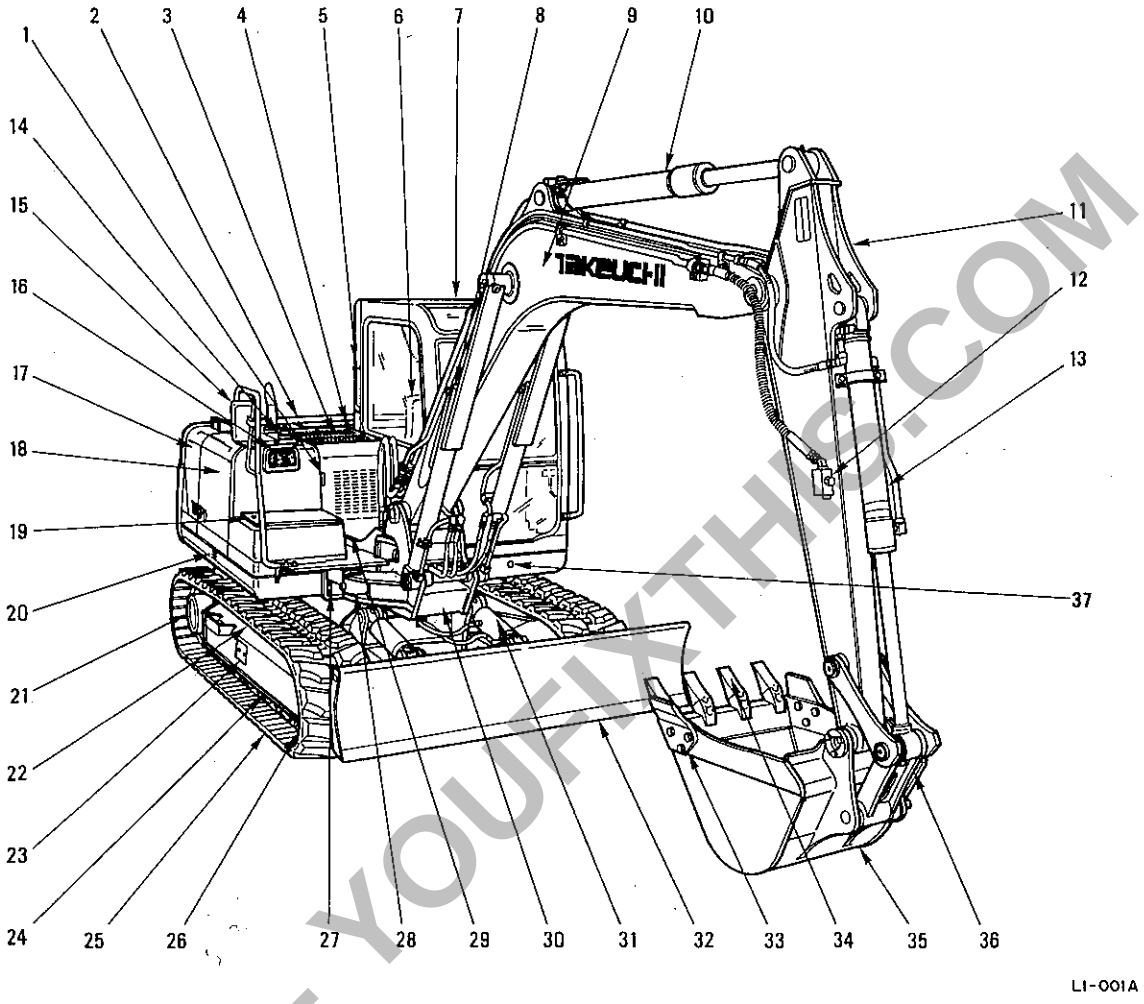


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CONTROLS AND INSTRUMENTS

NAMES OF COMPONENTS



1. Hydraulic oil Level Gauge
2. Bonnet
3. Center Cover
4. Inspection Cover
5. Antenna
6. Seat
7. Cab
8. Boom Cylinder
9. Boom
10. Arm Cylinder
11. Arm
12. Auxiliary Port
13. Bucket Cylinder
14. Hydraulic Tank
15 Rear View Mirror
16. Front Light
17. Right Side Cover
18. Fuel Tank
19. Tool Box
20. Side Light
21. Travel Motor
22. Carrier Roller
23. Tensioning Cylinder
24. Track Roller
25. Crawler Belt
26. Idler
27. Grease Nipple
28. Swing Cylinder
29. Stop Valve
30. Swing Bracket
31. Dozer Blade Cylinder
32. Dozer Blade
33. Side Cutter
34. Tooth Point
35. Bucket
36. Bucket Link
37. Electric Socket DC24V (for EU)

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Trouble	Main causes	Countermeasures
Levers & pedals stiff or do not return automatically	• Insufficient grease • Defective control valve and / or pilot valve	• Grease. • Contact service outlet for repairs.
Only the hoe attachment and slewing cannot be operated.	• Forgot to release the lock levers. • Defective control valve and / or pilot valve.	• Release the lock levers. • Contact service outlet for repairs.
No operations possible, or insufficient operating power	• Insufficient hydraulic oil • Hydraulic oil not warmed • Low engine power • Defective pump or coupling • Improper hydraulic oil • Low relief valve pressure setting • Defective control valve	• Replenish to specified level. • Warm up machine. • Clean air cleaner and inspect fuel system. • Contact service outlet for repairs. • Replace with recommended hydraulic oil. • Contact service outlet for repairs. • Contact service outlet for repairs.
Turning or traveling problems	• Stone or foreign object stuck • Defective pump • Defective control valve • Defective motor or gear • Defective brake valve	• Remove foreign object. • Contact service outlet for repairs. • Contact service outlet for repairs. • Contact service outlet for repairs. • Contact service outlet for repairs.
Machine does not travel straight	• Stone or foreign object stuck • Defective belt tension • Defective tensioning cylinder • Defective pump • Defective motor or brake valve • Defective control valve	• Remove foreign object. • Contact service outlet for repairs. • Contact service outlet for repairs. • Contact service outlet for repairs. • Contact service outlet for repairs. • Contact service outlet for repairs.
Slewing is impossible or not smooth	• Insufficient grease on slew bearing • Defective brake or pilot valve • Defective motor or gear	• Grease. • Contact service outlet for repairs. • Contact service outlet for repairs.
Insufficient digging power	• Insufficient hydraulic oil • Hydraulic oil not warmed • Hydraulic oil not appropriate • Low engine power • Defective pump • Low relief valve setting • Defective hydraulic cylinder • Defective control or pilot valve	• Replenish to specified quantity. • Warm up machine. • Replace with recommended hydraulic oil. • Clean air cleaner and inspect fuel system. • Contact service outlet for repairs. • Contact service outlet for repairs. • Contact service outlet for repairs. • Contact service outlet for repairs.

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PERFORMANCE

Slew speed:	Slow — 5.5 min^{-1}, Normal — 10.5 min^{-1}
Travel speed	
W/ rubber crawrers:	First — 3.1 km/h (1.93mph), Second — 5.8 km/h (3.6mph)
W/ steel crawlers:	First — 3.0 km/h (1.86mph), Second — 5.5 km/h (3.42mph)
Gradeability:	35 deg.

SIDE DITCH DIGGING MECHANISM

Type:	Boom offset by hydraulic cylinder
Offset angle:	Right 50 deg., Left 80 deg.

FUEL, LUBE OIL AND COOLANT

Fuel tank capacity:	120 liters (31.7 US gal.)
Hydraulic oil:	68 liters (18.0 US gal.)
	Total system capacity-132 liters (34.9 US gal.)
Engine oil	
Upper limit:	11 liters (2.9 US gal.)
Lower limit:	9 liters (2.4 US gal.)
Coolant:	12 liters (3.2 US gal.) (including reserve tank)

ENGINE

Model:	Nissan BD3004
Type:	4-cycle, water-cooled, 4-cylinder in-line diesel engine
Displacement:	2953 cm^3 (180.19 cu. in.)
Rated output:	41 kW (55.2 hp) @2300 min^{-1}
Max. torque:	186 N·m / (137.4ft.-lb.) @1600 min^{-1}

WEIGHT

During transport	
W/ rubber crawlers:	7030 kg (15500 lb.)
W/ steel crawlers:	7160 kg (15780 lb.)
Ground pressure	
W/ rubber crawrers:	31.9 kPa (4.62 psi)
W/ steel crawlers:	32.9 kPa (4.76 psi)

STANDARD BUCKET

Cutting width:	750 mm (29.5 in.)
Rated Capacity:	0.25 m^3 (0.33 cu.yd.)
Weight:	180 kg (397 lb.)

NOISE LEVEL

Sound-power level:	L_{WA} 101 dB(A)
Sound-pressure level:	L_{PA} 79 dB(A)

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INSPECTION AND MAINTENANCE CHART

Item	Every day	Every 50 hrs.	Every 100 hrs.	Every 250 hrs.	Every 500 hrs.	Every 1000 hrs.
Grease application	▲	▲				
Grease application/Slew motor bearing				▲(1st time)		▲
Crawler belt tension		●				
Travel motor gear oil					×(1st time)	×
Hydraulic oil	●					×
Return filter		×(1st time)			×	
Suction strainer					■	
Operation lever movement, looseness	●					
Travel lever movement, looseness	●					
Water separator	●		■ When the warning lamp lights			
Fuel filter						×
Feed pump gauze filter						■
Air breather filter						×
Engine oil filter		×(1st time)		×		
Air cleaner	●			■		×
Coolant	●					×
Radiator fins					■	
Fan belt	●					
Engine oil	●	×(1st time)		×		
Fuel tank drainage		■				
All lights, horn, flasher lamp	●					
Operation of hour meter	●					
Operation of water temp. gauge & fuel gauge	●					
Monitor lamp operation	●					
Battery		●				
Retightening of screws	● Periodic inspections time					

●: Inspection ▲: Replenishment ■: Cleaning ×: Replacement

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STARTING THE ENGINE

Follow the following procedure to start the engine.

⚠ WARNING

- **Do not use starter fluids to assist in the starting of the engine, since they introduce the risk of fuel exploding. Use a clean, quality diesel fuel for good performance.**

1. Look all around the machine to check that it is safe to start up, then put the levers and pedals in neutral position.
2. Turn the starter switch to the ON position. All lamps on the cluster gauge will light up for 1 second while a buzzer sounds. The engine oil pressure and battery charge warning lamps continue flashing until the engine is started.
3. Check that the operating mode lamp (L) is lit. Starting the engine before the L mode lamp lights may result in damage.
4. Make sure that the glow lamp has gone out. The glow lamp remains on in cold temperatures, and goes out after the engine has been warmed up. (The glow lamp lights for 9 seconds when coolant temperatures are at –10° C (14°F).

☞ Do not run the starter motor for more than 15 consecutive seconds. If the engine fails to start, wait for 30 seconds to protect the battery, and then try again to start the engine.

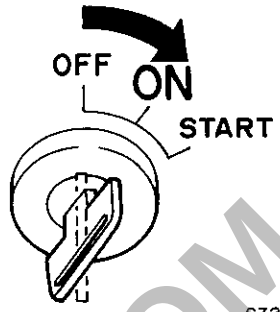
5. Turn the starter switch to the START position to start the engine. Once released, the starter switch automatically returns to the ON position. All warning lamps on the cluster gauge will turn themselves off once the engine has been started. Stop the engine and check for problem if they fail to do so, and perform repairs if necessary.

☞ Do not race the engine immediately after starting it up. Doing so runs the risk of seizure in each portion of the engine due to insufficient lubrication.

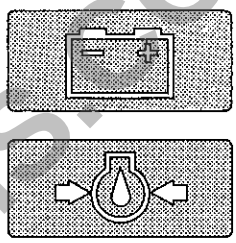
6. Warm the engine up for five minutes. Check to see if there is anything unusual in the color of the exhaust, the noise from the engine, or unusual vibrations when the engine is warming up.

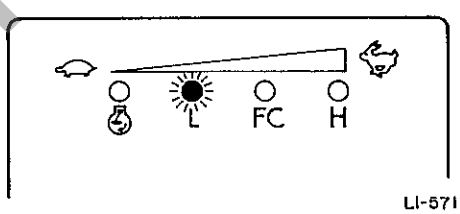
⚠ CAUTION

- **Warm up the engine for five minutes, until the needle on the coolant temperature gauge moves.**
- **Note that after warming up the engine, the hydraulic oil also has to be warmed up for the machine to run efficiently. See the section below for further details.**

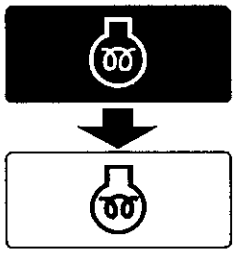


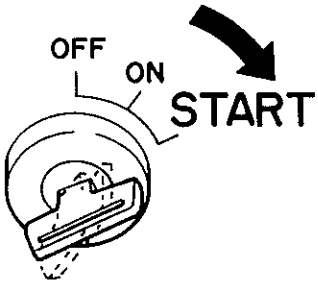
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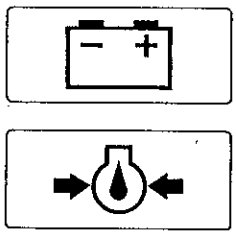


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LI-082

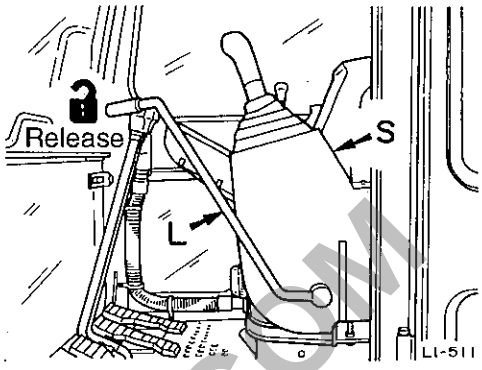
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LOCKING LEVER

⚠ WARNING

- **Be sure to, set the bucket on the ground, lock the operation levers, and remove the key when not working or away from the machine.**
- **Be careful not to touch the operation levers when shifting the locking lever. Doing so with the locking lever incompletely set may result in the machine slewing or in the hoe attachment being inadvertently moved.**



This lever locks the right and left operation levers.

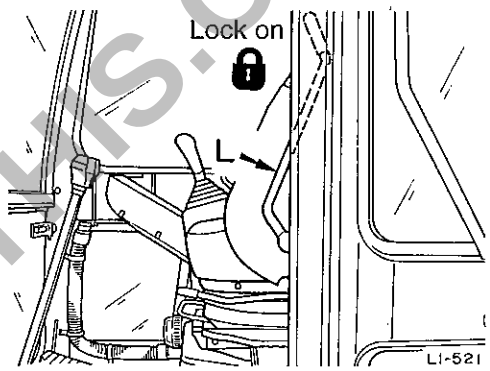
Serial No. 1705081 ~

This lever locks the operation levers and travel levers. The locking lever is located on the left side of the left lever stand (S).

- To unlock, push locking lever (L), firmly down until the stand comes to a full halt.
- To lock, pull up locking lever (L), causing the lever stand to rise automatically.

☞ Note that the operation of the travel, boom swing, and dozer blade are not locked by the locking of the operation levers.

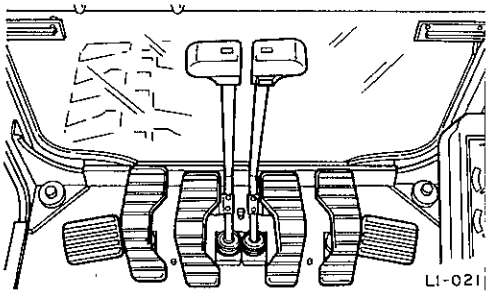
☞ The locking system is hydraulically operated. This means that while the left and right operation levers still move when the levers has been locked, the cab may not be slewed and the hoe attachment cannot be used.



TRAVEL LEVERS

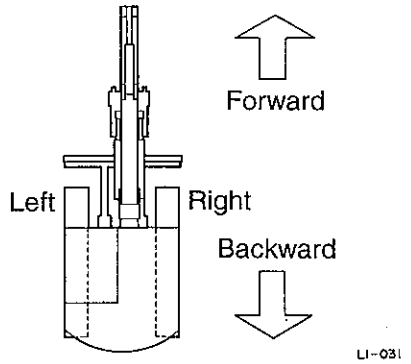
⚠ WARNING

- **Check the dozer blade location before traveling, when the dozer blade is to the rear, operate the travel levers in the opposite direction to when the dozer blade is in the front.**



These levers control the travel of the machine, i.e., move the machine forward or backward or change direction. Moving the levers further down causes the travel speed to increase.

(See page 39)



OPERATION LEVERS

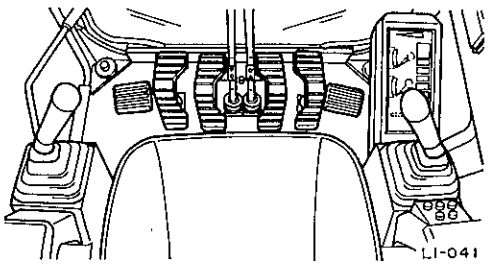
⚠ CAUTION

- **Always check the lever type before operating the levers.**

These levers control the boom, arm, bucket, and the slewing of the upperstructure.

- Moving the levers further down causes the working speed to increase.

(See pages 38 to 41)



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ATTACHMENTS

⚠ WARNING

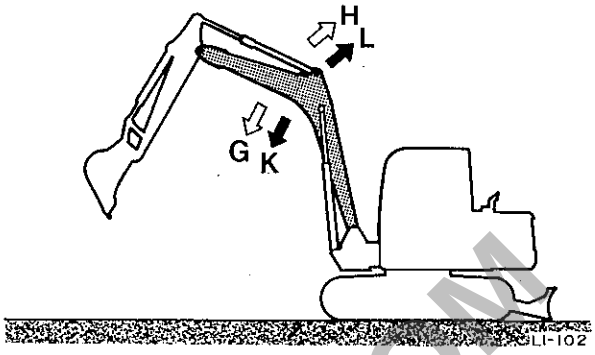
- **Be careful to check what type of lever control arrangement you are operating with before beginning operations.**

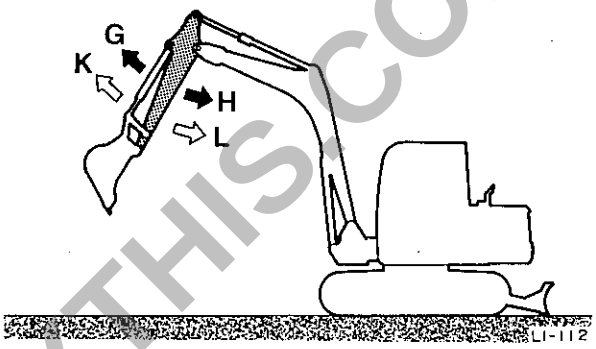
• Unlock the lever lock.

- **Boom movement**

⚠ CAUTION

- **Move the boom slowly at the beginning and end of its motion when moving it up and down. Sudden stops when lowering the boom cause especially strong shocks and damage to the machine.**

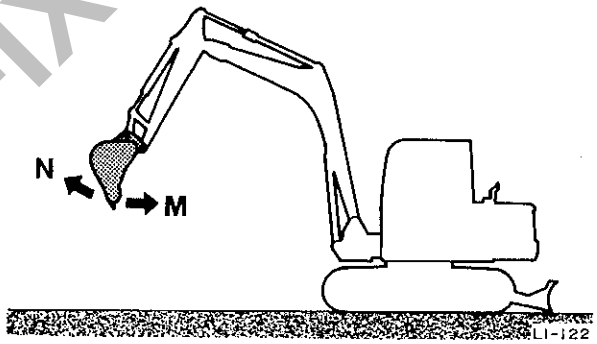




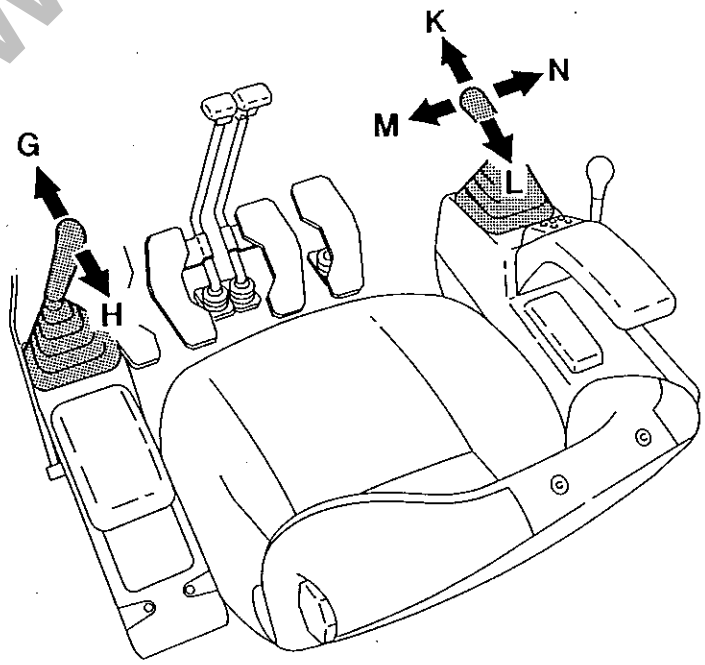
- **Arm movement**

A-type ➡
G-type ⇨

- **Bucket movement**



• Move the levers obliquely to perform actions simultaneously using both the boom and bucket, or slewing and moving of the arm.



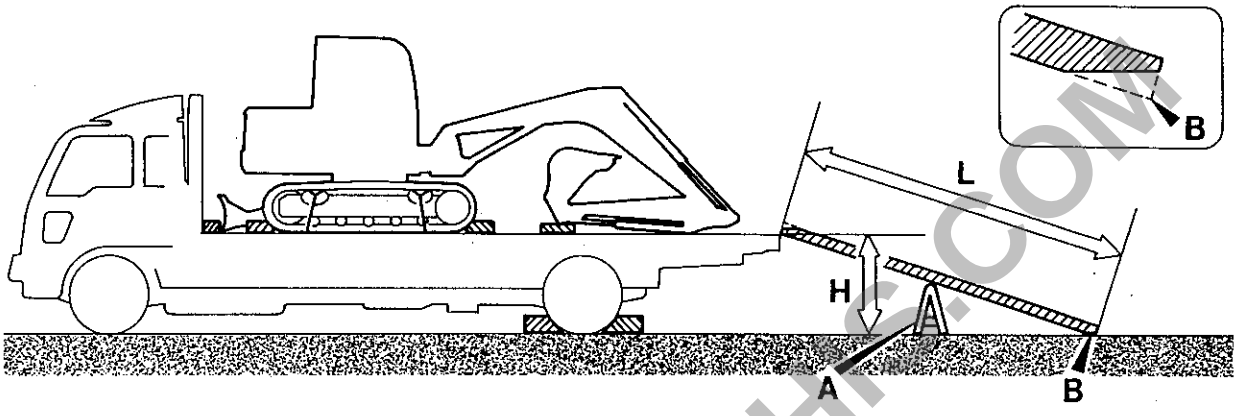
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TRANSPORTING THE MACHINE

Before getting ready to transport, refer to the page giving the machine's specifications and check its total weight, height, width, length, speed and maximum tonnage.

Posture During Transport



LI-282

Loading Ramps

- Choose a ramp length that will keep the slope angle under 15° and a material that is sufficiently strong.
- The ramp width should be at least 1.2 times the crawler belt width.
- Bevel the end of the ramps as shown at point (B) on the diagram.
- Fasten the ramps securely to the truck bed with a metal fitting in such a way that the truck and machine centers are aligned.
- For better safety, insert supports (A) under the ramps in the middle.

Relationship of bed hight (H) and ramp length (L)

H	L
750 (2-6)	2800 (9-2) or greater
930 (3-1)	3500 (11-6) or greater
1110 (3-8)	4200 (13-9) or greater
1300 (4-3)	4900 (16-1) or greater

Units: mm (ft. in.)

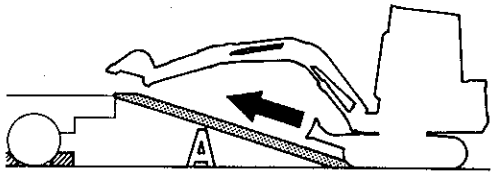
Loading and Unloading the machine

⚠ WARNING

- **Never change directions or slew while on the ramps, as this is extremely dangerous. Wait until the machine is off the ramp to change directions.**
- **The machine should always be loaded and unloaded on firm, level ground. Set the truck's parking brake and set stoppers under the wheels.**
- **Slowly move the machine in low speed when travelling on the ramps.**
- **Do not use hoe attachment when loading or unloading.**

1. Clean the crawlers to prevent sideways slippage on the ramps.
2. When loading, extend the bucket before starting the machine up the ramps so that it is directly over the bed, lift the dozer blade, then climb up the ramps at slow speed.

Loading



D3-022

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