COMPACT EXCAVATOR

TB070

WORKSHOP MANUAL

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SERIAL NUMBER
TB070 : 1703004～

TAKEUCHI
TAKEUCHI MFG.CO.,LTD.

02. 2000
13935



I . GENERAL



II . SPECIFICATIONS



III. MACHINE CONFIGURATION



IV. HYDRAULIC UNITS



V . TROUBLESHOOTING



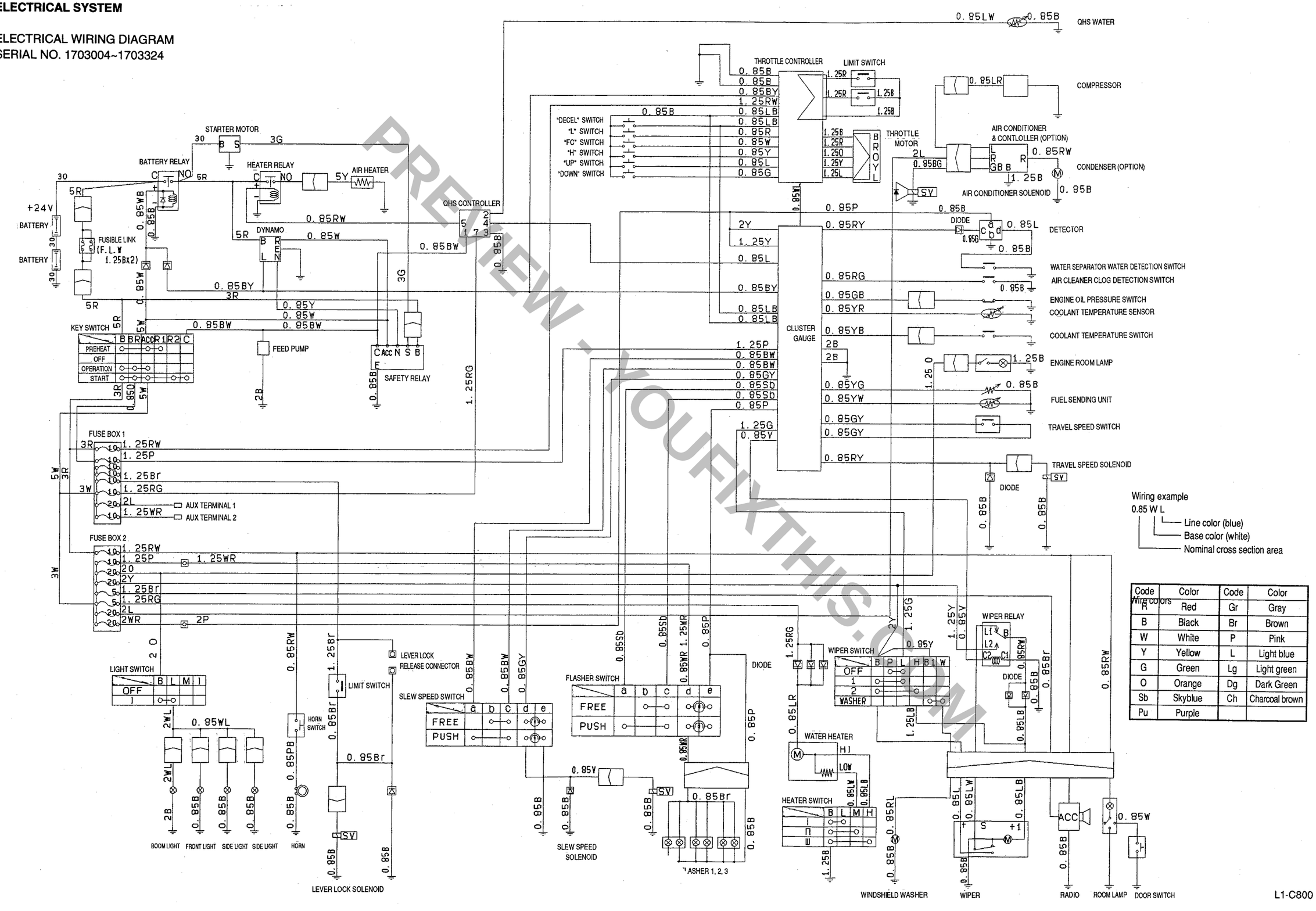
VI. ENGINE

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ELECTRICAL SYSTEM

ELECTRICAL WIRING DIAGRAM
SERIAL NO. 1703004~1703324

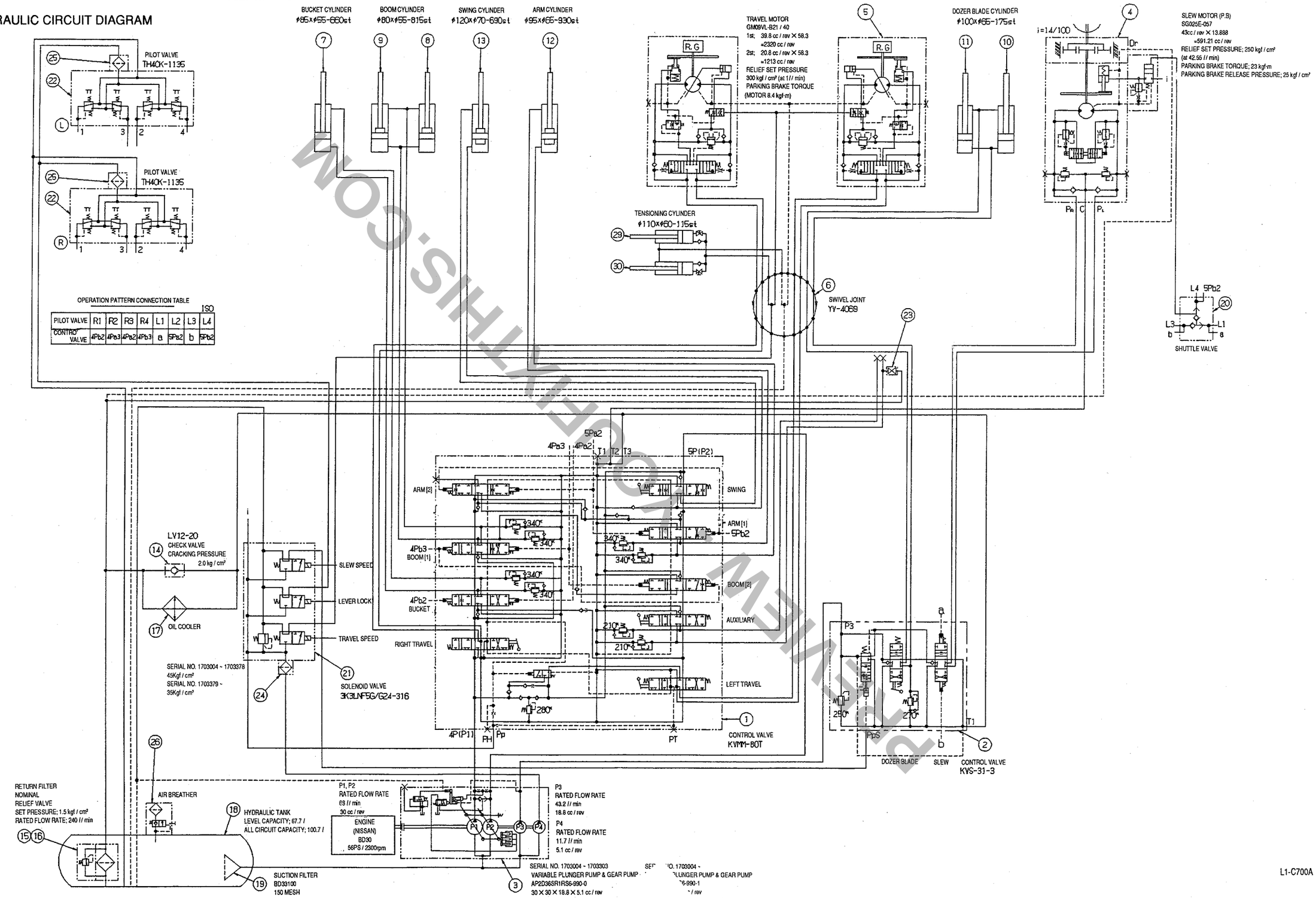


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HYDRAULIC SYSTEM SERIAL NO. 1703004 ~ 1703504

HYDRAULIC CIRCUIT DIAGRAM

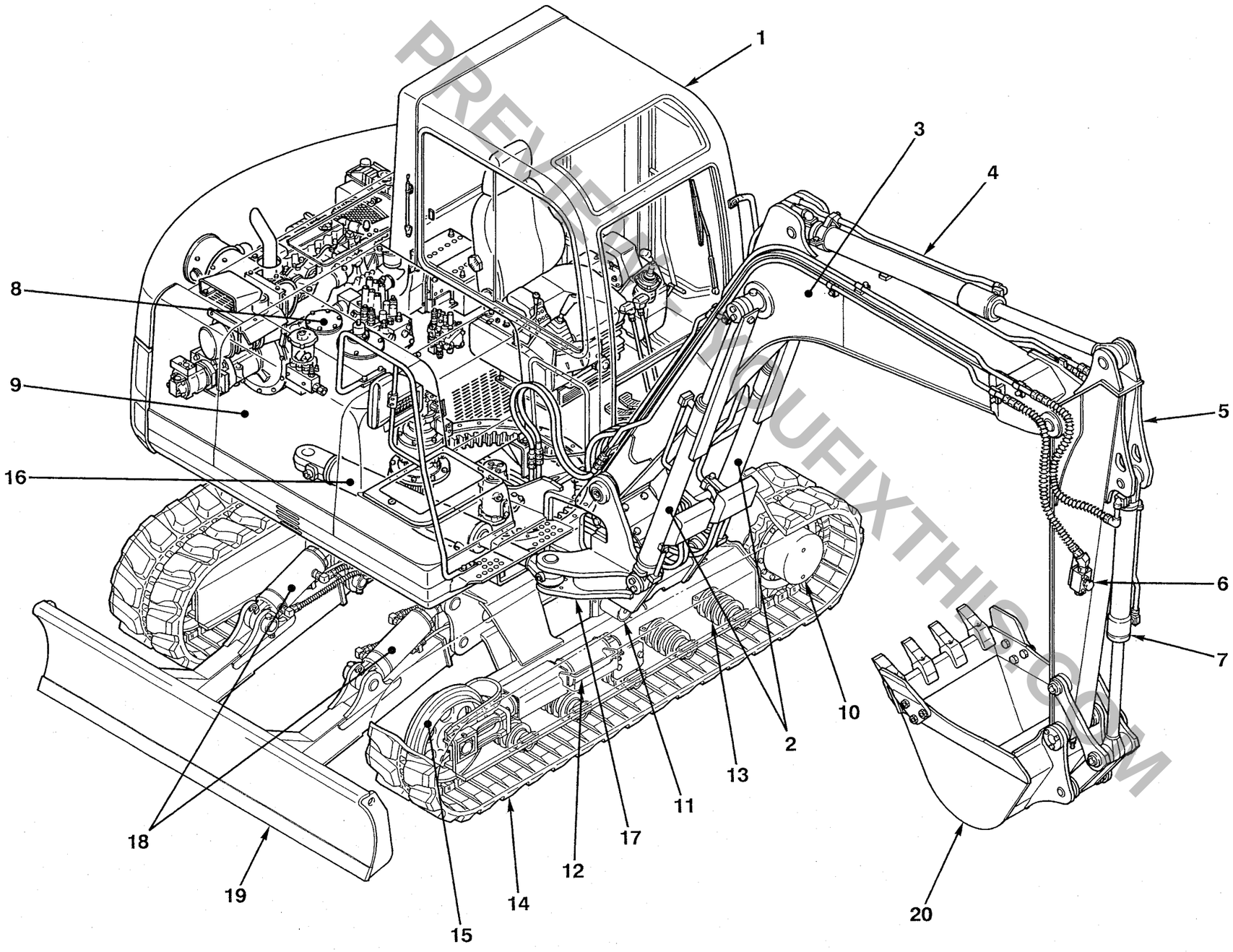


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L1-C700A

NAMES OF COMPONENTS



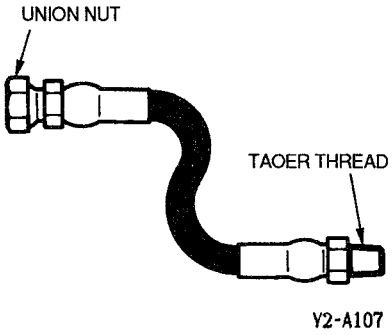
1. Cab
2. Boom Cylinder
3. Boom
4. Arm Cylinder
5. Arm
6. Auxiliary Port
7. Bucket Cylinder
8. Hydraulic Tank
9. Fuel Tank
10. Travel Motor
11. Carrier Roller
12. Tensioning Cylinder
13. Track Roller
14. Crawler Belt
15. Idler
16. Swing Cylinder
17. Swing Bracket
18. Dozer Blade Cylinder
19. Dozer Blade
20. Bucket

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TIGHTENING TORQUES

Hydraulic Hoses

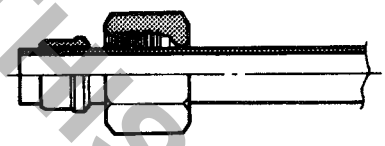
Hose Fitting Size	Torque			
	Union Nut (PF)		Taper Thread (PT)	
	kgf·m	ft-lb	kgf·m	ft-lb
1/8	$1.0^{+0.5}_{0}$	$7.3^{+3.5}_{0}$	1.2±0.12	8.7±0.8
1/4	$2.5^{+0.5}_{0}$	$18.1^{+3.5}_{0}$	3.0±0.30	21.7±2.1
3/8	$5.0^{+0.5}_{0}$	$36.2^{+3.5}_{0}$	5.5±0.55	39.8±3.9
1/2	$6.0^{+0.5}_{0}$	$43.4^{+3.5}_{0}$	9.0±0.90	65.1±6.4
3/4	$12.0^{+0.5}_{0}$	$86.8^{+3.5}_{0}$	15.0±1.50	108.5±10.7
1	$14.0^{+0.5}_{0}$	$101.3^{+3.5}_{0}$	20.0±2.00	144.7±14.3



Y2-A107

Bite Type Pipe Fitting for Steel Pipe

Pipe Outer Diameter (mm)	Torque	
	kgf·m	ft-lb
8	3.5±0.5	25.3±3.5
10	4.25±0.25	30.7±1.7
12	6.0±0.5	43.4±3.5
15	9.0±0.5	65.1±3.5
16	9.5±0.5	68.7±3.5
18	13.5±0.5	97.6±3.5
22	21.0±1.0	151.8±7.2
27.2	25.0±1.0	181.0±7.2
28	32.0±2.0	231.4±14.3
32	32.0±2.0	231.4±14.3
35	42.0±2.0	303.7±14.3


Y2-A108

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FOREWORD

This section, TROUBLESHOOTING, explains mainly concerning the trouble diagnosis procedures and countermeasures to take when trouble occurs in the hydraulic system. The troubleshooting procedure is shown in diagram form at the beginning of each section, with the arrows in the diagram indicating the likely causes of each type of trouble to aid in your investigation. Each item in the diagrams is also numbered, and the items are explained in the order of the numbers.
In the future, we will be working to make the contents of this workshop manual more complete through revisions, so if you have any opinions or suggestions on any point, please contact the persons who are responsible.

Cautions in Troubleshooting and Repairs

(1) Do not begin disassembling the equipement immediately just because it has broken down. Conduct a thorough preliminary check before attempting disassembly.
   a. Ask the user the following questions.
      • What were the conditions when the machine broke down?
      • Did anything abnormal happen before breakdown occured?
      • Are there any other places which were functioning poorly other than the part that broke down?
      • Are there any parts which have been repaired previous to the breakdown? What were they?
      • Has the same thing happened before?
   b. Run the machine yourself and confirm the breakdown conditions.
      • Judge whether the machine is really broken down or not following the judgment standards. The judgment on whether the machine has broken down may differ between individuals. Caution : When running the machine, it is possible that moving the machine could make the breakdown worse than it already is, so do not forget to ask the user if there is anything to prevent your operating the machine.
   c. Based on the information that you have gathered from the user and the information obtained from running the machine yourself, judge the cause of the trouble. Also keep in mind that it is difficult to reproduce the conditions of the breakdown again once the machine has been disassembled, and early disassembly may make it impossible to determine the true cause of the trouble. Therefore be sure to find the true cause of the trouble before attempting disassembly.

(2) When it is thought that the trouble has more than one cause, begin investigating from the simplest cause.

(3) Think over why the trouble could have occurred and try to correct the root cause of that problem.

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SPECIFICATION TABLES

SPECIFICATIONS

Serial Number		1703004~
Type		Cab
Standard Bucket Capacity(SAE Rated)	(m^3)	0.25
Weight in Transport Condition	(kg)	7160(7030)
Dimensions	(mm)	
Overall Length (in Transport Position)		6595
Overall Width (in Transport Position)		2245
Overall Height (in Transport Position)		2560
Minimum Ground Clearance		360(350)
Minimum Height of Upper Machinery		760
Overall Width of Upper Machinery		2110
Overall Width of Crawler		2150
Overall Length of Crawler		2830(2850)
Minimum Slew Radius		2170
Tail Swing Radius		1755
Dozer Blade Width		2150
Dozer Blade Height		500
Working Range	(mm)	
Maximum Digging Height		7005(6995)
Maximum Digging Depth		4260(4270)
Vertical Digging Depth		3500(3510)
Maximum Digging Reach		7055
Maximum Reach at Ground Level		6910
Maximum Dumping Height		4970(4960)
Bucket Offset: Right/Left		735 / 695
Dozer Blade Lift: Above/Below Ground		505(495) / 435(445)
Performance		
Digging Force: Arm/Bucket	(kgf)	3600 / 4800
Slew Speed	(rpm)	5.5 / 10.5
Travel Speed	(km/h)	3.0(3.1) / 5.5(5.8)
Traction Force	(kgf)	8030(7640)
Gradeability	(degree)	35
Ground Pressure (JIS)	(kgf/cm^2)	0.335(0.325)

* Values in ( ) are for models with rubber crawler specifications.

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INJECTION PUMP

INJECTION PUMP CALIBRATION DATA

Ass'y No. 101482-9100
Company: ZEXEL

Injection pump: PES4A
101048—8150

Governor: EP/RSV
105419—0790

Timing device:

1. Test Conditions:

Pump rotation: clockwise (viewed from drive side)
Nozzle & Nozzle Holder Ass'y: 105780—8140 (BOSCH Type No. EF8511/9A)

Nozzle: 105780—0000
(BOSCH Type No. DN12 SD12T)

Nozzle Holder: 105780—2080
(BOSCH Type No. EF8511/9)

Nozzle opening pressure: 175 kg/cm^2 (2,489 psi)

Transfer pump pressure: 1.6 kg/cm^2 (23 psi)

Injection pump: Inner dia. 2 mm (0.08 in) x Outer dia. 6 mm (0.24 in) — Length 600 mm (23.62 in)
Test Oil: ISO4113 or SAE Standard Test Oil (SAE J967d) Oil Temp: 40^{+5}°C (104^{+9}°F)
Overflow valve opening pressure: 1.6 kg/cm^2 (23 psi)

2. Injection Timing:

Pre-stroke: No. 1 Plunger 3.2 ± 0.05 mm (0.1260 ± 0.0020 in)
Note: Adjust with control rack position of mm
Injection order: 1 $\frac{}{90° \pm 30'}$ 3, 1 $\frac{}{180° \pm 30'}$ 4, 1 $\frac{}{270° \pm 30'}$ 2

(interval: °± 30')

Plungers are numbered from the Drive side

Tappet clearance: Bolt adjustment type; More than 0.3 mm (0.012 in) for all cylinders.
Shim adjustment type; Manually rotate the camshaft 2 - 3 times and confirm that it rotates smoothly.

4. Injection Quantity:

Adjustment Point	Rack Position mm (in)	Pump Speed rpm	Injection Q'ty mℓ (Imp fl oz)/1,000 strokes	Max. var. bet. cyl. %	Fixed	Remarks
A	10.4 (0.409)	1,000	41.7 - 43.7 (1.47 - 1.54)	± 3.5	Rack	Basic
	Approx. 9.2 (0.362)	450	6.0 - 10.0 (0.21 - 0.35)	± 10	Rack	
A	10.4 (0.409)	1,000	41.7 - 43.7 (1.47 - 1.54)	—	Lever	Basic
B	10.7 (0.421)	700	36.4 - 40.4 (1.28 - 1.42)	—	Lever	
C	—	100	62.0 - 72.0 (2.18 - 2.53)	—	Lever	Control rack limit

5. Timing Advance Specification:

Pump Speed rpm	
Advance Angle (deg.)	

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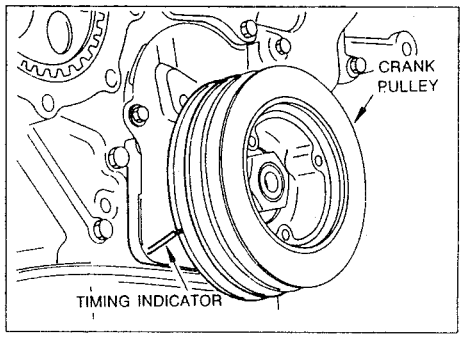
INSPECTION AND MAINTENANCE

ENGINE MAIN BODY

CHECKING VALVE CLEARANCE

Check and adjust valve clearance when the engine is hot.

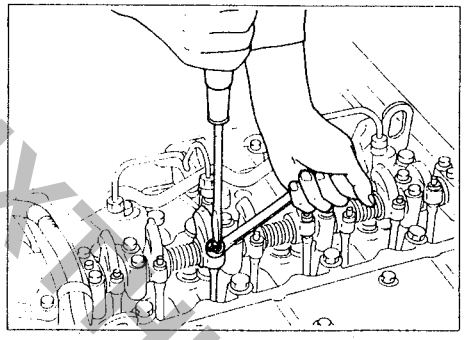
1) Align the top mark scribed on the crank pulley with the gear case timing mark.
2) Using a thickness gauge, measure valve clearance at points indicated by "o" in the following table.



Cylinder No.	1		2		3		4	
Valve	IN	EX	IN	EX	IN	EX	IN	EX
No. 1 cylinder at compression TDC	○	○	○			○		
No. 4 cylinder at compression TDC				○	○		○	○

ADJUSTING VALVE CLEARANCE

1) If valve clearance is incorrect, loosen the adjustment screw lock nut and then turn the adjustment screw until the specified clearance is obtained.



Unit: mm (in)

Item		Service standard
Valve clearance (hot engine)	Intake valve	0.35 (0.0138)
	Exhaust valve	0.35 (0.0138)

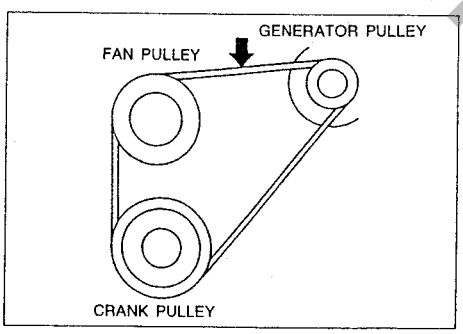
2) After adjustment, tighten the lock nut while holding the adjustment screw in the adjusted position.

   T : 1.5 - 2.0 kg-m (11 - 14 ft-lb)

3) Recheck the valve clearance.

CHECKING V-BELT

1) Inspect the V-belt for cracks or damage.
   If the V-belt is faulty, replace with a new one.
2) Press the V-belt at the middle of span with a force of approximately 10 kg (22 lb) and check for belt deflection.



Unit: mm (in)

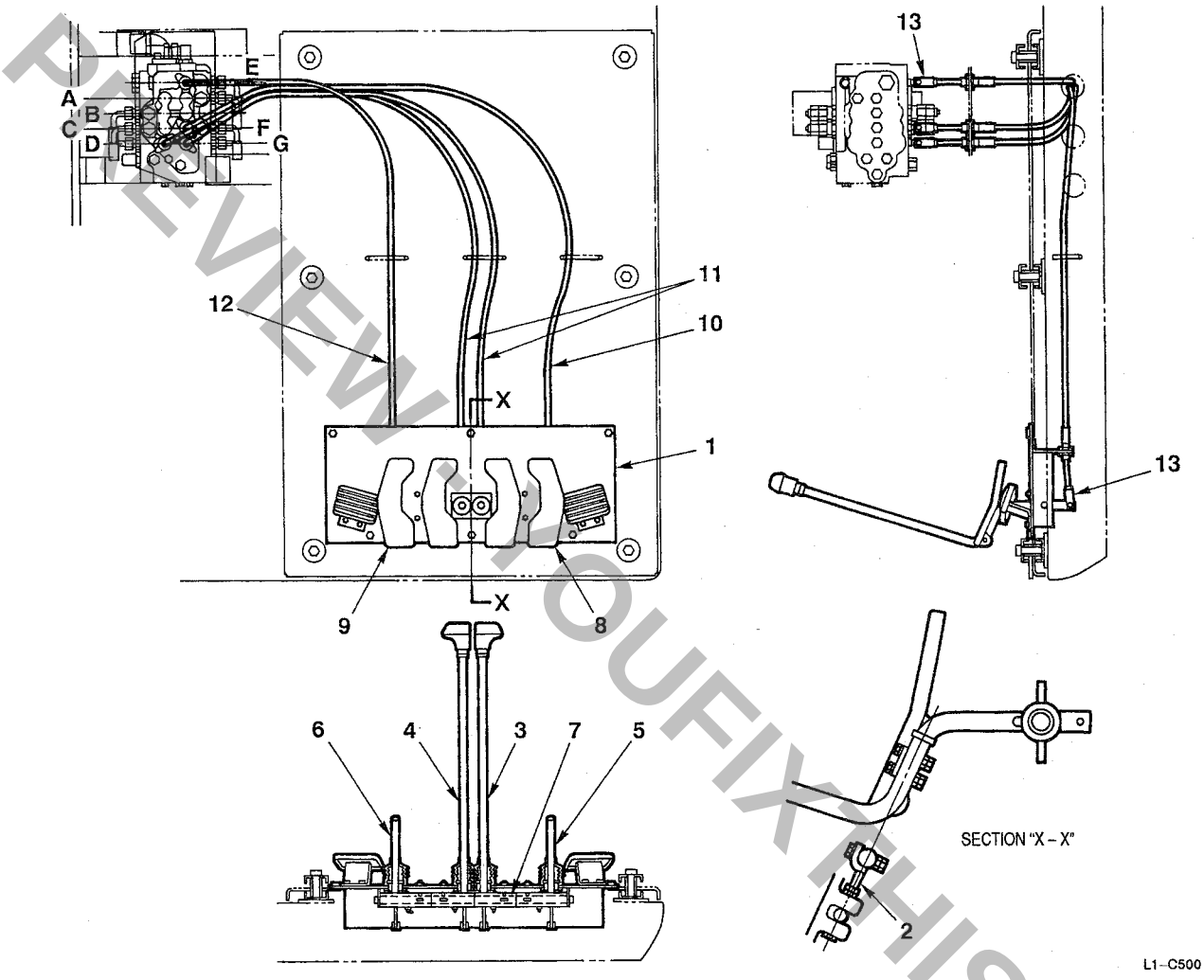
Item	Belt deflection	
	New belt	When re-adjusting
V-belt adjustment	9 - 11 (0.35 - 0.43)	11 - 13 (0.43 - 0.51)

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CONTROL SYSTEM

CONSTRUCTION

Travel, Auxiliary, Swing Lever Unit



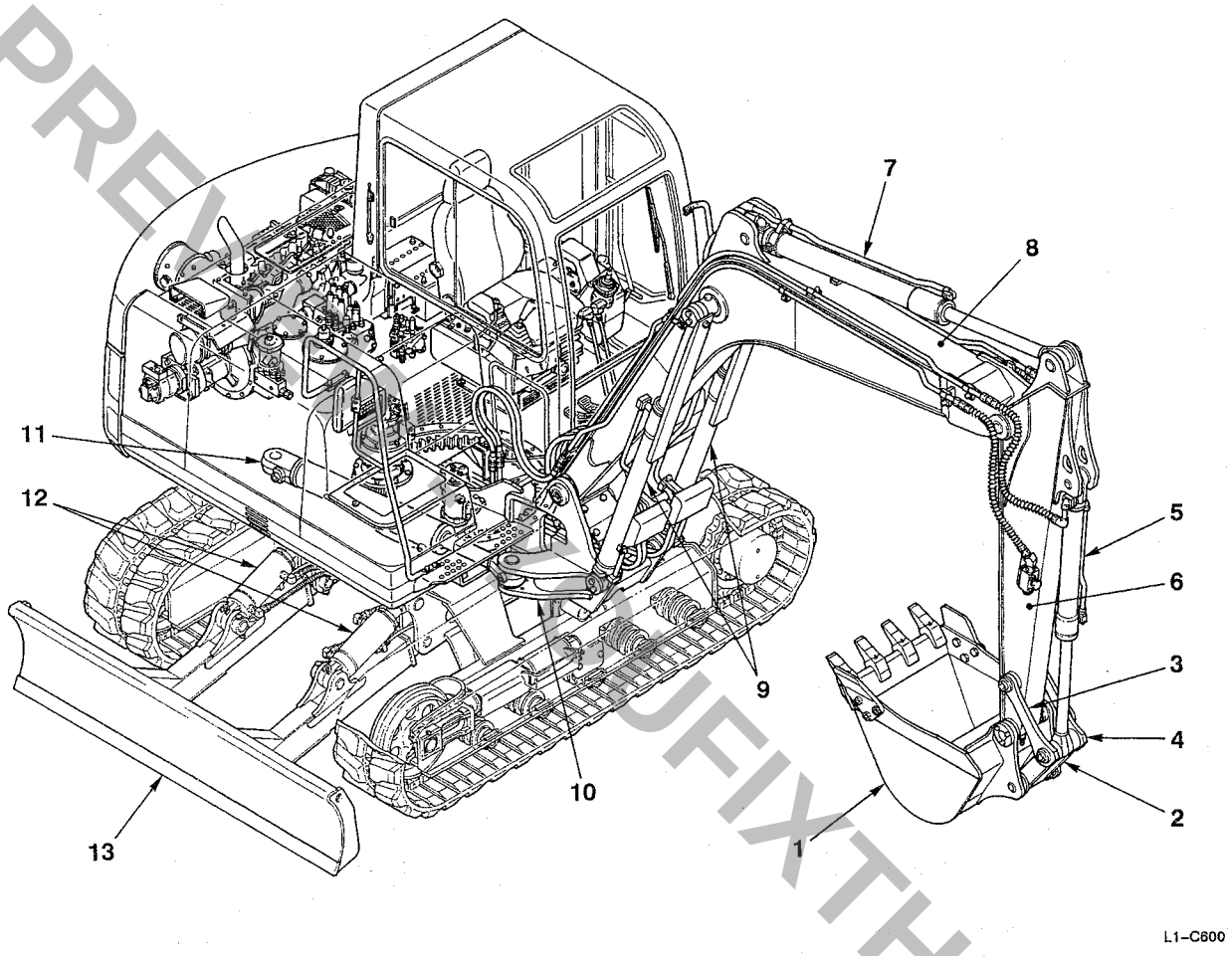
A: Arm
B: Boom
C: Bucket
D: Right Travel
E: Swing
F: Auxiliary
G: Left Travel

1. Lever Bracket
2. Pedal Bracket
3. Left Travel Lever
4. Right Travel Lever
5. Auxiliary Lever
6. Swing Lever
7. Shaft
8. Pedal [L]
9. Pedal [R]
10. Control Cable
11. Control Cable
12. Control Cable
13. Yoke

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ATTACHMENTS

CONSTRUCTION



1. Bucket
2. Bucket Link
3. Guide Link [R]
4. Guide Link [L]
5. Bucket Cylinder
6. Arm
7. Arm Cylinder
8. Boom
9. Boom Cylinder
10. Swing Bracket
11. Swing Cylinder
12. Dozer Blade Cylinder
13. Dozer Blade

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LIFTING CAPACITIES

Rated lift capacity chart

- The numerical values in the charts indicate either 87% of the hydraulic lift capacity or 75% of the tipping load, whichever value is smaller. (*Marks indicate values limited by the hydraulic lift capacity.)
- The mass of slings and any auxiliary lifting devices shall be deducted from the rated load to determine the net load that may be lifted.
- The load point is the bucket hinge pin, and the bucket posture is with the standard bucket completely retracted under the arm.
- Units: kg (lbs.)

Load hooking system

A load hooking system with all of the following capacities must be provided and used.

① A system which can withstand a weight of two times the rated lift capacity no matter at what position the load is applied.

② A system in which there is no risk of the lifted load falling from the hooking device, for example one equipped with a hook slippage prevention device.

③ A system in which there is no risk of the hooking system slipping from the hoe attachment.

⚠ WARNING

- **DO NOT attempt to lift or hold any load that is greater than these rated values at their specified load radii and height.**
- **All rated lift capacities are based on the machine being level and on a firm supporting surface. For safe working loads, the user is expected to make due allowance for the particular job conditions such as soft or uneven ground, non-level conditions, side loads, hazardous conditions, experience of personnel, etc. The operator and other personnel should fully acquaint themselves with the operator's manual furnished by the manufacturer before operating this machine, and rules for safe operation of equipment shall be adhered to at all times.**

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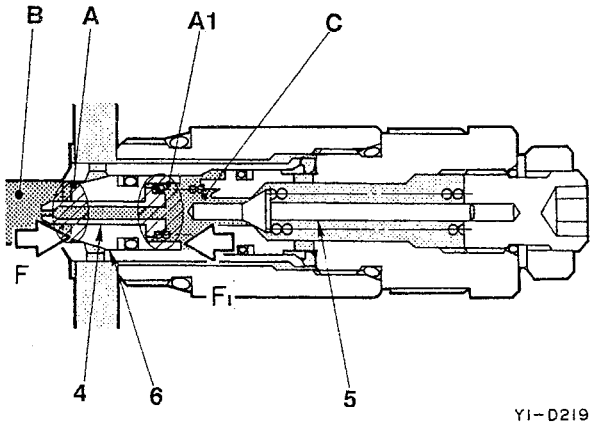
1. Relieving Operation

a. When the pressure in the circuit is low with respect to the set valve, the relief valve is maintained at equilibrium. Pressure from the pump passes from chamber B to the orifice in piston (4), then reaches chamber C and the needle valve (5). On the other hand, forces F and Fl are acting in the arrow directions on both sides of the main poppet (6).

F = P×A F1 = P×A1

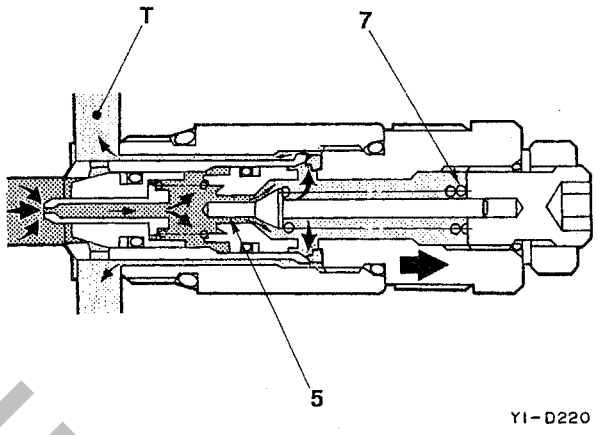
P: Pressure A, A1: Sectional Area

Since the sectional area of A is less than that of Al, the main poppet (6) is pushed by the force "F1 – F" to the seat surface on the left side.



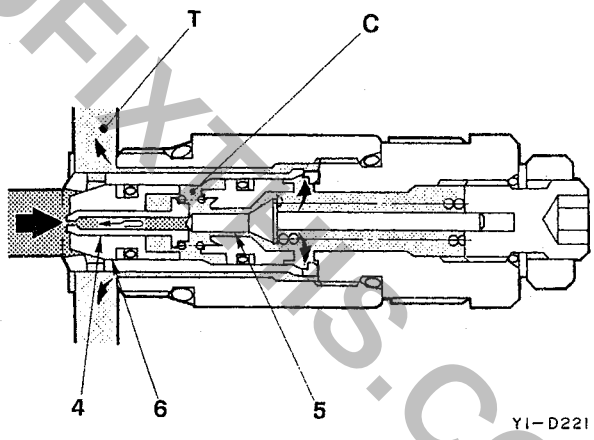
YI-D219

b. If the pressure in the circuit becomes higher than the force of the spring (7), the needle valve (5) is pushed to the right by hydraulic pressure, opening. Oil then flows around the circumference of the needle valve (5) and passes through the slits, flowing into the tank passage (T).



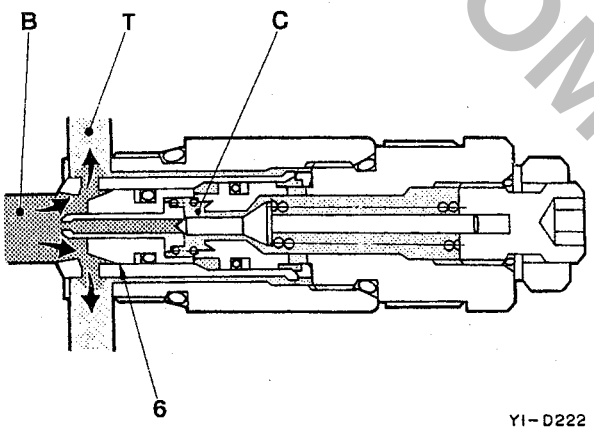
YI-D220

c. When the needle valve (5) opens, the pressure drops on the back side of the piston (4), pushing the piston (4) to be pushed to the right, seating with the needle valve (5). This shuts off the flow of hydraulic oil to the rear of the main poppet (6). As a result, the pressure in chamber C on the inside drops.



YI-D221

d. Compared to the chamber B side, the pressure in chamber C is low and there is no equilibrium in pressure. For this reason, the main poppet (6) opens and pressurized oil flows to the tank passage (T).



YI-D222

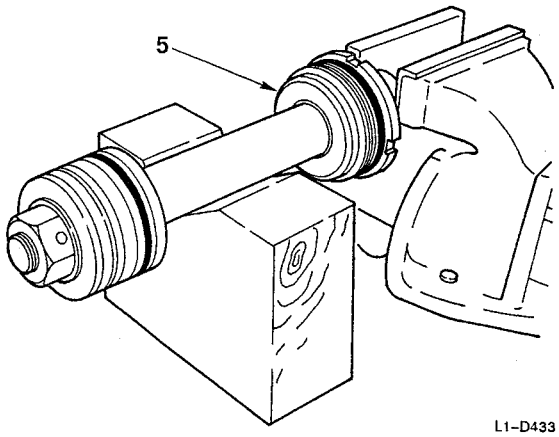
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Disassembling the Piston Rod Assembly

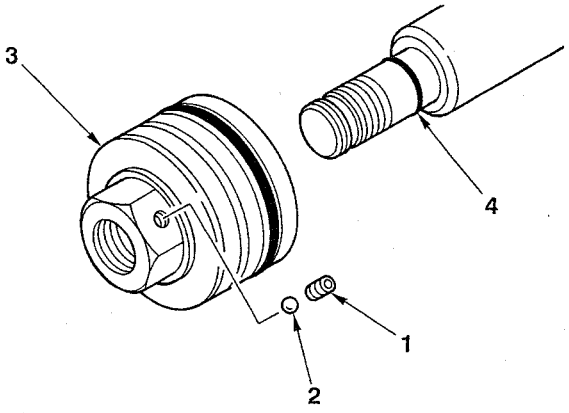
1. Fasten the piston rod assembly securely in a level position.

2. Remove the piston.
   a. Take out the set screw (1) and remove the steel ball (2).
      • The set screw is staked at 2 places with a punch, so grind off the staked portions using a hand drill.
      • When assembling, caulk the set screw at two places with a punch.
      • Set Screw Tightening Torque: 1.7 kgf·m
   b. Loosen piston (3) and remove it.
      • Piston Tightening Torque: 195 kgf·m
   c. Remove the O-ring (4) from the piston rod.

3. Remove the rod cover (5).



L1-D433



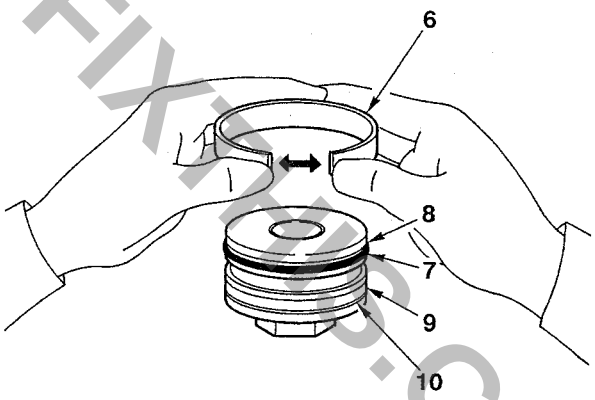
L1-D434

Disassembling the Piston

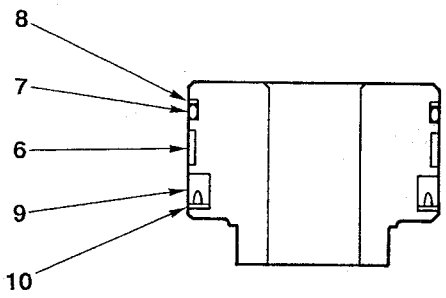
1. Remove the wear ring (6) from the piston.
   • Spread the wear ring the minimum amount necessary and remove it in the axial direction.

2. Remove the O-ring (7) and backup ring (8).
   • When assembling, be careful to install in the proper position.

3. Remove the rod packing (9) and backup ring (10).
   • When assembling, be careful to install the rod packing in the proper position.



L1-D435



L1-D436

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