FIAT KOBELCO COMPACT LINE

E20SR EVOLUTION
E22SR EVOLUTION
E25SR EVOLUTION

WORKSHOP MANUAL
ENGLISH

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FIAT KOBELCO
EVOLVING TECHNOLOGY

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1.1 GENERAL SAFETY INFORMATION

WARNING

Do Not operate or perform any maintenance on this machine until all instructions found in the OPERATION & MAINTENANCE MANUAL have been thoroughly read and understood.
Improper operation or maintenance of this machine may cause accidents and could result in serious injury or death.
Always keep the manual in the operator's seat pocket. If it is missing or damaged, place an order with an authorized Distributor for a replacement.
If you have any questions, please consult an authorized Distributor.

1. Most accidents, which occur during operation, are due to neglect of precautionary measures and safety rules. Sufficient care should be taken to avoid these accidents. Erroneous operation, lubrication or maintenance services are very dangerous and may cause injury or death of personnel. Therefore all precautionary measures, NOTES, DANGERS, WARNINGS and CAUTIONS contained in the manual and on the machine should be read and understood by all personnel before starting any work with or on the machine.

2. Operation, inspection, and maintenance should be carefully carried out, and safety must be given the first priority. Messages of safety are indicated with marks. The safety information contained in the manual is intended only to supplement safety codes, insurance requirements, local laws, rules and regulations.

3. Messages of safety appear in the manual and on the machine : All messages of safety are identified by eighter word of "DANGER", "WARNING" and "CAUTION".

DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury and is represented as follows:

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury and is represented as follows:

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against possible damage to the machine and its components and is represented as follows:

4. It is very difficult to forecast every danger that may occur during operation. However, safety can be ensured by fully understanding proper operating procedures for this machine according to methods recommended by Distributor.

5. While operating the machine, be sure to perform work with great care, so as not to damage the machine, or allow accidents to occur.

6. Continue studying the manual until all Safety, Operation and Maintenance procedures are completely understood by all persons working with the machine.

1.2 SAFETY PRECAUTIONS

WARNING

The proper and safe lubrication and maintenance for this machine, recommended by Distributor, are outlined in the OPERATOR'S MANUAL for the machine.
Improper performance of lubrication or maintenance procedures are dangerous and could result in injury or death. Read and understand the MANUAL before performing any lubrication or maintenance.

The serviceman or mechanic may be unfamiliar with many of the systems on this machine. This makes it important to use caution when performing service work. A knowledge of the system and or components is important before the removal or disassembly of any component.

Because of the size of some of the machine components, the serviceman or mechanic should check the weights noted in this manual. Use proper lifting procedures when removing any components. Weight of components table is shown in the section; SPECIFICATIONS.

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3. SPECIFICATIONS AND PERFORMANCE

■ SPEED AND GRADEABILITY

Model		(with Rubber Shoe)	
Item			
Slewing Speed	min^{-1} {rpm}	9.4 {9.4}	
Travel Speed	km/h (mph)	Low (1st.)	High (2nd.)
		2.5 (1.6)	4.3 (2.7)
Gradeability	%(degree)	58(30)	

■ ENGINE

Model (YANMAR)		3TNE74-NYBB
Type		Vertical,4-cycle,water cooled diesel engine
Number of cylinders-Bore X Stroke		3-ø74mm X 78mm
Total Displacement	L	1.01
Rated Output	kW/min^{-1} {PS/rpm}	15/2,000 {18.0/2,400}
Maximum Torque	$N{\cdot}m/min^{-1}$ {kgf·m/rpm}	60.8/1,700 {6.2/1,700}
Starter	V X kW	12 X 1.0
Generator (Dynamo)	V X A	12 X 20

■ HYDRAULIC COMPONENTS

Hydraulic Pump	Variable displacement axial piston gearpump
Slewing Motor	Axial piston
Travel Motor	Axial piston 2 speed motor
Control Valve	with 10 spools
Cylinder (Boom,Arm,Swing Bucket,Dozer)	Double acting cylinder
Return filter	Paper filter with safety valve (30μ)

■ OFFSET DIGGING · DOZER

Mechanism		Boom swing operation by cylinder stroke
Boom swing angle degree	Right	58
	Left	82 (Cab spec : 65)
Strokes of dozer (Up / Down)	mm	320/330 (12.6 /13.0)

■ WEIGHT

Unit:kg (lb)

Machine Weight	Rubber shoe
	2,410 (5310)
Upper slewing body	1,160 (2560)
Travel system	930 (2050)
Attachment (Boom+STD Arm+STD Bucket)	260 (570)
Oil & Water	60 (130)

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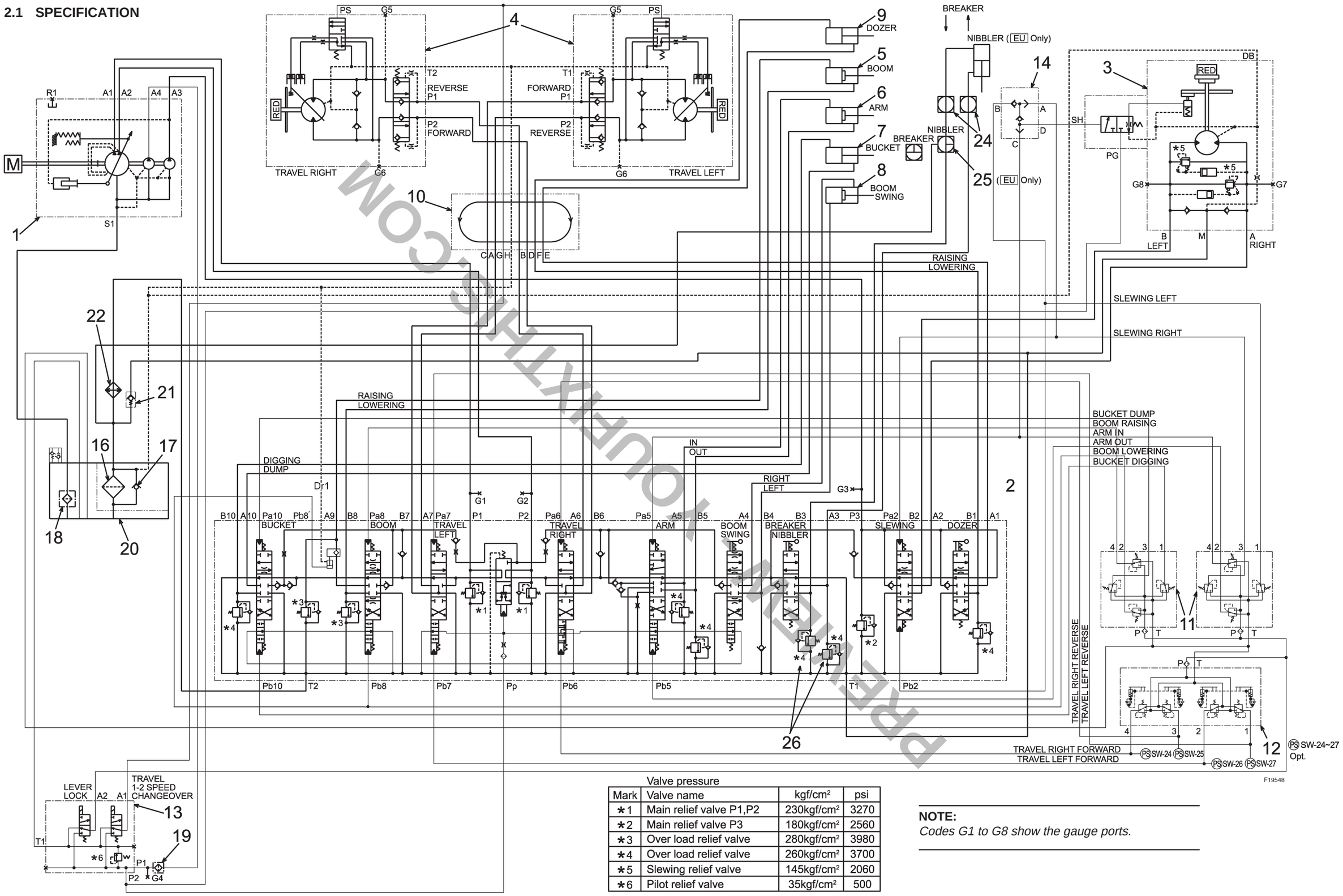
NOTE:

This figure is calculated with standard bucket. Bucket weight 47 kg (104 lb).

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2.1 SPECIFICATION



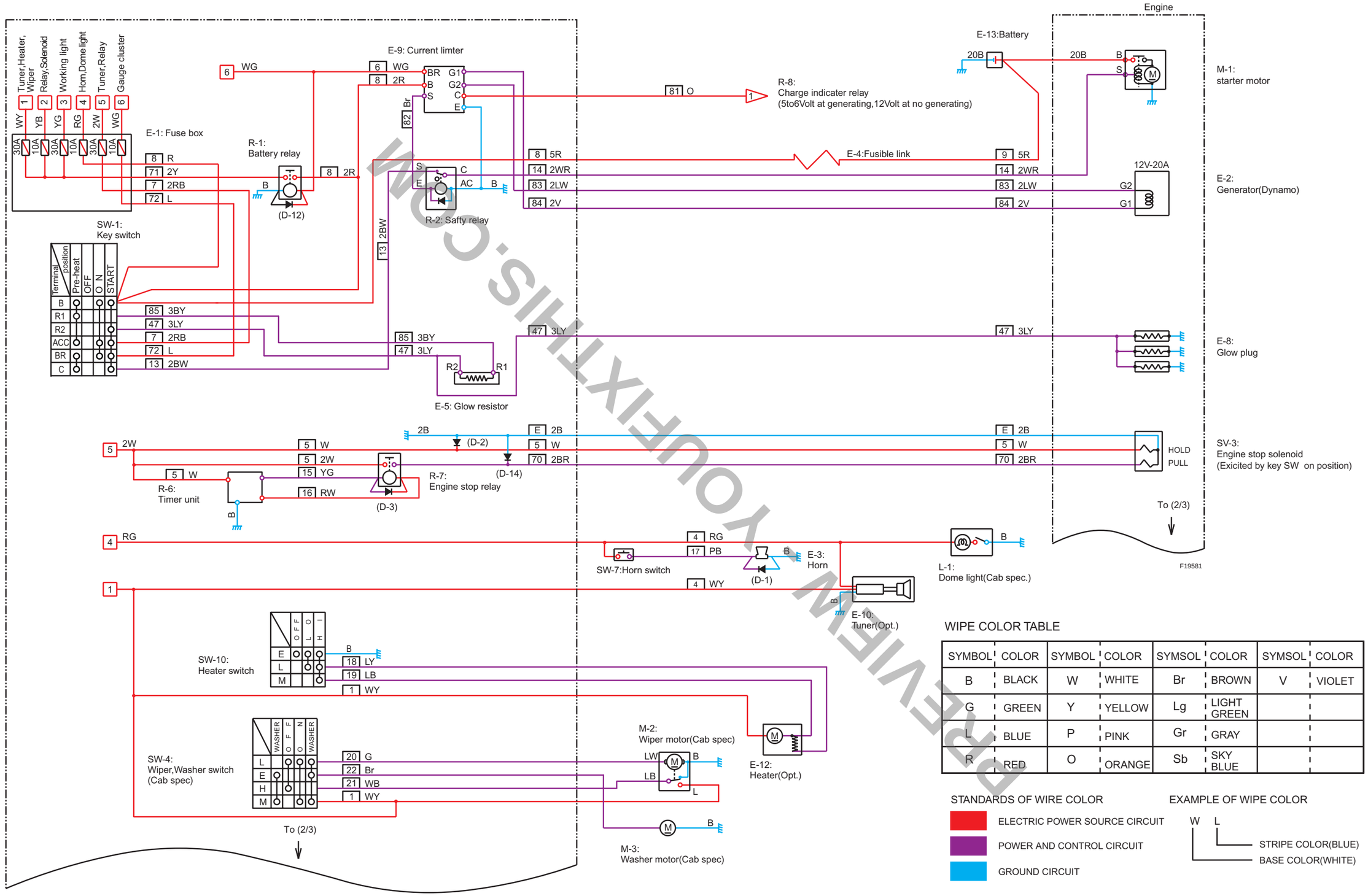
Valve pressure

Mark	Valve name	kgf/cm²	psi
∗1	Main relief valve P1,P2	230kgf/cm²	3270
∗2	Main relief valve P3	180kgf/cm²	2560
∗3	Over load relief valve	280kgf/cm²	3980
∗4	Over load relief valve	260kgf/cm²	3700
∗5	Slewing relief valve	145kgf/cm²	2060
∗6	Pilot relief valve	35kgf/cm²	500

NOTE:
Codes G1 to G8 show the gauge ports.

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2. ELECTRIC CIRCUIT DIAGRAM (1/2)



WIPE COLOR TABLE

SYMBOL	COLOR	SYMBOL	COLOR	SYMSOL	COLOR	SYMSOL	COLOR
B	BLACK	W	WHITE	Br	BROWN	V	VIOLET
G	GREEN	Y	YELLOW	Lg	LIGHT GREEN		
L	BLUE	P	PINK	Gr	GRAY		
R	RED	O	ORANGE	Sb	SKY BLUE		

STANDARDS OF WIRE COLOR

- ELECTRIC POWER SOURCE CIRCUIT
- POWER AND CONTROL CIRCUIT
- GROUND CIRCUIT

EXAMPLE OF WIPE COLOR

W L — STRIPE COLOR(BLUE) / BASE COLOR(WHITE)

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2. BUCKET

2.1 REMOVAL OF BUCKET

(1) Operate the operating lever and place the bucket on the ground, so the bucket and arm connecting pins are not loaded.
(2) Move the O-rings (3) toward the bucket bosses using a spatula.
(3) In order to remove pin (K) which links arm and bucket, remove the ring (2) and the pin (3) by means of straight driver, and draw out pin (K).
- If the pin does not come off easily, the pin is loaded. Take off the load by manipulating the operating lever.
- Take care so the dust seal between the arm and the bucket bosses is not damaged.

(4) Adjust the bucket by manipulating the operating lever so the pin (J) between the bucket link and the bucket is not loaded.
(5) Remove the ring (2) and pin (1) then pull out the pin (J).
(6) Remove bucket assy.
Weight: 48 kg (106 lb)

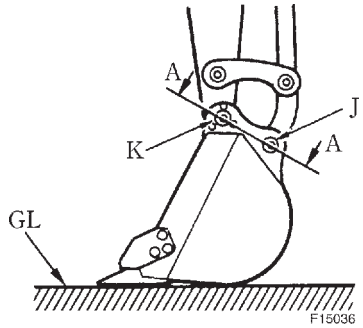


Fig. 2-2 To place bucket on ground

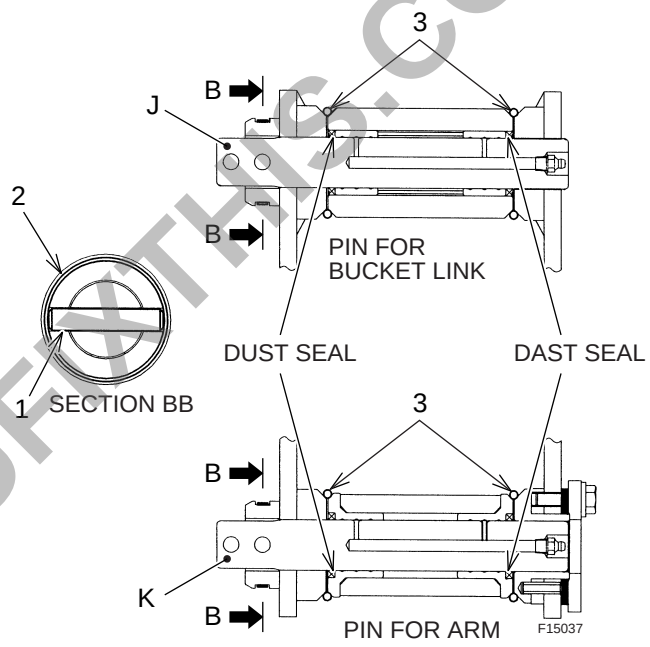


Fig. 2-3 Assembly of pin (SECTION A-A)

2.2 INSTALLATION OF BUCKET

Installation is performed in the reverse order of removal, including the following workings:

WARNING

When aligning the pin borees, do not put your finger in the pin holes in any circumstances, but align them visually.

(1) Clean the welded part of the structures and check that there is no crack on the part.
(2) Check that the dust seal is not damaged, and replace a faulty one if necessary.
(3) Adjust the clearance between the bucket and the arm according to Item 2.3.
(4) Replace the worn pins and bushings according to the section "ATTACHMENT DIMENSIONS" of "SPECIFICATIONS".
(5) When inserting the pin, coat the shaft with grease.
- The bucket can be mounted easily if the bucket link is installed in the beginning.

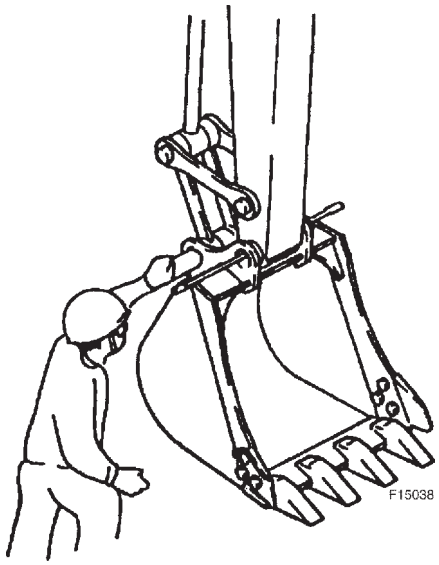


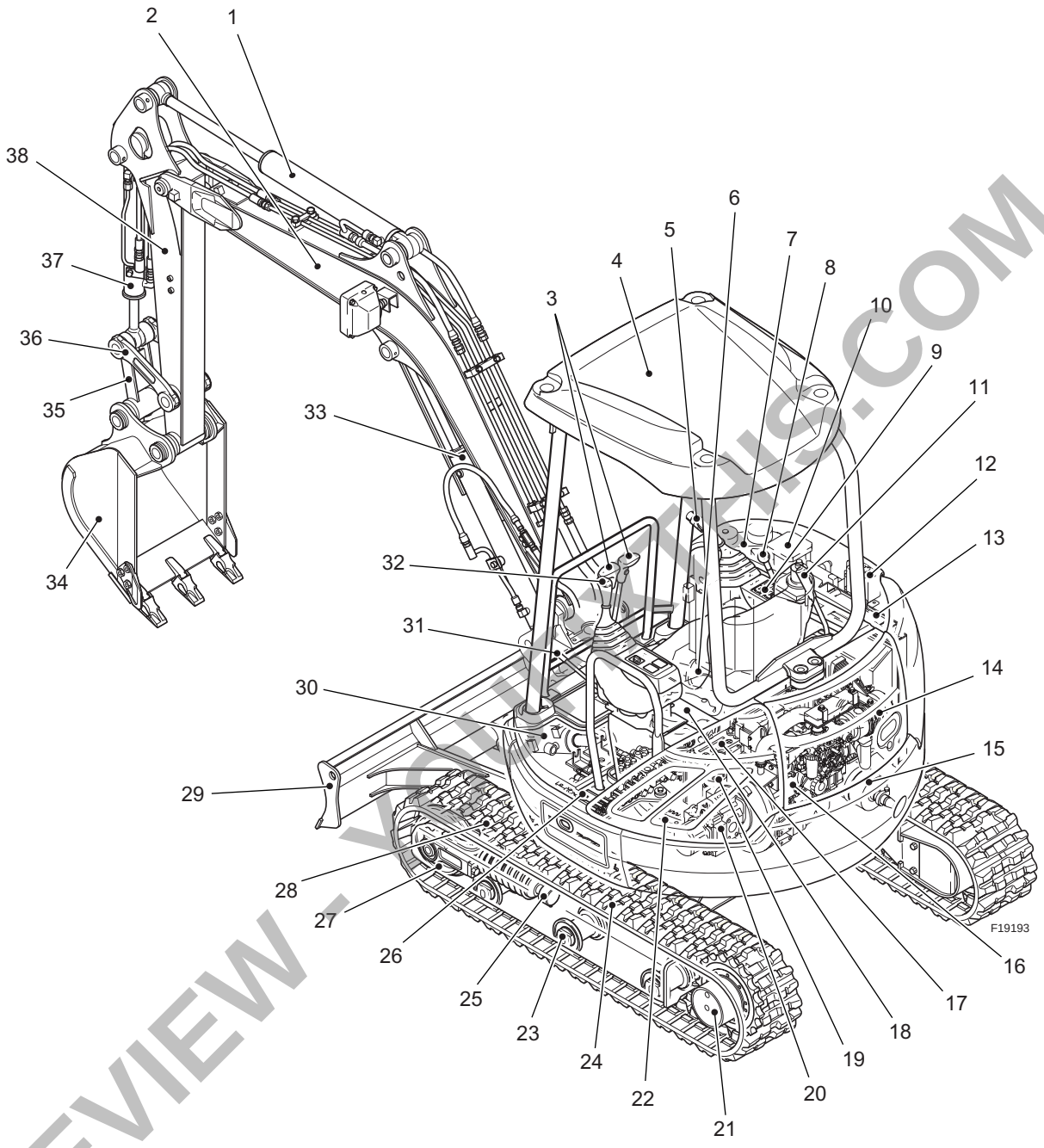
Fig. 2-4 Installation of bucket

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1. COMPONENTS NAME



1. Arm cylinder
2. Boom
3. Travel lever
4. Canopy
5. Right operating lever
6. Swing cylinder
7. Fuel tank
8. Dozer lever
9. Monitor panel
10. Hydraulic tank
11. Throttle lever
12. Reservoir tank
13. Radiator
14. Air cleaner
15. Muffler
16. Engine
17. Battery
18. Slewing motor
19. Swivel joint
20. Hydraulic pump
21. Travel motor
22. Slewing bearing
23. Lower roller
24. Rubber crawler shoe
25. Idler adjuster
26. Control valve
27. Idler
28. (Shoe slide)
29. Dozer blade
30. Dozer blade cylinder
31. Safety lock lever
32. Left operating lever
33. Boom cylinder
34. Bucket
35. Bucket link
36. Idler link
37. Bucket cylinder
38. Arm

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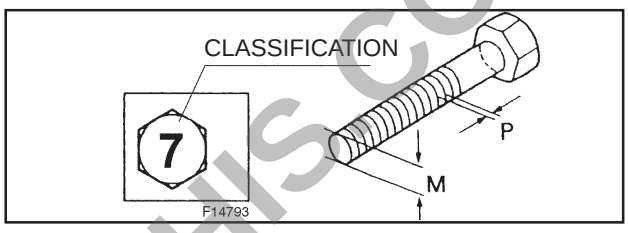
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1. TORQUE SPECIFICATIONS FOR CAPSCREWS AND NUTS

The following Torque Specifications are provided for use when actual torque value of a fastener is not known. Check the capscrews and nuts for their looseness and dropping off before the start of daily work and at the periodical maintenance. Retighten the loosened ones, and install new ones for the dropped off. For the new machine, the check and retightening of them must be carried out at first 50 hours operation. For the replacement of them, make sure to use the same size of genuine parts.

Refer to the table below for the tightening and retightening of capscrews.

- The table below is not applicable for the capscrews to fix the cover, etc., made of plastic. For the tightening torque for such capscrews, consult with an authorized Distributor. Over-tightening may cause damages on the parts to be fixed.
- In case that the tightening torque is specified in the manual, use such torque values regardless to the table below.
- Numerical indication on the capscrew head shows the classification for strength (e.g., 7 = 7 T). No indication is provided for smaller size of capscrews, M 5 or less.



2.Metric caorse thread standard tightening torque values. Make certain to tighten all capscrews & nuts to proper torque values.

Classification	4.8 T		7 T		10.9 T	
NOMINAL SIZE	NO LUBRICATION	OIL LUBRICATION	NO LUBRICATION	OIL LUBRICATION	NO LUBRICATION	OIL LUBRICATION
M6 P=1	0.45±0.05(3.2±0.4)	0.38±0.04(2.7±0.3)	0.98±0.1(7.1±0.7)	0.83±0.08(6.0±0.6)	1.77±0.18(12.8±1.3)	1.5±0.15(10.8±1.1)
M8 P=1.25	1.09±0.11(7.9±0.8)	0.92±0.09(6.6±0.7)	2.4±0.2(17.3±1.4)	2.0±0.2(14.4±1.4)	4.3±0.4(31±2.9)	3.6±0.4(26±2.9)
M10 P=1.5	2.2±0.2(15.9±1.4)	1.83±0.18(13.2±1.3)	4.7±0.5(34±3.6)	4.0±0.4(29±2.9)	8.5±0.9(61±6.5)	7.2±0.7(52±5.1)
M12 P=1.75	3.7±0.4(27±2.9)	3.2±0.3(23±2.2)	8.1±0.8(59±5.8)	6.8±0.7(49±5.1)	14.6±1.5(105±10.8)	12.3±1.2(89±8.7)
M14 P=2	5.9±0.6(43±4.3)	5.0±0.5(36±3.6)	12.8±1.3(93±9.4)	10.8±1.1(78±7.9)	23±2(166±14.5)	19.5±1.9(140±13.7)
M16 P=2	9.0±0.9(65±6.5)	7.6±0.7(55±5.1)	19.5±2(140±14.4)	16.4±1.6(118±11.5)	35±4(252±29)	29±3(209±22)
M18 P=2.5	12.4±1.2(90±8.7)	10.5±1.0(76±7.2)	27±3(195±22)	23±2(166±14.5)	49±5(354±36)	41±4(296±29)
M20 P=2.5	17.5±1.7(126±12.3)	14.7±1.4(106±10.1)	38±4(274±29)	32±3(231±22)	68±7(491±51)	57±6(412±43)
M22 P=2.5	23±2(166±14.5)	19.6±2(142±14.5)	51±5(368±36)	43±4(310±29)	92±9(665±65)	77±8(557±58)
M24 P=3	30±3(217±22)	24±3(173±22)	65±7(470±51)	53±5(383±36)	118±12(852±87)	93±10(673±72)
M27 P=3	44±4(318±29)	36±3(260±22)	96±10(694±72)	78±8(563±58)	173±17(1250±123)	140±14(1010±100)
M30 P=3.5	60±6(433±43)	50±5(361±36)	131±13(948±94)	110±11(796±79)	235±24(1700±174)	198±20(1430±145)
M33 P=3.5	81±8(585±58)	68±7(491±51)	176±18(1270±130)	148±15(1070±110)	317±32(2290±230)	266±27(1920±195)
M36 P=4	105±10(758±72)	88±9(636±65)	227±23(1640±170)	190±19(1370±140)	409±41(2960±300)	343±34(2480±250)

TORQUE VALUE UNIT-kgf·m (lbf·ft)

2.Metric fine thread standard tightening torque values. Make certain to tighten all capscrews ans nuts to proper torque values.

Classification	4.8 T		7 T		10.9 T	
NOMINAL SIZE	NO LUBRICATION	OIL LUBRICATION	NO LUBRICATION	OIL LUBRICATION	NO LUBRICATION	OIL LUBRICATION
M8 P=1.0	1.15±0.11(8.3±0.8)	0.97±0.1 (7.0±0.7)	2.5±0.2 (18.0±1.4)	2.1±0.2 (15.2±1.4)	4.5±0.4 (33±2.9)	3.8±0.4 (27±2.9)
M10 P=1.25	2.3±0.2 (16.6±1.4)	1.91±0.19(13.8±1.4)	4.9±0.5 (35±3.6)	4.2±0.4 (30±2.9)	8.9±0.9 (64±6.5)	7.5±0.7 (54±5.1)
M12 P=1.25	4.0±0.4 (29±2.9)	3.4±0.3 (25±2.2)	8.7±0.9 (63±6.5)	7.3±0.7 (53±5.1)	15.7±1.6 (114±11.6)	13.2±1.3 (95±9.4)
M16 P=1.5	9.4±0.9 (68±6.5)	7.9±0.8 (57±5.8)	20±2 (144±14.5)	17.2±1.7 (124±12.3)	37±4 (268±29)	31±3 (224±22)
M20 P=1.5	19±1.9 (137±13.7)	15.8±1.6 (114±11.6)	41±4 (296±29)	34±3 (246±22)	74±7 (535±51)	62±6 (448±43)
M24 P=2	32±3 (231±22)	27±3 (195±22)	70±7 (506±51)	58±6 (420±43)	126±12 (911±87)	105±10 (759±72)
M30 P=2	65±6 (470±43)	54±5 (391±36)	142±14(1030±100)	118±12 (852±87)	255±26 (1840±188)	212±21 (1530±150)
M36 P=3	109±11 (788±79)	91±9 (658±65)	238±23(1720±166)	198±20 (1430±145)	428±43 (3100±310)	357±36 (2580±260)

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TORQUE VALUE UNIT-kgf·m (lbf·ft)

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2. TROUBLE DIAGNOSIS: HYDRAULIC

Classification	Reference No.		Causes / Phenomenon	Pump			Valve								Actuator		
				Main pump	Trochoid pump	Gear pump	Travel & ATT main R/V	Main gear pump R/V	Each over load R/V	Travel straight valve	Travel spool	Attachiment spool	Check valve	Shuttle valve	Slewing motor unit	Travel motor unit	Hydraulic cylinder
Attachment	1	(1)	Attachment operational failure (excluding swing and dozer operation)	○							○	○					
		(2)	Travel speed is slow.	○								○					○
		(3)	Attachment operating power is low.				○		○								○
		(4)	Malfunction of attachment							○		○					○
Travel operation	2	(1)	Travel operational failure	○							○					○	
		(2)	Travel speed is slow.	○							○					○	
		(3)	Travel operating power is low.				○									○	
		(4)	It deviates in travel independent operation.	○						○	○					○	
Swing operation	3	(1)	Slewing operational failure									○			○		
		(2)	Slewing speed is slow.			○											
		(3)	Slewing operating power is low.					○	○						○		
		(4)	Malfunction of slewing operation									○		○	○		
Pump	4	(1)	Engine speed is reduced due to pump load.	○													
		(2)	Malfunction of pump	○	○	○											

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Abbreviation

E/G: Engine
SOL: Solenoid
SW: Switch
ATT: Attachment
C/V: Control valve
R/V: Relief valve
V: Valve

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AVOID ACCIDENTS

Most accidents, whether they occur in industry, on the farm, at home or on the highway, are caused by the failure of some individuals to follow simple and fundamental safety rules or precautions. For this reason MOST ACCIDENTS CAN BE PREVENTED by recognising the real cause and doing something about it before the accident occurs.
Regardless of the care used in the design and construction of any type of equipment there are conditions that cannot be completely safeguarded against without interfering with reasonable accessibility and efficient operation.
Carefully read indications, cautions and safety warning quoted in the "SAFETY RULES" section.
A careful operator is the best insurance against an accident.
The complete observance of one simple rule would prevent many thousand serious injuries each year.
That rule is:
Never attempt to clean, oil or adjust a machine while it is in motion.

ATTENTION

On machines having hydraulically, mechanically and/or cable controlled equipment (such as showels, loaders, dozers, scrapers etc.) be certain the equipment is lowered to the ground before servicing, adjusting and/or repairing.
If it is necessary to have the equipment partially or fully raised to gain access to certain items, be sure the equipment is suitably supported by means other than the hydraulic lift cylinders, cable and/or mechanical device used for controlling the equipment.

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(2) Clearance in thrust direction on arm and cylinder installation section

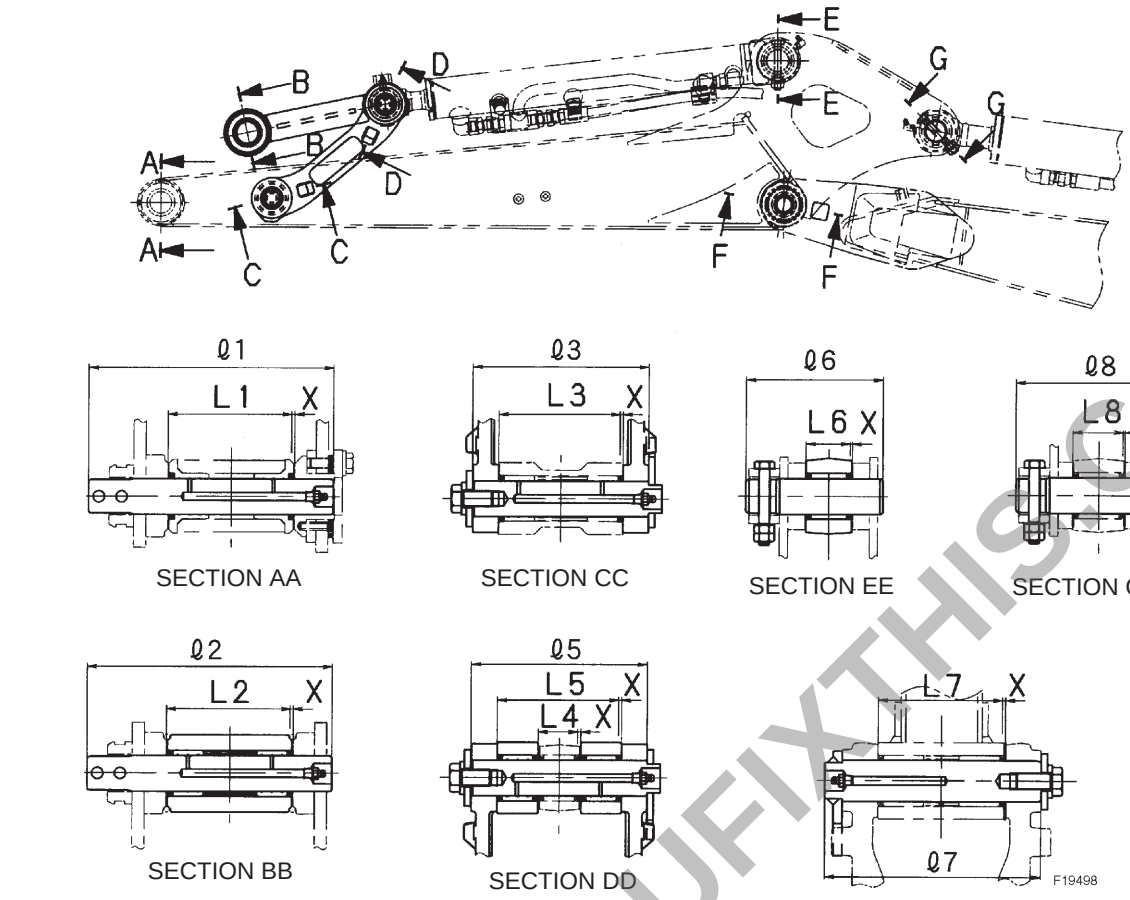


Fig. 2-3 Clearance in thrust direction

* Total clearance of both sides to be 0.1 ~ 0.5 mm (0.004″ ~ 0.020″) or less after adjusting by shims.

Table 2-2 Unit: mm (ft·in)

POS.	ITEM		STANDARD DIMENSIONS Code	STANDARD DIMENSIONS Dimensions	CLEARANCE X ADJUSTED BY SHIM (TOTAL OF BOTH SIDES) Standard value	Repairable level	Service limit	PIN LENGHT Code	PIN LENGHT Dimensions	REMEDY
A-A	Arm point	Arm	L1	$122^{+0.1}_{+0.5}$ (4.803)	Less than 0.5 (0.020)			ℓ1	247 (9.72)	Adjusted by shim
		Bucket		$122^{-0.2}_{-0.4}$ ($4.803^{-0.039}_{-0.020}$)						
B-B	Bucket link	Link side	L2	$122^{+0.9}_{-0.5}$ ($4.803^{-0.008}_{-0.016}$)	Less than 2.5 (0.098)	See "NOTE"		ℓ2	247 (9.72)	
		Bucket		123 ($4.843^{-0.035}_{-0.020}$)						
C-C	Idler link (Connected part of arm)	Arm	L3	122 (4.803)	0.1~0.5 (0.004~0.020)	1.0 (0.039)	1.5 (0.059)	ℓ3	172.5 (6.79)	
		Link side		—						
D-D	Bucket link (Rod side)	Rod side	L4	40 $^{0}_{-0.5}$ ($1.575^{0}_{-0.020}$)	0.6~1.0 (0.024~0.039)	1.5 (0.059)	2.0 (0.079)	ℓ5	171 (6.73)	
		Link side		42 (1.654)						
	Bucket link (Idler link side)	Bucket link	L5	$122^{-0.2}_{-0.4}$ ($4.803^{-0.008}_{-0.016}$)	0.1~0.5 (0.004~0.020)	—				
		Idler link		—						
E-E	Bucketcylinder (Head side)	Head side	L6	45 $^{0}_{-0.5}$ ($1.772^{0}_{-0.020}$)	0.5~0.9 (0.020~0.035)	1.0 (0.039)	1.5 (0.059)	ℓ6	134 (5.28)	
		Arm		46 $^{+1}_{0}$ ($1.811^{+0.039}_{0}$)						
F-F	Arm foot	Arm	L7	125 (4.921)	Less than 0.5 (0.020)	1.0 (0.039)	1.5 (0.059)	ℓ7	195 (7.68)	
		Boom		$125^{+0.5}_{0}$ ($4.921^{+0.020}_{0}$)						
G-G	Arm cylinder (Rod side)	Rod side	L8	55 $^{0}_{-0.5}$ ($2.165^{0}_{-0.020}$)	0.5~0.9 (0.020~0.035)	1.0 (0.039)	1.5 (0.059)	ℓ8	132 (5.20)	
		Arm		56 $^{+1}_{0}$ ($2.165^{+0.039}_{0}$)						

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NOTE:

Clearance "X" shall be adjusted by shims, if clearance exceeds the standard value for repair.

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6. MEASURING SLEW PERFORMANCES

• TEST PROCEDURES

Measure 3-time each.

Apply average data of the above for judgement.

6.1 SLEW TIME

- Engine : high idle
- Hydraulic oil temp. : 50 ~ 60 °C (122 ~ 140 °F)
- Measurement posture: completely retract the arm cylinder, fully extend the bucket cylinder and place so that boom foot pin and bucket pin are at matching height. Place the dozer blade on the ground.
- With the hoe attachment in a no-load, drive 1 rotation, then measure the time required for the next 2 rotations.

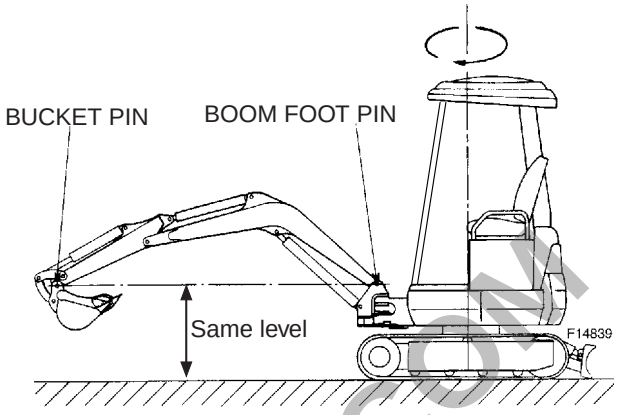


Fig. 6-1

6.2 OVERRUN WHEN SLEWING STOPS

- Engine : high idle
- Hydraulic oil temp. : 50 ~ 60 °C (122 ~ 140 °F)
- Measurement posture: same as that for measuring slew time.
- Prior to measuring, draw matching marks on the outer race of the slew bearing and lower frame at exactly 180 degrees slew from the starting point. Then with the hoe attachment in a no-load, slew 180 degrees from starting point. At which point return the operating lever to neutral. Measure the distance between the position marks and the point the hoe attachment stops.

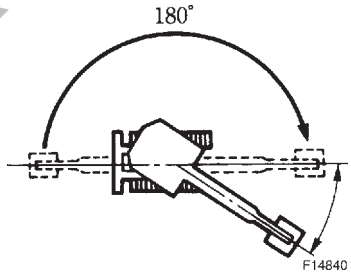


Fig. 6-2

6.3 SLEW DRIFT DUE TO GRAVITY

- Engine : stopped
- Hydraulic oil temp. : 50 ~ 60 °C (122 ~ 140 °F)
- Gradient : 15 ° (approx.1/3.73)
- Measurement posture : same as that for measuring slew time.
- Slew the upper slewing structure and stop at right angle to the slope, then draw matching marks on the slew bearing's outer race and the lower frame. Then measure the distance that develops between the marks after 5 minutes. Measure for both RH and LH directions.

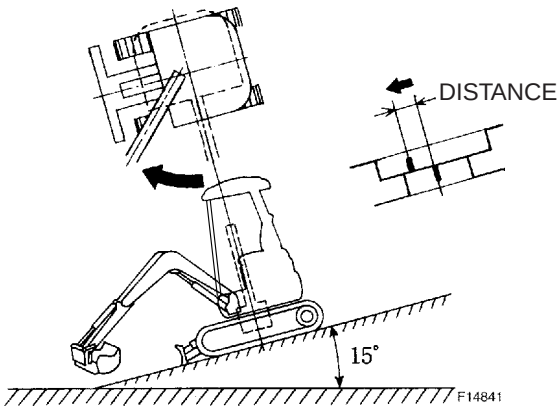


Fig. 6-3

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3.2 HARNESS AND CABLE LIST

CODE	NAME	REMARKS
H-1	Main harness	
H-2-1	Instrument panel harness	
H-3-1	Engine harness	
H-4	Battery cable ⊕	
H-5	Battery cable ⊖	
H-6	Engine ground cable	
H-7	Boom harness	
H-8	Key switch harness	
H-9	Auto air bleed harness	(Opt.)
H-10	Connection harness with cab	(Opt.)
H-11	Cab harness	(Opt.)
H-13	Travel alarm harness	(Opt.)
H-14	Travel alarm switch harness	(Opt.)

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(2) Operation

1) Pump operation

Dislacement q (cm^3)

$q = \pi X d^2/4 X \tan\alpha X D X Z/2X10^{-3}$

S (Stroke) (Number of piston)

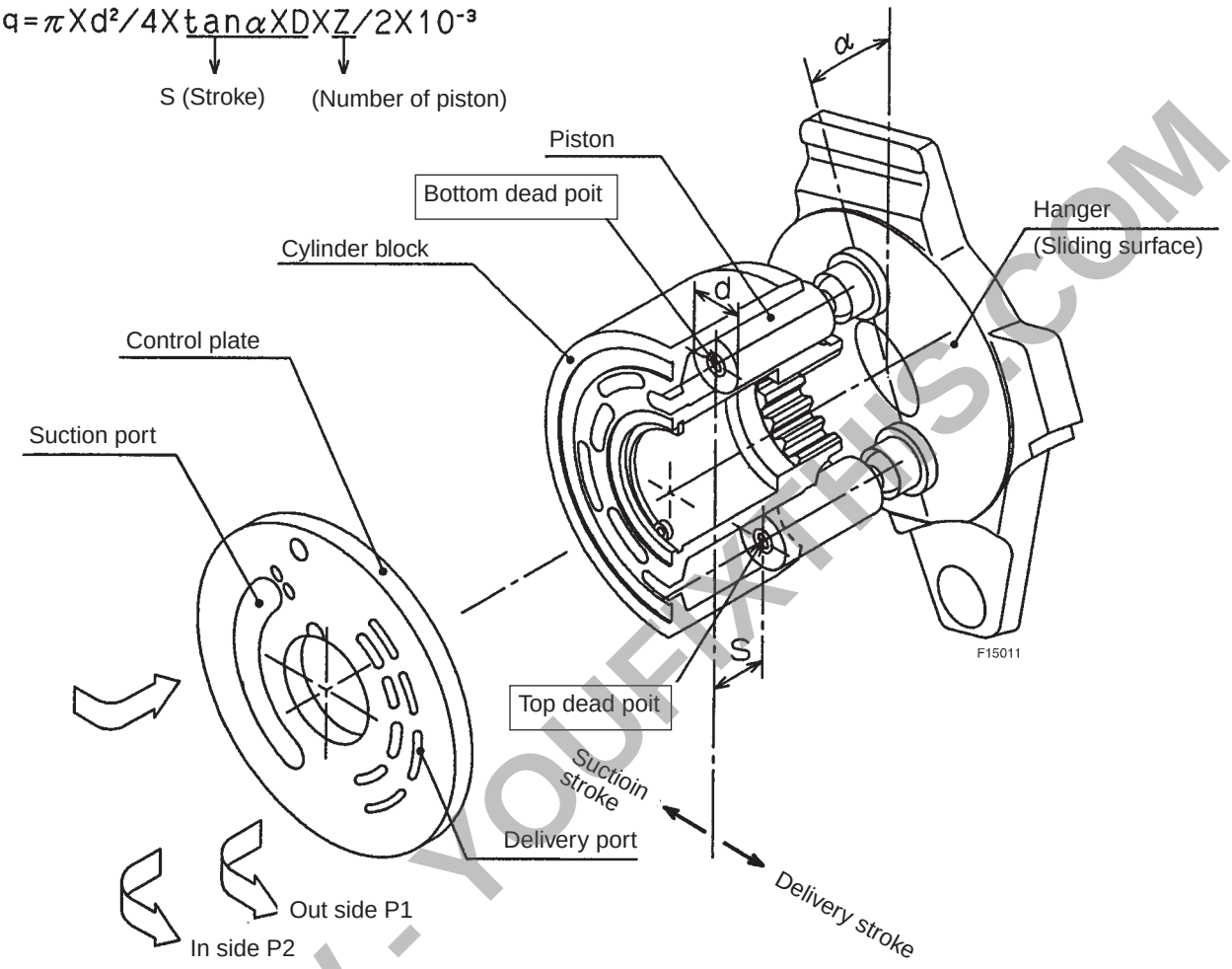


Fig. 1-3

- The cylinder block is fitted on the spline and rotates with the drive shaft.
- The piston fitted on the cylinder block follows the sliding surface of the hanger and moves to and from.
- The piston moves to increase the capacity from the bottom dead point to the top dead point, the pressure oil flows from the inlet port into cylinder block through the control plate (suction stroke).
- But as the piston moves to decrease the capacity from the top dead point to the bottom dead point, the pressure oil is sent out to the delivery port (delivery stroke).
- By changing the tilting degree of the hanger(sliding surface), the displacement varies.
- The oil sucked from the inside port of the cylinder block is delivered from the delivery port inside of the control valve.
- The oil sucked from the outside port of the cylinder block is delivered from the delivery port outside of the control plate.

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(5) Make-up valve (check valve, No.54)

The make-up valve performs the following two functions.

The 1st function is to prevent the cavitation produced when overrunning to avoid the overrun of the upperstructure. The motor revolved by the inertia force of the upperstructure causing the pumping action, and when the motor speed is over the speed equivalent to the oil quantity fed into the motor, the shortage of oil is made up from the outside to the motor main circuit through the make-up valve to protect the circuit from the generation of vacuum.

The 2nd function is, when the closed circuit is formed between the control valve and the motor as when braking, to protect the circuit from the generation of the vacuum by making up the shortage due to the motor drain and valve leak from the make up valve to maintain the braking function in the regular circuit condition.

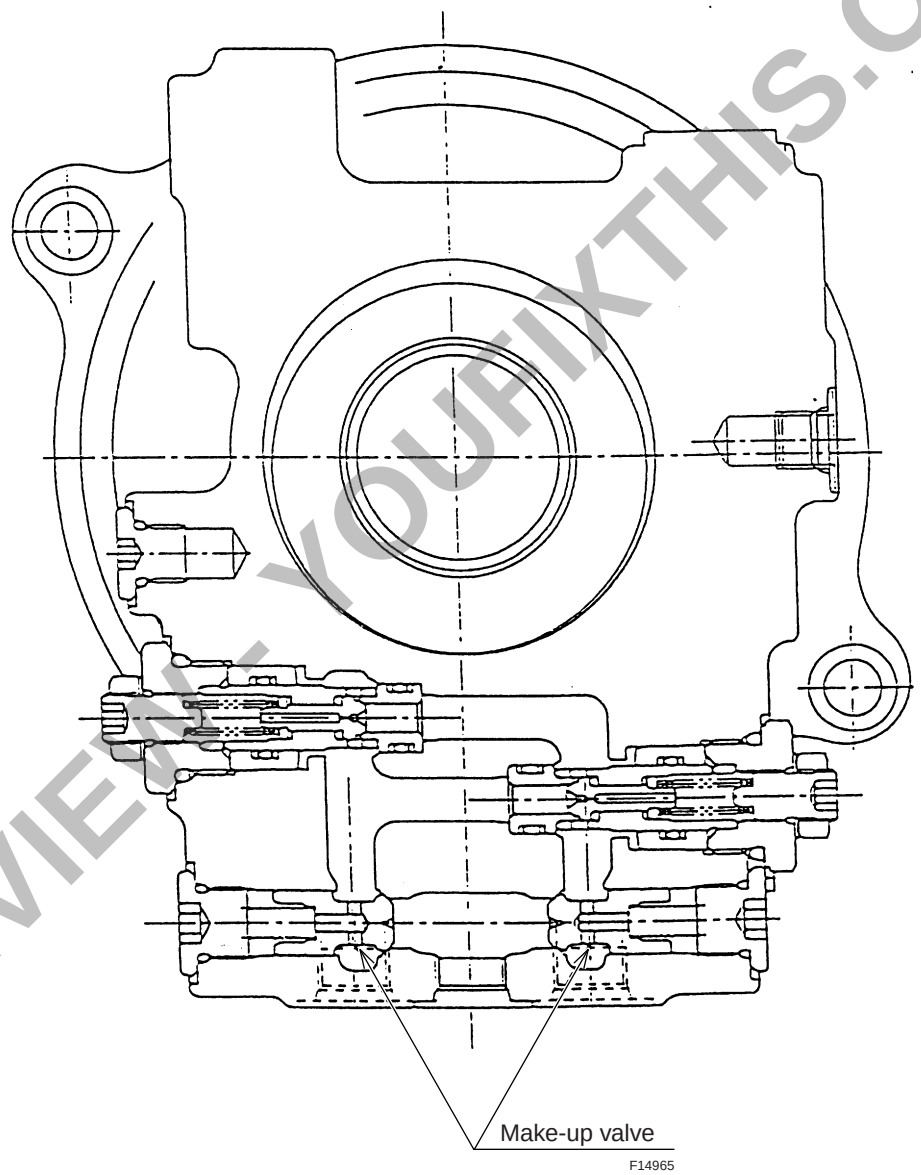
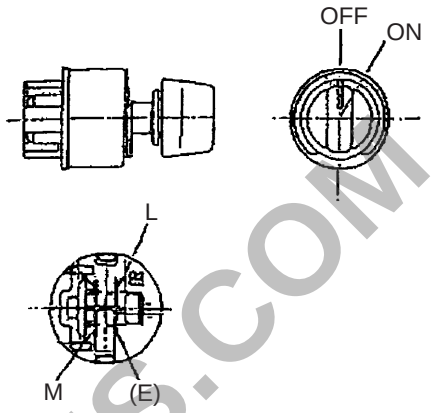
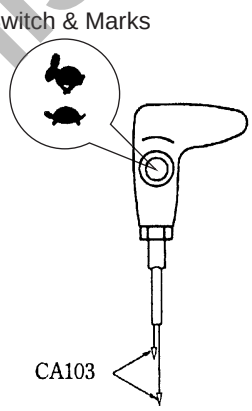
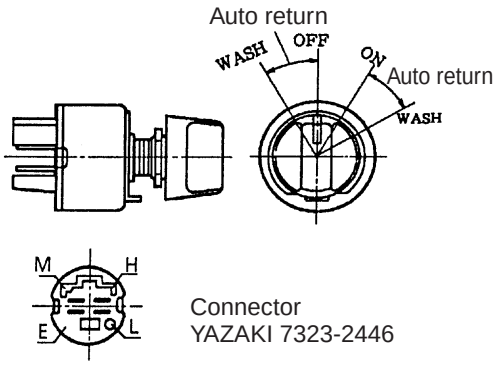
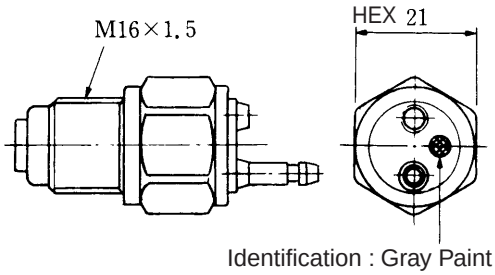


Fig. 5-13

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Code No. Parts Name Use	Specifications	Description
SW-2 Switch Working light	Connection table M L (E) OFF ○—○ ↕ ON ○—○—○ L:70WX2 lamps ↑ (Unconnected)	
SW-3 Switch (Right travel lever) Trvel 1,2speed	Type: Buried in right travel lever	
SW-4 Switch Wiper Washer (Cab only)	Type: 0850-00596 Insulation resistance: 1MΩ or more (DC500V Megger) Connection table P T L E H M Load WASH ○—○ 2A OFF ○—○ 3A (Peak10A) ON ○—○ 3A (Peak10A) WASH ○—○ 5A (Peak10A) Wiper motor Cam switch · Wiper Washer Motor	
SW-5 Switch E/G water temperature	Operating temperature: ON : 110 ± 3°C, OFF : 100°C or less Electric capacity: DC12V 1A Insulation resistance: 100MΩ or more/ 500V Megger Tightening torque: 2.8 kgf·m (20 lbf·ft)	

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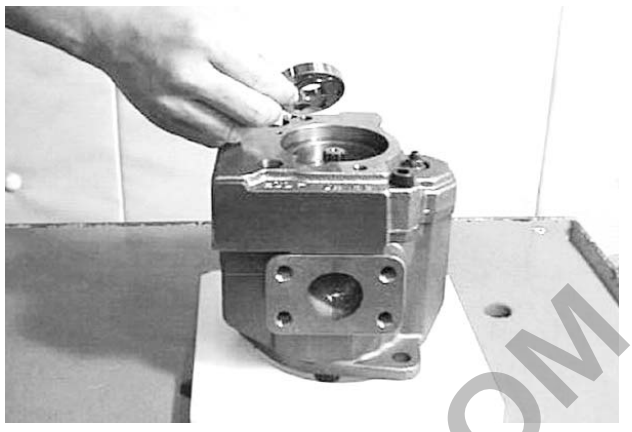
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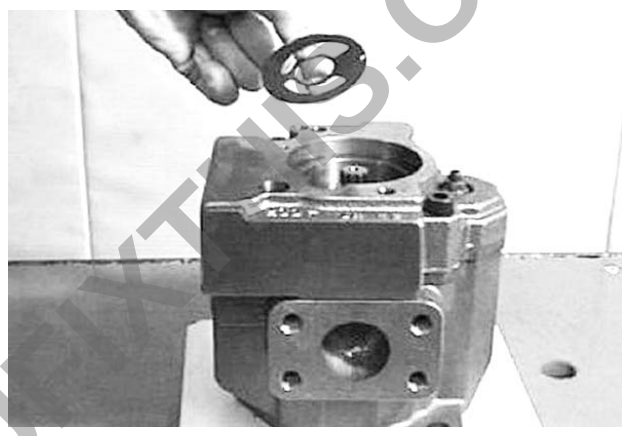
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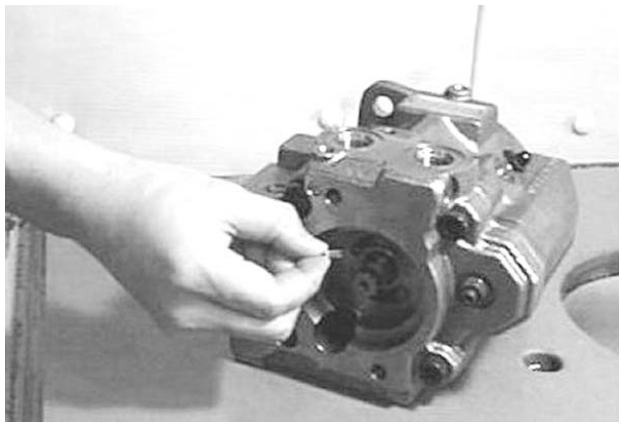
3. Take the gear out of the cover.



4. Remove side plate(B) from the cover.



5. Remove the key of the shaft

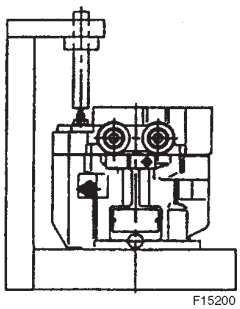


3) Disassembling main pump

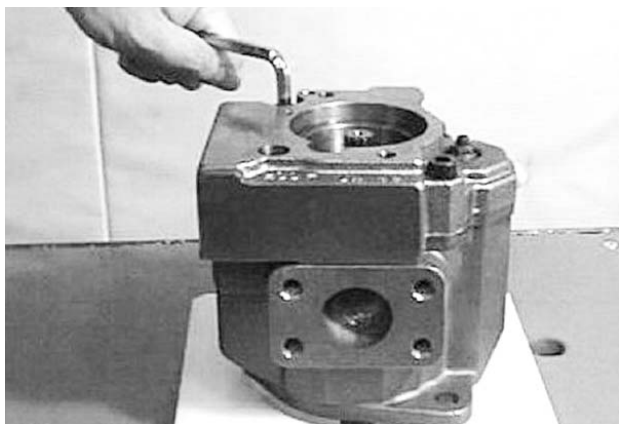
1. Removing cover

Since the control spring is strong, remove 3 capscrews (M 10 X 50) and one (M 10 X 40) while pressing the cover with jig.

: 8 mm



F15200



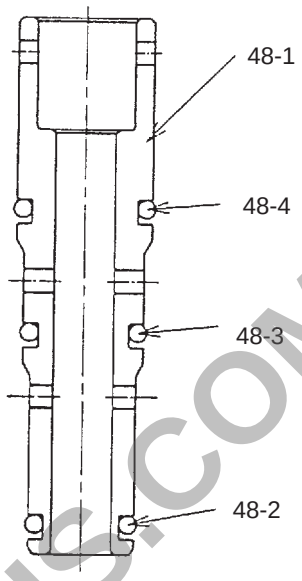
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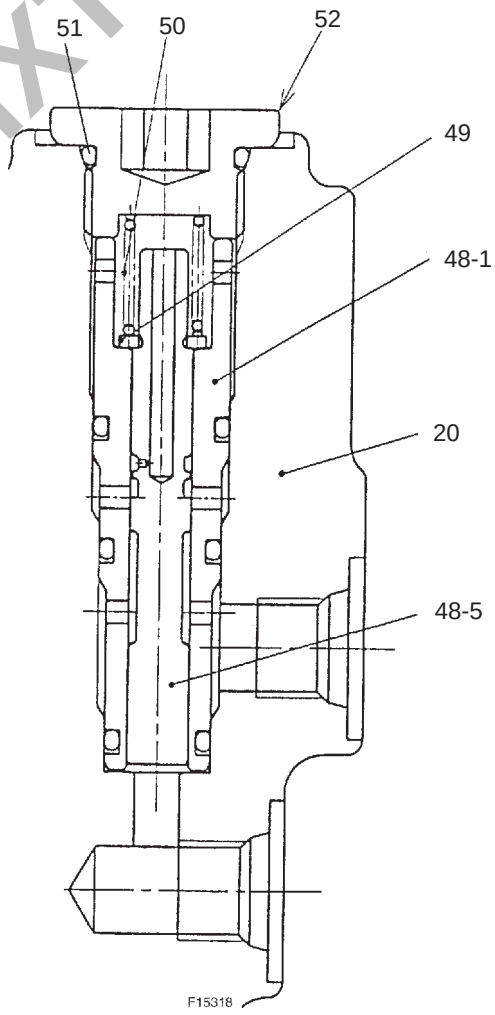
1-4 Fit O-rings (48-2,48-3,48-4) on sleeve (48-1).



1-5 Install sleeve (48-1) on case (20), and place spool (48-5), washer (49) and spring (50) in the hole of the sleeve.

1-6 Install plug (52) with O-ring (51).
T = 8.5kgf·m (61 lbf·ft)

NOTE:
Fit O-ring (51) paying attention not to damage when placing in.



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5) Remove idler adjuster assy from jig.

6) Fit oil seal (7) and O-ring (8) to grease cylinder (2).
   • Apply grease on oil seal (7) and O-ring (8).

7) Fill up grease in grease cylinder (2), remove the grease nipple from piston (1) and press the piston by hand to discharge the inside air.

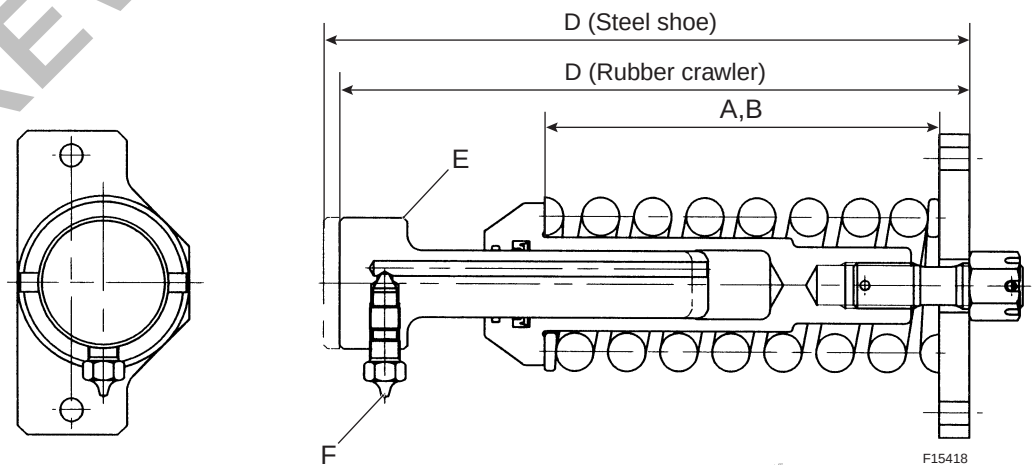
8) Tighten grease nipple to piston (1).
   : 19 mm
   Tightening torque: 6 kgf·m (43 lbf·ft)

6.4 MAINTENENCE STANDARDS

Table 6-1 Unit: mm (in)

CODE	ITEM	RUBBER CRAWLER	IRON SHOE
A	Installed length of spring	210 (8.27)	←
B	Free length of spring	247.2 (9.73)	←
–	Stroke	15 (0.59)	←
D	Set length	335 (13.2)	343.5
E	Visual check of piston	Nor scoring and rusting	←
F	Tightening torque of grease nipple	6 kgf·m (43 lbf·ft)	←

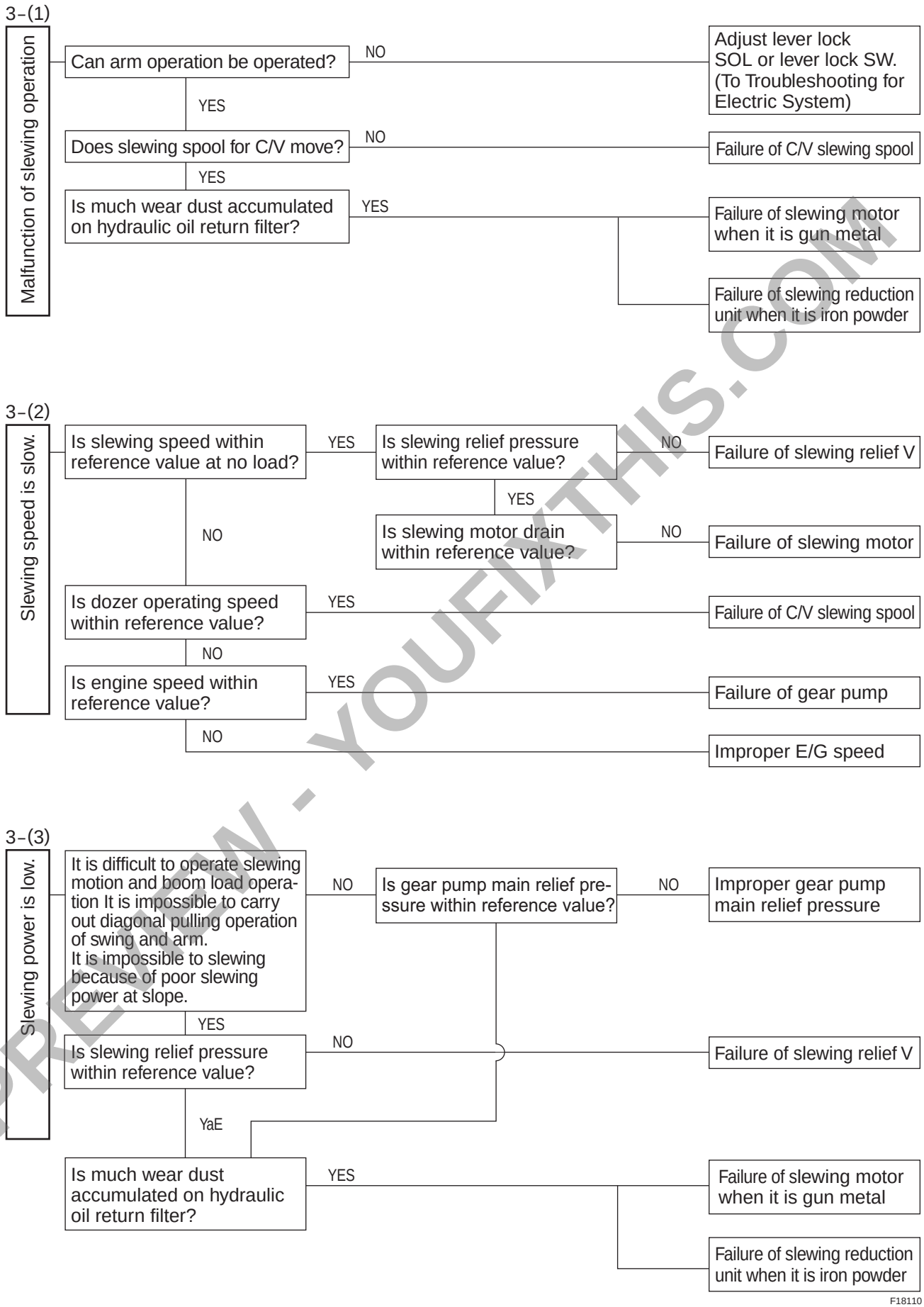
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Fig. 6-10 Idler adjuster assy.

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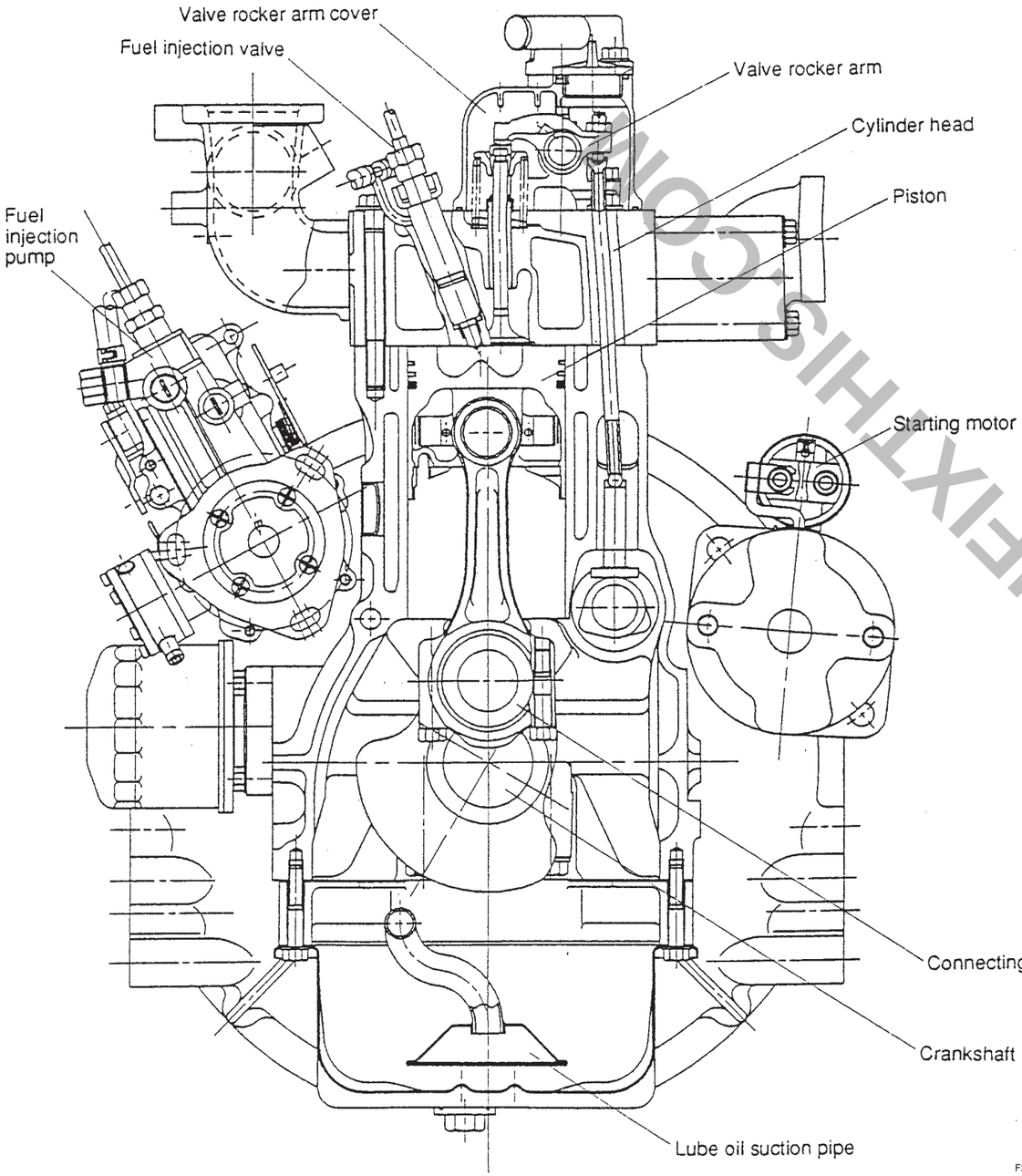


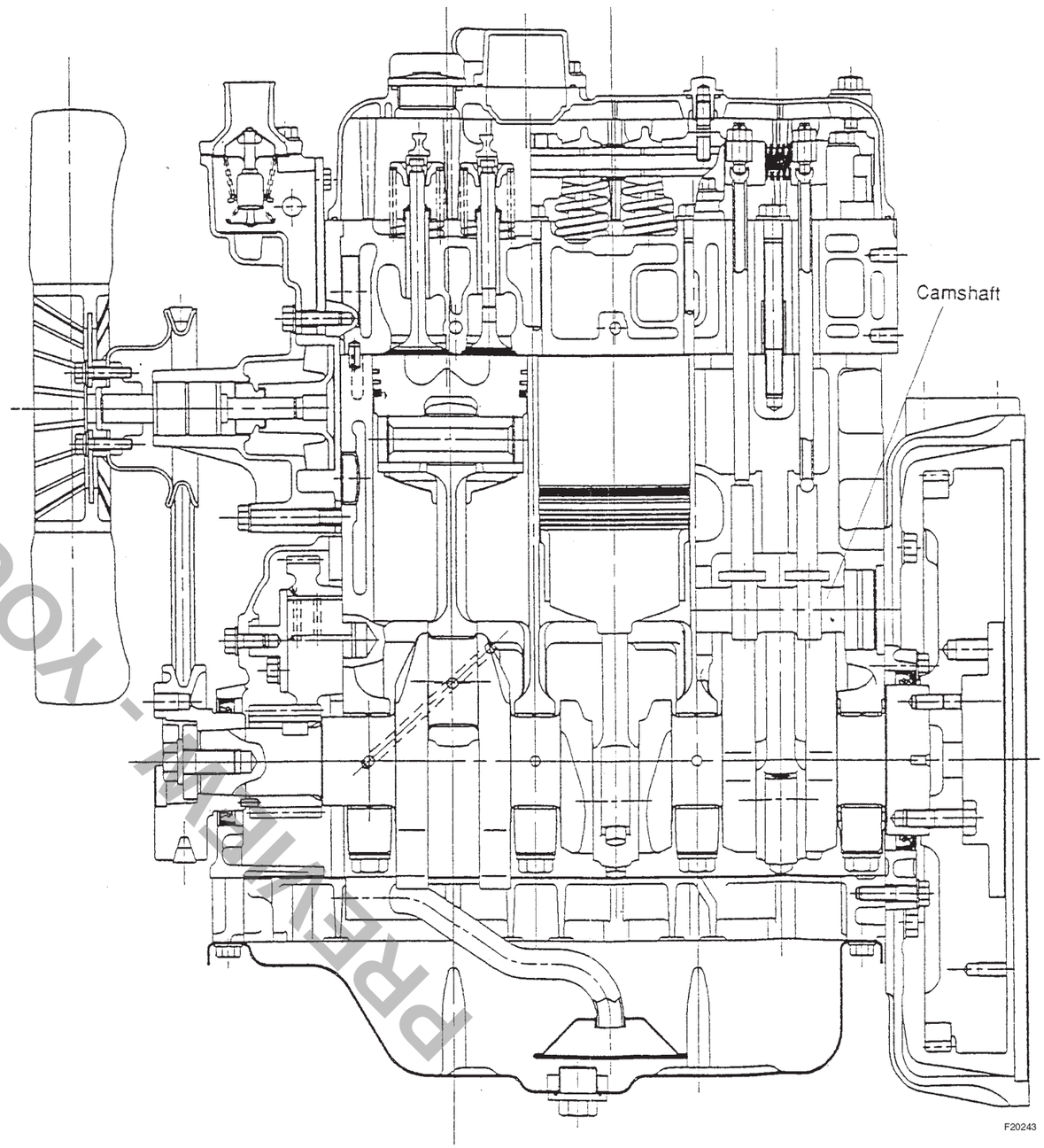
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2.2 DIRECT INJECTION SYSTEM





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(mm)

		2/3TNE68		3TNE74		3TNE78A/82A, 3/4TNE82, 3/4TNE84(T), 3/4TNE88	
		Standard	Wear limit	Standard	Wear limit	Standard	Wear limit
Push rod bending		0.03 or less	—	0.03 or less	—	0.03 or less	—
Tappet	Tappet stem outside diameter	17.950 ~17.968	17.93	20.927 ~20.960	20.90	11.975 ~11.990	11.93
	Tappet guide hole inside diameter	18.000 ~18.018	18.05	21.000 ~21.021	21.05	12.000 ~12.018	12.05
	Oil clearance	0.032 ~0.068	0.12	0.040 ~0.094	0.15	0.010 ~0.043	0.12

3. Other checks

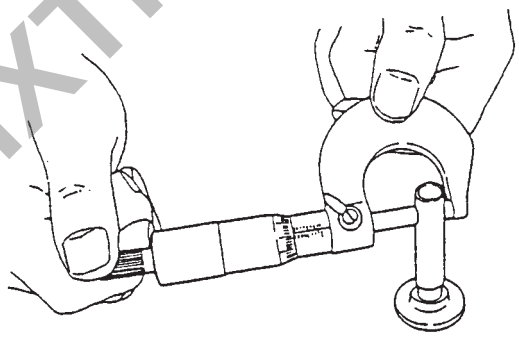
(1) Valve rocker arm shaft spring

Check to see if the rocker arm shaft spring is free from corrosion and wear. If not, replace it with a new one.

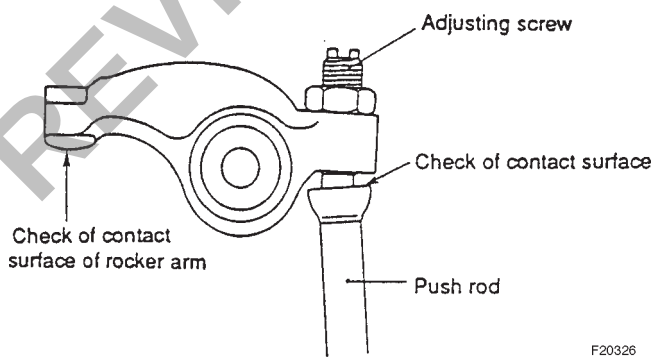
(2) Wear of intake/exhaust valve rocker arm and valve cap

Check the intake/exhaust valve rocker arm for their contact surfaces with valve cap. If any of them is abnormally worn or partially flaked, replace it.

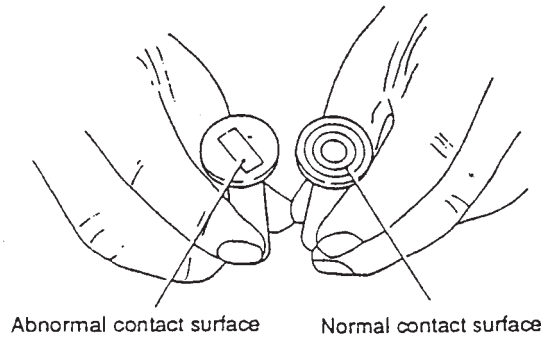
(3) Check the portion where the valve clearance adjusting screw is in contact with the push rod. If the portion is worn and flaked, replace the pushrod or adjusting screw.



(Measuring the tappet outside diameter)



F20326



F20327

(Checking the tappet contact surface)

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NOTE

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