3. SPECIFICATIONS AND PERFORMANCE

■ SPEED AND GRADEABILITY

E40SR

Model		E40SR (with Rubber Shoe)	
Item			
Slewing Speed	min^{-1} {rpm}	9.3 {9.3}	
Travel Speed	km/h (mph)	Low (1st.)	High (2nd.)
		2.5 (1.5)	4.5 (2.8)
Gradeability	%(degree)	58 (30)	

■ ENGINE

Model (YANMAR)		[4TNE84] 4TNE84-EYB
Type		Vertical,4-cycle,water cooled diesel engine
Number of cylinders-Bore X Stroke		4-Ø84 mm X 90 mm
Total Displacement	L	1.99
Rated Output	kW/min^{-1} {PS/rpm}	22.8 / 2,100 {31.0 / 2,100}
Maximum Torque	N·m/min^{-1} {kgf·m/rpm}	118 / 1,400 {12 /1,400}
Starter	V X kW	12 X 2.0
Generator (Dynamo)	V X A	12 X 40

Note) ● The model name in [ ] is for the earlier one before the improvement / change.

■ HYDRAULIC COMPONENTS

Hydraulic Pump	Variable displacement axial piston + gearpump
Slewing Motor	Axial piston
Travel Motor	Axial psiton, 2 speed motor
Control Valve	10 spool multiple control valve
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	Approx.58
	Left	Approx.83 (Cab spec : 73)
Stroke of dozer (Up / Down)	mm (in)	360 /320 (14.2 / 12.6)

■ WEIGHT

Unit : kg (lb)

Machine Weight	Rubber shoe, Canopy
	4,060 (8,950)
Upper slewing body	1,770 (3,900)
Travel system	1,660 (3,660)
Attachment (Boom+STD Arm+STD Bucket)	450 (990)
Oil & Water	104 (230)

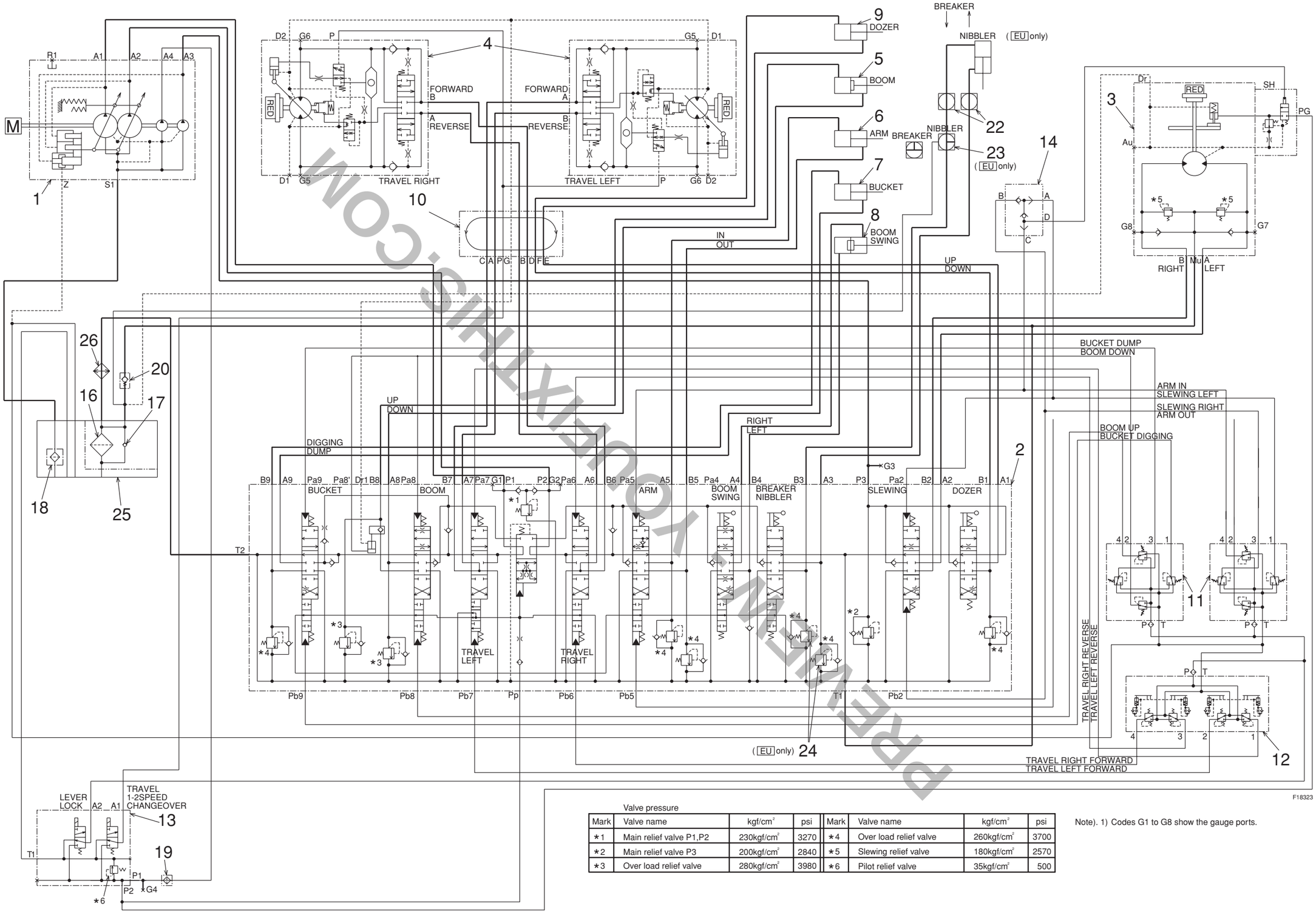
Note: The figure is calculated with standard bucket.
Bucket weight 100 kg (220 lb)

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2.1 HYDRALIC CIRCUIT DIAGRAM



Valve pressure

Mark	Valve name	kgf/cm²	psi	Mark	Valve name	kgf/cm²	psi
∗1	Main relief valve P1,P2	230kgf/cm²	3270	∗4	Over load relief valve	260kgf/cm²	3700
∗2	Main relief valve P3	200kgf/cm²	2840	∗5	Slewing relief valve	180kgf/cm²	2570
∗3	Over load relief valve	280kgf/cm²	3980	∗6	Pilot relief valve	35kgf/cm²	500

Note). 1) Codes G1 to G8 show the gauge ports.

Fig. 1 Hydraulic circuit diagram

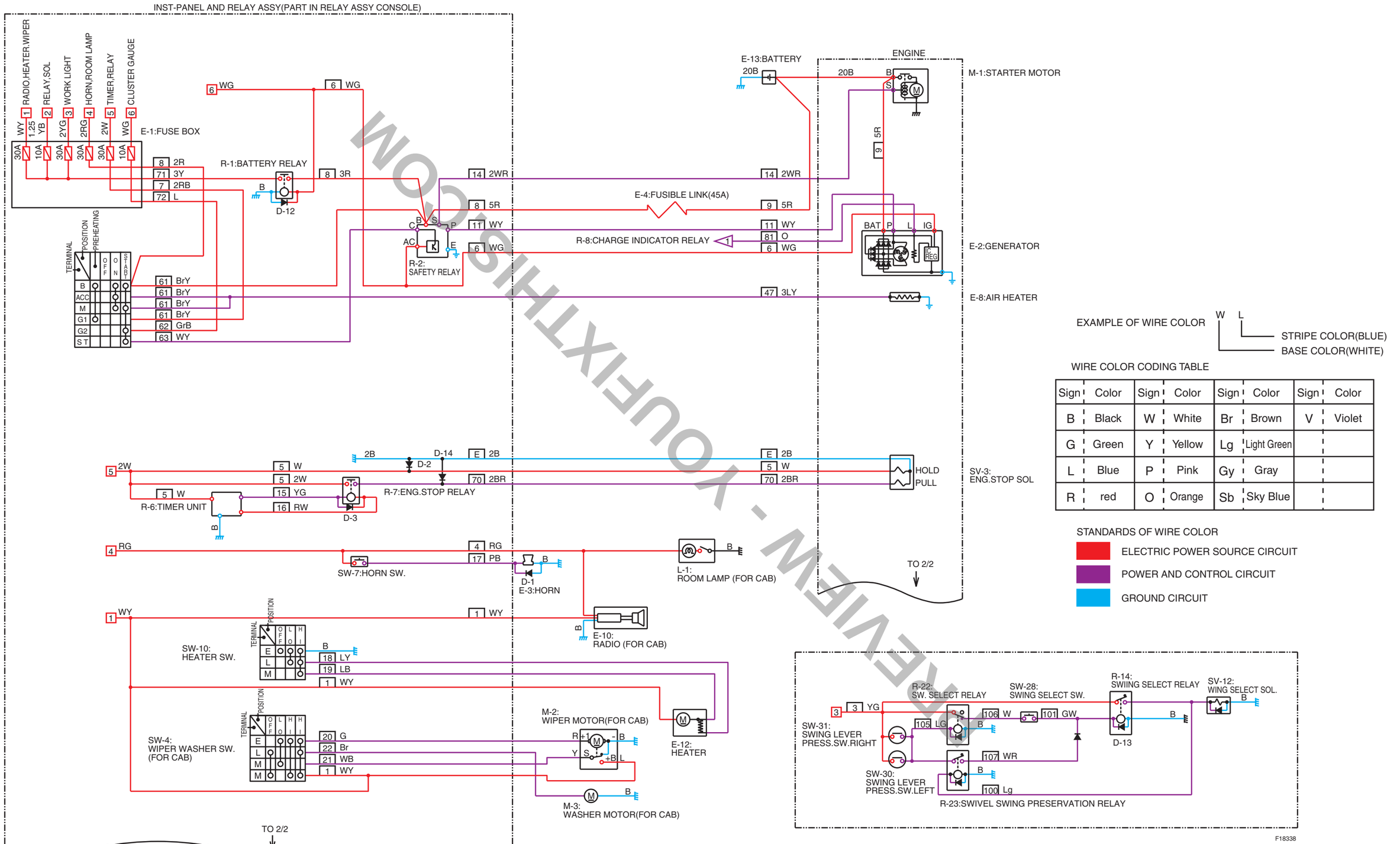
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PROTOTYPE

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2. ELECTRIC CIRCUIT DIAGRAM

2. ELECTRIC CIRCUIT DIAGRAM (1/2)



EXAMPLE OF WIRE COLOR

W L
- STRIPE COLOR(BLUE)
- BASE COLOR(WHITE)

WIRE COLOR CODING TABLE

Sign	Color	Sign	Color	Sign	Color	Sign	Color
B	Black	W	White	Br	Brown	V	Violet
G	Green	Y	Yellow	Lg	Light Green		
L	Blue	P	Pink	Gy	Gray		
R	red	O	Orange	Sb	Sky Blue		

STANDARDS OF WIRE COLOR

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

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3. ARM

3.1 REMOVAL OF ARM

(1) Making the arm cylinder and bucket cylinder to the most retracting conditions, place the arm tip to the ground.

(2) Depressing the air breather on the hydraulic oil tank, release the pressure in the tank.

(3) Disconnect the 2 hoses connected to the bucket cylinder. Then apply a blinding plug to the openings.

: 27 mm

(4) Lift up the arm cylinder body with a nylon sling in order not to exert any load to the pin (E).

(5) Remove the capscrew and nuts that are preventing the pin (E) from coming out. Then remove the pin (E) and shims.

: 19 mm

(6) Placing wood block under the arm cylinder, get down the cylinder.

(7) Install the pin (E) to the original position, and install the capscrew and nuts that prevents the pin (E) from coming out. Applying a rope to the pin (E) and the arm tip, slightly lift it up in order not exert any load to the pin (F).

(8) Remove the capscrew that is preventing the pin (F) connecting the arm and boom, from coming out. Then pull off the pin (F).

: 36 mm

(9) Remove the arm assy paying attention to the stability of arm.

Weight of arm assy: approx.

130 kg (290 lb) E40SR EVOLUTION

140 kg (310 lb) E45SR EVOLUTION

(10) Removal of bucket cylinder

1) Remove the capscrew that is preventing the rod pin (H) from coming out, then pull off the pin (H).

: 24 mm

2) Remove the capscrew and nuts that are preventing the head pin (G) from coming out, then pull off the pin (G).

: 19 mm

3) Apply a nylon sling to the tube of bucket cylinder, and remove the cylinder.

Weight ; 26 kg (57 lb)

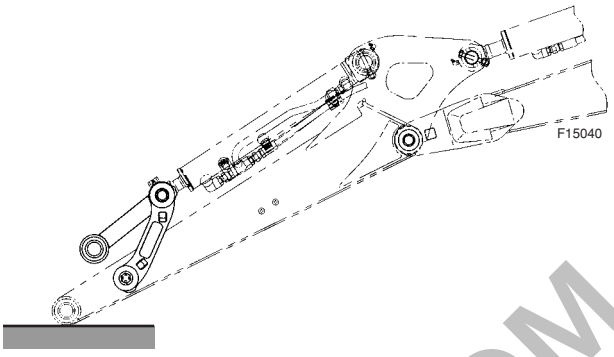


Fig. 2-5 Arm removing posture

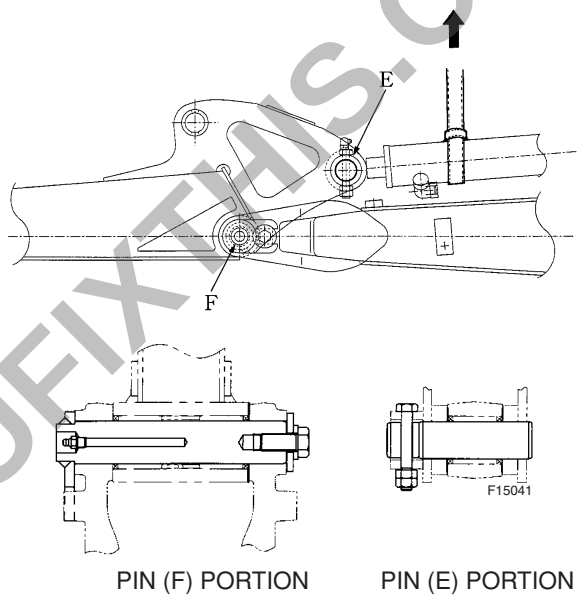


Fig. 2-6 Sectional view of installing pin

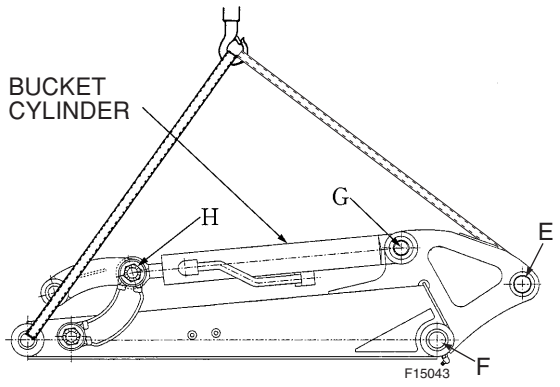


Fig. 2-7 Removal of arm assy

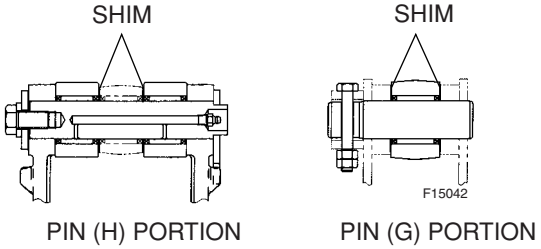


Fig. 2-8 Sectional view of installing pin

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2. TROUBLE DIAGNOSIS: HYDRAULIC

Classification	Reference No.		Causes / Phenomenon	Pump			Valve								Actuator			Pilot valve	
				Main pump	Trochoid pump (for pilot)	Gear pump	Travel & ATT main R/V	Main gear pump R/V	Each port & slewing R/V	Travel straight valve	Travel spool	Attachment & slewing spool	Check valve	Shuttle valve	Slewing motor unit	Travel motor unit	Hydraulic cylinder	Travel pilot valve	Operation control pilot valve
Attachment	1	(1)	Attachment operational failure (excluding dozer operation and EU type swing 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.	○						○	○					○		○	
Slewing 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
P/V : Pilot valve

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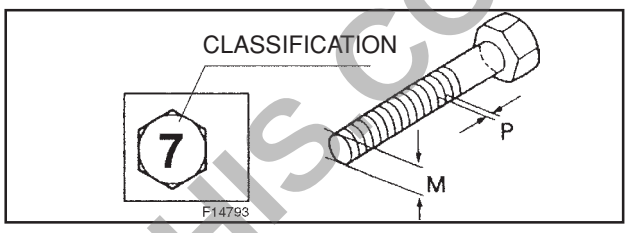
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1. TORQUE SPECIFICATIONS FOR CAPSCREWS AND NUTS

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.



1.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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E40SR EVOLUTION
E45SR EVOLUTION

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2. ARM

2.1 ARM DIMENSION

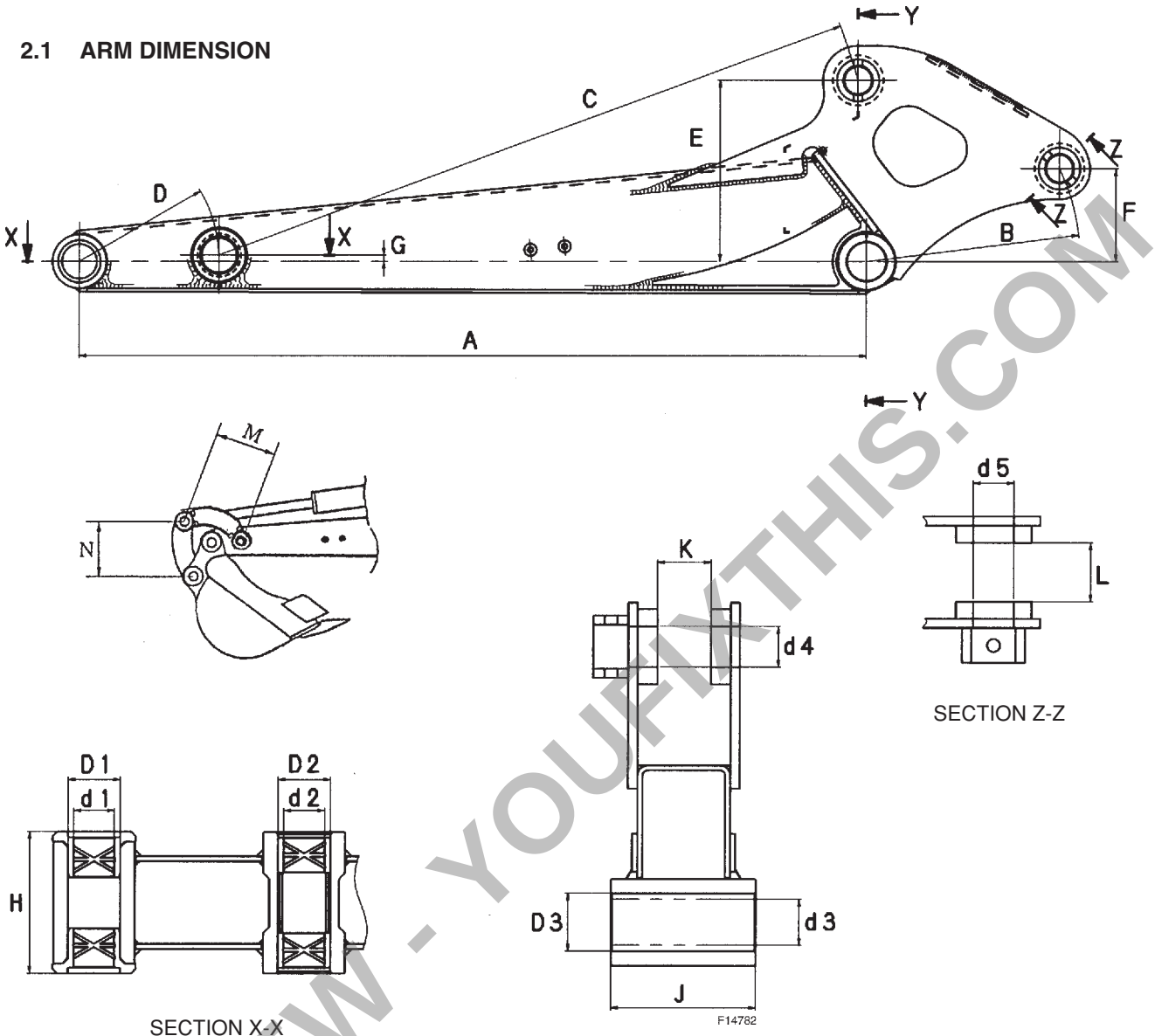


Fig. 2-1 Arm dimension

Table 2-1

■ *E40SR EVOLUTION*

Unit : mm (ft-in)

Code	Item	Dimensions	Code	Item	Dimensions
A	Arm length	1360 (4´5.5˝)	M	Link dimension (Idler)	320 (12.60˝)
B	Distance between pins of boss and bracket	R405 (15.94˝)	N	Link dimension (Bucket link)	310 (12.20˝)
C	Distance between pins of boss and bracket	R1118 (3´8.0˝)	D1	I.D. of boss	ø55 (2.17˝)
D	Distance between pins of boss and boss	R230.5 (9.07˝)	D2	I.D. of boss	ø55 (2.17˝)
E	Height between pins of boss and bracket	311 (12.24˝)	D3	I.D. of boss	ø75 (2.95˝)
F	Height between pins of boss and bracket	190 (7.48˝)	d1	Pin dia.	ø45 (1.77˝)
G	Height between pins of boss and center	12 (0.47˝)	d2	Pin dia.	ø45 (1.77˝)
H	Boss width	150 (5.91˝)	d3	Pin dia.	ø60 (2.36˝)
J	Boss width	175 (6.89˝)	d4	Pin dia.	ø45 (1.77˝)
K	Bracket inner width	61 (2.40˝)	d5	Pin dia.	ø45 (1.77˝)
L	Bracket inner width	61 (2.40˝)			

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4.2.2 Pilot circuit pressure

(1) Measuring conditions
Engine: high idling
Hydraulic oil temp. : 50 ~ 60 °C (122 ~ 140 °F)
Coolant temp. : 60 ~ 90 °C (140 ~ 194 °F)
at radiator surface

(2) Measurement
Setting a 70 kgf/cm^2 pressure gauge to the pressure detecting port (plugged G4 : PF1/4), measure the pilot relief pressure.

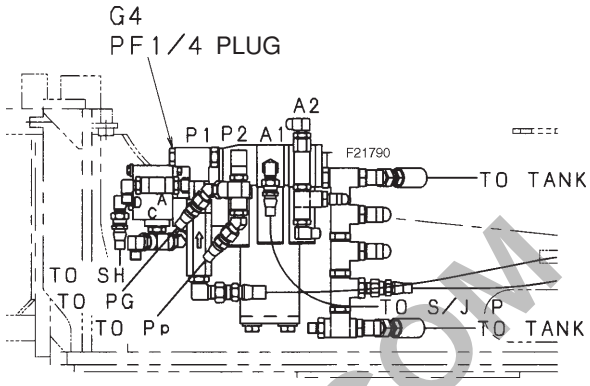


Fig. 4-7 Pilot oil pressure measurement

Pressure detecting port		Relief valve
Port location	Size	
G4	PF1/4	PR1

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(3) Pressure adjustment
Adjust it with the relief valve attached to the solenoid valve.

1) Loosen the lock nut (2), then turn the setscrew (1) to adjust the set pressure.
CW turning: set pressure is increased.
CCW turning: set pressure is decreased.
2) After the adjustment, tighten the lock nut holding the setscrew not to allow its turning.
3) Again actuate the relief valve, and verify that the set pressure is being stable.

Tightening torque
: Lock nut (2): 0.8 kgf·m (6 lbf·ft)
: Relief valve (PR1) ┐
: Solenoid valve (3) ┘ 4.5 kgf·m (33 lbf·ft)

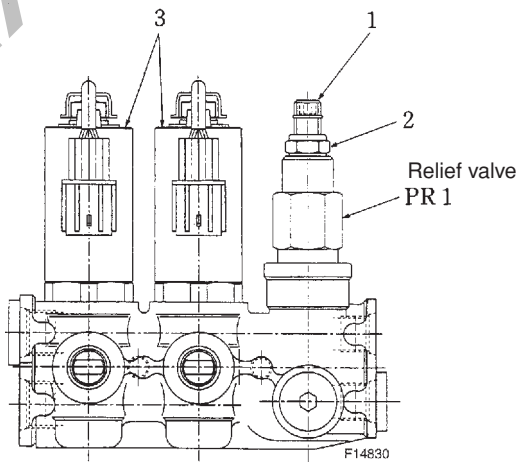


Fig. 4-8 Solenoid valve

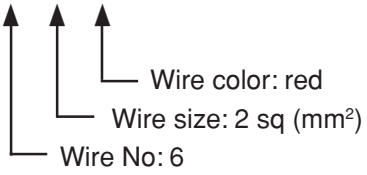
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1. HOW TO READ CIRCUIT DIAGRAM AND HARNESS CONNECTION

1.1 ELECTRIC CIRCUIT DIAGRAM

(1) In the diagram, the number, size and color of wires are shown on the wiring line.
The size of the wire is to be 0.75 sq (square mm = mm^2) unless otherwise specified.
Example: 6 2 R

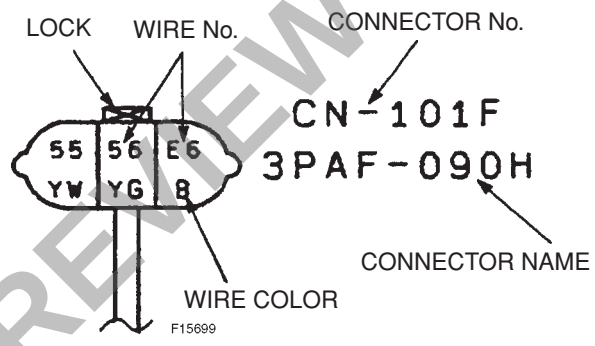


WIRING COLOR TABLE

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

1.2 HARNESS CONNECTION

(1) Indication for connector



1) The figure for the connector pin arrangement is shown by putting the lock (nail) to upper portion, and looking from the fitting face.
2) The numbers in the connector show the wire No., and alphabetical letters show the wire color.
3) On the side face of connector, the connector name and serial number of the connector No. are indicated.
4) At the place indicated as "DOUBLE SPLICE", two wires are connected to one place.

(2) The connector is to be connected with engaging the male (M) and fermale (F) connectors of the same number:
Example: CN-101M and CN-10F
Where: M means for Male and F for Fermale.

(3) ⊣◄ mark means the connector with diode.
The direction for diode is shown by the arrow.

(4) The AVSS wires are to be useD for the size between 0.75 sQ and 2 sq. AVS wires between 3 sq and 5 sq and others are AV wires, unless otherwise specified.

(5) The wire size is 0.75 sq, unless otherwise specified.

(6) The treatment for the harness end is to be as follows:
1) ═══ After roughly applying harness taping, wires are installed in a corrugated tube.
2) ——— Harness taping by two plies.
3) ——— No harness treatment for connection.

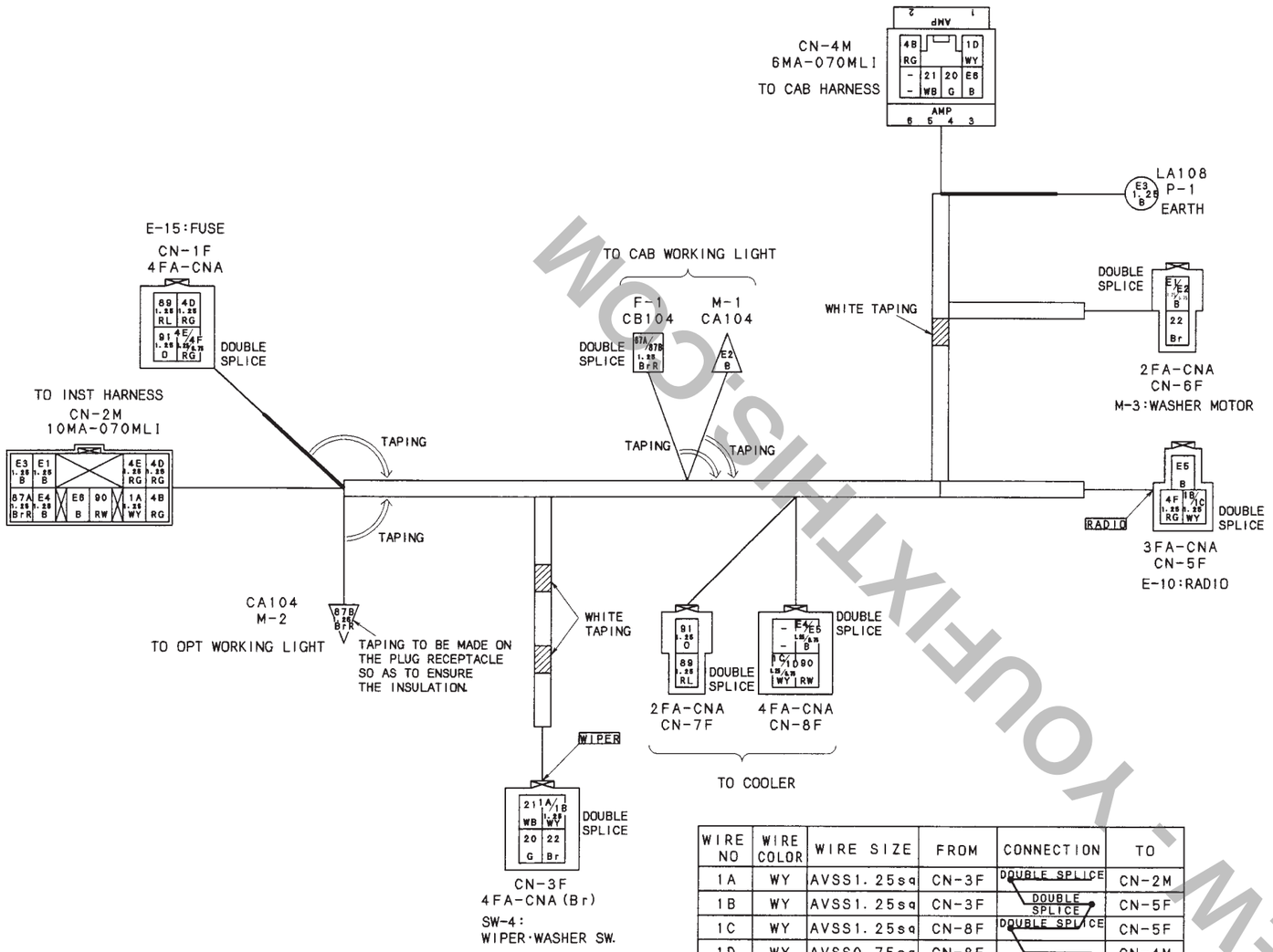
(7) The length for the above (6)-3) is to be 30 ± 10 mm; (1.2 ± 0.4 in), and the length includes in the total length of wire shown in the diagram.

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4.5.7 Cab harness (No. H-10)

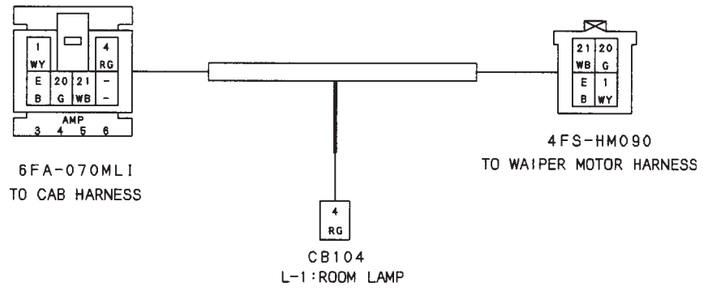


CONNECTORS SELECTION TABLE

CONNECTOR NAME (PIN NUM.)	MANUFUC.	PART. NUMBER	
		HOUSING	TERMINAL
4FA-CNA	AMP	172134-1	170032-2
3FA-CNA	AMP	172132-1	170032-2
10MA-070MLI	AMP	174932-1	173645-1
2FA-CNA	AMP	172130-1	170032-2
6MA-070MLI	AMP	175657-1	173645-1
CA104	AMP	170887-1	170002-5
CB104	AMP	170889-1	170003-5
4FA-CNA(Br)	AMP	172134-3	170032-2

WIRE NO	WIRE COLOR	WIRE SIZE	FROM	CONNECTION	TO
1A	WY	AVSS1.25sq	CN-3F	DOUBLE SPLICE	CN-2M
1B	WY	AVSS1.25sq	CN-3F	DOUBLE SPLICE	CN-5F
1C	WY	AVSS1.25sq	CN-8F	DOUBLE SPLICE	CN-5F
1D	WY	AVSS0.75sq	CN-8F		CN-4M
4B	RG	AVSS0.75sq	CN-2M		CN-4M
4D	RG	AVSS1.25sq	CN-2M		CN-1F
4E	RG	AVSS1.25sq	CN-2M	DOUBLE SPLICE	CN-1F
4F	RG	AVSS1.25sq	CN-5F		CN-1F
20	G	AVSS0.75sq	CN-3F		CN-4M
21	WB	AVSS0.75sq	CN-3F		CN-4M
22	Br	AVSS0.75sq	CN-3F		CN-6F
87A	BrR	AVSS1.25sq	F-1	DOUBLE SPLICE	CN-2M
87B	BrR	AVSS1.25sq	F-1		M-2
89	RL	AVSS1.25sq	CN-1F		CN-7F
90	RW	AVSS0.75sq	CN-2M		CN-8F
91	O	AVSS1.25sq	CN-1F		CN-7F
E1	B	AVSS1.25sq	CN-6F	DOUBLE SPLICE	CN-2M
E2	B	AVSS0.75sq	CN-6F		M-1
E3	B	AVSS1.25sq	CN-2M		P-1
E4	B	AVSS1.25sq	CN-2M	DOUBLE SPLICE	CN-8F
E5	B	AVSS0.75sq	CN-5F		CN-8F
E6	B	AVSS0.75sq	CN-2M		CN-4M

4.5.8 Harness (inside of the cab) (No. H-11)



CONNECTORS SELECTION TABLE

CONNECTOR NAME (PIN NUM.)	MANUFUC.	PART. NUMBER	
		HOUSING	TERMINAL
6FA-070MLI	AMP	175658-1	175027-1
CB104	AMP	170889-1	170003-5
4FS-HM090	SUMITOMO	6090-1011	8240-4422

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(6) Actuation of P1 and P2 main relief valves (MR1)

1) Actuation when released

1. The pressure oil flows through the inside of the piston placed on the pressure regulating valve (main valve) and orifice “B”, and fills “A” chamber, and consequently the pressure regulating valve and socket and pressure regulating section are securely seated.

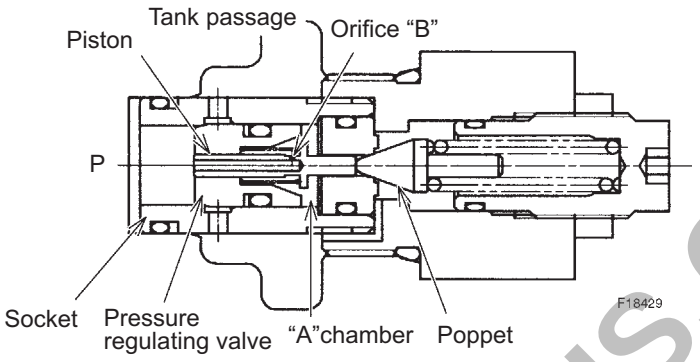


Fig. 4-16

2. When the oil pressure of port “P” reaches to the spring set pressure of the regulating valve, the pressure oil actuates on the regulating valve through the piston and opens it.
Then, the pressure oil passes through the inside of piston, orifice “B”, “A”chamber, ring-shaped restriction “C” and passage “D” in succession, and flows into the tank passage.

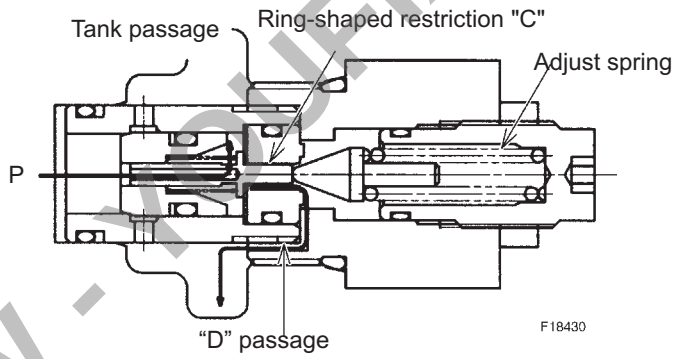


Fig. 4-17

3. Since the regulating valve is open and the pressure of “A” chamber is lowered, the pressure regulating valve opens and the pressure oil of port “P” directly flows into the tank passage through the drilled hole “E”.

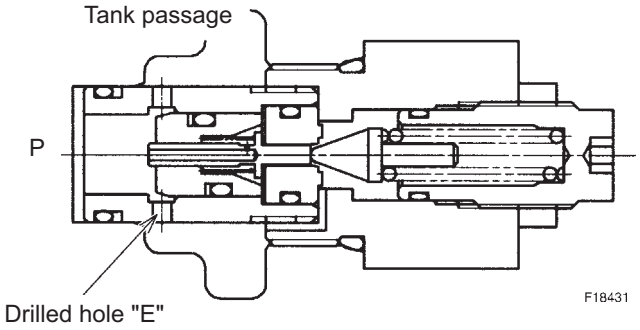


Fig. 4-18

4. When the pressure of port “P” lowers to the spring set pressure of the regulating valve or less, the regulating valve is pushed against the seat by the force of regulating spring of the regulating valve, and consequently the pressure of “A” chamber becomes equal to the pressure of “P” port and the pressure regulating valve is also pushed against the socket seat section, restoring to the original condition (Figure 4-16).

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ELECTRICAL EQUIPMENT LIST

Applicable machines: E40SR / E45SR Evolution

GROUP	CODE	PART NAME
DIODE	D-1	DIODE
	D-2	DIODE
	D-3	DIODE
	D-4	DIODE
	D-12	DIODE
	D-14	DIODE
ELECTICAL FITTINGS	E-1	FUSE BOX
	E-2	GENERATOR (ALTERNATOR)
	E-3	HORN
	E-4	FUSIBLE LINK
	E-6	GAUGE CLUSTER
	E-7	POWER SOCKET
	E-8	AIR HEATER
	E-10	RADIO (OPT)
	E-12	HEATER (OPT)
	E-13	BATTERY
	E-14	SEQUENCE BOX
	E-15	FUSE BOX (OPT) (FOR COOLER)
LIGHT	L-1	ROOM LAMP
	L-2	BOOM WORKING LIGHT (LH)
MOTOR	M-1	STARTER MOTOR
	M-2	WIPER MOTOR
	M-3	WASHER MOTOR
	M-4	DECELERATION MOTOR
	M-6	FUEL PUMP (OPT) (AUTO AIR BLEED)
RELAY	R-1	BATTERY RELAY
	R-2	SAFETY RELAY
	R-3	DECELERATION RELAY (OPT)
	R-6	TIMER UNIT
	R-7	E/G STOP RELAY
	R-8	CHARGE INDICATOR RELAY
	R-9	OPT. WORK LIGHT RELAY

GROUP	CODE	PART NAME
SENSOR	SE-1	FUEL SENSOR
	SE-2	ENGINE THERMO SENSOR
SOLENOID	SV-1	LEVER LOOK SOL.
	SV-2	2-SPEED SELECT SOL.
	SV-3	E/G STOP SOL.
	SV-5	POWER SHIFT SOL. (Cooler Spec)
	SV-8	TILT ANGLE SOL
SWITCH	SW-1	KEY SWITCH
	SW-2	WORKING LIGHT SW.
	SW-3	2-SPEED SELECT SW.
	SW-4	WIPER WASHER SW.
	SW-5	E/G COOLANT TEMP. SW.
	SW-6	E/G OIL PRESSURE SW.
	SW-7	HORN SW.
	SW-9	LEVER LOCK SW. (LH)
	SW-10	HEATER SW. (OPT)
	SW-11	DECELERATION SW.
	SW-12	AIR FILTER CLOGGING SW.
	SW-17	TILT ANGLE SELECT SW.
	SW-23	TRAVEL ALARM SELECT SW.
	SW-24	TRAVEL RIGHT (FORWARD) PRESS.SW.
	SW-25	TRAVEL RIGHT (REVERSE) PRESS.SW.
	SW-26	TRAVEL LEFT (FORWARD) PRESS.SW.
	SW-27	TRAVEL LEFT (REVERSE) PRESS.SW.

Note)

- This is for reference only, because the part No. might be change due to improvement.

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(5) Disassembly of clevis portion:

1) Remove the dust seal (25) from the clevis portion of tube (1) and piston rod (2).

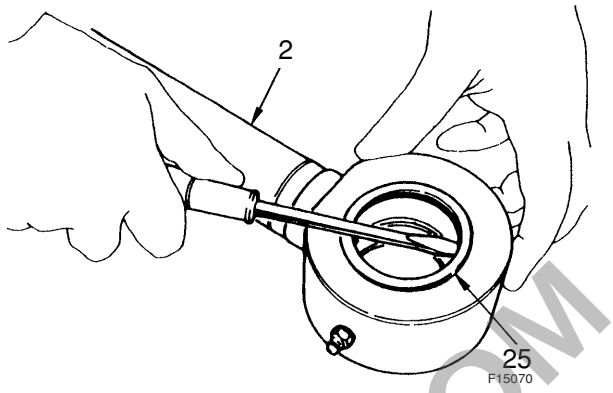


Fig. 1-15 Removing dust seal

2) Remove the pin bushing (24).

- Using a metal block, push it out with a press machine.

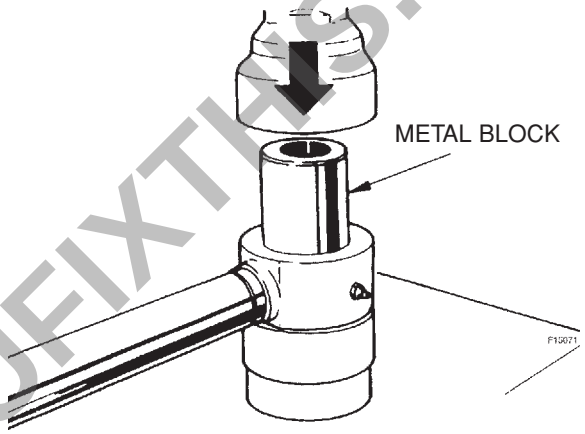


Fig. 1-16 Removing pin bushing

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12. MUFFLER

12.1 PREPARATION FOR REMOVAL

(1) Slew the upperstructure right about 30 degrees.
(2) Remove under cover (3) under the muffler.
: 17 mm
Torque : 5.3 kgf·m (38 lbf·ft)
(3) Remove cover assy (8).
(See 2.1-(8))

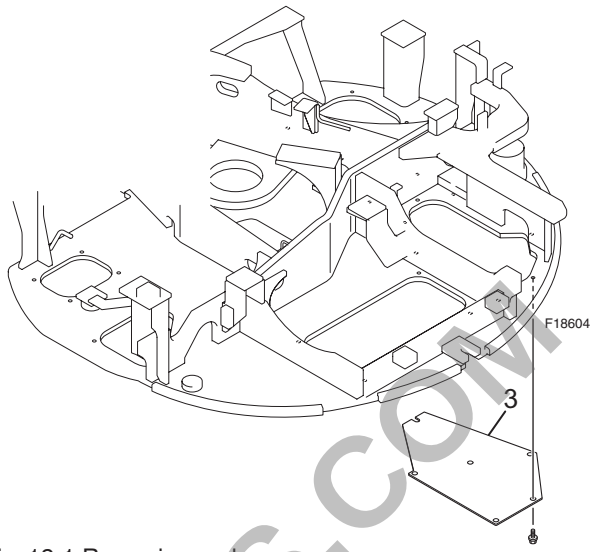


Fig. 12-1 Removing under cover

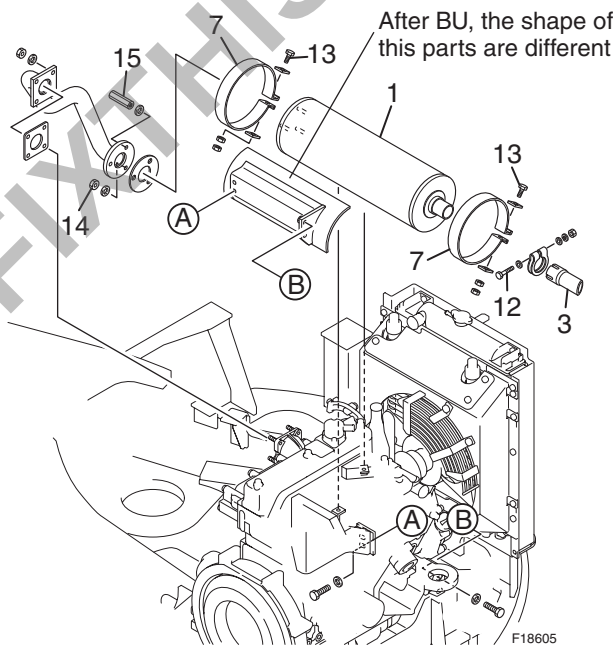
12.2 REMOVAL

(1) Loosen capscrew (12) from outside of counterweight, and remove exhaust tube (3).
: 17 mm

(2) Loosen and take out one nut (14) and 2 nuts (15) through the under cover section.
: 13 mm

(3) Loosen 2 capscrews (13) and remove 2 clamps (7).
: 13 mm

(4) Take out muffler (1) drawing it downward.



• The figure shows before BU.

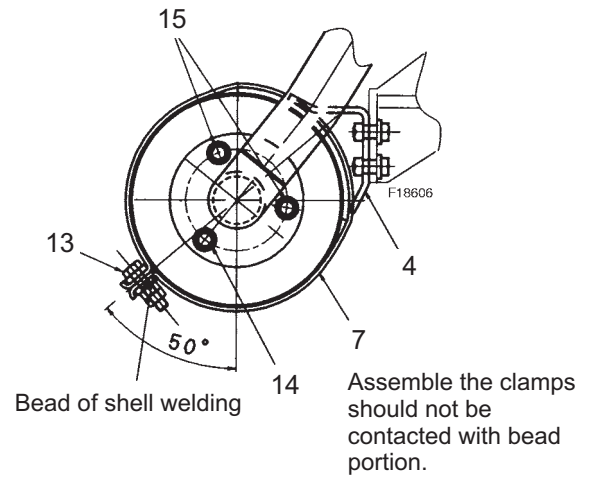
Fig. 12-2 Removing muffler

12.3 INSTALLATION

Install the muffler by the procedure reverse of the removal following the Tightening Torque Table.

Code	Parts	Tools (mm)	Torque kgf·m (lbf·ft)
12	Capscrew	17	2.4 (17)
13	Capscrew	13	2.4 (17)
14 (A) 14 (B) 15	Nut	13	2.4 (17)

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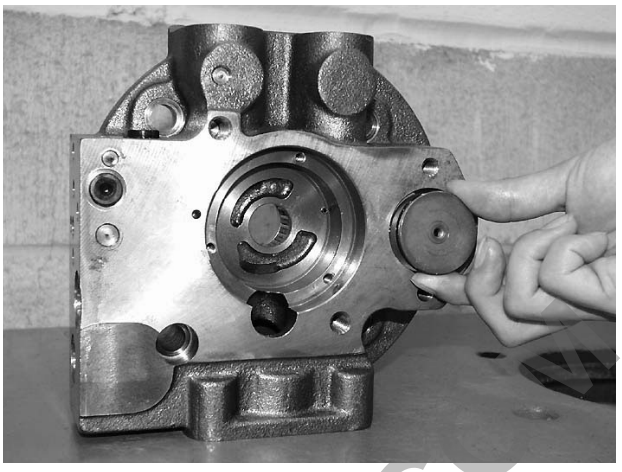


• The figure shows before BU.

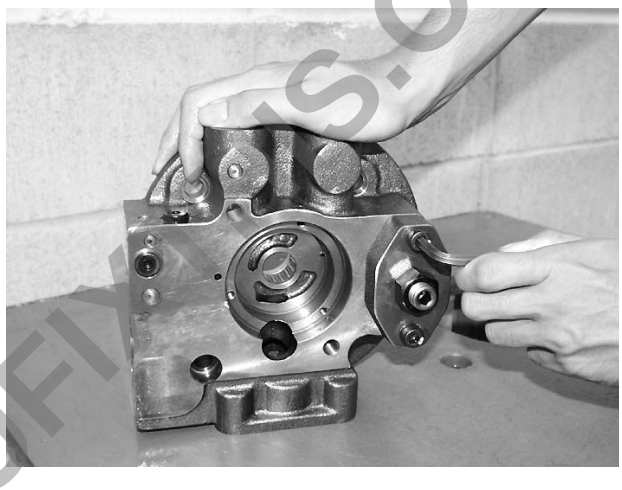
Fig. 12-3 Installing muffler

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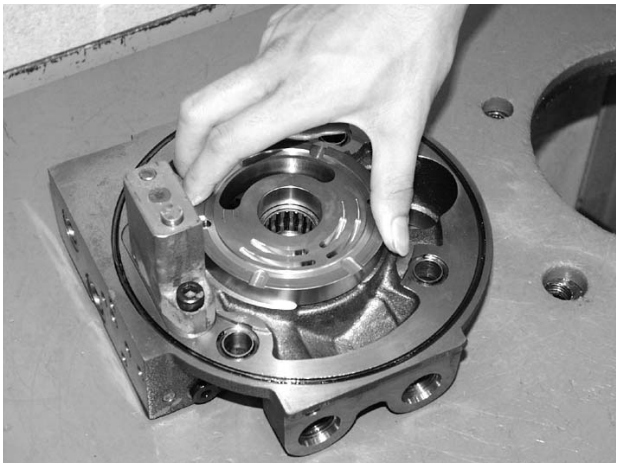
23. Install spring seat in control spring section.



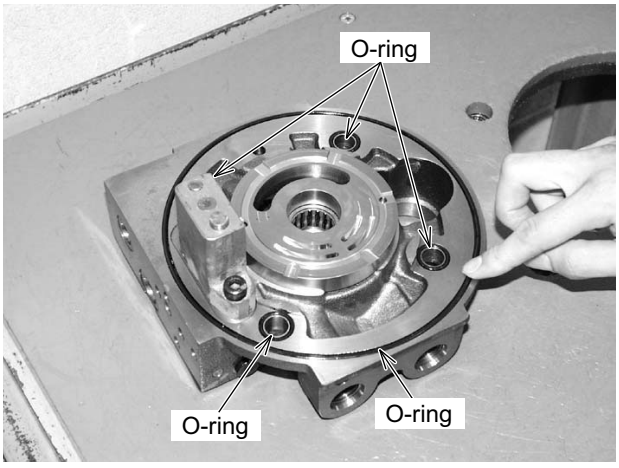
24. Install cover with two socket bolts (M8 X 30).
    : 6 mm
    Torque : 3.25 kgf·m (23.5 lbf·ft)



25. Apply grease to rear surface of control plate and install it on the cover to align the hole with parallel pins.



26. Fit five O-rings (2 kinds), on mating face of cover.



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(3) Relief valve

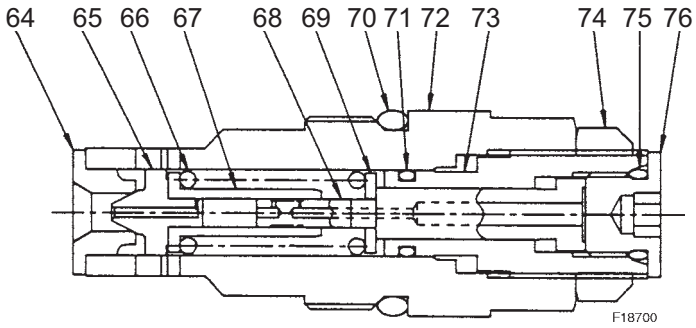


Fig. 5-4

Table. 5-4

No.	Parts name	Q'ty	No.	Parts name	Q'ty	No.	Parts name	Q'ty
64	Seat	1	69	Spacer	1	74	Nut	1
65	Poppet	1	70	O-ring	1	75	O-ring	1
66	Spring	1	71	O-ring	1	76	Cap	1
67	Sleeve	1	72	Sleeve	1			
68	Piston	1	73	Sleeve	1			

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(4) Hydraulic timer

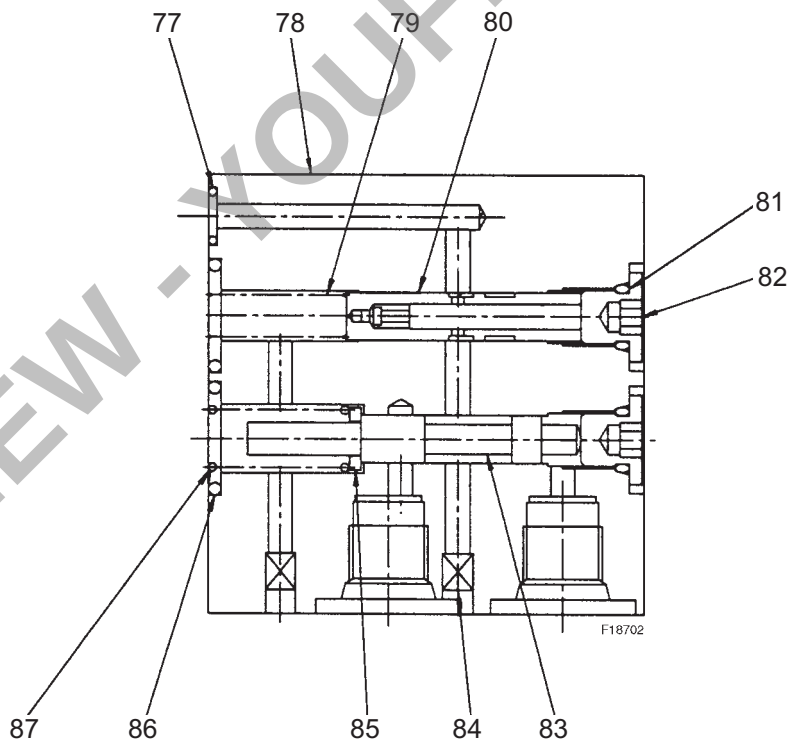


Fig. 5-5

Table. 5-5

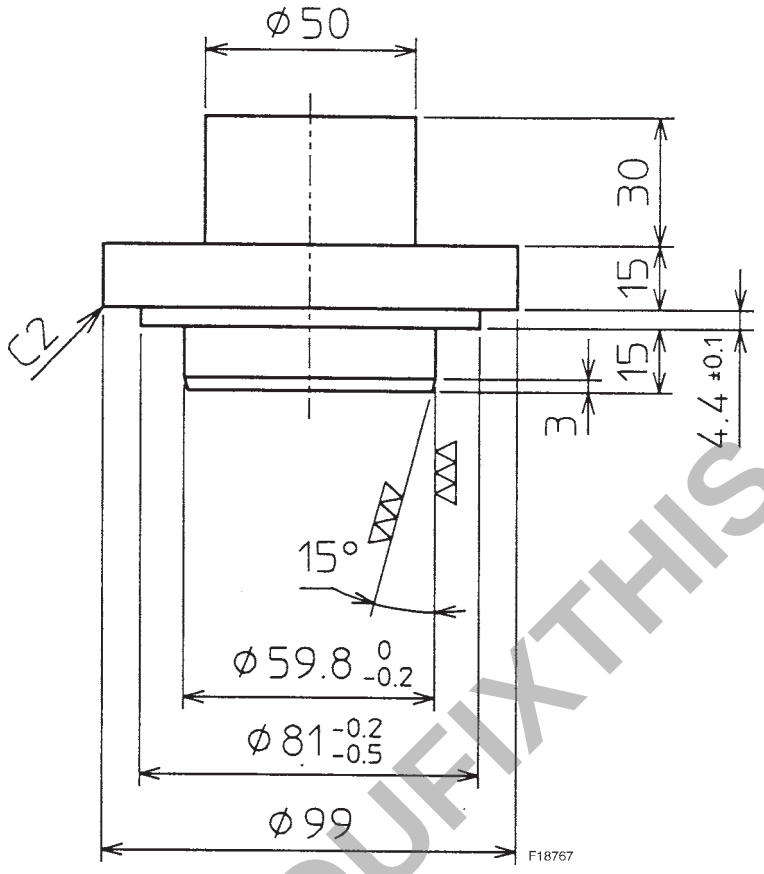
No.	Parts name	Q'ty	No.	Parts name	Q'ty	No.	Parts name	Q'ty
77	O-ring	1	81	O-ring	2	85	Stopper	1
78	Manifold	1	82	Cap	2	86	O-ring	2
79	Spring	1	83	Spool	1	87	Spring	1
80	Poppet	1	84	Plug	2			

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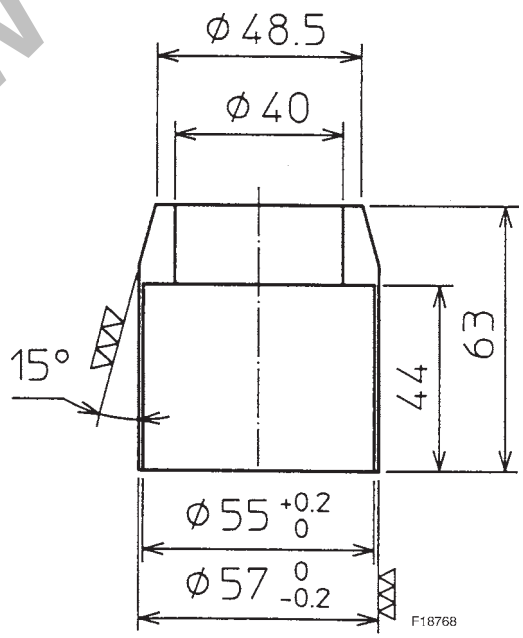
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(4) Jig for oil seal (43) press fit



(5) Protector for seal



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9) Allow the hydraulic jack to retract slowly till the spring is extended to its free length. Remove the retainer plate and take off bracket (4).
Free length of the spring:
Approx.340 mm (13.4 in)

10) Hook lifting eye nut (W) to screw M27 X P2 on grease cylinder (2) top end and hoist it.

11) Remove the set of grease cylinder (2) and spring (3).

(2) Assembly
Assembly is done in the reverse order of disassembly.

1) Insert grease cylinder (2) into spring (3) and attach lifting eye nut (W) to screw M27 X P2 at the tip of the grease cylinder. Lift the grease cylinder by crane and erect it in the center of the jig stand upright.

2) Install bracket (4) on top of spring (3). Center the rod of grease cylinder (2) and the holes in bracket (4). Attach the retainer plate and four holding-down nuts. Fasten the nuts evenly all round fix the idler adjudter assy to the jig body.

3) Extend the hydraulic jack, compress spring (3) to a set length and screw in nut (5) to the screwed part at the tip of grease cylinder (2).

Set length of the spring : 265 mm (10.4 in)

4) Tighten nut (5) till the holes for locking spring pins (9) are aligned. then fit spring pin (9)

: 41 mm

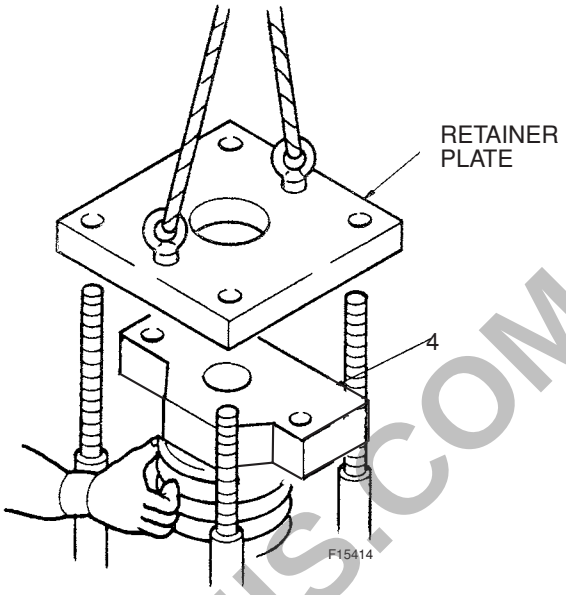


Fig. 6-7 Removing retainer plate, bracket (4)

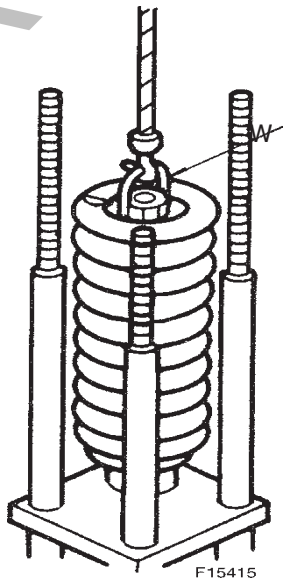


Fig. 6-8 Removing and Installing of idler adjuster

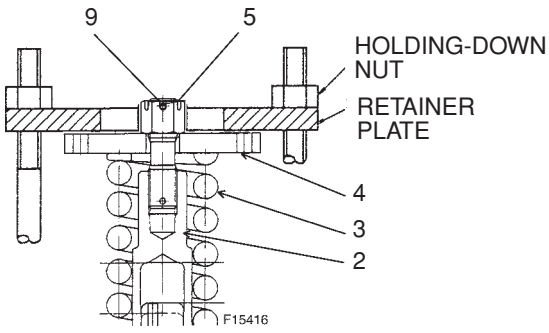


Fig. 6-9 Attach idler adjuster assy to the jig.

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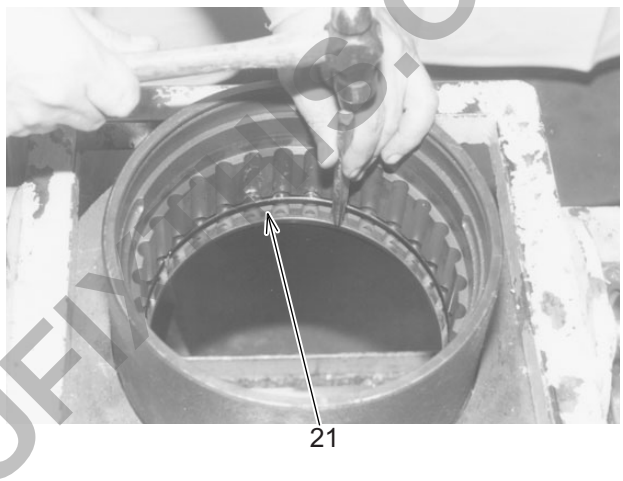
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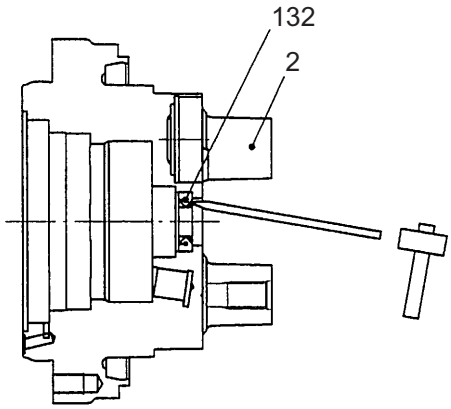
3. Clear away bearing (21), RV gear assy and pin (17).
   - Never remove bearing (22), bearing (23) and spacer (12) from crankshaft (9) except for replacement.

4. Turn over the travel motor.

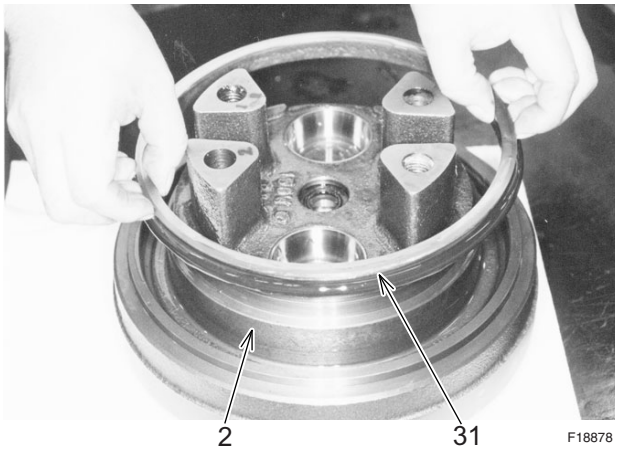
5. Remove bearing (21) from hub (1).
   - Remove bearing (21) striking 3 or 4 points of perimeter evenly taking care for bearing not to be leaned.



21) Removing the spindle fittings.
1. Remove oil seal (132) from spindle (2).
   - Never reuse removed oil seal (132).



2. Remove floating seal (31) from spindle (2).



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E40SR EVOLUTION
E45SR EVOLUTION

SECTION 43 TROUBLESHOOTING (ELECTRICAL SYSTEM)

TABLE OF CONTENTS

1. Trouble diagnosis: electrical system 43-1

2. Troubleshooting 43-2

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3. COOLING WATER, LUBRICATING OIL AND FUEL OIL

3.1 COOLING WATER

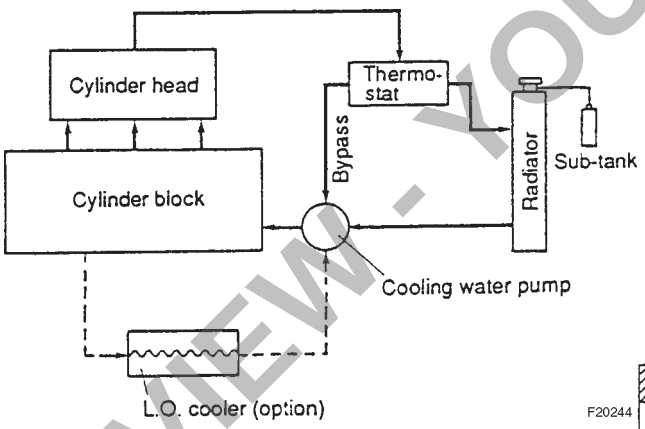
1. Proper use of cooling water

Impurities in cooling water are deposited in the engine and radiator in the form of scale and cause rusting. For this reason, heat conduction of the cooling system and cooling water flow are impaired, and cause cooling functions to reduce and the engine to overheat. Therefore, drain the cooling water at intervals of 400 hours or one year. Never use hard water as the cooling water.

In order to prevent the cooling water from freezing in cold weather, be sure to use an antifreeze agent. For further information on and proper usage and type of rust-preventive agents, antifreezes, and cleaning agents, contact your nearest dealer.

2. Cooling water system diagram

Indirect injection system and direct injection system



3.2 LUBRICATING OIL

1. Proper use of lubricating oil

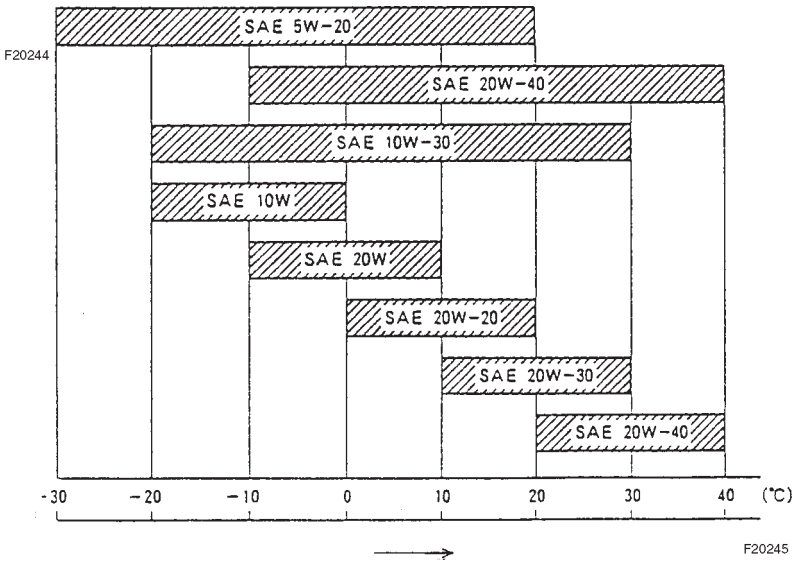
Use of proper lubricating oil brings about the following effects.

(1) The friction part of the engine is protected from friction and wear.
(2) The engine parts is protected from rusting and corrosion.
(3) The high temperature part of the engine is effectively cooled.
(4) The engine is protected from leakage of combustion gas.
(5) The engine parts are protected from sludge deposits.

For the above reasons, use lubricating oil API Service Classification Class CC or better. Instruct your customers to replace lubricating oil initially at 20-30 hours in a dusty place, 50 hours in a less dusty place, and at intervals of 250 hours (100 hours in a dusty place) thereafter.

Reference : Lubricating oil to be used at ambient temperature

Select the viscosity of lubricating oil depending on ambient temperature at which the engine is used, according to SAE Service Grade shown below.



Ambient temperature at which the engine is used, °C

: Recommended SAE Service Grade

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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

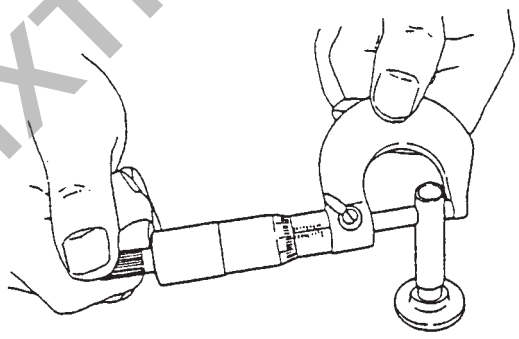
(1) Valve rocker arm shaft spring

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

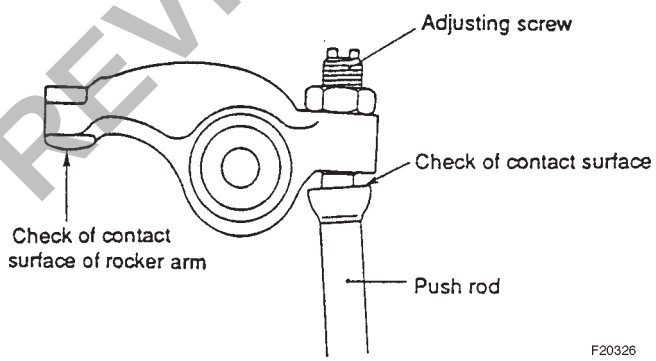
(2) Wear of intake/exhaust valve rocker arm and valve cap

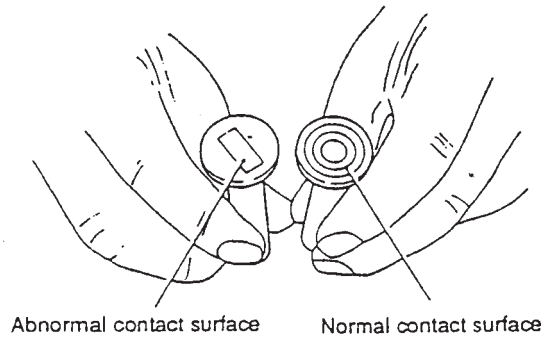
Check the intake/exhaust valve rocker arm for their contact surfaces with valve cap. If any of them is abnormally worn or partially flaked, replace it.

(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)





(Checking the tappet contact surface)

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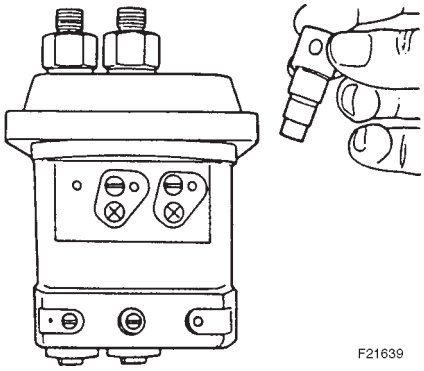
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11.4 REASSEMBLY

(1) Insert the plunger barrel packing into the fuel injection pump body.

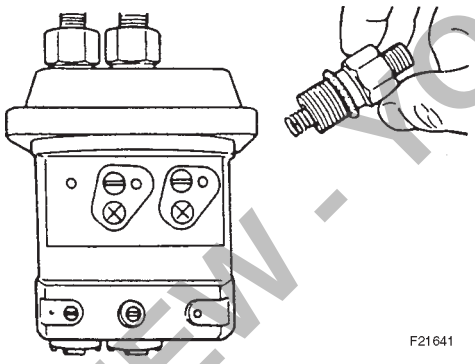
(2) Insert the plunger barrel assembly.



(3) Fit the delivery valve assembly, delivery valve spring and delivery valve spring holder.

(kgf-m)

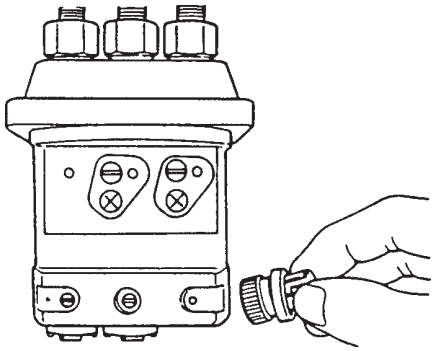
Delivery valve spring holder tightening torque.	4.0 ~4.5



(4) Reassemble the fuel control rack and fuel control pinion.

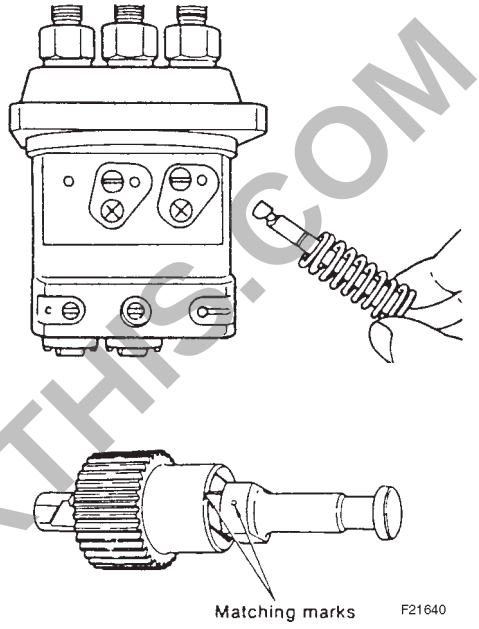
* *1. Ensure that the match mark of the fuel control rack aligns with that of the fuel control pinion.*

* *2. Make sure that the fuel control rack moves smoothly over alla the strokes.*

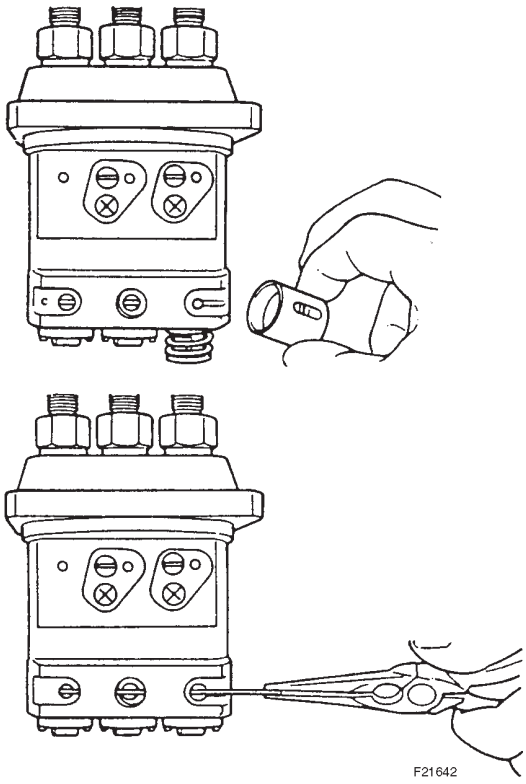


(5) Fit the plunger mounted with the plunger spring upper retainer, plunger spring and plunger spring lower retainer.

* *Ensure that the match mark of the plunger aligns with that of the fuel control pinion.*



(6) Insert the plunger adjusting shim. Press the plunger guide assembly by hand. While aligning the plunger guide stopper pin with the mating hole of the stopper pin of the fuel injection pump body, attach the plunger guide stopper pin.



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