

HYDRAULIC EXCAVATOR

SHOP MANUAL

model

SK235SR-1E
SK235SRLC-1E
SK235SRNLC-1E

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SPECIFICATION

MAINTENANCE

SYSTEM

DISASSEMBLING

TROUBLESHOOTING

E/G

OPT.

KOBELCO

Book code No. S5YF0002E①

- (9) When water has entered in the waterproofed connector, the removing of water is not easy. So check the removed waterproofed connector with care to protect it from entry of water. If moisture adheres on it, dry it completely before connecting.



Battery electrolyte is dangerous.

The battery electrolyte is dilute sulfuric acid, and causes scald and loss of eyesight by adhering on eyes, skin and clothes. When the electrolyte has adhered on them, take an emergency measure immediately and see a doctor for medical advice.

- o When it has adhered on skin ;
Wash with soap and water.
- o When it has got in eyes ;
Wash in water for 10 minutes or more immediately.
- o When it has spilled out in large quantity ;
Use sodium bicarbonate to neutralize, or wash away with water.
- o When it was swallowed ;
Drink milk or water.
- o When it has adhered on clothes ;
Wash it immediately.



1.5 HYDRAULIC PARTS

1) O ring

- Check that O ring is free from flaw and has elasticity before fitting.
- Even if the size of O ring is equal, the usage differs, for example in dynamic and static sections, the rubber hardness also differs according to the pressure force, and also the quality differs depending on the materials to be seated. So, choose proper O ring.
- Fit O ring so as to be free from distortion and bend.
- Floating seal should be put in pairs.

2) Flexible hose (F hose)

- Even if the connector and length of hose are the same, the parts differ according to the withstanding pressure. Use proper parts.

- Tighten it to the specified torque, and check that it is free from distortion, over tension, interference, and oil leakage.

1.6 WELD REPAIR

- (1) The weld repair should be carried out by authorized personnel in the specified procedure after disconnecting the grounding cable of battery. If the grounding cable is not disconnected, the electrical equipment may be damaged.
- (2) Remove parts which may cause flame due to the entry of spark beforehand.
- (3) Repair attachments which are damaged, giving particular attention to the plated section of piston rod to protect it from sparks, and don't fail to cover the section with fire proof clothes.

1.7 ENVIRONMENTAL ISSUES

- (1) Engine should be started and operated in the place where air can be sufficiently ventilated.
- (2) Waste disposal
The following parts follows the regulation.
Waste oil, waste container and battery
- (3) Precautions for handling hydraulic oil
Hydraulic oil may cause inflammation of eyes. Wear goggles to protect eyes on handling it.
 - o When it has got in eyes ;
Wash eyes with water until the stimulus is gone.
 - o When it was swallowed ;
Don't force him to vomit it, but immediately receive medical treatment.
 - o When it has adhered on skin ;
Wash with soap and water.
- (4) Others
For spare parts, grease and oil, use KOBELCO genuine ones.

(2) Pilot relief valve

Pilot relief valve PR1 is built in main pump.

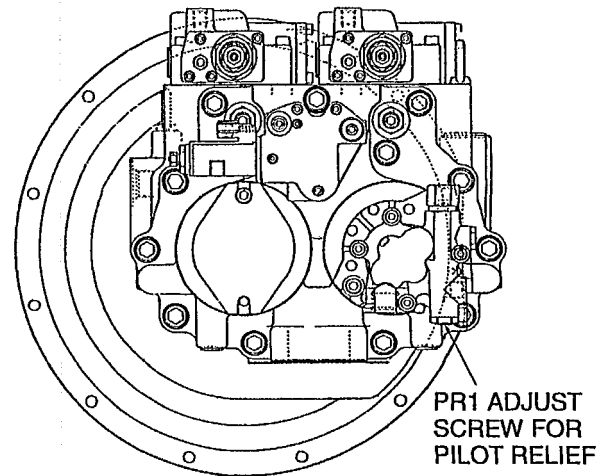


Fig. 6 Pilot relief valve position

(3) Swing over load relief valve

The swing motor is equipped with plugs PA,PB for pressure measurement, but the measurement is carried out using gauge ports **a1** and **a2**. (See Fig. 4)

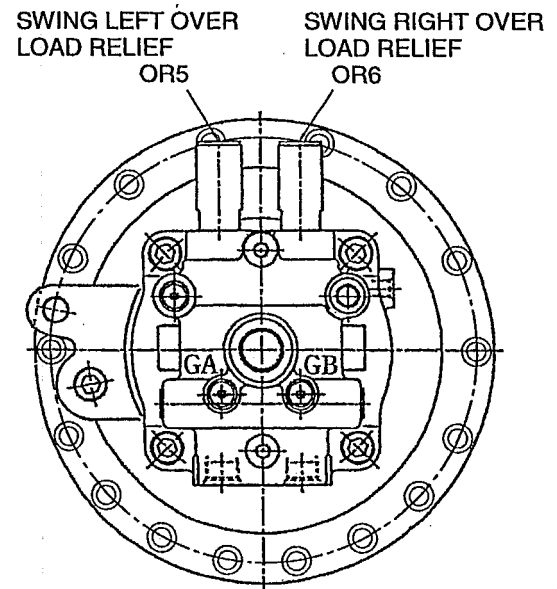


Fig. 7 Swing over load relief position

4.4 PROCEDURE FOR ADJUSTING RELIEF VALVE

(1) Pilot relief valve

Adjust it with adjust screw (311).

 : 24mm Tightening torque :
3.0kgf·m (22 lbf·ft)

 : 6mm

Table 2

No. of turns of adjust screw	Pressure change kgf/cm ² (psi)
1 turn	Approx. 21 (300)

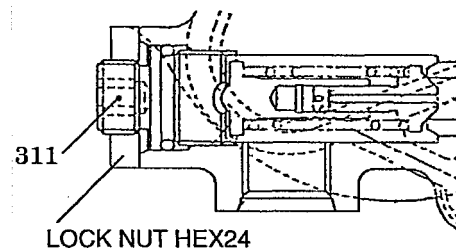
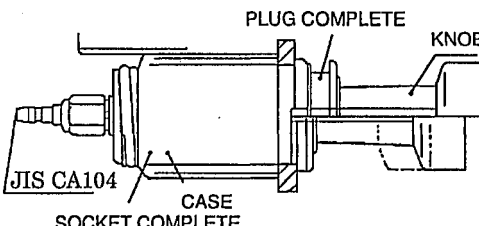
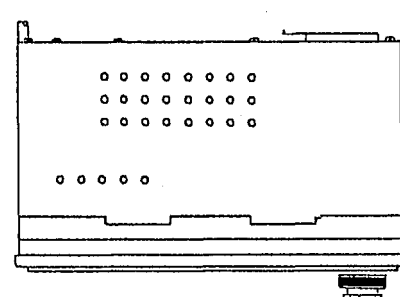
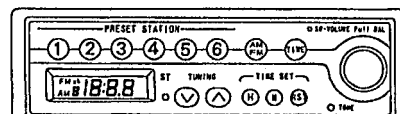
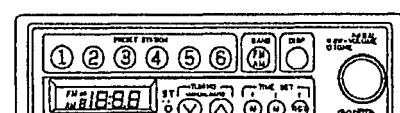
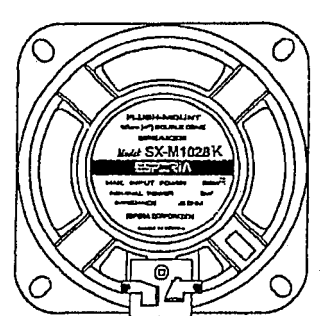
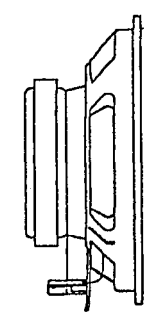


Fig. 8 Pilot relief valve

No.	NAME	Q'TY	No.	NAME	Q'TY	No.	NAME	Q'TY
1	FLANGE	1	36	ORIFICE	5	71	NAME PLATE	1
2	BASE PLATE	1	37	PLUG	4	72	RIVET	2
3	(SPOOL) PLUNGER	1	38	O RING	4	73	PLUG	2
4	CHECK VALVE	2	39	CHECK VALVE	2	74	PLUG	1
5	SPRING	2	40	SPRING	2	75	PLUG	1
6	PLUG	2	41	O RING	2	76	FLOATING SEAL	2
7	O RING	2	42	SHAFT	1	77	ANGULAR BEARING	2
8	SPRING SEAT	2	43	CYLINDER BLOCK	1	78	HOUSING (RING GEAR)	1
9	SPRING	2	44	PISTON ASSY	9	79	SHIM	1
10	SPRING SEAT	2	45	PLATE	1	80	HOLDER B	1
11	CAP	2	46	HOLDER	1	81	WASHER	8
12	O RING	2	47	SNAP RING	1	82	SOCKET BOLT	8
13	SOCKET BOLT	8	48	SPRING SEAT	1	83	THRUST PLATE	4
14	O RING	2	49	SPRING	1	84	INNER RACE	4
15	PLUG	2	50	COLLAR	1	85	NEEDLE BEARING	4
16	ORIFICE	2	51	PIN	3	86	PLANETARY GEAR B	4
17	RELIEF VALVE ASSY	2	52	PLATE (SWASH PLATE)	1	87	THRUST PLATE	4
18	PLUG	4	53	BALL	2	88	SOCKET BOLT	4
19	SPOOL A : 2-SPEED CHANGE OVER	1	54	PISTON ASSY	2	89	SUN GEAR B	1
20	SPOOL C	1	55	BALL BEARING	1	90	SNAP RING	1
21	FILTER	1	56	BALL BEARING	1	91	HOLDER A	1
22	O RING	1	57	PIN	1	92	THRUST PLATE	3
23	O RING	1	58	SOCKET BOLT	10	93	INNER RACE	3
24	BACKUP RING	1	59	OIL SEAL	1	94	NEEDLE BEARING	3
25	BACKUP RING	1	60	DISK PLATE	3	95	PLANETARY GEAR A	3
26	SNAP RING	1	61	FRICTION PLATE	2	96	THRUST PLATE	3
27	SPRING	1	62	BRAKE PISTON	1	97	THRUST PLATE	1
28	PLUG	1	63	O RING	1	98	CAPSCREW	3
29	O RING	2	64	O RING	1	99	DRIVE GEAR	1
30	SPRING GUIDE	1	65	SPRING	8	100	THRUST PLATE	1
31	PLUG	1	66	PIN	4	101	COVER	1
32	WASHER	1	67	SPRING	2	102	BOLT	16
33	PLUG	6	68	VALVE PLATE	1	103	PLUG	3
34	ORIFICE	1	69	O RING	4	104	O RING	3
35	ORIFICE	2	70	O RING	1	105	PIN	4

File No. Name of part Part No. Use Applicable Machine	Specification		Description																		
E-6	Model	409112-0000																			
Cigar lighter	Rated voltage	DC 24V																			
2421R180F1	Max. current	5A																			
Cigar lighter	Return time	Less than 18sec																			
YF02-01201~ YF03-01300~	Insulation resistance	More than 3MΩ / 500V megger																			
	Temperature fuse	Fusing temp.180℃~250℃ (356° F~482° F)																			
E-7	Rated voltage	DC 24V	  For KCMA  For Oceania																		
Tuner	Frequency range	KCMA AM 530~1710kHz FM 87.5~108.0MHz																			
LB54S00001P1 (KCMA) YN54S00013P1 (OCE)		OCE AM 531~1602kHz FM 87.5~108.0MHz																			
Radio (AM & FM)	<table><tr><td>1</td><td>L SPEAKER(+)</td></tr><tr><td>2</td><td>R SPEAKER(+)</td></tr><tr><td>3</td><td>ACC(+B)</td></tr><tr><td>4</td><td>OPEN</td></tr><tr><td>5</td><td>L SPEAKER(-)</td></tr><tr><td>6</td><td>R SPEAKER(-)</td></tr><tr><td>7</td><td>GND(-)</td></tr><tr><td>8</td><td>BACK UP(-)</td></tr><tr><td>9</td><td>OPEN</td></tr></table>			1	L SPEAKER(+)	2	R SPEAKER(+)	3	ACC(+B)	4	OPEN	5	L SPEAKER(-)	6	R SPEAKER(-)	7	GND(-)	8	BACK UP(-)	9	OPEN
1	L SPEAKER(+)																				
2	R SPEAKER(+)																				
3	ACC(+B)																				
4	OPEN																				
5	L SPEAKER(-)																				
6	R SPEAKER(-)																				
7	GND(-)																				
8	BACK UP(-)																				
9	OPEN																				
YF02-01201~ YF03-01300~																					
E-8,9	Model	SX-M1028K	 																		
Speaker	Rated input	8W																			
YT54S00006P1	Impedance	8Ω																			
Radio	Frequency	33.3Hz																			
YF02-01201~ YF03-01300~																					

1.2 CONSTRUCTION OF CYLINDER (AN EXAMPLE OF BOOM CYLINDER)

T=Tightening torque ; kgf·m (lbf·ft)

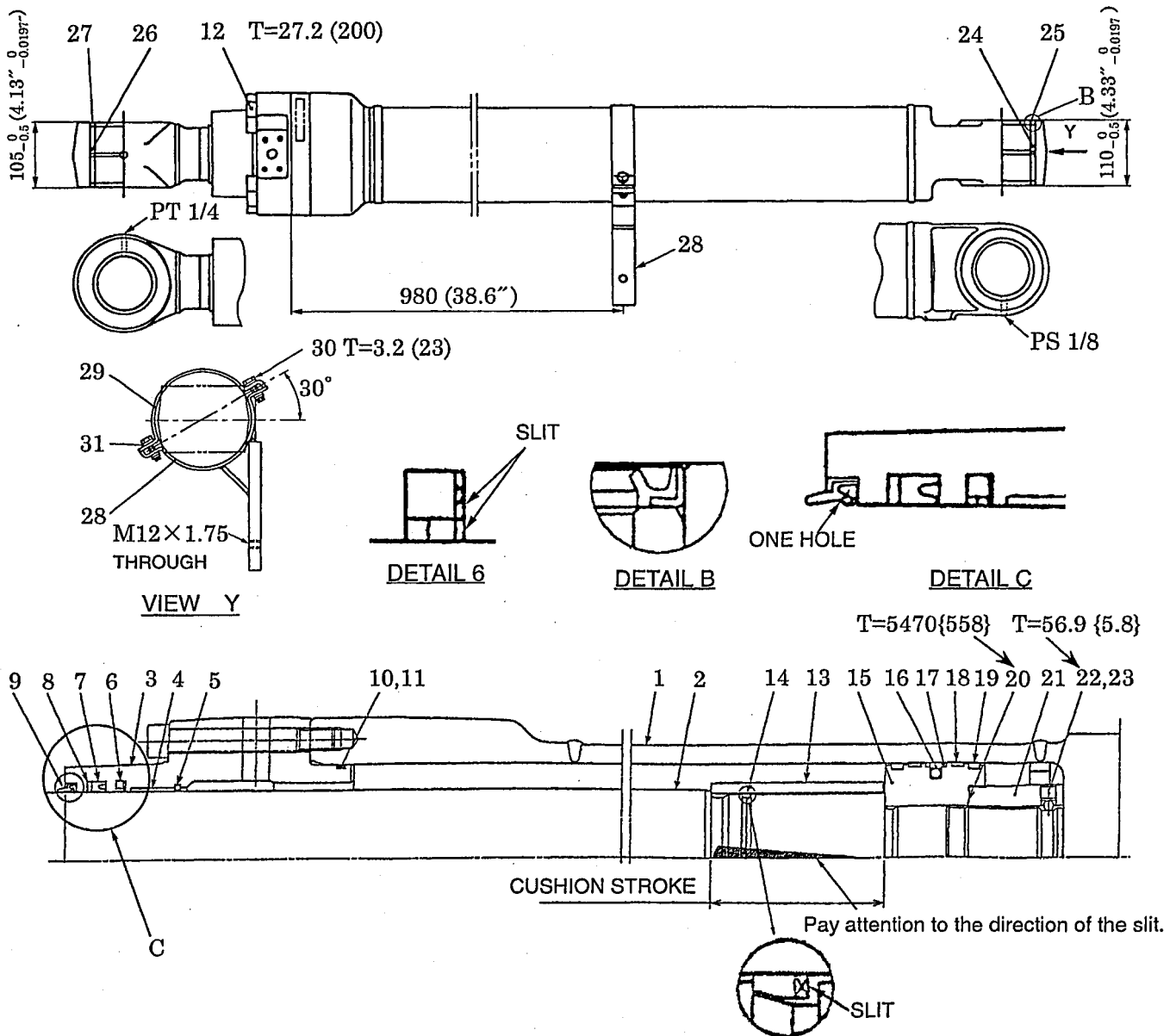


Fig. 1-3 Construction of boom cylinder
(The figure shows the right cylinder.)

P/No.	YN01V00107F3							
	YN01V00108F3							
No.	PARTS NAME	Q'TY	No.	PARTS NAME	Q'TY	No.	PARTS NAME	Q'TY
1	CYLINDER TUBE	1	12	SOCKET BOLT; M16×75	12	23	STEEL BALL	1
2	PISTON ROD	1	13	CUSHION BEARING	1	24	PIN BUSHING	1
3	ROD COVER	1	14	CUSHION SEAL	1	25	WIPER RING	2
4	BUSHING	1	15	PISTON	1	26	PIN BUSHING	1
5	SNAP RING	1	16	SEAL RING	1	27	WIPER RING	2
6	BUFFER RING	1	17	BACK-UP RING	2	28	BAND ASSY	1
7	U-RING	1	18	SLIDE RING	2	29	BAND	1
8	BACK-UP RING	1	19	SLIDE RING	2	30	CAPSCREW; M10×43	2
9	WIPER RING	1	20	SHIM	1	31	WASHER	2
10	O RING	1	21	PISTON NUT	1			
11	BACK-UP RING	1	22	SETSCREW; M12	1			

- (9) Install suction tube (1) with four capscrews (11) M12×45. (See Fig. 8-3.)

⑥ : 19mm,

Tightening torque : 10kgf·m (72 lbf·ft)

- (10) Install the hydraulic piping by referring to "Hydraulic System".

(11) Installing the hose

Tightening position	Tool
Cap nut Dr2	19,22
Cap nut PSV1	19,19
Cap nut A3	22,22

- (12) Remove suction stopper

Bleed air by loosening the oil filling port F.

- (13) Install suction strainer



When the pump is replaced, replenish more than 1ℓ (0.26gal) of hydraulic oil from the oil filling port.

- (14) Bleed air in pump

Bleed air by loosening the oil filling port F.

- (15) Check hydraulic oil level.

- (16) Start engine and check it for oil leakage and noise.

- (17) Attach drain down pipe under engine muffler.

- (18) Install guards (16), (68)

Tightening position	Tool	Tightening torque kgf·m (lbf·ft)
Sems bolt (35), (36)	19	8.1 (59)

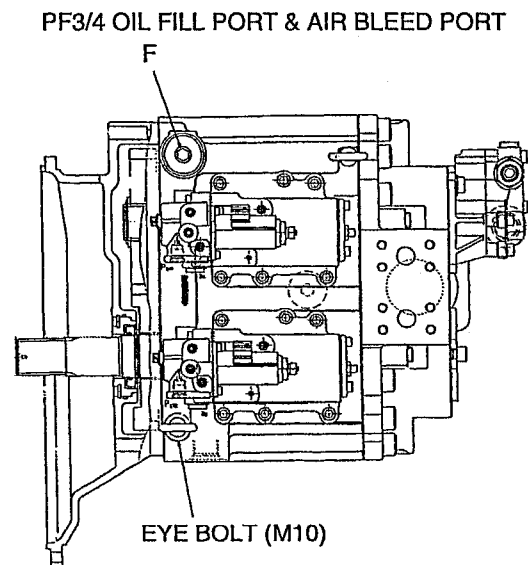


Fig. 8-7 Bleed air in pump

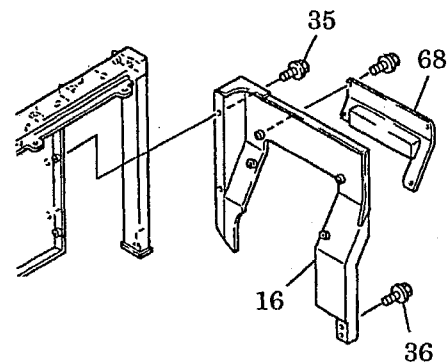


Fig. 8-8 Installing guard (16),(68)

(10) Remove port plate (111), O ring (122) from casing (101).

(11) Remove bushing (131) from casing (101).

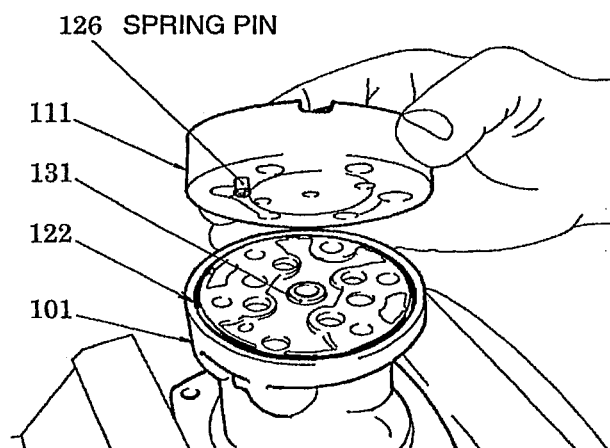


Fig. 3-10 Removing port plate, bushing

(12) Push springs (241-1), (241-2) in the range of that the movement of spring seats (216-1), (216-2) is 7mm (0.276in) or less, and remove spools (201-1), (201-2) through the larger hole of seat.

⚠ Never push spring seat (216-1) in 7mm (0.276in) or more. (For ports 1,3)
Never push spring seat (216-2) in 9.4mm (0.370in) or more. (For ports 2,4)

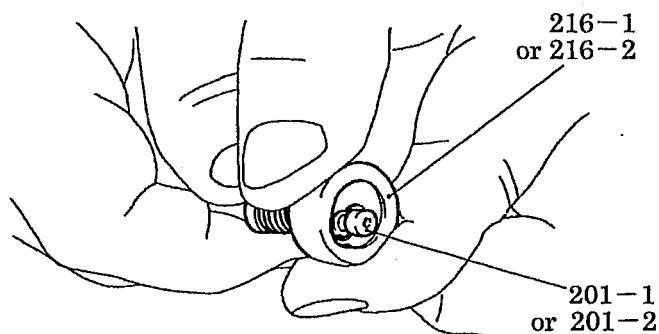


Fig. 3-11 Removing spool (201)

(13) Remove spool (201-1), (201-2), spring seats (216-1), (216-2), spring (241-1), (241-2) and washer (217).

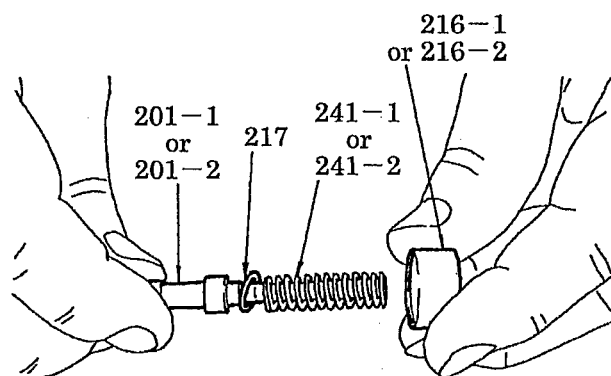


Fig. 3-12 Disassembling pressure reducing valve

(14) Remove spring (※246), spring seat (※218-1), (※218-2) from push rod (212).

⚠ The parts marked ※ may not be equipped depending on valve type.

(15) Pull out push rod (212) from plug (211).

(16) Remove O ring (214) from plug (211).

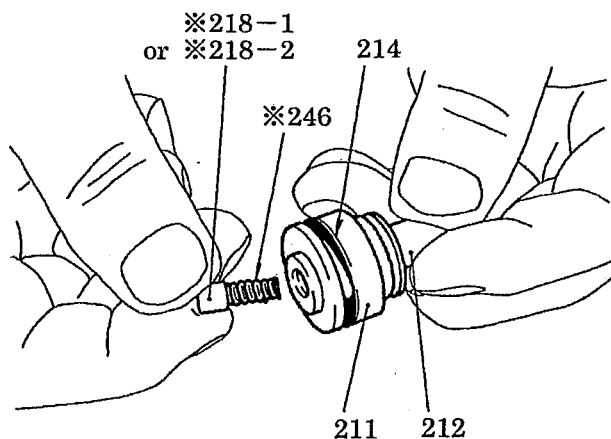


Fig. 3-13 Disassembling push rod

1. OUTLINE

Troubleshooting provides process locating for the cause of trouble in the order that trouble occurred. This manual describes how to solve the specific phenomenon systematically as early as possible. For troubleshooting concerning the inside of equipment, refer to troubleshooting for each manual of equipment.

1.1 JUDGMENT OF ACTUAL THING AT SITE

(1) Get to the site as quickly as possible.

Verify model, serial number, situation of trouble and field, and notify person of arrival time.

(2) Verify background of trouble occurred

1) Model name and serial number

2) Kind of attachment

Check that the combination of attachment is proper or that the operating method is not unreasonable.

3) Operating time by hour-meter

4) History of trouble occurred and additional works.

5) Recurrence of past trouble, or problems on the additional modification.

(3) How to diagnose trouble

1) Verify defective part

2) Make the condition of trouble again

3) Where defective parts can not be verified, surmise causes systematically.

4) Verify reasons for surmise

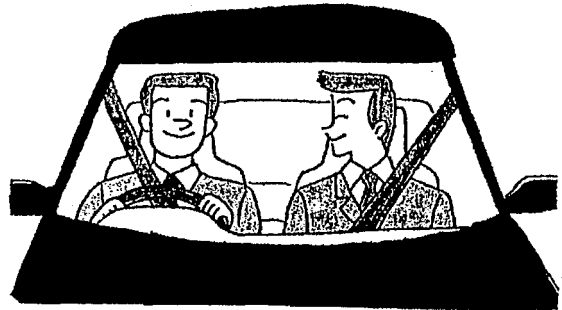
5) Report methods, procedure, and period for repairing to user.

(4) Explanation of the cause of trouble

1) Explain the cause of trouble to clients. For example, oil leak through piston is caused by flaws on the piston rod. And the method of using the machines should be explained so that the same kind of trouble does not reoccur.

2) Treatment of damaged parts

The damaged parts to be claimed and returned are evidence so they should be handled with care. Protect them from entry of water, soils, etc. into port of hydraulic unit, etc. and return them. And also use care not to flaw and damage those surfaces.



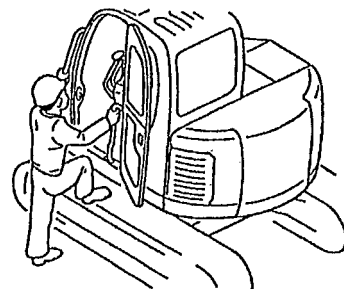
Attending the field to verify actual thing.

YR-B76



Verifying background of trouble occurred.

YR-B76



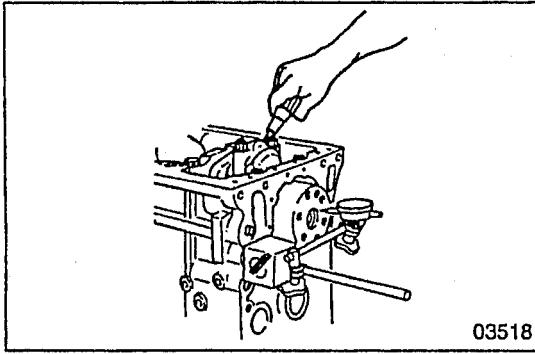
Confirm the symptoms of the trouble.

YT-B87



Diagnosing fail by means troubleshooting.

YR-B76



03518

◆ Service procedure

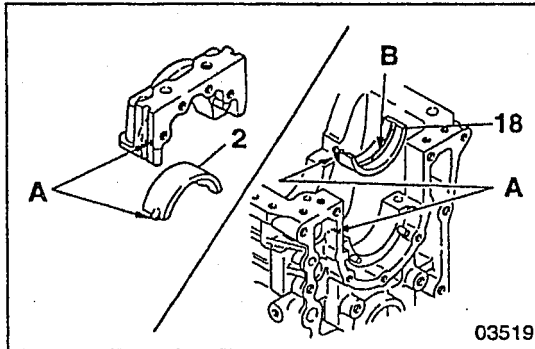
● Pre-disassembly inspection

Crankshaft assembly end play

If the measurement exceeds the specified limit, replace the thrust plate 10 with an oversize type. P11-59

<Oversize types>

+0.15, +0.30, +0.45 mm



03519

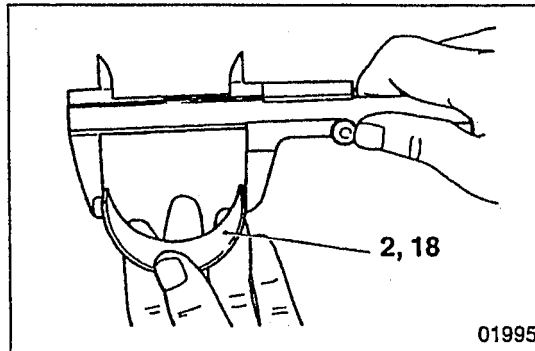
2 18 Main bearings

[Installation]

Install the main bearings 2, 18 such that their lugs A fit into the corresponding grooves.

CAUTION

The upper main bearing 18 has an oil hole B. The lower main bearing 2 has no oil hole. Take care not to confuse the upper and lower parts.



01995

[Inspection]

CAUTION

- Do not attempt to manually expand either bearing 2, 18 if its span is insufficient.
- Upper and lower bearings 2, 18 must be replaced as a set.

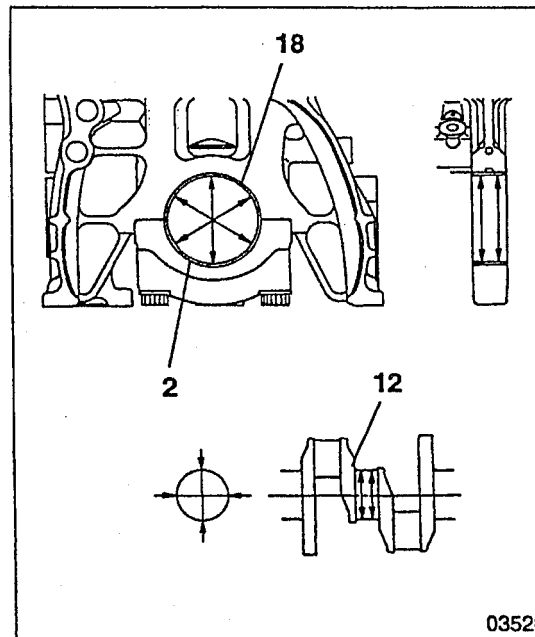
(1) Span when free

If either bearing's span when free exceeds the specified limit, the bearings 2, 18 must be replaced.

(2) Main bearing-to-crankshaft clearance

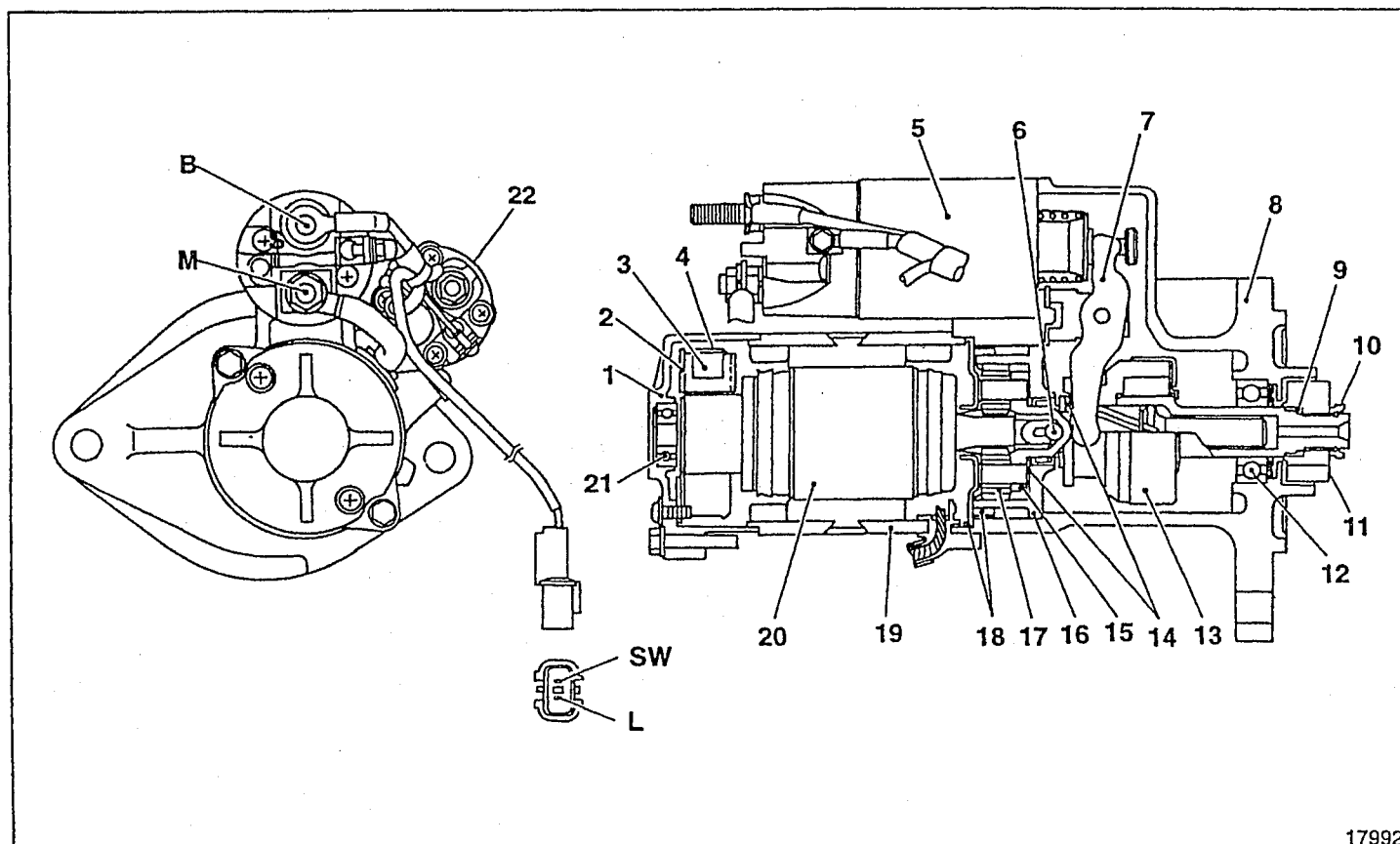
If any measurement exceeds the specified limit, replace the defective part(s).

If the main bearings 2, 18 are replaced with undersize types, rectify the outside diameter of the crankshaft 12 journal to the specified undersize dimension. P11-60



03520

Starter



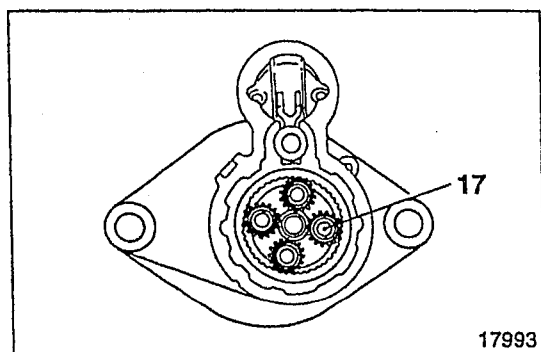
17992

- 1 Rear bracket
- 2 Brush holder
- 3 Brush
- 4 Brush spring
- 5 Magnet switch
- 6 Ball
- 7 Lever
- 8 Front bracket
- 9 Spring

- 10 Pinion stopper
- 11 Pinion
- 12 Front bearing
- 13 Overrunning clutch
- 14 Washer
- 15 Gearshaft assembly
- 16 Internal gear assembly
- 17 Planetary gear

- 18 Packing
- 19 Yoke assembly
- 20 Armature assembly
- 21 Rear bearing
- 22 Starter relay

B: Terminal B
M: Terminal M



17993

This starter uses planetary gear 17 in the reduction gear mechanism.

1.3 ADDITIONAL PARTS FOR THE MODIFICATION OF THE NIBBLER & BREAKER

CAB GUARD BREAKER

BREAKER OCEANIA

No.	PART No.	NAME	Q'TY	REMARK	Applicable Machines
	—	Since the cab guard is an option, it is not assigned a kit No.			
135	YN02C00076F3 YN02C00042P3	• 1 GUARD ASSY •• CAB ASSY	1		
135-2	YT02C01175P1	••• PLATE ASSY	2		
135-3	YT02C01254P1	••• PLATE	2		
135-4	YT02C01375P1	••• PLATE ASSY	1		
135-5	YT02C01452P1	••• PLATE ASSY	1		
141	YT02C01372P1	•• GUARD	1		
181	ZM32C12025	•• SEMS BOLT	4		
137	YN02C00076F5 YN02C00044P3	• 2 GUARDS ASSY •• CAB ASSY	1		
137-2	YT02C01175P1	••• PLATE ASSY	3		
137-3	YT02C01254P1	••• PLATE	2		
137-4	YT02C01375P1	••• PLATE ASSY	1		
137-5	YT02C01452P1	••• PLATE ASSY	2		
137-6	YN02C02239P1	••• PLATE ASSY	1		
137-7	YN02C01853P1	••• PLATE ASSY	1		
141	YT02C01372P1	•• GUARD	1		
142	YN02C01854P1	•• GUARD	1		
181	ZM32C12025	•• SEMS BOLT	8		

(1) UPPER STRUCTURE BREAKER

BREAKER OCEANIA

No.	PART No.	NAME	Q'TY	REMARK	Applicable Machines
④	YF32T01016F4	Upper structure modification kit No. <u>BREAKER</u>			
4	YF33H00002F2 YN50V00009P1	• MODIFICATION OF THE HYDRAULIC TANK •• RETURN FILTER	1		YF02-01201~ YU02-00501~
17-100	YF33H00002F3 YN52V01008R100	• MODIFICATION OF THE HYDRAULIC TANK •• REPAIR KIT	1		YF03-01300~ YU03-00648~
2	YF68H00003F5 2420R349D035	• REMOTE CONTROL PIPING •• HOSE	1		
4	2420R349D420	•• HOSE	1		
5	PY03M01026P1	•• PIN	1		
6	YT30M01002F1	•• LOCK ASSY	1		
12	LC52S00011P1	•• PRESS SENSOR	1		
13	ZH32X04000	•• ELBOW	1		
15	ZS18C08020	•• CAPSCREW	2		
18	ZW16X08000	•• WASHER	3		
20	ZN18C08007	•• NUT	1		
29	ZH22X04000	•• CONNECTOR	1		
32	ZH32X04006	•• ELBOW	1		
45	2444R1120D045	•• HOSE	1		
46	2444R1119D155	•• HOSE	1		
47	ZW16X12000	•• WASHER	1		
48	ZS18C08045	•• CAPSCREW	2		
49	ZW16H08000	•• WASHER	2		
50	YN68H01038P1	•• BRACKET	1		
51	2419T3757D6	•• PIN	1		
52	2419R9D4	•• PIN	1		
53	HH25R04004G5	•• CONNECTOR	1		

2.3 LAYING OF PIPING

(1) Nibbler & Breaker specification

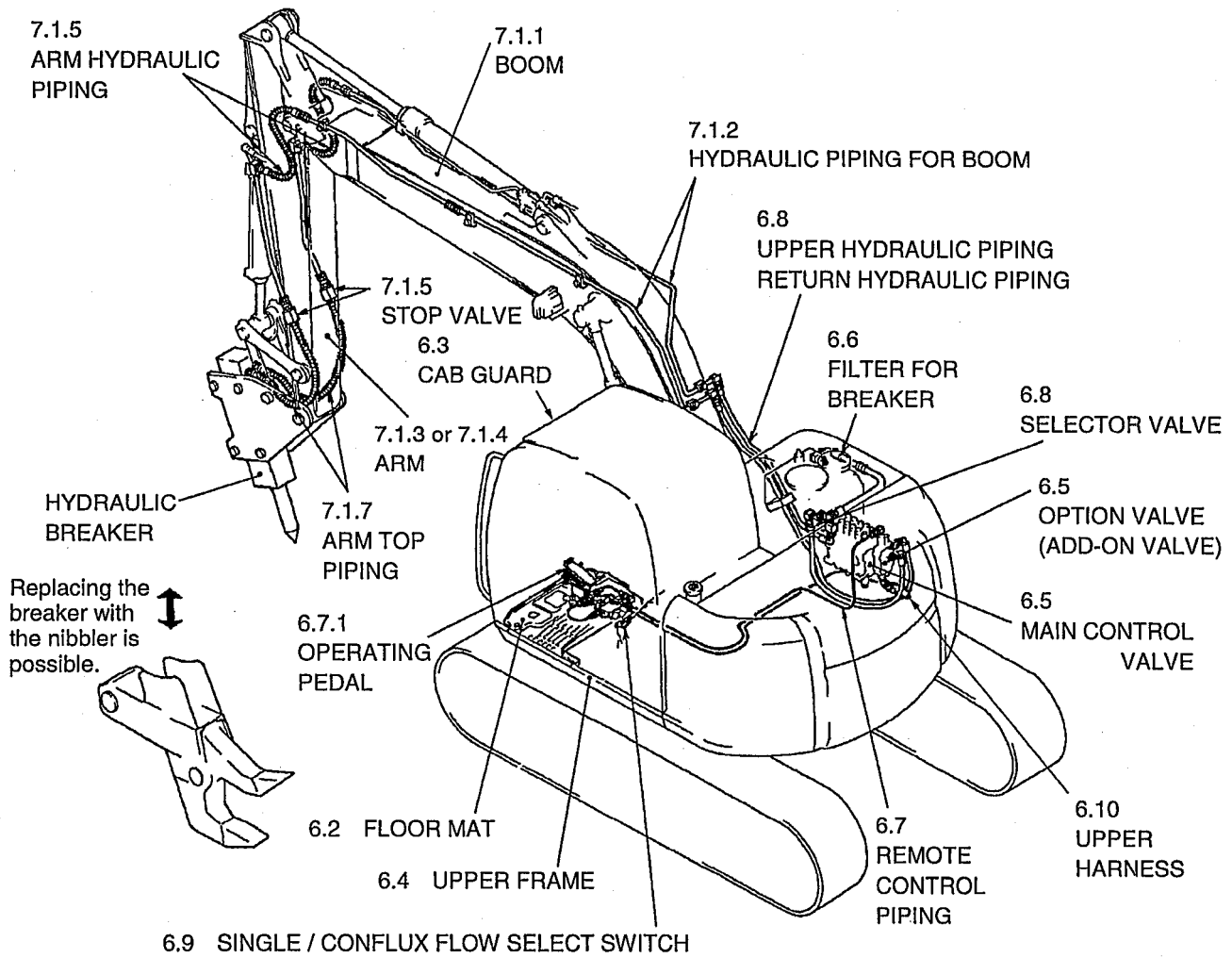
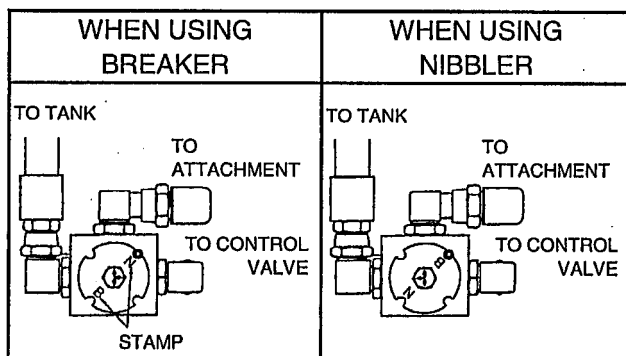
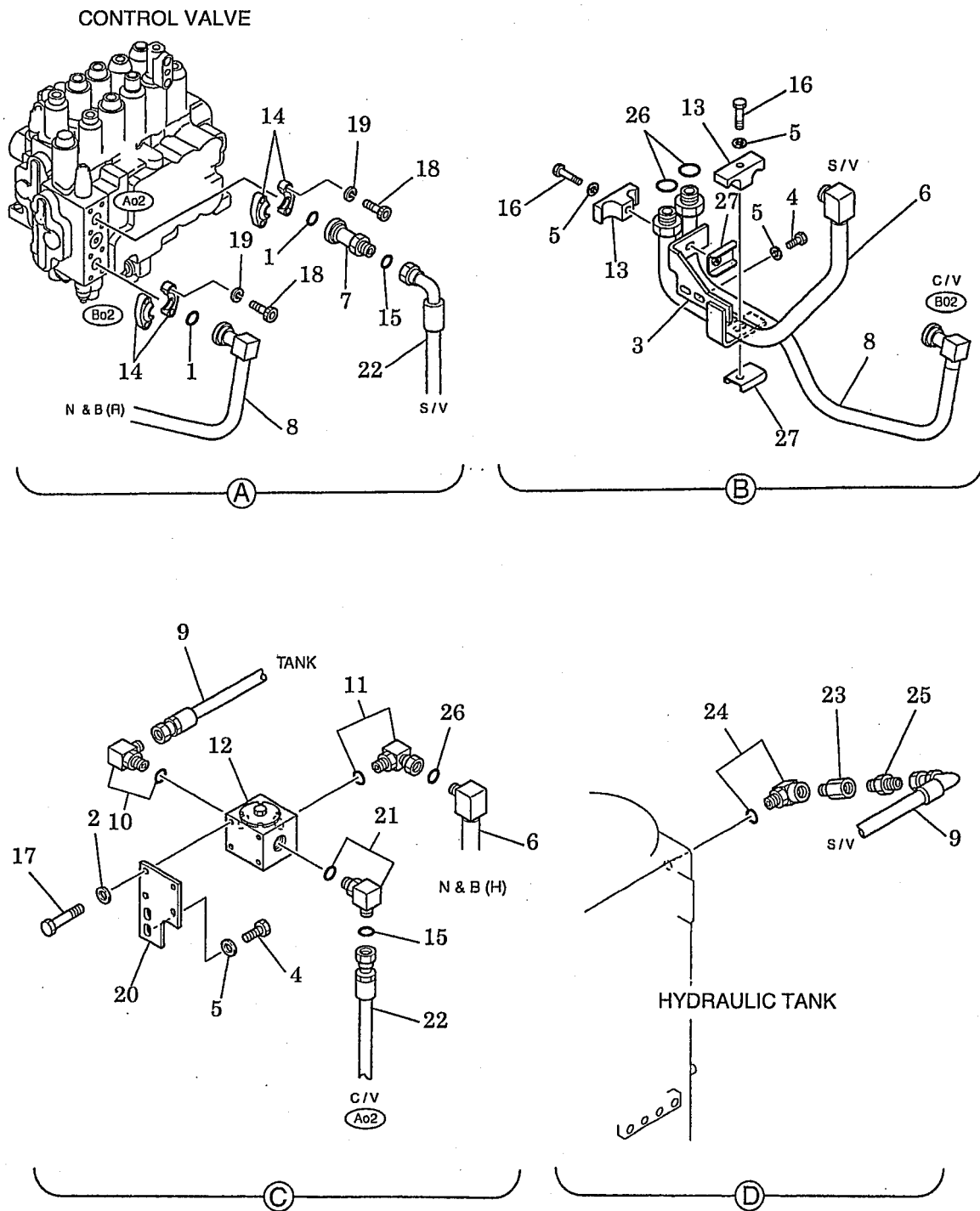


Fig. 1 Outside view of Nibbler & Breaker-attached machine



CHANGE TRAIN SCHEDULE THE KNACK SELECT

Fig. 6-12 (2/2) Upper hydraulic piping (Nibbler & Breaker)

8.5 MODIFICATION OF THE 3.33M (10ft-11in) LONG ARM (BREAKER)

1) OCEANIA Spec.

Weld the additional parts listed in table 8-10 to the arm of the long specification, according to Fig. 8-9.

Table 8-10

3.33M (10'11") ARM ASSY		YF12B00010F2		
No.	PART No.	NAME	Q'TY	REMARK
1	(YF12B00010F1)	ARM	(1)	
2	YN43H01199P1	PLATE	1	
3	YN43H01200P1	PLATE	1	
4	YN43H01009P1	PLATE	1	
5	YN43H01051P1	TAPPED BLOCK	2	
6	LC02B01024P1	TAPPED BLOCK	4	

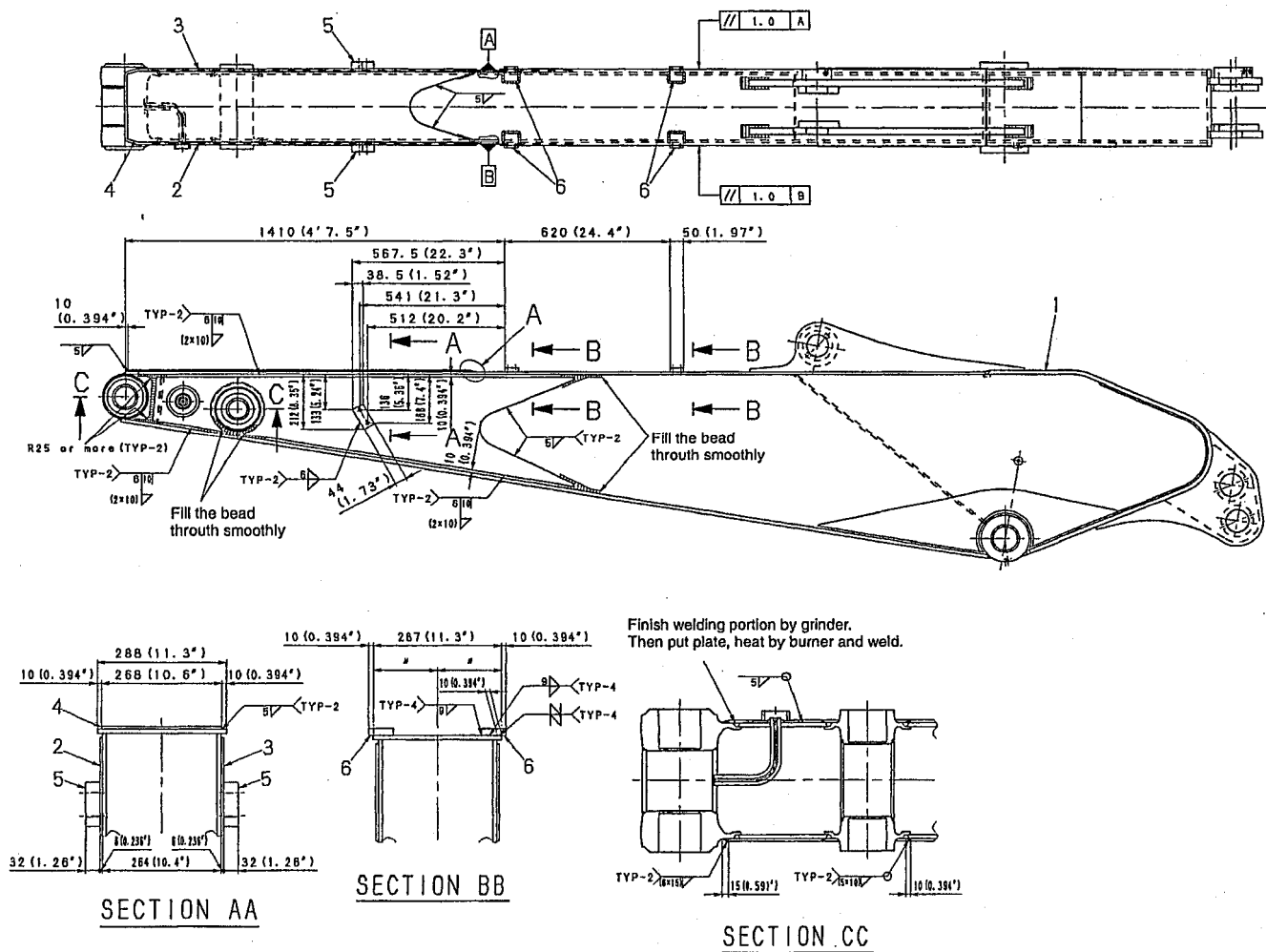
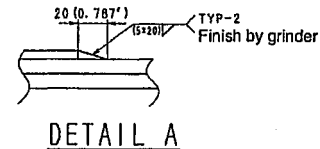


Fig. 8-9 Modification of the 3.33M (10ft-11in) long arm (Breaker)