SEAW021N0103

Field Assembly Manual

PC1000-1

HYDRAULIC EXCAVATOR

SERIAL NUMBERS
PC1000-1 -10001
PC1000SE-1 -10001 and up
PC1000SP-1 -10351

It is our policy to improve our products whenever it is possible and practical to do so. We reserve the right to make changes or add improvements at any time without incurring any obligation to install such changes on products sold previously.

Due to this continuous program of research and development, periodic revisions may be made to this publication. It is recommended that customers contact their distributor for information on the latest revision.

July 1995

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APPENDIX

FIELD ASSEMBLY INSPECTION REPORT

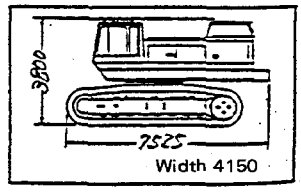
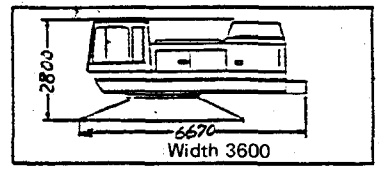
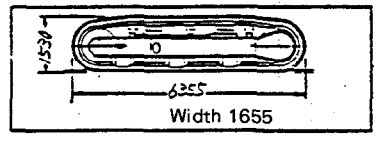
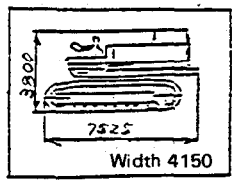
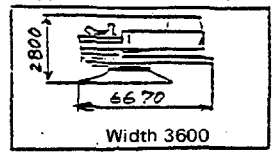
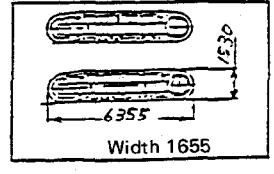
A. GENERAL

A-1: BEFORE ASSEMBLY

The method of assembly differs depending on whether the machine was divided into three parts or four parts for transportation. Therefore, determine first how many parts the machine was divided into for transportation, and then assemble according to the respective procedure.

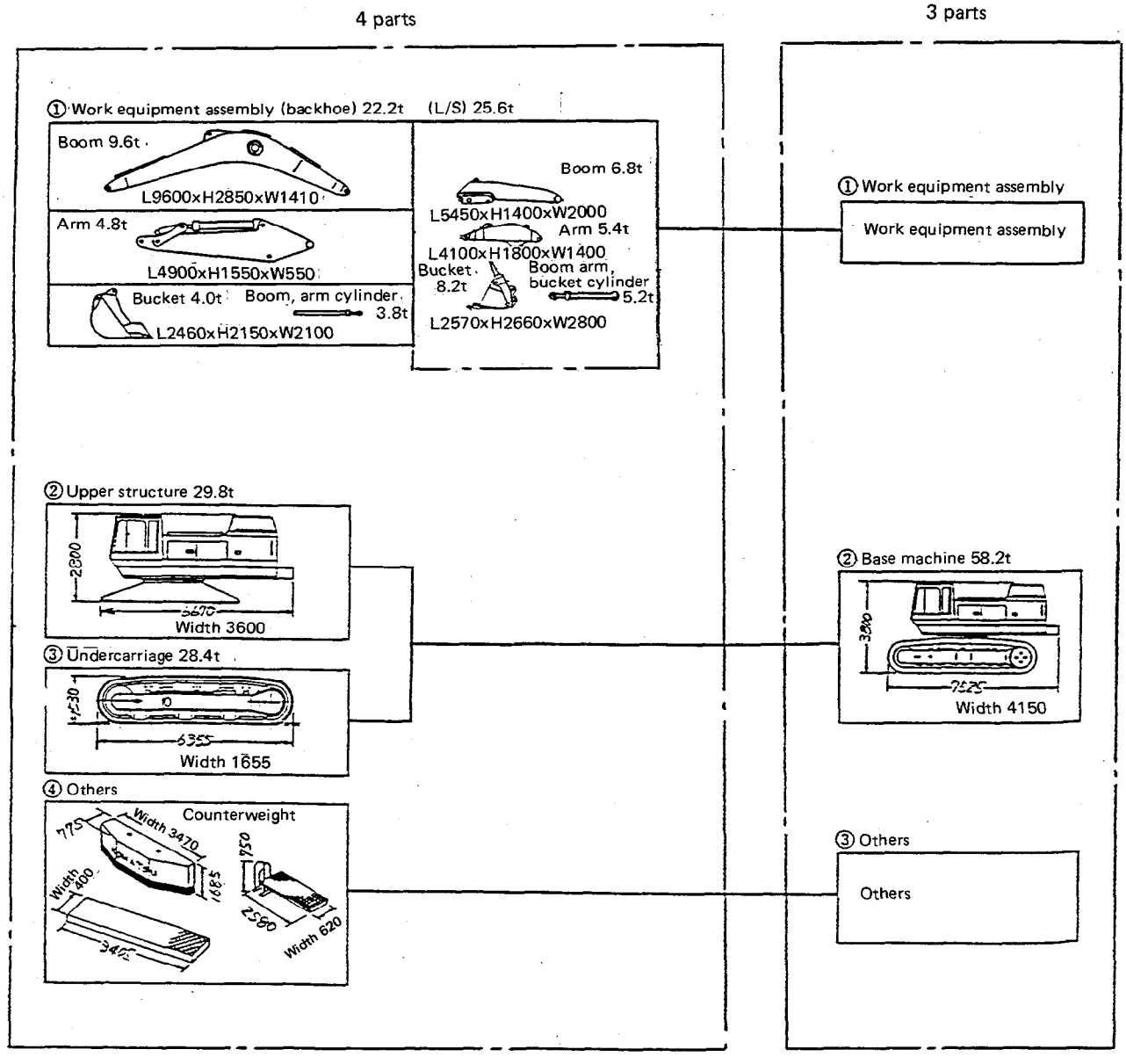
When divided into three parts: Upper structure and track unit are already assembled.

When divided into four parts: Upper structure and track unit are separate.

<table>
<tr><th>3 or 4 parts
High
or Low-cab</th><th>3 parts</th><th>4 parts</th></tr>
<tr><td rowspan="2">Low-cab</td><td rowspan="2">Base machine 58.2t
 
</td><td>Upper structure 29.8t
 
</td></tr>
<tr><td>Undercarriage 28.4t (14.2t x 2)
 
</td></tr>
<tr><td rowspan="2">High-cab
For high-cab, remove cab for transportation, but leave cab base installed.
*: Figures which are different from low-cab specification.</td><td rowspan="2">Base machine 57.9t
 
</td><td>Upper structure *29.5t
 
</td></tr>
<tr><td>Undercarriage 28.4t (14.2t x 2)
 
</td></tr>
</table>

EXAMPLE OF SHAPE FOR TRANSPORTATION

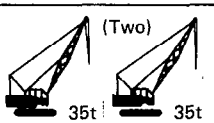
The figures below show the shape for transportation of the low-cab specification machine divided into three parts and divided into four parts for transportation.



ASSEMBLY PROCESSES, ASSEMBLY EQUIPMENT, AND SCHEDULE

Divided into three parts

Day	①		②
Units to be assembled	Base machine ① Counterweight ② Platform group • Check oil and water levels. If necessary, add oil or water. • Bleed air as necessary	Backhoe Loading shovel ③ Work equipment assembly • Check oil and water levels. If necessary, add oil or water. • Flush the hydraulic circuit. • Bleed air from the work equipment cylinder.	• Extend track frame width • Adjust the track tension • Performance check
Assembly procedure No.	A-1 – A-6	C-1 – C-19	Backhoe: D-1 – D-17 Loading shovel: E-1 – E-29	F-1 – F-2, G
Cranes	(Two) 35t 35t			
Air compressor	Air pressure: 5 – 7 kg/cm² Air flow: 15 m³/min.			
Workers	Foreman + 4 mechanics			
	Starting the assembly • Meeting all the workers	Completion of assembly of the units into a machine	Completion of general assembly of the machine	Delivering the machine

Day	①			②	③
Units to be assembled	 ① : L.H. track frame assembly ② : R.H. track frame assembly	 ③ Upper structure • Check oil and water levels. If necessary, add oil or water. • Bleed air as necessary. • Flush as necessary.	 ④ Counterweight ⑤ Platform group • Check oil and water levels. If necessary, add oil or water. • Bleed air as necessary. • Adjust the track tension.	 Backhoe  Loading shovel ⑥ Work equipment assembly • Check oil and water levels. If necessary, add oil or water. • Flush the hydraulic circuit. • Bleed air from the work equipment cylinder.	Performance check
Assembly procedure No.	A-1 – A-6	B-1 – B-8	C-1 – C-19	Backhoe : D-1 – D-17 Loading shovel : E-1 – E-29	G
Cranes	 (Two) 35t 35t				
Air compressor	Air pressure: 5 – 7 kg/cm² Air flow: 15 m³/min. 				
Workers	 Foreman + 4 mechanics				
	Starting the assembly • Meeting all the workers	Completion of assembly of the units into a machine		Completion of general assembly of the machine	Delivering the machine

A-2: LIST OF PARTS SENT INDIVIDUALLY

This is a list of parts sent individually for the following specifications options and attachments.
[ ]: These parts are specifications, options, and attachments which are not sent as individual parts.

- Standard specification
- High-mount cab specification
- DX operator's seat (for low-mount cab specification, no parts sent individually)
- DX floor mat
- Air conditioner (for low-mount cab specification, no parts sent individually)
- Left side step (low-mount cab specification)
- Left side step (high-mount cab specification)
- FOPS (for both low and high-mount cab)
- Additional rear view mirror
- Cold area (−30°C) specification
- Automatic horizontal push-out system for front loading shovel
- Outside muffler
- Precleaner (sandy and dusty area) specification

- Electronic OLSS (including auto-deceleration)
- Low mount cab specification
- AM radio
- Hot water heater
- Vandalism protection
- 910, 1010 mm width shoe
- Center frame underguard
- Travel pedal (width: 150 mm)
- Free swing
- Sun vizor
- Heater and defroster
- Air-type grease pump
- Final roller guard
- Fire extinguisher

LIST OF BASE MACHINE RELATED PARTS (1/3)

[See map of parts sent individually (base machine, high-mount cab)]

No.	Part No.	Part Name	Q'ty	Remarks
1	209-60-31130	ELEMENT	4	For flushing
2	21T-60-13730	PLATE	4	
3	07000-05175	O-RING	4	For return filter
4	6162-13-5280	PIPE, TAIL	1	Sub-assembly parts
5	6162-13-5250	CAP, RAIN	1	
6	01010-51230	BOLT	6	For installing muffler tail pipe
7	01643-31232	WASHER	6	
8	209-54-54140	STEP	3	For getting on and off left machine cab
9	01010-51230	BOLT	6	
10	01643-31232	WASHER	6	
11	21N-54-11340	HANDRAIL	2	For getting on and off left machine cab
12	01010-51230	BOLT	8	
13	01643-31232	WASHER	8	
14	21N-54-12320	FRAME	1	Left side (front) catwalk
15	01010-51230	BOLT	9	
16	01643-31232	WASHER	9	
17	21N-54-12310	FRAME	1	Common for high and low Left side (rear) catwalk
18	01010-51230	BOLT	10	
19	01643-31232	WASHER	10	
20	01010-51225	BOLT	2	
21	01643-31232	WASHER	2	
22	209-54-54130	STEP	2	For getting on and off (crawler frame)
23	01010-51640	BOLT	8	
24	01643-31645	WASHER	8	
25	08174-33023	MIRROR	1	Rear view mirror
26	205-54-68480	SUPPORT	1	
27	207-54-17840	CLAMP	1	
28	01252-41025	BOLT	2	
29	209-54-51230	MAT, FLOOR	1	Standard export specification
	209-54-51220	MAT, FLOOR	1	Standard Japan specification
30	21N-46-12110	WEIGHT	1	

LIST OF BASE MACHINE RELATED PARTS (2/3)

No.	Part No.	Part Name	Q'ty	Remarks
31	209-46-51190	BOLT	10	For counterweight mount
32	209-46-11210	SPACER	10	
33	21N-72-11210	SHIM (t1.0)	3	Boom foot
	21N-72-11220	SHIM (t1.5)	3	
34	21N-72-11230	SHIM (t1.0)	8	For boom cylinder bottom
35	21N-30-11262	COVER L.H	1	For related parts of travel motor, travel piping cover
36	21N-30-11272	COVER R.H	1	
37	01010-51225	BOLT	16	
38	01643-31232	WASHER	16	
39	21N-30-11340	COLLAR	16	
40	21N-30-11242	COVER L.H	1	
41	21N-30-11252	COVER R.H	1	
42	01010-51225	BOLT	18	
43	175-54-34170	WASHER	18	
44	01010-52040	BOLT	26	
45	156-54-11350	WASHER	26	
46	21N-30-11281	COVER	1	
47	01010-51225	BOLT	10	
48	175-54-34170	WASHER	10	
49	21N-30-11321	COVER L.H	1	
50	21N-30-11331	COVER R.H	1	
51	01010-52480	BOLT	8	
52	01643-32460	WASHER	8	
53	01010-52480	BOLT	8	
54	01643-32460	WASHER	8	
55-1	21N-30-11180	BOLT	20	For center frame, crawler frame joint
55-2	21N-30-11190	BOLT	60	
56-1	21N-30-11171	SPACER	20	
56-2	21N-30-11170	SPACER	60	
57	21N-30-11180	BOLT	8	
58	21N-30-11230	PLATE	4	
59	21N-30-11160	COLLAR	8	
60	07000-13025	O-RING	2	For HiC

LIST OF BASE MACHINE RELATED PARTS (3/3)

No.	Part No.	Part Name	Q'ty	Remarks
61	07000-13032	O-RING	16	For travel motor hose
62	07377-01018	FLANGE	4	For travel circuit flushing
63	07000-13048	O-RING	2	Boom cylinder hose
	07000-13038	O-RING	2	Chassis – boom cylinder
64	21N-62-19330	FLANGE	2	For boom cylinder flushing

LIST OF HIGH-MOUNT CAB SPECIFICATION PARTS

[See map of parts sent individually (base machine, high-mount cab)]

No.	Part No.	Part Name	Q'ty	Remarks
80	21N-54-12330	FRAME	1	Left side (front) catwalk
81	01010-51230	BOLT	12	
82	01643-31232	WASHER	12	
83	209-54-54140	STEP	2	For getting on and off cab
84	01010-51230	BOLT	4	
85	01643-31232	WASHER	4	
86		OPERATOR'S CAB ASS'Y	1	Operator's cab and mount related parts
87	01010-51250	BOLT	3	
88	01643-31232	WASHER	3	
89	01010-51270	BOLT	6	
90	01643-31232	WASHER	6	
91	205-979-6140	DUCT	1	For air conditioner (with bracket)
92	205-979-6130	DUCT	1	
93	01010-50812	BOLT	4	
94	01643-30823	WASHER	4	
95	01010-50816	BOLT	4	For air conditioner control panel mount
96	01643-30823	WASHER	4	
97	21N-57-11000	OPERATOR'S SEAT ASS'Y	1	Standard
	205-57-71500	OPERATOR'S SEAT ASS'Y	1	Optional, with height adjustment mechanism
98	01010-51230	BOLT	4	For installing operator's seat
99	01643-31232	WASHER	4	

LIST OF ADDITIONAL REAR-VIEW MIRROR (RIGHT SIDE) PARTS

[See map of parts sent individually (base machine, high-mount cab)]

No.	Part No.	Part Name	Q'ty	Remarks
120	08174-33023	MIRROR	2	
121	205-54-76380	SUPPORT	1	
122	205-54-76390	CLAMP	1	
123	205-54-67141	SUPPORT	1	
124	207-54-17840	CLAMP	1	
125	01252-41025	BOLT	4	

LIST OF FOPS PARTS

[See map of parts sent individually (base machine, high-mount cab)]

No.	Part No.	Part Name	Q'ty	Remarks
130	209-956-6110	GUARD	1	
131	01010-51645	BOLT	16	
132	01643-31645	WASHER	16	
133	21N-956-1210	BRACKET	1	For low cab
	209-956-6130	BRACKET	1	For high cab
134	01010-51640	BOLT	3	
	01010-51655	BOLT	3	
135	01643-31645	WASHER	6	

LIST OF COLD AREA SPECIFICATION (–30° C) PARTS

[See map of parts sent individually (base machine, high-mount cab)]

No.	Part No.	Part Name	Q'ty	Remarks
140	175-98-22350	PREHEATER	1	
141	175-98-22360	CABLE	1	For power source
142	175-98-22390	HOSE	2	For cooling water
143	154-04-11370	HOSE	1	For fuel

INDIVIDUAL PARTS SHIPMENT LIST FOR OUTSIDE MUFFLER AND PRECLEANER (SANDY AND DUSTY AREA) SPECIFICATION (1/2)

No.	Part No.	Part Name	Q'ty	Remarks
[Outside muffler specification]				
1	6162-13-5250	RAIN CAP	1	
2	6162-13-8740	PIPE	1	
3	6162-13-5801	MUFFLER	1	
4	01010-61265	BOLT	4	For installing muffler
5	01643-31232	WASHER	4	
6	198-38-12460	SPACER	4	
7	21N-01-11240	TUBE	1	Muffler water drain tube
8	04434-51010	CLIP	1	For muffler water drain tube clamp
9	01010-51025	BOLT	1	
10	01643-31032	WASHER	1	
11	6162-13-8730	ELBOW	1	Exhaust piping between turbo-charger and muffler, and related parts
12	6162-14-5540	GASKET	1	
13	01010-61030	BOLT	2	
14	01602-01030	WASHER	2	
15	6162-13-5340	BELLOWS	1	
16	6162-13-5890	GASKET	2	
17	01010-31650	BOLT	16	
18	01643-31645	WASHER	32	
19	01580-01613	NUT	16	
20	6162-13-5301	CHECK VALVE	1	Ejector piping and related parts
21	6162-13-5610	GASKET	2	
22	01010-61025	BOLT	4	
23	01602-21030	WASHER	4	
24	6162-13-8750	PIPE	1	
25	6162-13-5830	CLIP	2	
26	01010-30830	BOLT	2	
27	01602-00825	WASHER	2	
28	01640-00816	WASHER	2	
29	6130-12-8620	HOSE	1	
30	07281-00709	CLIP	2	

INDIVIDUAL PARTS SHIPMENT LIST FOR OUTSIDE MUFFLER AND PRECLEANER (SANDY AND DUSTY AREA) SPECIFICATION (2/2)

No.	Part No.	Part Name	Q'ty	Remarks
31	21N-54-14180	COVER	1	Muffler, exhaust pipe cover and mounting bolts, washers
32	01010-51245	BOLT	4	
33	01643-31232	WASHER	4	
34	21N-54-14170	COVER	1	
35	01010-51240	BOLT	6	
36	01643-31232	WASHER	6	
[Precleaner (sandy and dusty area specification)]				
36	6162-13-5250	RAIN CAP	1	Not needed for outside muffler + precleaner specification
37	6162-13-5080	PIPE	1	
38	600-181-4960	HOOD	1	

LIST OF BACKHOE BOOM RELATED PARTS

[See map of parts sent individually (for backhoe) O^B mark]

No.	Part No.	Part Name	Q'ty	Remarks
1		BOOM ASS'Y	1	
2	21N-63-X2011	BOOM CYL ASS'Y (L.H)	1	
3	21N-63-X2021	BOOM CYL ASS'Y (R.H)	1	
4	21N-63-X2031	ARM CYL ASS'Y	1	
5	21N-72-11210	SHIM (t1.0)	1	Boom top
6	21N-72-11230	SHIM (t1.0)	2	Boom cylinder top
7	21N-72-11210	SHIM (t1.0)	2	Arm cylinder bottom
8	07099-01432	HOSE	5	Chassis — work equipment
	07099-01232	HOSE	2	
9	07000-13048	O-RING	10	
	07000-13038	O-RING	4	
10	21N-62-18461	CLAMP	2	
11	01011-51035	BOLT	4	
12	01678-21029	WASHER	8	
13	01580-11008	NUT	8	
14	07098-01420	HOSE	3	For arm cylinder
15	07000-13048	O-RING	6	
16	205-70-51380	ELBOW	1	Arm cylinder bottom
17	205-70-51390	NIPPLE	2	Boom cylinder top
18	07020-00675	FITTING, GREASE	5	Boom central greasing block
19	07020-00000	FITTING, GREASE	2	Boom cylinder bottom
20	203-06-56140	LAMP ASS'Y	1	Working lamp (side face of boom)
21	203-06-21290	PLATE	1	
22	01010-51430	BOLT	1	
23	01643-31445	WASHER	1	
24	21N-62-19340	TEE	1	For arm cylinder flushing
25	21N-62-19310	FLANGE	1	For bucket cylinder flushing

☆ BOOM
9200 : STD
7900 : SE Spec.
7550 : SP Spec.

LIST OF BACKHOE ARM (INCLUDING LINK) RELATED PARTS

[See map of parts sent individually (for backhoe) O^A mark]

No.	Part No.	Part Name	Q'ty	Remarks
1		ARM ASS'Y	1	Including link assembly
2	21N-72-11210	SHIM (t1.0)	3	Arm cylinder top
3	21N-70-13150	O-RING	2	Arm top
4	21N-72-11230	SHIM (t1.0)	3	Bucket, link connection
5	07098-21420	HOSE	2	Boom – Arm
6	07000-13048	O-RING	4	
7	21N-70-15171	TUBE	1	Boom, arm connecting pin greasing
8	209-72-16140	ELBOW	1	
9	176-43-54580	CLIP	1	
10	01010-51016	BOLT	1	
11	01643-31032	WASHER	1	
12	07282-01048	CLAMP	1	
13	01010-50612	BOLT	2	
14	01643-30623	WASHER	2	
15	205-70-51390	NIPPLE	1	Arm cylinder top
16	205-70-51380	ELBOW	1	Bucket cylinder bottom
17	07020-00675	FITTING, GREASE	3	Arm central greasing block

☆ARM
3400 (STD, SE spec., SP spec.)

LIST OF BACKHOE BUCKET RELATED PARTS

[See map of parts sent individually (for backhoe) ○BU mark]

No.	Part No.	Part Name	Q'ty	Remarks
1		BUCKET ASS'Y	1	
2	21N-70-14220	BUSHING	1	For adjusting clearance (For STD)
3	21N-70-14230	SHIM (t1.0)	14	
	21N-70-14240	SHIM (t0.5)	4	
	21N-70-14320	SHIM (t1.0)	14	For adjusting clearance (For SE, SP Spec.)
	21N-70-14330	SHIM (t1.0)	4	

LIST OF FRONT LOADING SHOVEL BOOM RELATED PARTS (1/4)

[See map of parts sent individually (for front loading shovel, boom + arm, link + bucket) O^B mark]

No.	Part No.	Part Name	Q'ty	Remarks
1		BOOM ASS'Y	1	
2	21N-63-X3010	BOOM CYLINDER ASS'Y (L.H)	1	
3	21N-63-X3020	BOOM CYLINDER ASS'Y (R.H)	1	
4	21N-63-X3030	ARM CYLINDER ASS'Y (L.H)	1	
5	21N-63-X3040	ARM CYLINDER ASS'Y (R.H)	1	
6	21N-63-X3050	BUCKET CYLINDER ASS'Y (L.H)	1	
7	21N-63-X3060	BUCKET CYLINDER ASS'Y (R.H)	1	
8	21N-72-11210	SHIM (t1.0)	3	(Used only on left inside) Boom, arm connecting pin
	21N-72-11220	SHIM (t1.5)	4	
9	07000-12130	O-RING	4	Bucket cylinder bottom pin
10	21N-72-11230	SHIM (t1.0)	2	Boom cylinder top pin
11	07000-12130	O-RING	4	Arm cylinder bottom pin
12	07099-01432	HOSE	5	Chassis – work equipment
	07099-01232	HOSE	4	
13	07000-13048	O-RING	10	
	07000-13038	O-RING	8	
14	21N-62-13171	CLAMP	2	
15	01011-51035	BOLT	5	
16	01678-21029	WASHER	10	
17	01580-11008	NUT	10	
18	07097-01414	HOSE	2	Boom – Arm cylinder
	07097-01212	HOSE	2	
19	07000-13048	O-RING	4	
	07000-13038	O-RING	4	
20	205-70-65780	ELBOW	2	Arm cylinder bottom
21	205-70-51380	ELBOW	2	Boom cylinder top
22	21N-72-16260	TUBE (L.H)	1	Bucket cylinder bottom greasing related parts
	21N-72-16250	TUBE (R.H)	1	
23	209-72-16140	ELBOW	2	
24	07213-51013	CONNECTOR	2	
25	07020-00000	FITTING, GREASE	2	

LIST OF FRONT LOADING SHOVEL BOOM RELATED PARTS (2/4)

No.	Part No.	Part Name	Q'ty	Remarks
26	07282-11048	CLAMP	4	Bucket cylinder bottom greasing related parts
27	01010-50612	BOLT	8	
28	01643-30623	WASHER	8	
29	07020-00675	FITTING, GREASE	6	Boom central greasing block
30	07020-00000	FITTING, GREASE	2	Boom cylinder bottom
31	22W-06-12381	LAMP ASS'Y	1	Working lamp
32	203-06-21290	PLATE	1	
33	01010-51430	BOLT	1	
34	01643-31445	WASHER	1	
35	08036-01414	CLIP	1	
36		METER, POTENTIO ASS'Y	1	For boom (Optional)
	7861-91-4110	METER, POTENTIO	1	Assembly parts (Nos. 39, 40, 41, 48, 49 also included in assembly)
	142-06-14510	GASKET	1	
	01010-50612	BOLT	2	
	01643-30623	WASHER	2	
	6136-71-9730	SHAFT	1	
	04064-01610	RING, SNAP	1	
	142-43-13180	SPRING	1	
	702-16-11490	BEARING	1	
	702-16-11510	SEAL, OIL	2	
	21N-06-11120	BRACKET	1	
	21N-06-11140	LEVER	1	
	04025-00432	PIN, SPRING	1	
	04050-12040	COTTER PIN	1	
37	01011-51205	BOLT	3	Boom potentiometer mount related parts
38	01643-31232	WASHER	3	
39	21N-06-11130	COVER	1	Included in assembly No. 36
40	01010-51230	BOLT	3	
41	01643-31232	WASHER	3	
42	195-06-41820	CLIP	1	
43	21N-06-11150	SHAFT	1	

LIST OF FRONT LOADING SHOVEL BOOM RELATED PARTS (3/4)

No.	Part No.	Part Name	Q'ty	Remarks
44	01010-51230	BOLT	2	Boom potentiometer mount related parts
45	01643-31232	WASHER	2	
46	195-06-41820	CLIP	1	
47	421-09-12170	CLIP	1	
48	01010-51285	BOLT	1	Included in assembly No. 36
49	01643-31232	WASHER	1	
50		METER, POTENTIO ASS'Y	1	For arm (Optional)
	7861-91-4110	METER, POTENTIO	1	Assembly parts (Nos. 53, 54, 55 also included in assembly)
	142-06-14510	GASKET	1	
	01010-50612	BOLT	2	
	01643-30623	WASHER	2	
	6136-71-9730	SHAFT	1	
	04064-01610	RING, SNAP	1	
	142-43-13180	SPRING	1	
	702-16-11490	BEARING	1	
	702-16-11510	SEAL, OIL	2	
	21N-06-11120	BRACKET	1	
	21N-06-11140	LEVER	1	
	04025-00432	PIN, SPRING	1	
	04050-12040	COTTER PIN	1	
51	01011-51205	BOLT	3	For installing arm potentiometer
52	01643-31232	WASHER	3	
53	21N-06-11130	COVER	1	
54	01010-51230	BOLT	3	Included in assembly No. 50
	01010-51285	BOLT	1	
55	01643-31232	WASHER	4	
56	195-06-41820	CLIP	1	
57	21N-06-11150	SHAFT	1	
58	01010-51230	BOLT	2	
59	01643-31232	WASHER	2	
60	21N-62-19330	FLANGE	2	For arm cylinder flushing

LIST OF FRONT LOADING SHOVEL BOOM RELATED PARTS (4/4)

No.	Part No.	Part Name	Q'ty	Remarks
61	21N-62-19330	FLANGE	2	For bucket cylinder flushing
62	21N-62-19320	FLANGE	1	For bottom cylinder flushing

LIST OF FRONT LOADING SHOVEL ARM (INCLUDING LINK) RELATED PARTS

[See map of parts sent individually (for front loading shovel, boom + arm, link + bucket) O^A mark]

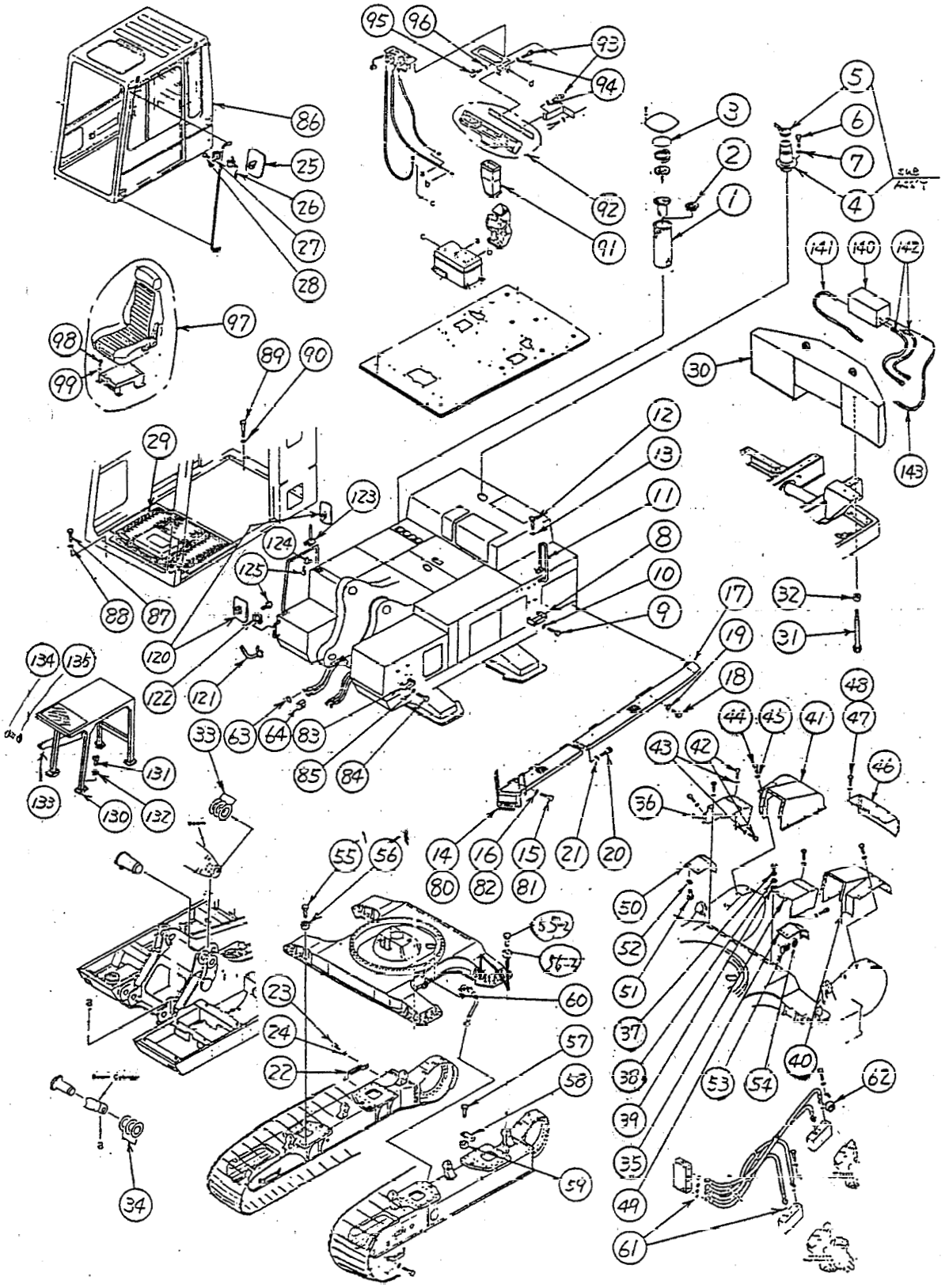
No.	Part No.	Part Name	Q'ty	Remarks
1		ARM ASS'Y	1	Boom — Arm
2	07099-01421	HOSE	2	
	07099-01221	HOSE	2	
3	07000-13048	O-RING	4	
	07000-13038	O-RING	4	
4	21N-62-13471	CLAMP	4	
5	01011-51035	BOLT	2	
6	01678-21029	WASHER	4	
7	01580-11008	NUT	4	
8	07099-21219	HOSE	2	
9	07000-13038	O-RING	4	
10	07097-21219	HOSE	2	Arm — Bucket
11	07000-13038	O-RING	4	
12	07020-00000	FITTING, GREASE	4	Arm central greasing block
13	209-72-16140	ELBOW	2	Boom, arm connection boss
14	205-70-51390	NIPPLE	2	Arm cylinder top
15	07020-00900	FITTING, GREASE	2	Arm top link mounting boss
16	07020-00000	FITTING, GREASE	2	Front link
17	07020-00900	FITTING, GREASE	4	
18	07000-12130	O-RING	4	Bucket cylinder top
19	21N-72-13110	LINK	4	Wrist link
20	21N-72-13120	LINK	2	Front link (including dust seal)
21		PIN ASS'Y	2	Front, wrist link connecting pin
	21N-72-13140	PIN	2	
	21N-72-13130	HOLDER	2	
	01010-51645	BOLT	6	
	01643-31645	WASHER	6	

LIST OF FRONT LOADING SHOVEL BUCKET RELATED PARTS

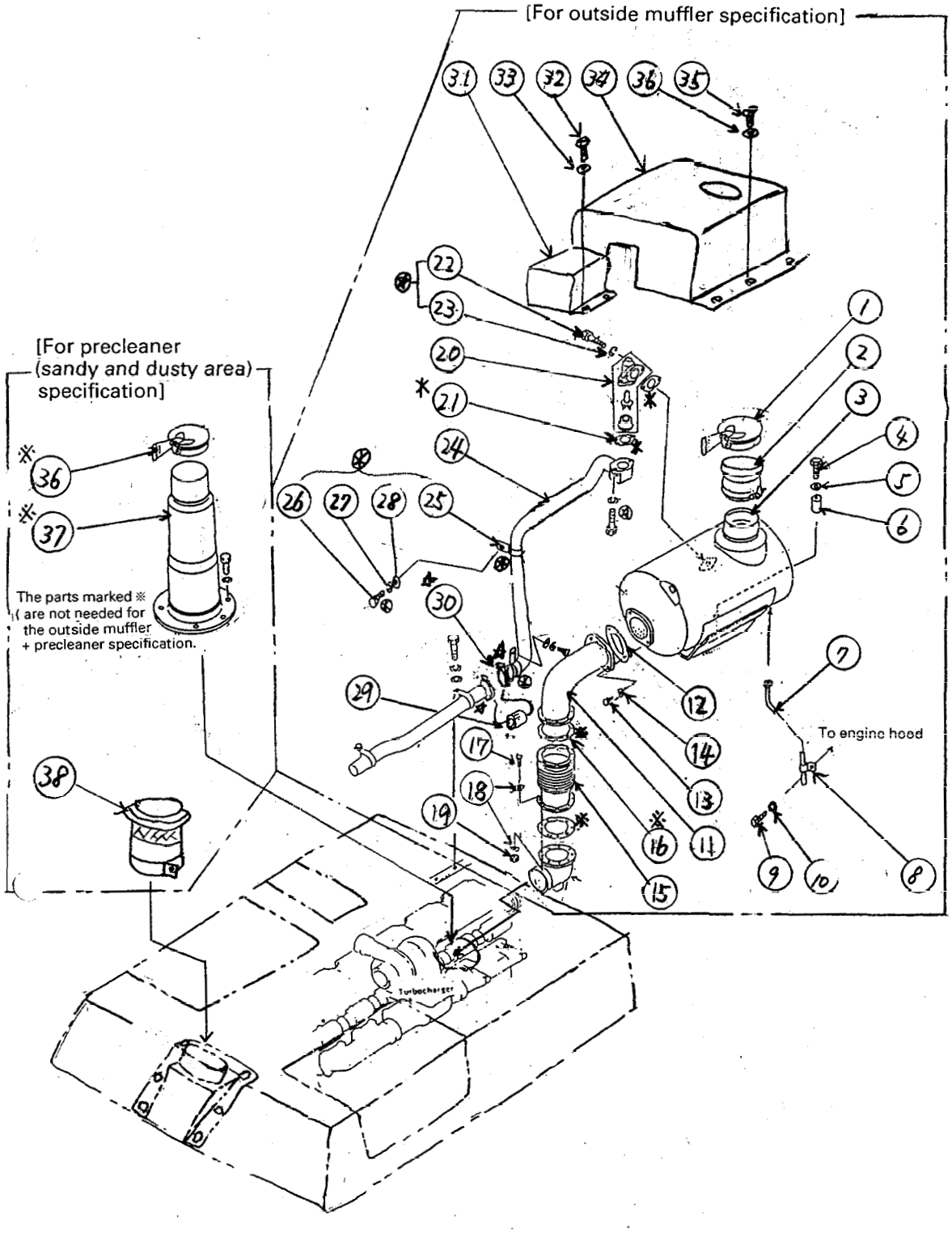
[See map of parts sent individually (for front loading shovel, boom + arm, link + bucket) $\bigcirc^{Bu}$ mark]

No.	Part No.	Part Name	Q'ty	Remarks
1	21N-72-X3000	BUCKET ASS'Y	1	
2	07020-00000	FITTING, GREASE	4	Hinge pin, bottom cylinder bottom
3	07020-00000	FITTING, GREASE	2	Bucket, arm connecting pin

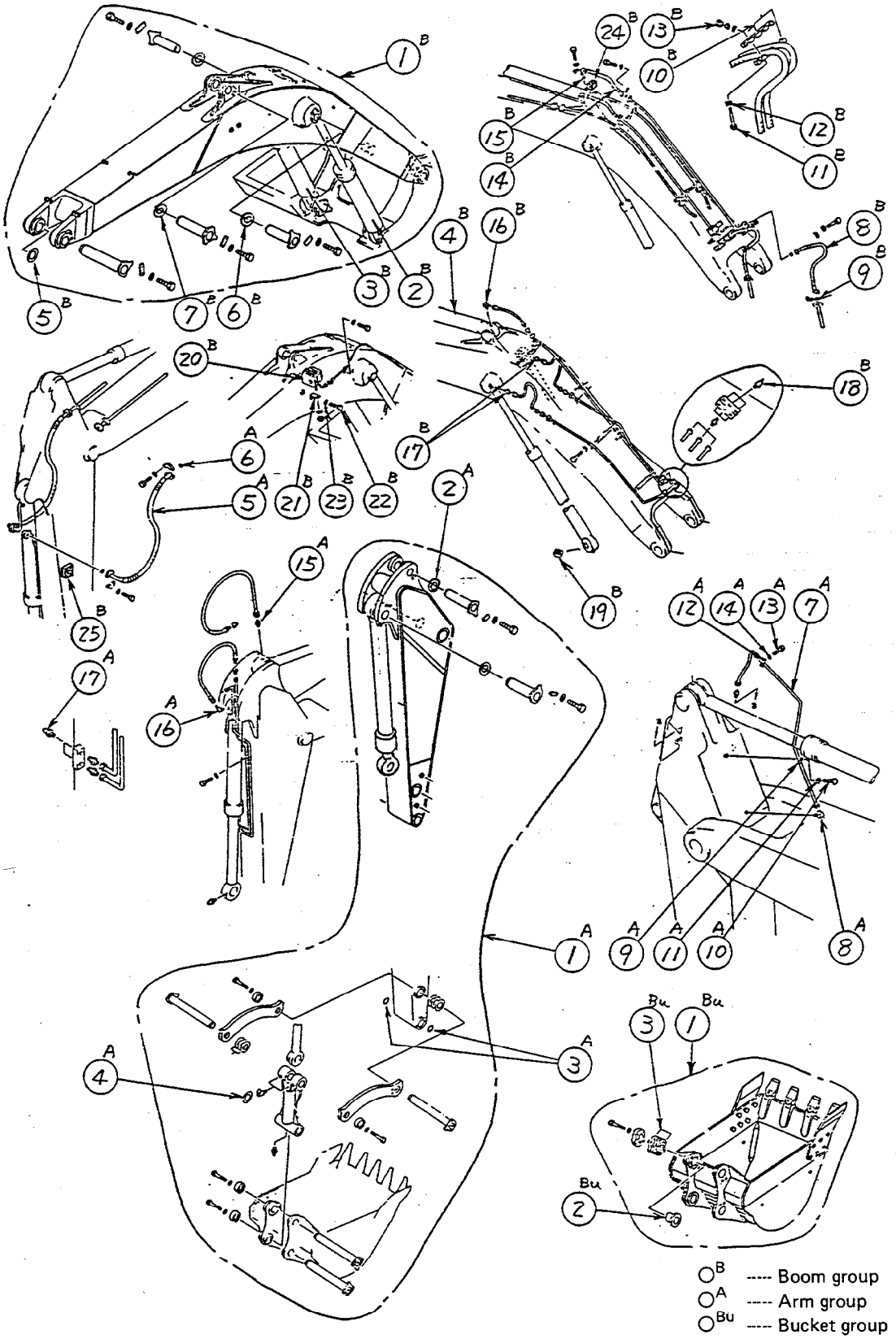
MAP OF PARTS SENT INDIVIDUALLY (BASE MACHINE, HIGH-MOUNT CAB)



INDIVIDUAL PARTS SHIPMENT LIST (OUTSIDE MUFFLER, PRECLEANER)

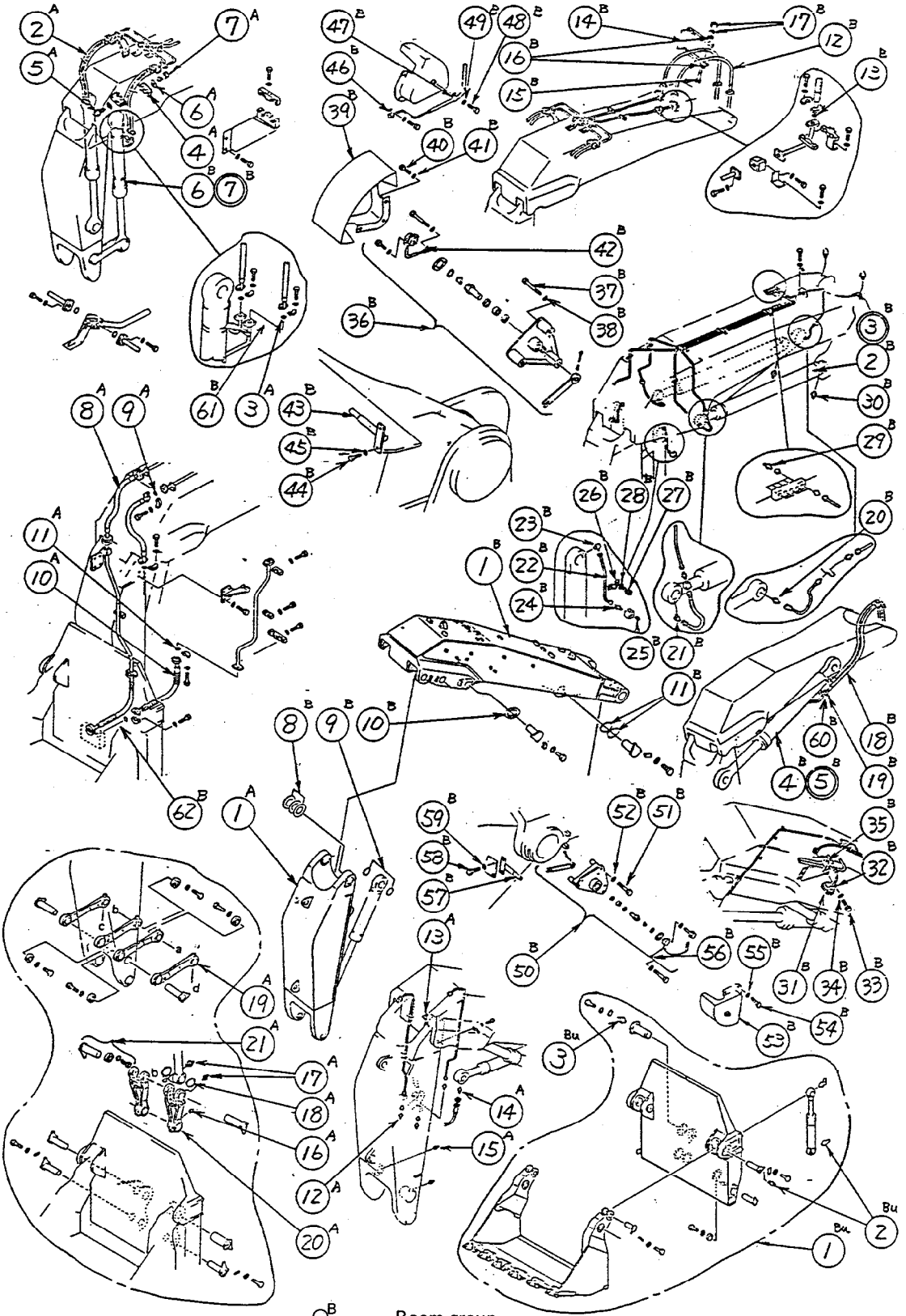


MAP OF PARTS SENT INDIVIDUALLY (BACKHOE SPECIFICATION)



MAP OF PARTS SENT INDIVIDUALLY

[Front loading shovel specification (boom + arm, link + bucket)]



A-3: POINTS REGARDING LOCAL ASSEMBLY

1. **Selection of work place**
   1) The work place should be suitable for loading and unloading the machine. The following points should be considered.
      - Area
      - Hardness of ground surface
      - Levelness
      - Entry/exit roads, turning space
   2) Assembly work on the hydraulic circuit must not be carried out in any place where dust or rain can get into the circuit during the operation.
   3) If the work is carried out outside, avoid places where there is rain or strong wind.

2. **Preparation and checks of lifting tools and jigs**
   1) Check each lifting tool and jig thoroughly.
      In particular, check stands and blocks made of wood to check that the inside is not rotted or cracked.

3. ⚠ **Checks during actual operation**
   1) Apply the parking brake of the trailer and crane securely, then put blocks under the wheel.
   2) Lower the pressure and temperature of the engine, hydraulic oil, and cooling water before starting work.
   3) When starting the engine, always give an agreed signal, such as blowing the horn, to warn the people around the machine. Check also that the work equipment levers and travel levers are in neutral, and that the fuel control lever is at the low idling position.
   4) Be careful to maintain the balance of parts being lifted by the crane.
   5) Do not allow unauthorized persons into the working area.

A-4: PRECAUTIONS WHEN ASSEMBLING, TIGHTENING TORQUE OF BOLTS, SCREWS AND TAPER SEAL HOLES

Remove the various blind plugs and jigs used during transportation. Remove the blind jigs (flange, head, cap, O-ring) used for the work equipment piping and undercarriage piping, the blind plugs used for the lubrication piping, the jigs used to hold the cylinders, and the blind plugs used in the tap holes where parts have been removed for transportation. Be careful not to damage these parts, and keep them in a safe place so that they can be used for future transportation.
For bolts where the tightening torque is not separately specified in the maintenance standards, use the tightening torques given in the table below.

1. Tightening torques for bolts

1) Use the figures in Table 1 when using an impact wrench or spanner.
The tightening torque for bolts is basically that given in Table 1, so for bolts which use this torque, no separate instruction is given.

Table 1 Unit: kgm

Material / Nominal of diameter thread (mm)	S43C, SCM 3H, equivalent, or higher	
	Range	Target
6	0.9 – 1.5	1.2
8	1.5 – 3.5	2.5
10	3.5 – 7.5	5.5
12	5.5 – 12.5	9.0
14	8.5 – 20.0	14.0
16	15.0 – 31.5	23.5
18	20.5 – 43.5	32.0
20	32.5 – 62.0	47.0
22	18.0 – 84.5	66.5
24	60.0 – 105	82.5
27	90.0 – 150	120
30	115 – 195	155
33	150 – 250	200
36	190 – 310	250
39	230 – 370	300

2) When using a torque wrench, use the figures in Table 2.
These torques are used when a particularly small range of tightening torque is needed.

Table 2 Unit: kgm

Material / Nominal diameter of bolt (mm)	S43C, SCM 3H, equivalent, or higher		
	Range	Target	Reference
			Tension load (kg)
6	1.2 – 1.5	1.35	1150
8	2.8 – 3.5	3.2	2175
10	6 – 7.5	6.7	3355
12	10 – 12.5	11.5	4865
14	16 – 20.0	18	6715
16	25 – 31.5	28.5	9350
18	35 – 43.5	39	11200
20	50 – 62.0	56	14800
22	67.5 – 84.5	76	18000
24	84 – 105	94.5	20600
27	120 – 150	135	26000
30	155 – 195	175	30100
33	200 – 250	225	35800
36	250 – 310	280	40700
39	295 – 370	335	45200

2. Tightening torque for pipe threads

Applicable range:

The tightening torques for pipe threads of nominal size PT1/8 – PT1, PS1/8 – PS1 are according to this standard. However, this table does not apply if torque is separately specified.

Tightening torque:

1) If the material of the male screw is SS41.FC.SGP, the tightening torque is as in Table 1.

Table 1 Unit: kgm

Material of female thread / Nominal	Steel	Cast iron	Light alloy
1/8	0.4 – 0.7	0.3 – 0.6	0.2 – 0.4
1/4	0.6 – 1.2	0.5 – 1.0	0.4 – 0.8
3/8	1.7 – 2.7	1.4 – 2.2	1.0 – 1.7
1/2	3.3 – 5.4	2.7 – 4.4	2.0 – 3.3
3/4	5.2 – 8.7	4.3 – 7.2	3.2 – 5.4
1	8.8 – 17.7	7.4 – 14.9	5.6 – 11.4

2) If the material of the male screw is S43C, the tightening torque is as in Table 2.

Table 2 Unit: kgm

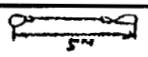
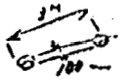
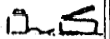
Material of female thread / Nominal	Steel	Cast iron	Light alloy
1/8	1.2 – 2.5	1.0 – 2.0	0.7 – 1.5
1/4	2.0 – 4.5	1.7 – 3.8	1.3 – 2.9
3/8	4.5 – 9.5	3.8 – 7.9	2.8 – 6.0
1/2	10.0 – 19.2	8.5 – 16.1	6.2 – 11.8
3/4	17.4 – 32.3	14.4 – 25.2	10.8 – 19.0
1	37.5 – 62.5	31.6 – 52.5	24.0 – 40.0

3) Tightening torque for rubber hoses with taper seal

Unit: kgm (Nm)

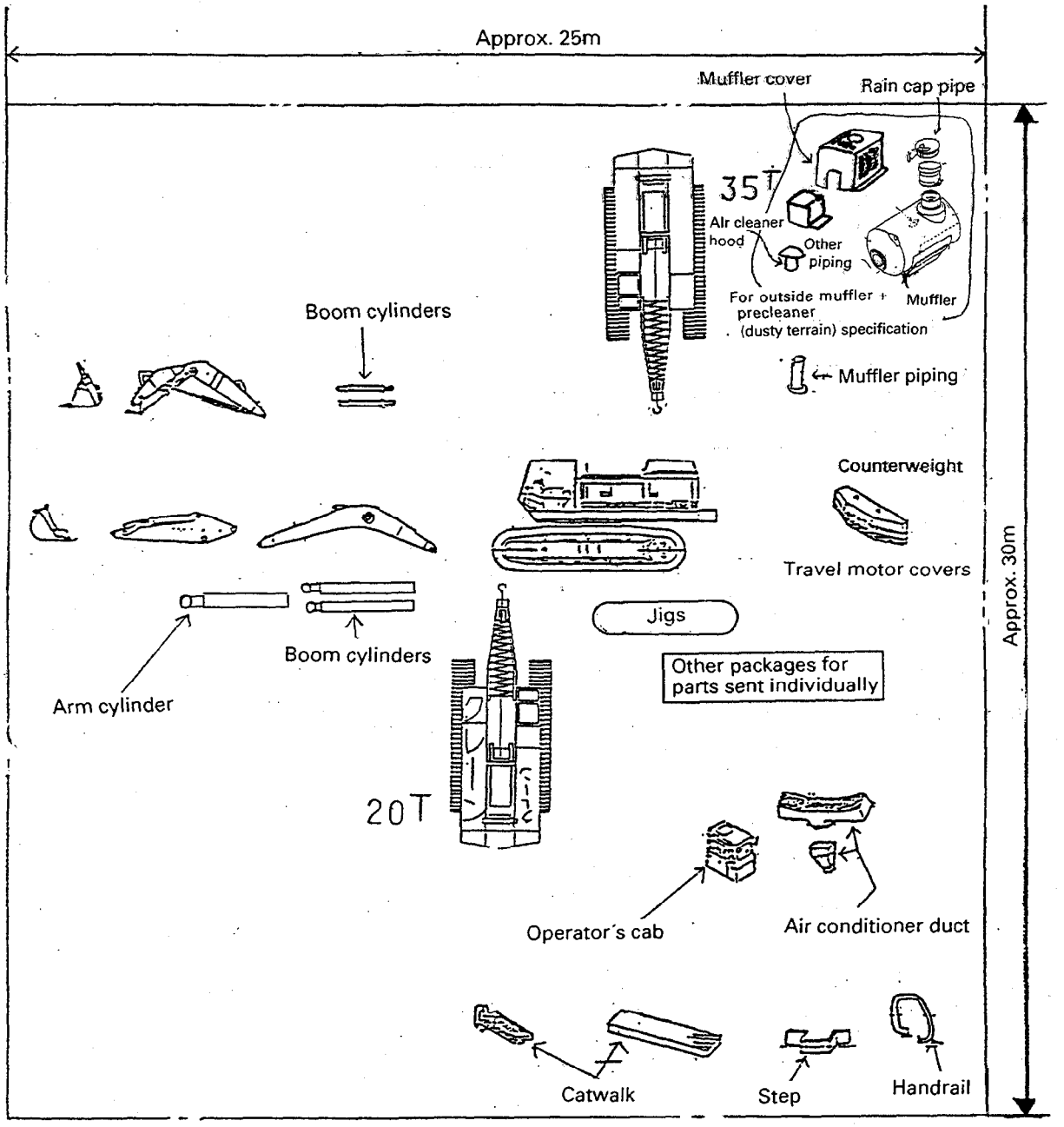
Index No.	02	03	04	05	06	10	12	14
Suitable tightening torque	25±0.5 (24.5±4.9)	5±2 (49±19.6)	8±2 (78.5±19.6)	14±3 (137.3±29.4)	18±5 (176.5±49)	20±5 (196.1±49)	25±5 (245.2±49)	30±5 (294.2±39)

4) Be careful to assemble the rubber hoses without twisting.

Operation	For loading, transportation	Q'ty	Specification	Tools for installing tightening	Q'ty	Specification	Others
Installing work equipment Boom 7.9 ton Arm 5.6 ton Bucket 8.2 ton	1. Wire 20φ x 5m	2	JIS No. 4 	Sledge hammer "10 (45kg)	2		• Safety boots
	2. Wire 30φ x 5m	1	JIS No. 4	Bar 1000ℓ	2		• Helmet
	3. Track crane 35 ton	2	 For 3 ton	Lubricating agent	1	KES07882 LM-P	• Cleaning bucket
				Triethane 18ℓ	3	Cleaning liquid	• Cleaning brush
	5. Nylon sling 100φ x 3m	2		Cloth	1		• Oil pan
	6. Shackle SC36	3	For 8 ton	Stand 1800mm	1 – 2		• Paint (Yellow, space blue)
	7. Lever block 1.5–3 ton	2	1 ton lever block 	Riken pump ram	1 set	Ram Pump R1-63 P-10 	
Installing track frame Revolving frame 29.5 ton Track frame 14.2 ton	8. Wire 30φ x 5m	2	JIS No. 4	Unnecessary when using self-propelled specification			Tools which enable work to be carried out faster • Engine compressor • Impact wrench KW45FS • Impact socket spline x 65 mm • Impact wrench (φ10, φ12, φ16) • Impact wrench air hose
	9. Wire 25φ x 8m	2	JIS No. 4				
	10. Pin 50φ x 500L	2	 For lifting track frame				
	11. Hydraulic jack	2	50 tonx 170 stroke				
	12. Revolving frame stand	4	or wooden sleeper				
	12a. Corner pad	4	To prevent damage to wire rope				
Track frame For extending, tightening				Power wrench 12x or 16x	1	Tone x12 wrench (x16 wrench can be used) (x16 wrench can be used)	
				Torque wrench	1	5000 kgcm, (Use x12 at 32 kgm; x16 at 24 kgm)	
				Socket 25.4□x 60	1	Tightening torque (for x12)	
				or 38.1□x 60	1	(for x16)	
Counterweight 14 ton	13. Wire	(2)	For work equipment and counterweight	Socket 38.1 x 65	2	Tightening torque 350 – 430 kgm	
				x16 wrench	1	Tone x16 wrench (for x16)	
				Torque wrench	1	5000 kgcm (Use at 28 kgm)	
Operator's cab, machine cab Maintenance work	14. Wire 10φ x 3m	2		Standard tool set	1 set	19□ socket, 12□ socket, spanner, chisel, bench, adjustable wrench	
	15. Wire 12φ x 3m	2		Working lamp 15V x 6	1		
	16. Lever block 3/4 ton	(1)		Hydraulic oil	300 ℓ	EO10-CD (SAE10W)	
	17. Shackle sc18	4		Grease for track	4	07950-90403	
				Grease pump for track	1	07950-10450,07951-21045	
Installing front loading shoevel potentiometer				3-pin T-adapter	1		
				Digital voltmeter	1		

A-6: PLACE TO SET (UNLOAD) EACH UNIT

★ Leave a space open for a truck crane to be brought in.
★ When unloading, lay out the units as shown in the diagram below. This will enable assembly operations to be carried out smoothly.



B. ASSEMBLY OF MACHINE (Part I)

START OF ASSEMBLY FOR MACHINE DIVIDED INTO FOUR PARTS FOR TRANSPORTATION

B-1: INSTALLATION OF LEFT, RIGHT TRACK FRAMES

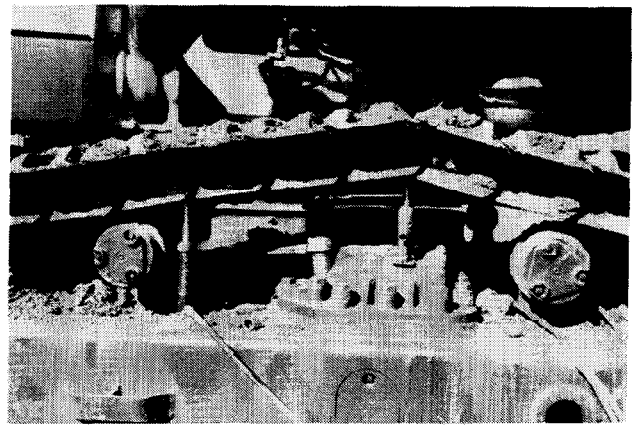
Tools and facilities required

No.	Name	Q'ty
1	Wire rope (ϕ30 x 5m)	2
2	Wire rope (ϕ25 x 8m)	2
3	Hydraulic jack (50 ton x 70 stroke)	2
4	Power wrench (x12 or x16)	1
5	Torque wrench (x12 = 32kgm or x16 = 24kgm)	1
6	Socket (x12 = 25.4□ x 60 or x16 = 38.1□ x 60)	1

★ All the mounting surfaces have been given rust prevention treatment, so clean them with triethane.

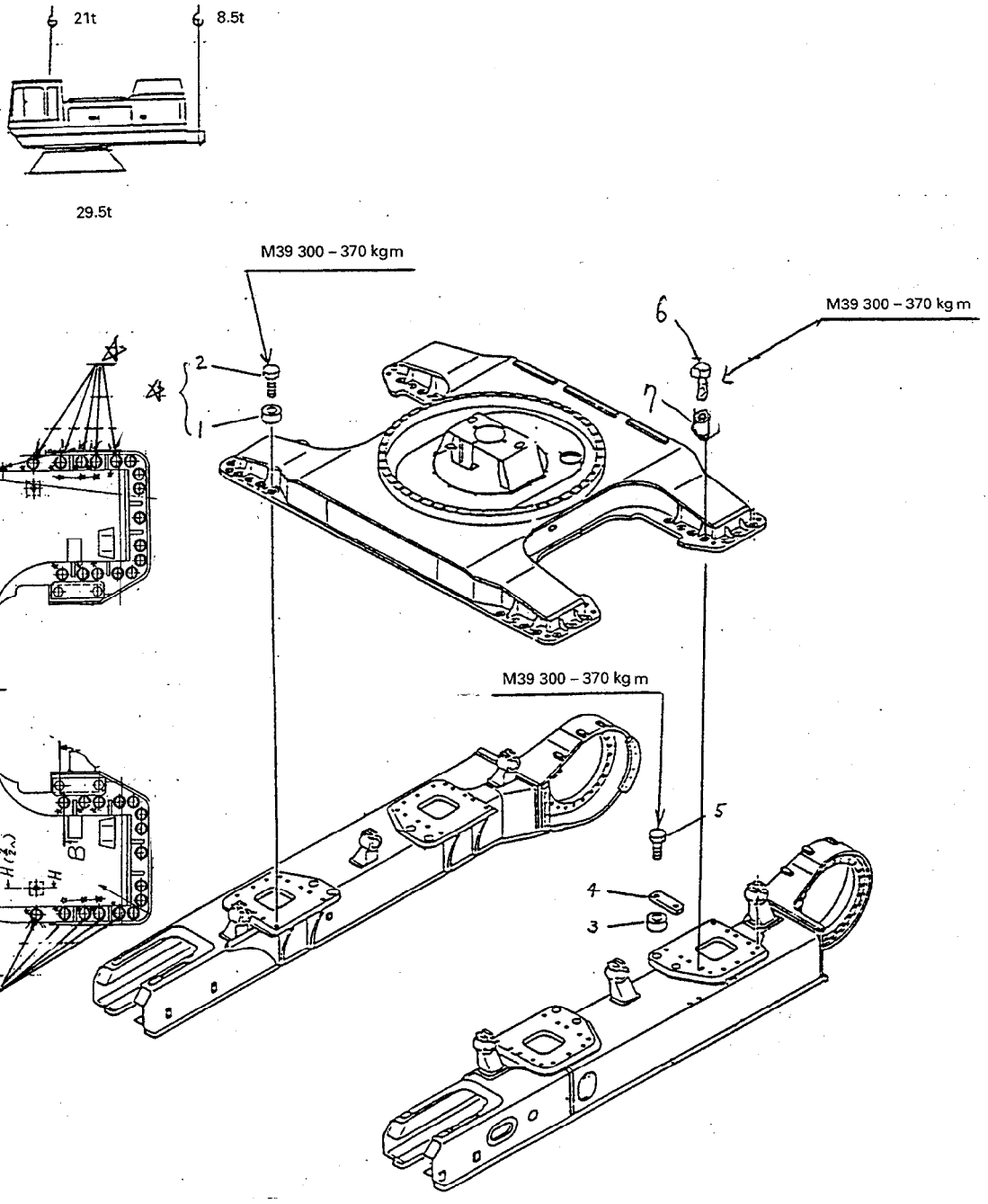
1. Raise the upper structure with a crane, align with the tap holes in the track frame, then install bolts (1) and spacers (2) sent individually.
   (Carry out the same operation for the left and right track frames.)
2. Intall collars (3), plates (4), and bolts (5).

★ When tightening the bolts, use hydraulic jacks as shown on the right to jack up the track and ensure space for the tightening operation.



Parts sent individually

No.	Part No.	Part Name	Q'ty
1	21N-30-11170	Spacer	60
2	21N-30-11190	Bolt	60
3	21N-30-11160	Collar	8
4	21N-30-11230	Plate	4
5	21N-30-11180	Bolt	8
6	21N-30-11180	Bolt	20
7	21N-30-11171	Spacer	20


21t
8.5t
29.5t
M39 300 – 370 kgm
M39 300 – 370 kg m
M39 300 – 370 kg m
1
2
3
4
5
6
7

B-2: INSTALLATION OF TRAVEL PIPING

1. Remove the blind plate from Hic piping Ⓗ , then replace the O-rings with new O-rings (07000-13025 x 2) (sent as individual parts) and connect the hose. (Fig. 1)
   Use the same split flanges, bolts, and washers again.
2. Install speed selector pilot hoses Ⓔ (07103-50312 x 2), drain hoses Ⓕ (07103-50515 x 2).
   (Fig. 3 and Figs. 1, 2)
3. Install main hoses Ⓐ , Ⓑ , Ⓒ , and Ⓓ to the center frame side. (Fig. 3)
   Replace the O-rings (07000-13032 x 8) with new parts (sentt as individual parts), and use the split flanges, bolts, and washers again.
4. Using the separately sent flanges (07377-01018 x 4), short circuit Ⓐ and Ⓑ , and Ⓒ and Ⓓ . (Fig. 4)
   On both the left and right sides of the machines.
   Use the same O-rings, split flanges, bolts, and washers again.

[Short circuit]

Related parts for high, low pressure hoses
(Parts sent individually)

Part No.	Part Name	Q'ty	Remarks
07000-13032	O-ring	16	For Ⓐ, Ⓑ, Ⓒ, Ⓓ
07000-13025	O-ring	2	For part Ⓗ
07377-01018	Flange	4	To short circuit Ⓐ, Ⓑ, Ⓒ, Ⓓ

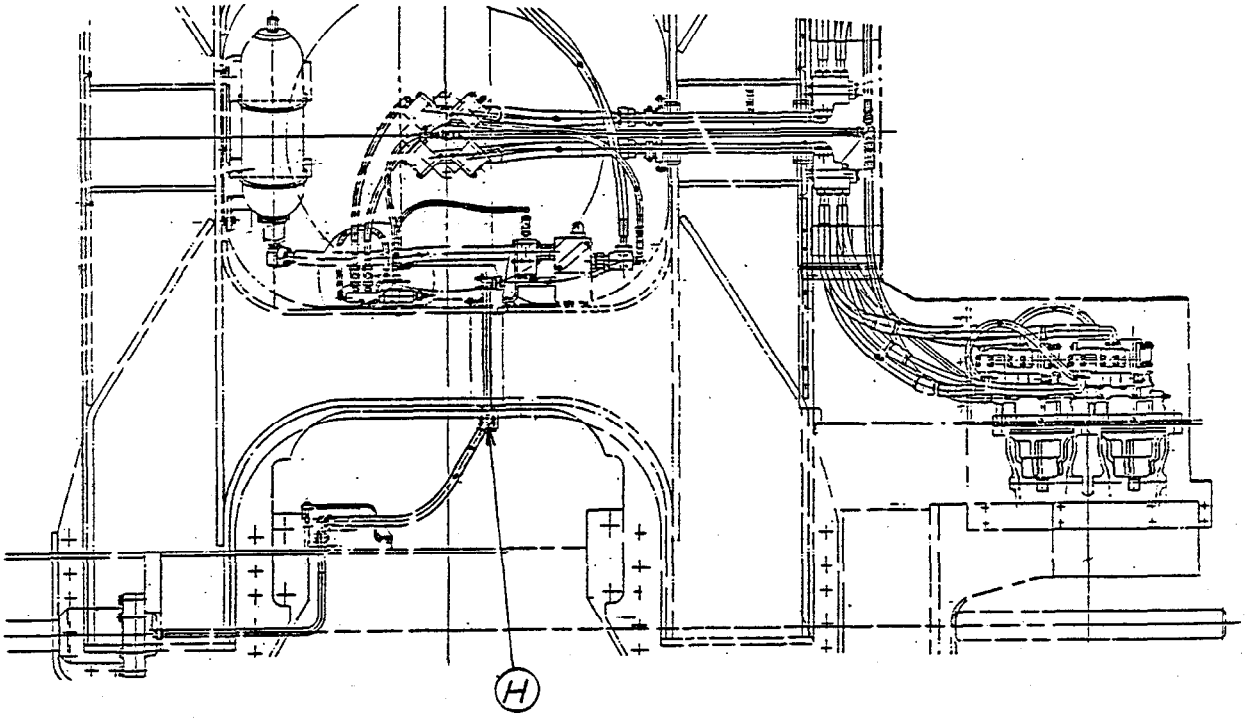


Fig. 1 View from top

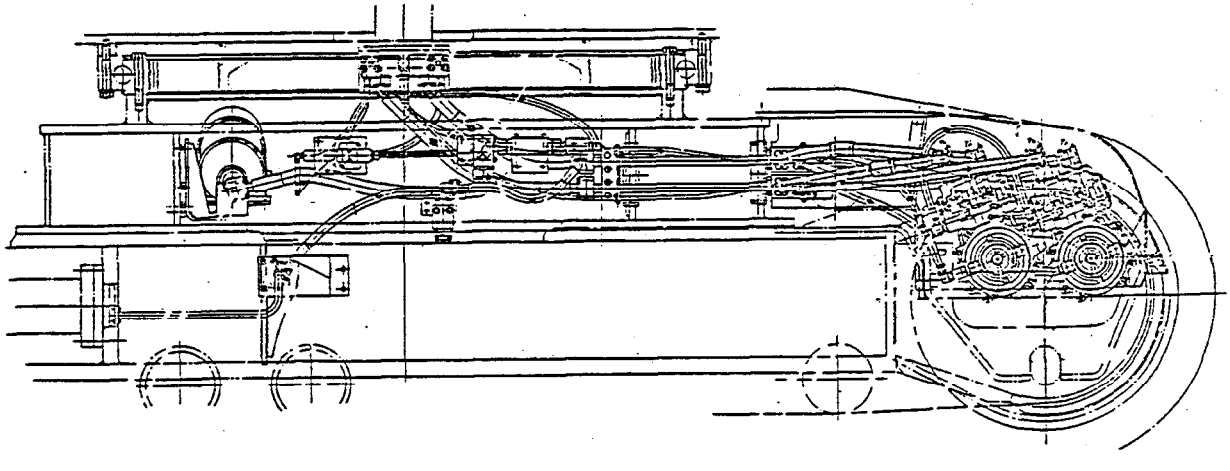


Fig. 2 View from left side of machine

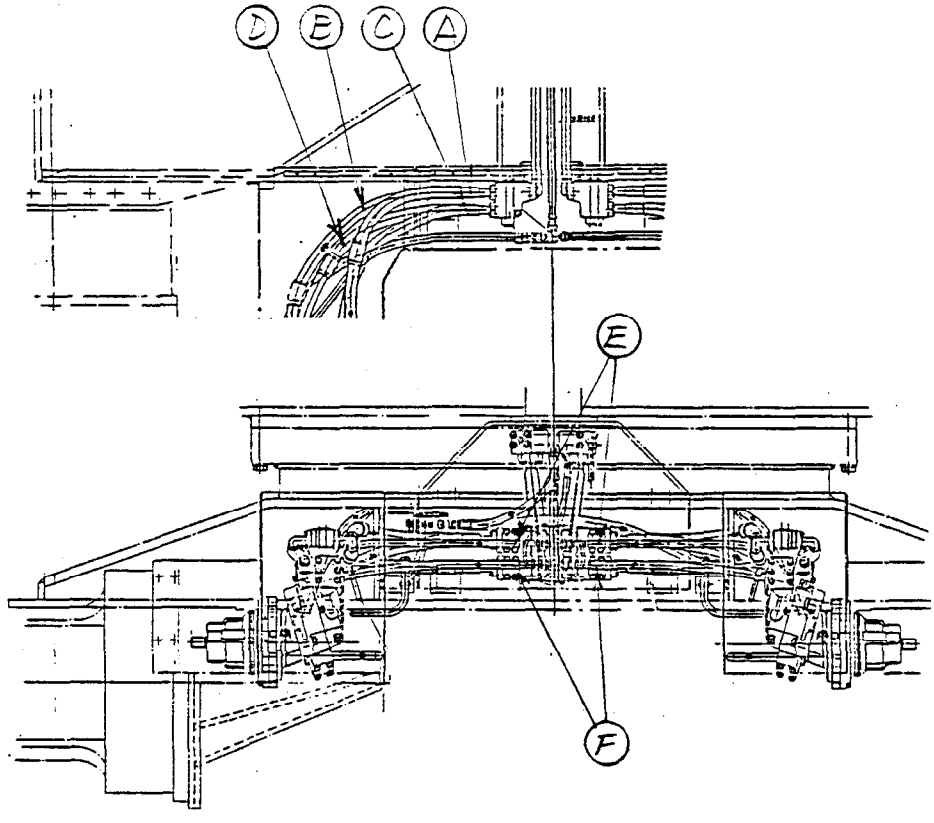


Fig. 3 View from rear of machine

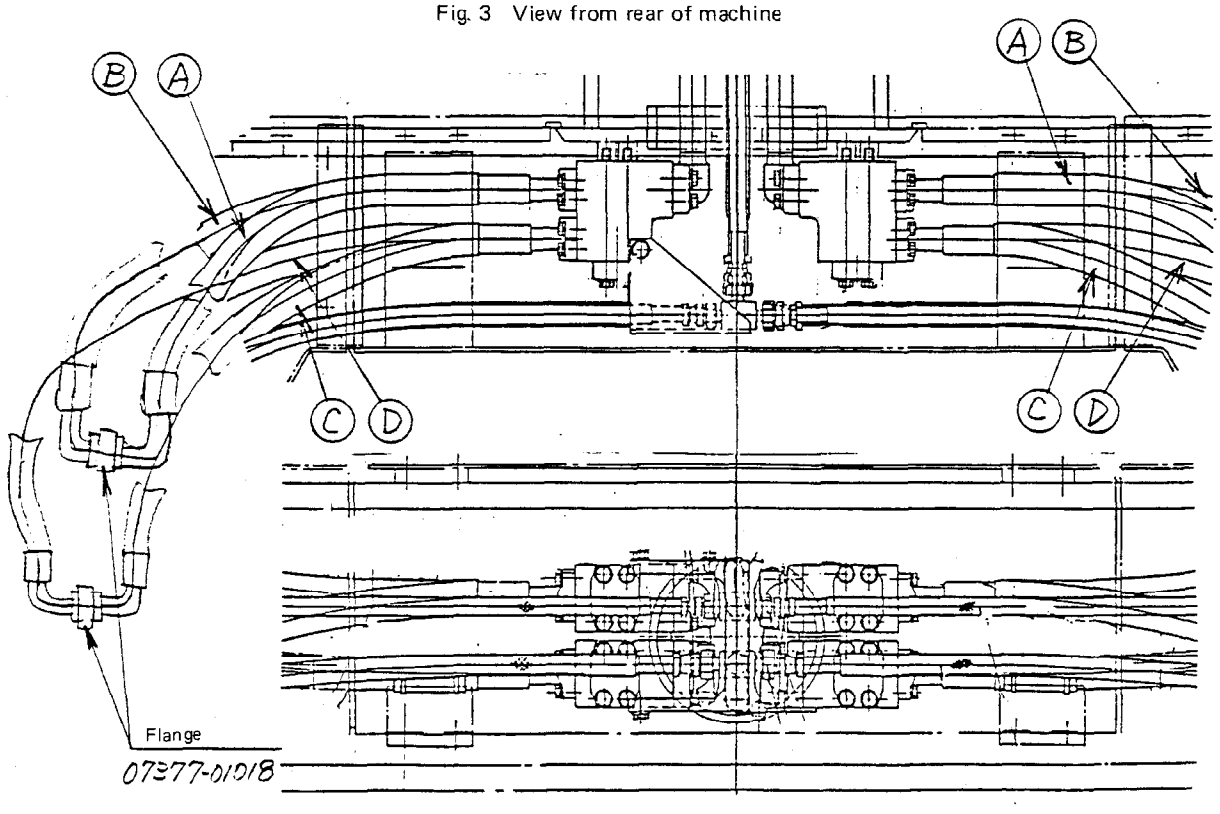
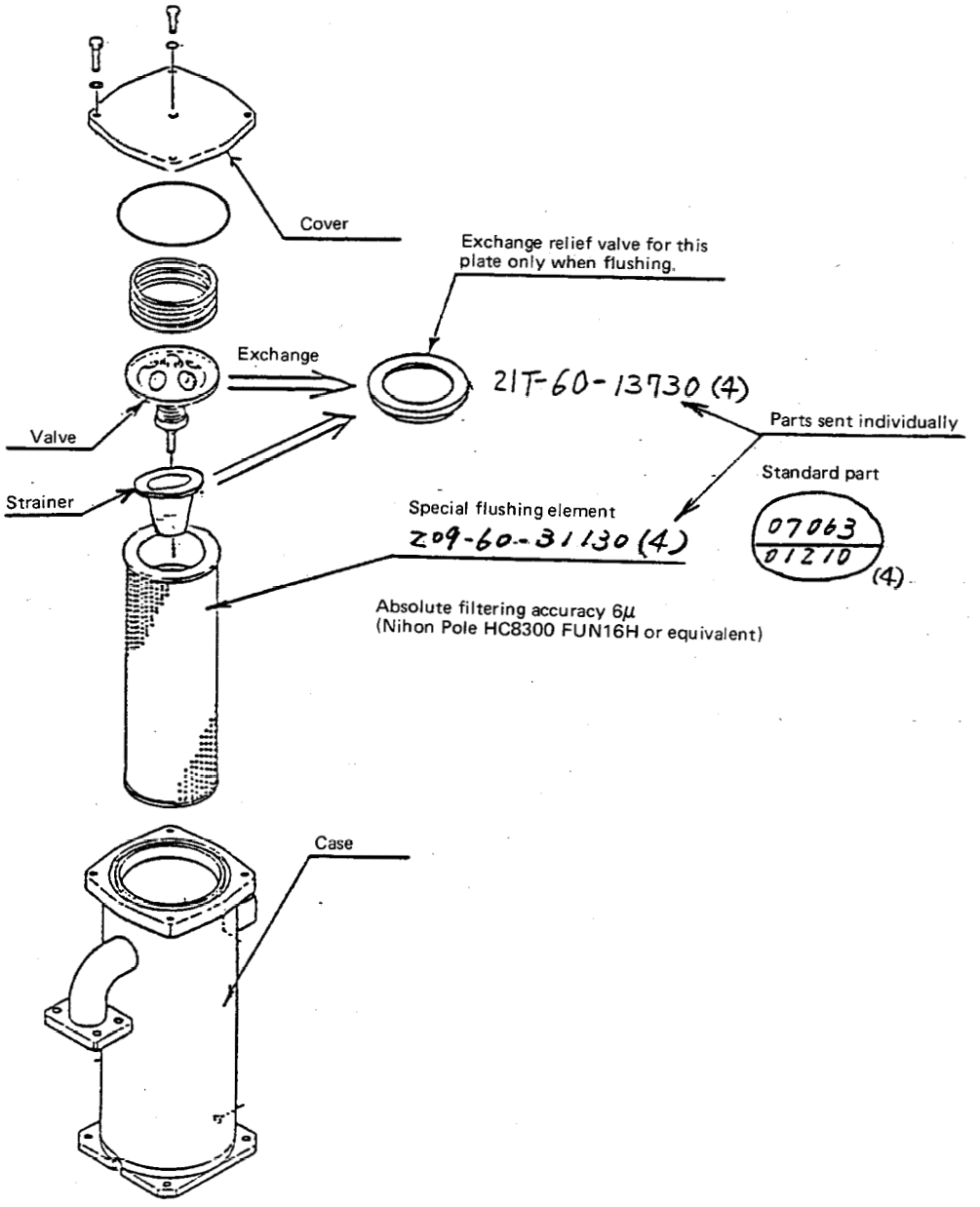


Fig. 4 (Exploded view of Fig. 3)

B-3: EXCHANGING RETURN FILTER
(standard part → special flushing part)

1. Exchange the hydraulic oil return filter elements for the special flushing elements (209-60-31130 x 4, 21T-60-13730 x 4).
   ★ The removed standard parts elements (07063-01210) x 4, strainers (206-60-41220) x 4, valves (12R-60-11300) x 4 are used again after completion of flushing, so keep them in a safe place and be careful not to damage them.

★ When replacing the element, raise the element carefully to prevent any dirt or dust stuck to the element from falling inside.
Remove any dirt remaining inside the case by hand.



Condition of element when installed

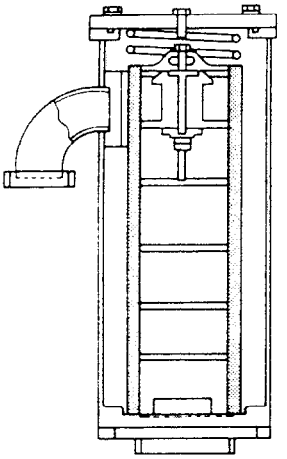


Fig. 1 Correct installation

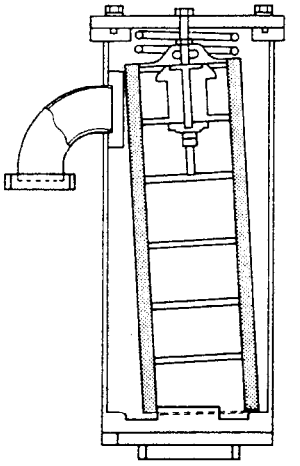


Fig. 2 Incorrect installation

Precautions

Be careful not to assemble the element with the bottom resting on the stepped part at the bottom of the case as shown in Fig. 2.

When there is oil inside the filter case, it is particularly difficult to judge if the element is assembled correctly, so after inserting the element, rotate it by hand and check that it rotates smoothly. If it rotates smoothly, it can be considered that it is installed correctly.

B-4: CHECK OF OIL AND WATER LEVELS

1. Check all oil and water levels, and add oil or water if necessary.

RESERVOIR	KIND OF FLUID	AMBIENT TEMPERATURE 14 32 50 68 86°F −10 0 10 20 30°C	CAPACITY (ℓ)	
			Specified	Refill
Engine oil pan	Engine oil	SAE 30 SAE 10W SAE 10W-30 SAE 15W-40	61	51
PTO case	Engine oil	SAE 30 SAE 10W	15	15
Swing machinery case (each)	Engine oil	SAE 30	13	13
Final drive case (each)	Engine oil	SAE 30	45	45
Hydraulic system	Engine oil	SAE 10W SAE 10W-30 SAE 15W-40	1200	650
Fuel tank	Diesel fuel	※ ASTM D975 No. 2	1140	–
Cooling system	Water	Add antifreeze	160	–

※ ASTM D975 No. 1

★ When starting the engine in temperatures below 0°C, even if the daytime temperature rises to around 10°C, always use SAE10W, SAE10W-30 and SAE15W-40.
★ Use tap water for the cooling system.

Anti-freeze
When the temperature goes below 0°C, add anti-freeze.

Table of water-antifreeze ratios

Min. temperature(°C) / Amount (ℓ)	−5	−10	−15	−20	−25
Antifreeze	37	48	58	66	74
Water	123	112	102	94	86

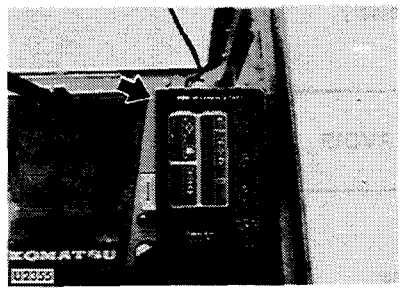
⚠ Antifreeze is a flammable fluid, so keep it away from fire.

★ Use anti-corrosion, all-season antifreeze (AF-ACL). Never use alcohol-based antifreeze.

B-5: CHECK CENTRAL MONITOR

Carry out the following checks to ensure that the system is not prevented from giving warning due to defective operation of the buzzer or burnt out bulbs in the central monitor.

1. Before starting the engine, turn the starting switch to the ON position. All monitors and gauges should light up for approx. 3 seconds, and the alarm buzzer should sound.
   Check that the alarm buzzer does not sound after this.



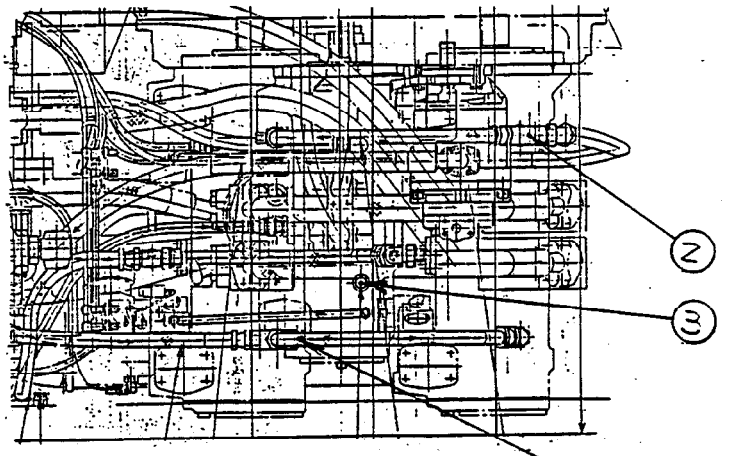
B-6: BLEEDING AIR FROM HYDRAULIC PUMP, SWING PUMP

1. Check that the hydraulic oil is at the specified level, then loosen air bleed plugs ① and ② two turns. Remove plug ③ .
2. Remove the oil filler cap from the hydraulic tank, and check that oil comes out from the hole of plug ③ , then tighten plug ③ .
3. Add hydraulic oil to the specified level.
4. Start the engine and run at low idling. When no more cloudy white oil comes out from plugs ① and ② , tighten plugs ① and ② .
   - ★ When doing this, do not operate the control levers in the operator's compartment.
   - ★ Lower the hydraulic safety lock to the LOCK position.
5. Stop the engine, add hydraulic oil to the specified level, then install the cap.

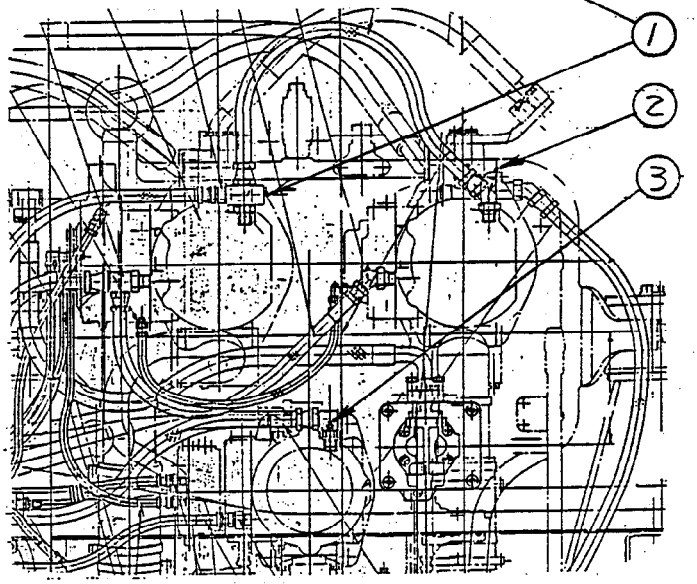
★ Start the engine and run at low idling for at least ten minutes.
- ★ When doing this, do not operate the control levers in the operator's compartment.
- ★ Lower the hydraulic safety lock to the LOCK position.

★ Clean the machine to make it easier to locate any problem points.

Be particularly careful to keep the greasing points and oil level gauges clean and to prevent the entry of dirt or dust.



View from top



Front of machine ←

View from left side of machine

(Open the rear side cover at the left side of the machine)

B-7: FLUSHING TRAVEL CIRCUIT

Note:
If the filter caution lamp on the monitor inside the operator's cab lights up during the flushing operation, stop the engine immediately and replace the flushing element.
If there are no more flushing elements available, replace with a new standard part (07063-01210).

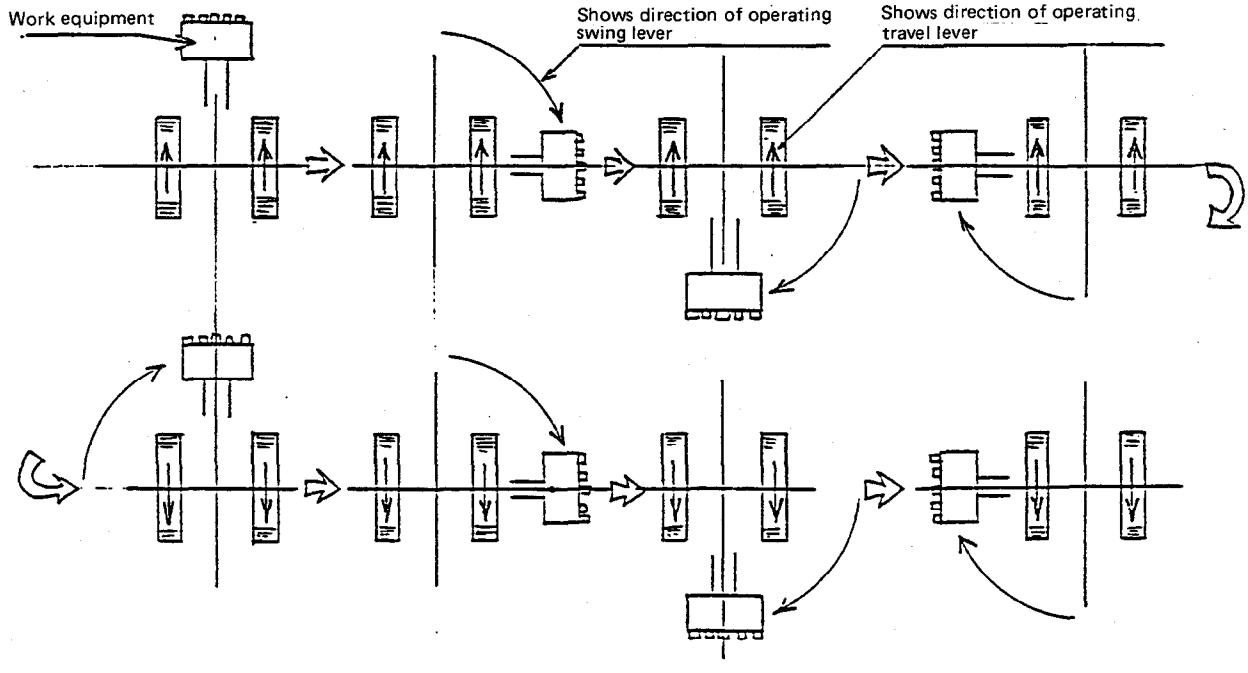
Procedure for flushing

★ Raise the hydraulic safety lock to the FREE position.

1. Set the left and right travel levers to FORWARD. (Approx. 15 sec) Engine full throttle.
2. Swing the upper structure 90°. (Swing either to the right or to the left).
3. Set the left and right travel levers to FORWARD. (Approx. 15 sec) Engine full throttle.
4. Swing the upper structure a further 90°.
5. Set the left and right travel levers to FORWARD. (Approx. 15 sec) Engine full throttle.
6. Swing the upper structure a further 90°.
7. Set the left and right travel levers to FORWARD. (Approx. 15 sec) Engine full throttle.
8. Set the left and right travel levers to REVERSE. (Approx. 15 sec) Engine full throttle.
9. Swing the upper structure a further 90°.
10. Set the left and right travel levers to REVERSE, and repeat Steps 3 – 6.

★ The travel circuit is short circuited and the system is flushed, but the purpose of swinging the upper structure 90° at a time is to completely remove the dirt inside the center swivel joint. (When the swivel joint rotor port and shaft port are at the same position, the flow of oil in the shaft groove is small, and it is difficult to get the dirt out, so swing the upper structure to change the position.)

★ The travel circuit is being short circuited, so even if the travel lever is operated, the machine will not move.



B-8: INSTALLATION OF TRAVEL PIPING

1. Stop the engine and operate the travel levers to the end of their stroke within 5 – 6 seconds to release the remaining pressure in the travel circuit.
   ★ Leave the safety lock lever in the FREE position.
2. Start the engine again, run for approx. 10 seconds, then stop the engine.
   ★ Do not run the engine above 1000 rpm.
   ★ Keep the control levers at neutral.
   ★ Leave the safety lock lever in the FREE position.
3. Stop the engine and operate the travel levers to the end of their stroke within 5 – 6 seconds to release the remaining pressure in the travel circuit.
   ★ Raise the safety lock lever and leave it in the FREE position.

   Repeat Steps 2 and 3 three times.

   This completes the release of the pressure in the travel circuit.
   ★ Lower the safety lock lever to the LOCK position.
4. Install the short circuited travel pipes Ⓐ , Ⓑ , Ⓒ , and Ⓓ to the standard circuit as shown in Figs. 1, 2, and 3.

   Use new parts sent individually for the O-rings (07000-13032 x 8), and use the same split flanges, bolts, and washers again.

C. ASSEMBLY OF MACHINE (Part II)

START OF ASSEMBLY FOR MACHINE DIVIDED INTO THREE PARTS FOR TRANSPORTATION
(USED ALSO FOR MACHINE DIVIDED INTO FOUR PARTS FOR TRANSPORTATION)

C-1: INSTALLATION OF LEFT SIDE STEP

★ Remove the rust prevention plugs knocked into the mounting tap holes.

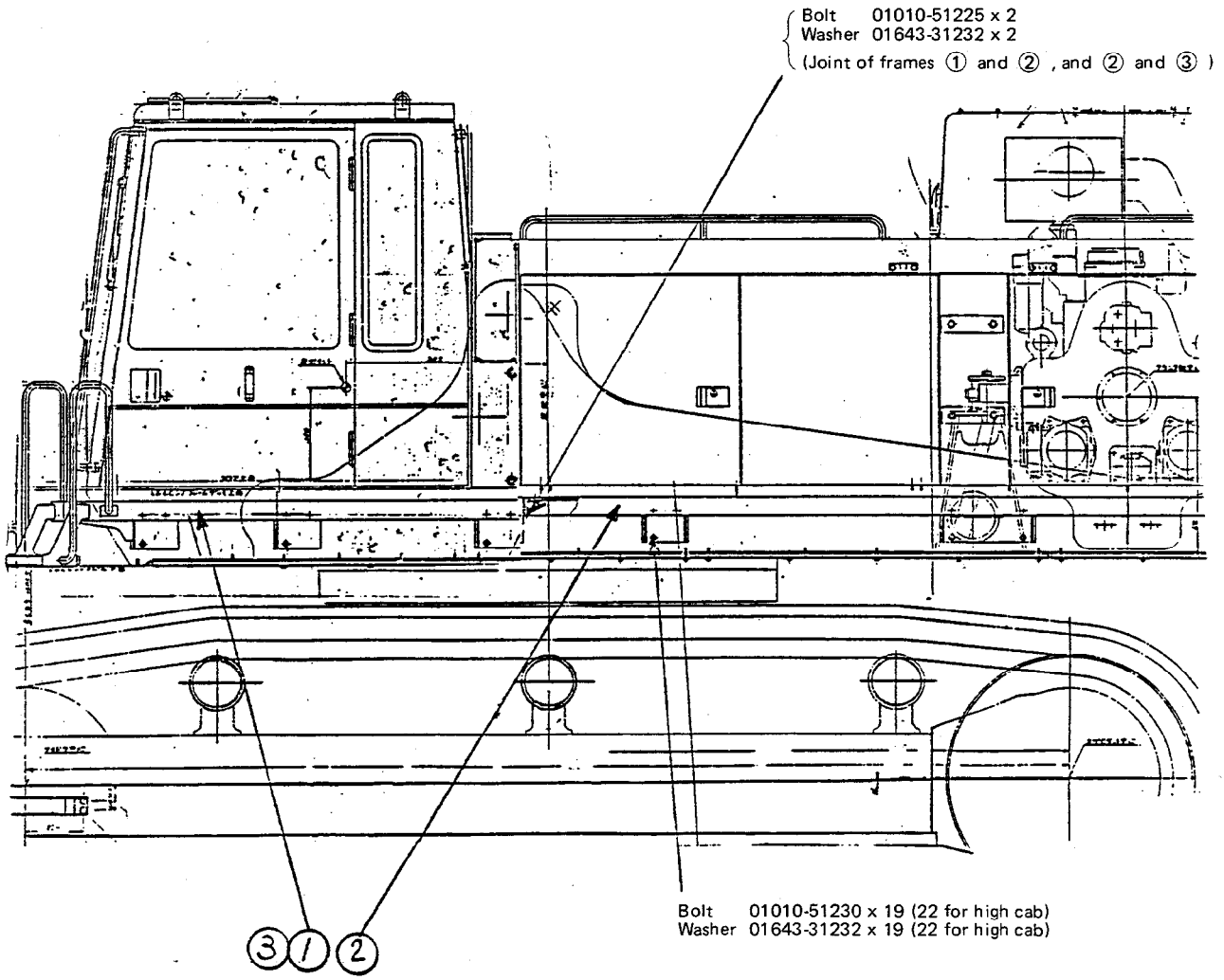
Raise frames ① and ② , and install to the chassis.
(For high cab: frames ② and ③)
[Mounting bolt: M12 x 1.75 x 21 (for high cab: 24)]

kg Frame ① : 56 kg
Frame ② : 57 kg
Frame ③ : 130 kg (for high cab)

Part No. Frame ① : 21N-54-12320
Frame ② : 21N-54-12310
Frame ③ : 21N-54-12330 (for high cab)

Types of mounting bolts (Parts sent individually)

Part No.	Part Name	Q'ty	Remarks
01010-51225	Bolt	2	
01010-51230	Bolt	19	
01643-31232	Washer	21	
01010-51230	Bolt	3	Additional parts for high cab
01643-31232	Washer	3	



C-2: INSTALLATION OF STEP

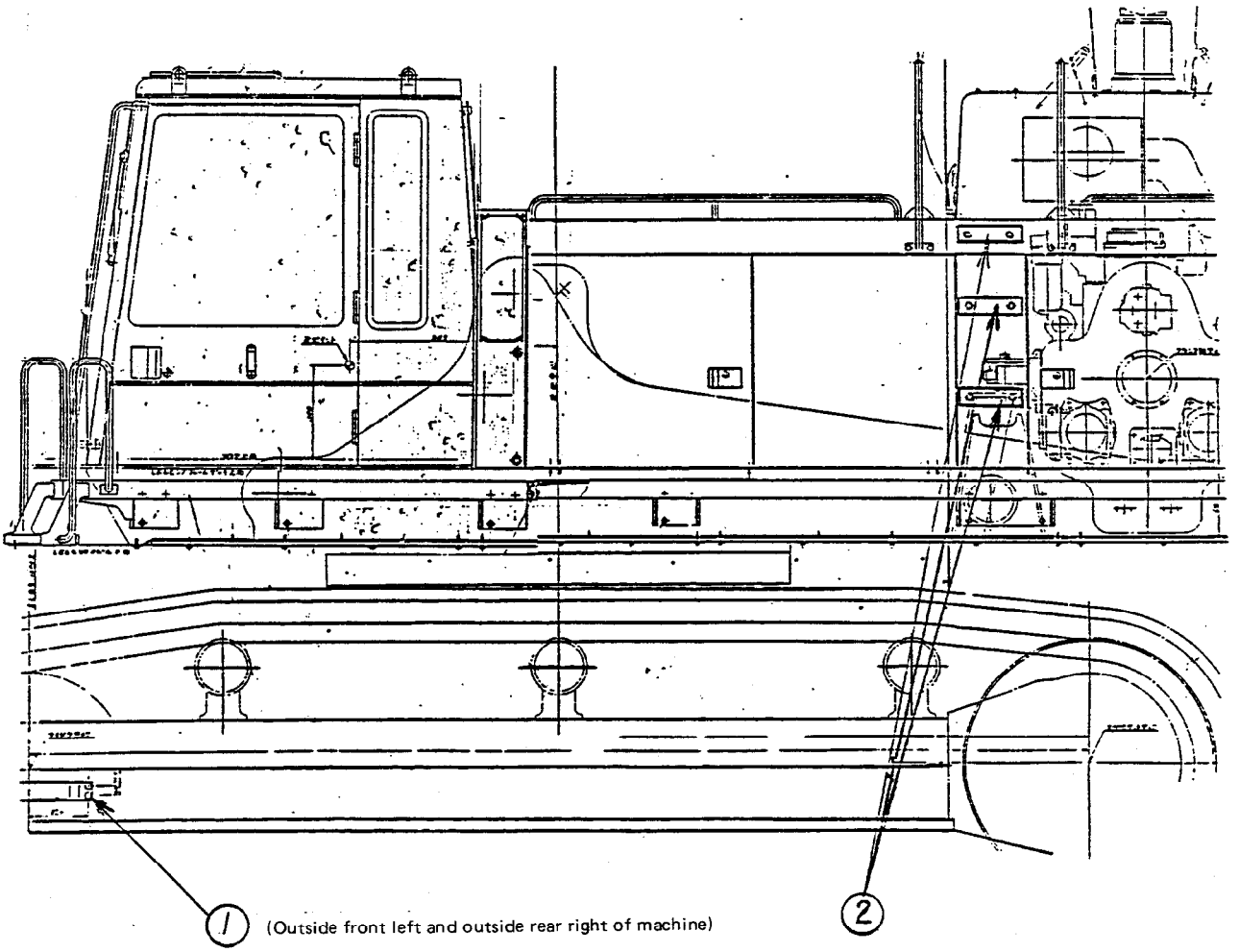
★ Remove the rust prevention plugs knocked into the mounting tap holes.

Install steps ① and ② .
[Mounting bolt: M12 x 1.75 x 6, for step ②
M16 x 2 x 8, for step ①]

Parts sent individually
Step ① : 209-54-54130 x 2
Step ② : 209-54-54140 x 3

Types of mounting bolts (Parts sent individually)

Part No.	Part Name	Q'ty
01010-51230	Bolt	6
01643-31232	Washer	6
01010-51640	Bolt	8
01643-31645	Washer	8



C-3: INSTALLATION OF HANDRAIL

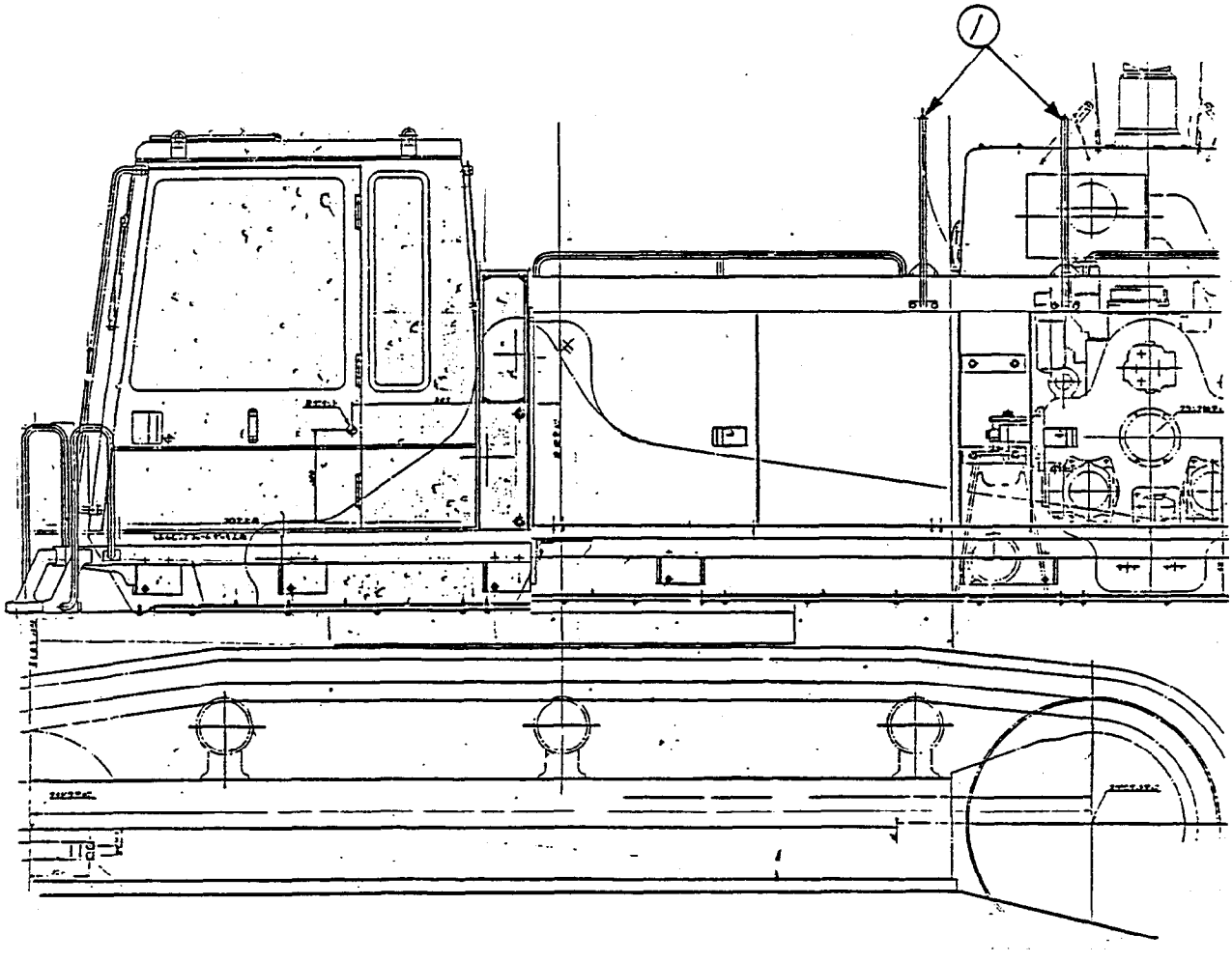
★ Remove the rust prevention plugs knocked into the mounting tap holes.

Install handrail ① .
[Mounting bolt: M12 x 1.75 x 8]

Parts sent individually
Handrail ① : 21N-54-11340 x 2

Types of mounting bolts (Parts sent individually)

Part No.	Part Name	Q'ty
01010-51230	Bolt	8
01643-31232	Washer	8



C-4: INSTALLATION OF STEP
(only when installing high cab)

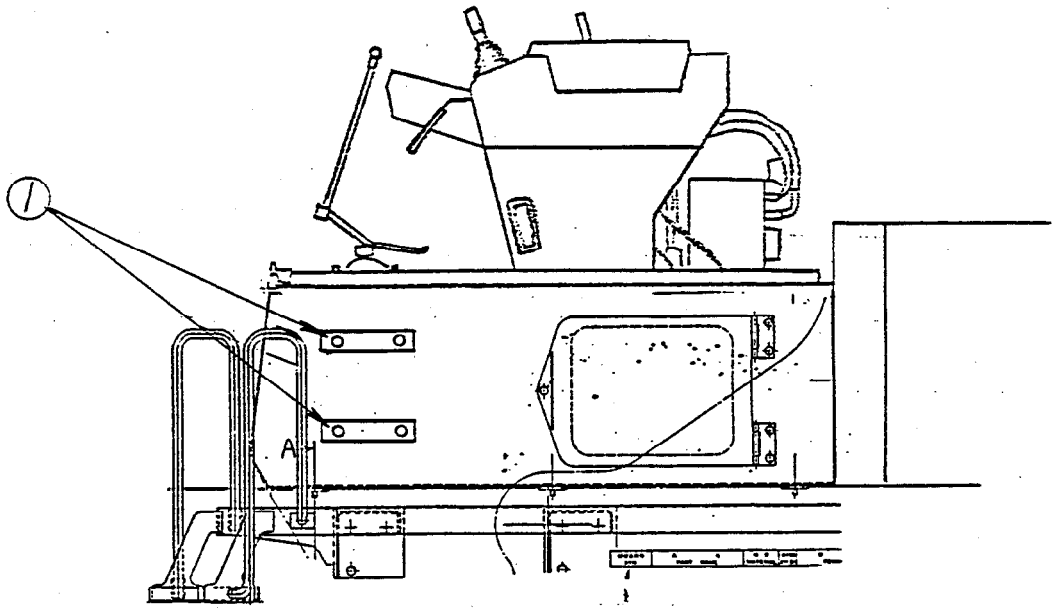
★ Remove the rust prevention plugs knocked into the mounting tap holes.

Install step ① only when installing high cab.
[Mounting bolt: M12 x 1.75 x 4]

Parts sent individually
Step ① : 209-54-54140 x 2

Types of mounting bolts (Parts sent individually)

Part No.	Part Name	Q'ty
01010-51230	Bolt	4
01643-31232	Washer	4



C-5: INSTALLATION OF OPERATOR'S CAB ASSEMBLY

★ Be extremely careful not to break or damage the glass of the operator's cab when installing.

1. Raise the operator's cab assembly, set in position, and install 9 mounting bolts. (Only when installing high cab)

   kg Operator's cab assembly: 300 kg

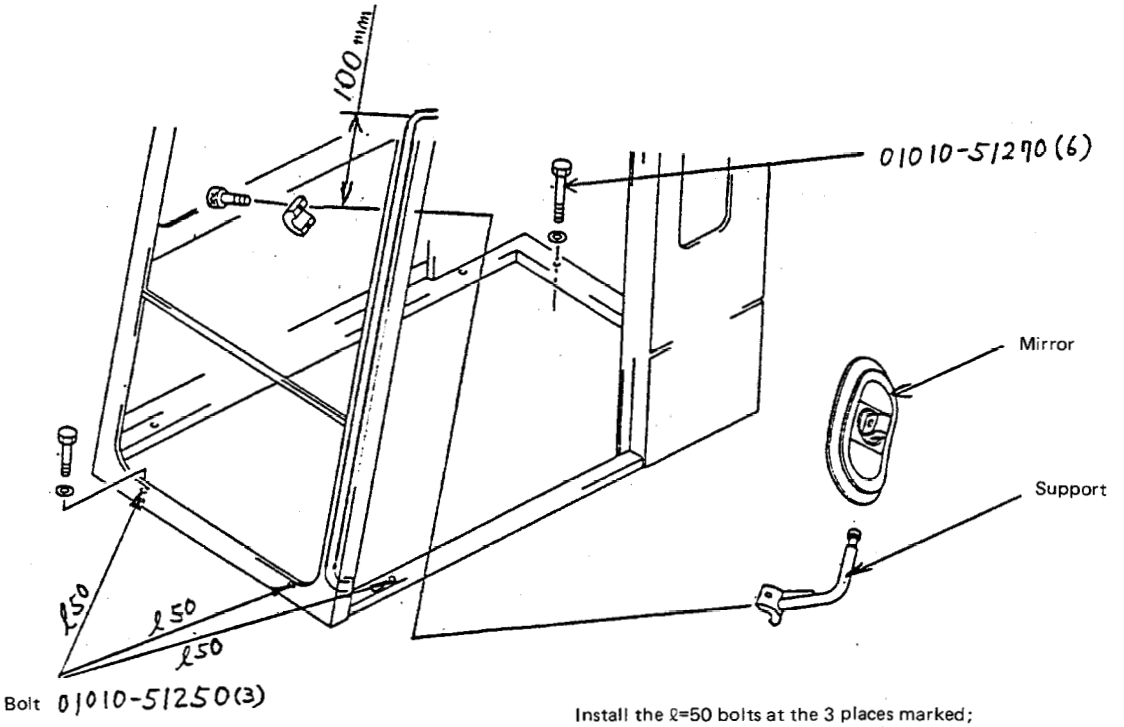
   ★ Before installing the operator's cab, loosen 4 mounting bolts (mounting to floor) of the left control box assembly, and move the box to the inside.

   ★ After installing the operator's cab, if there is interference between the operator's cab and the right panel, loosen 5 mounting bolts (mounting to floor) of the right control box assembly and move the box to the inside to ensure a clearance. (Clearance: Min. 2 mm)

2. Install the mirror to the operator's cab stay. (Approx. 100 mm from the stay corner)

Types of mounting bolts (Parts sent individually)

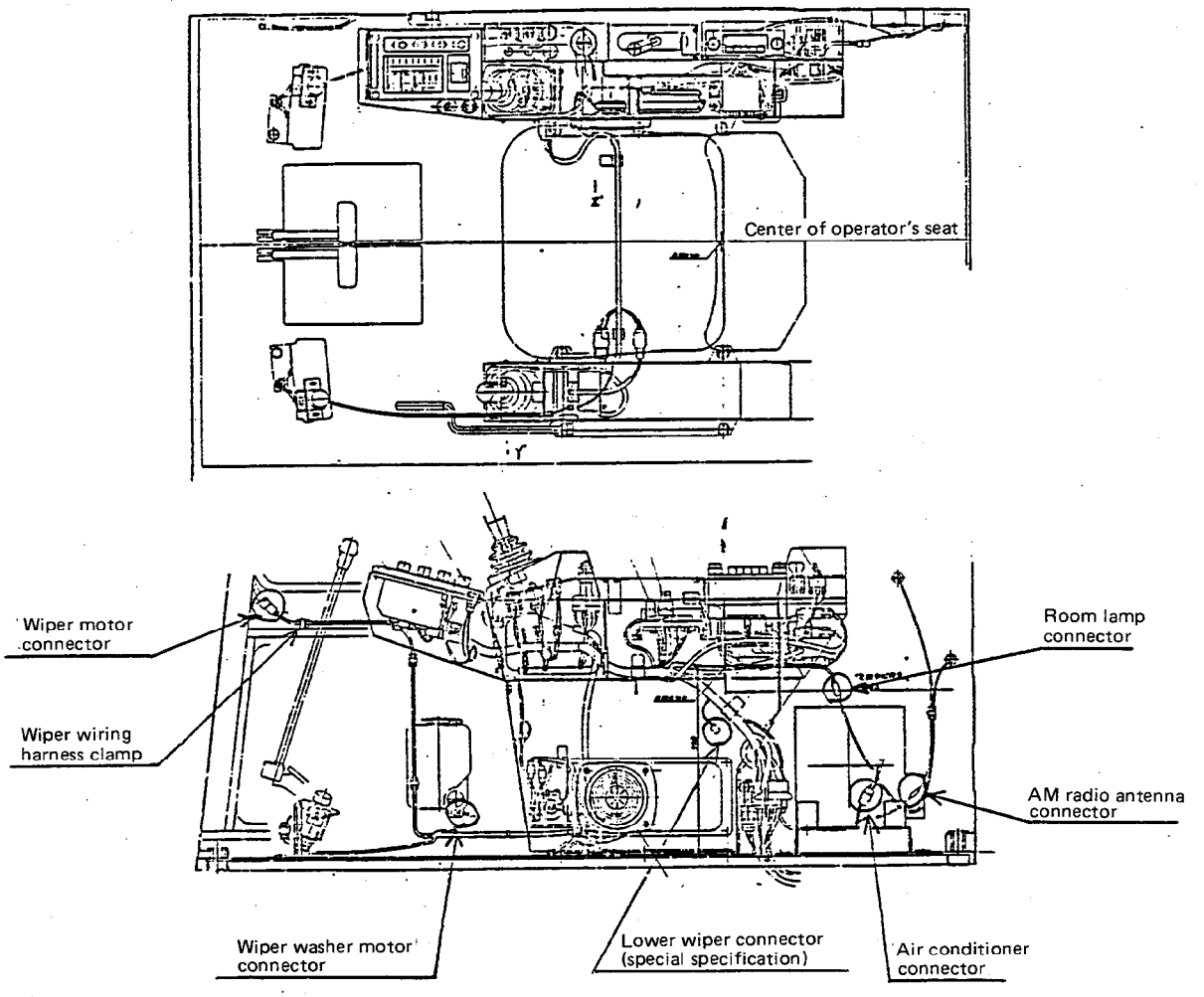
Part No.	Part Name	Q'ty
01010-51250	Bolt	3
01010-51270	Bolt	6
01643-31232	Washer	9
08174-33023	Mirror	1
205-54-68480	Support	1
207-54-17840	Clamp	1
01252-41025	Bolt	2



Install the ℓ=50 bolts at the 3 places marked;
Install the ℓ=70 bolts at the other 6 places.

C-6: CONNECTION OF ELECTRICAL COMPONENTS IN OPERATOR'S CAB
(only when installing high cab)

1. Remove the rust-preventive vinyl from the connectors for the air conditioner, AM radio antenna and room lamps, then connect.
2. Clamp the wiper wiring harness, then connect the wiper motor and washer motor connectors.



C-7: INSTALLATION OF AIR CONDITIONER
(only when installing high cab)

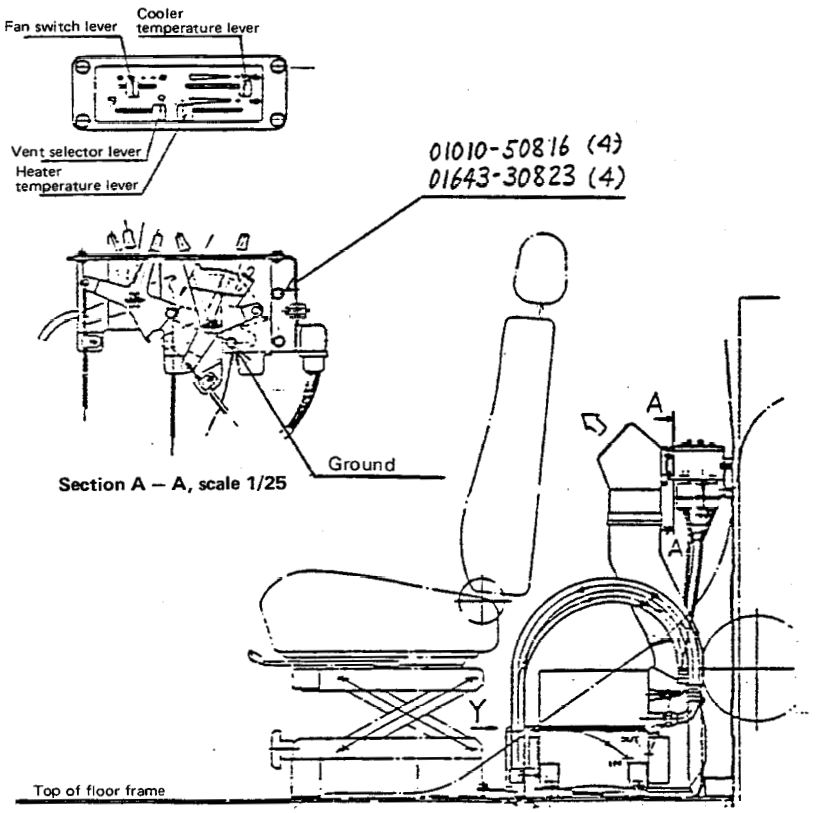
★ Keep the electrical wiring connectors and the push-pull cable between the air conditioner unit and the control panel still connected and put them on the floor.
★ The air conditioner mount is the same as for the PC200-3.

1. Install the control panel (with the cables and wiring still connected) to the rear right of the operator's cab.

Parts sent individually

Part No.	Part Name	Q'ty
01010-50816	Bolt	4
01643-30823	Washer	4

★ When installing the control panel, tighten the ground connection using the bolt shown in the diagram below.



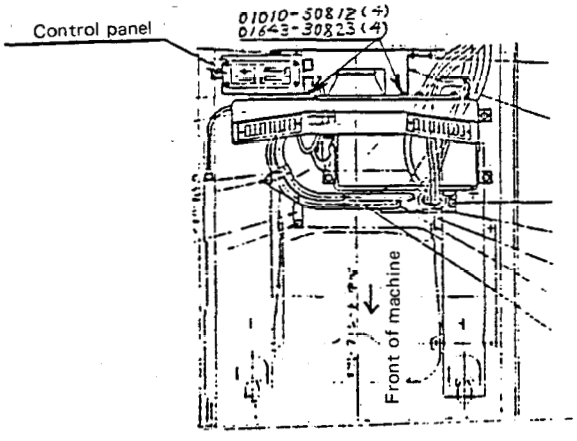
2. Install the air vent duct. Install duct ① to the air conditioner unit.

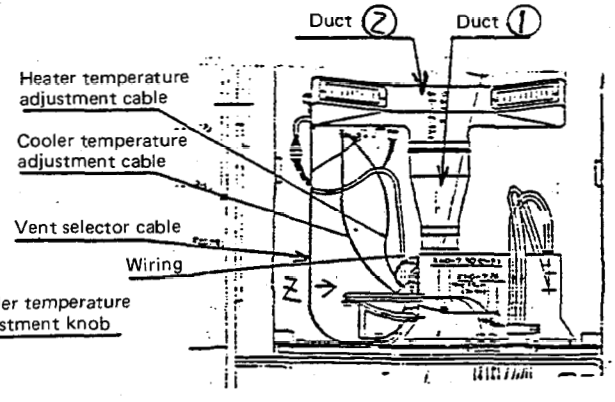
   Part No. Duct ① : 205-979-6140

3. Connect duct ② to duct ① , then secure to the bracket with the mounting bolts.

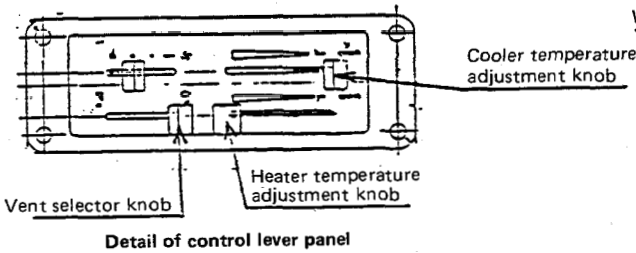
   Mounting bolt: 01010-50812 x 4
   01643-30823 x 4

   Part No. Duct ② : 205-979-6130

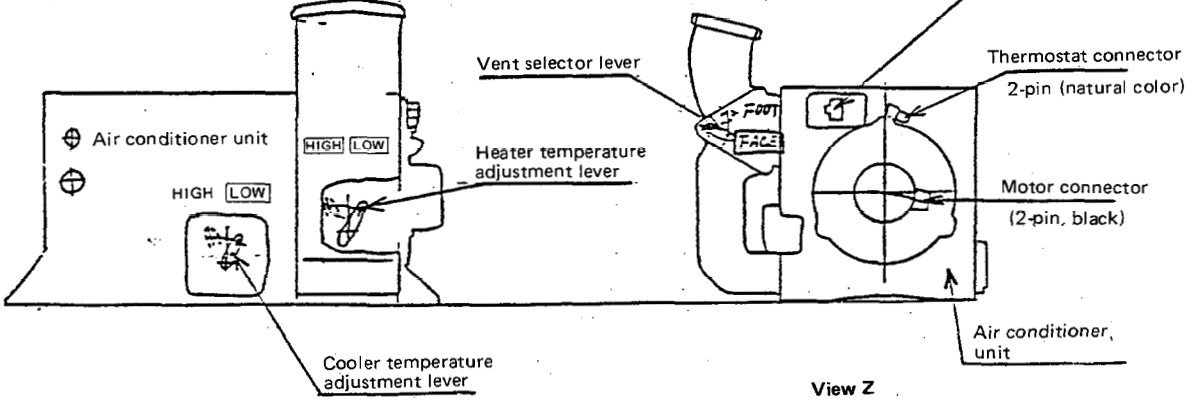




View from front of machine



Detail of control lever panel



View Z

★ If the electric wiring and push-pull cables between the air conditioner unit and control panel have become disconnected during transportation, connect them as follows.

1) Set the control levers to the positions shown in the detail diagram of the control panel.
2) Install the cooler temperature adjustment cable to the lever at the air conditioner unit end. When installing, connect the cable wire to the unit lever, move the unit lever by hand to the LOW position, then secure the cable to the unit.
3) Install the heater temperature adjustment cable to the lever at the air conditioner unit end. When installing, connect the cable wire to the unit lever, move the unit lever by hand to the HIGH position, then secure the cable to the unit using the supplied clamp.
4) Install the vent selector lever cable to the lever at the air conditioner unit end. When installing, connect the cable wire to the unit lever, move the unit lever by hand to the FACE position, then secure the cable to the unit using the supplied clamp.
5) After installing the cables, check that the unit works properly.
6) Connect the air conditioner unit wiring.
   Connect the wiring connectors assembled to the control panel in the cab to the connectors at the side face of the air conditioner unit. (See View Z)

C-8: INSTALLATION OF OPERATOR'S SEAT ASSEMBLY
(only when installing high cab)

Raise operator's seat assembly ① and install.

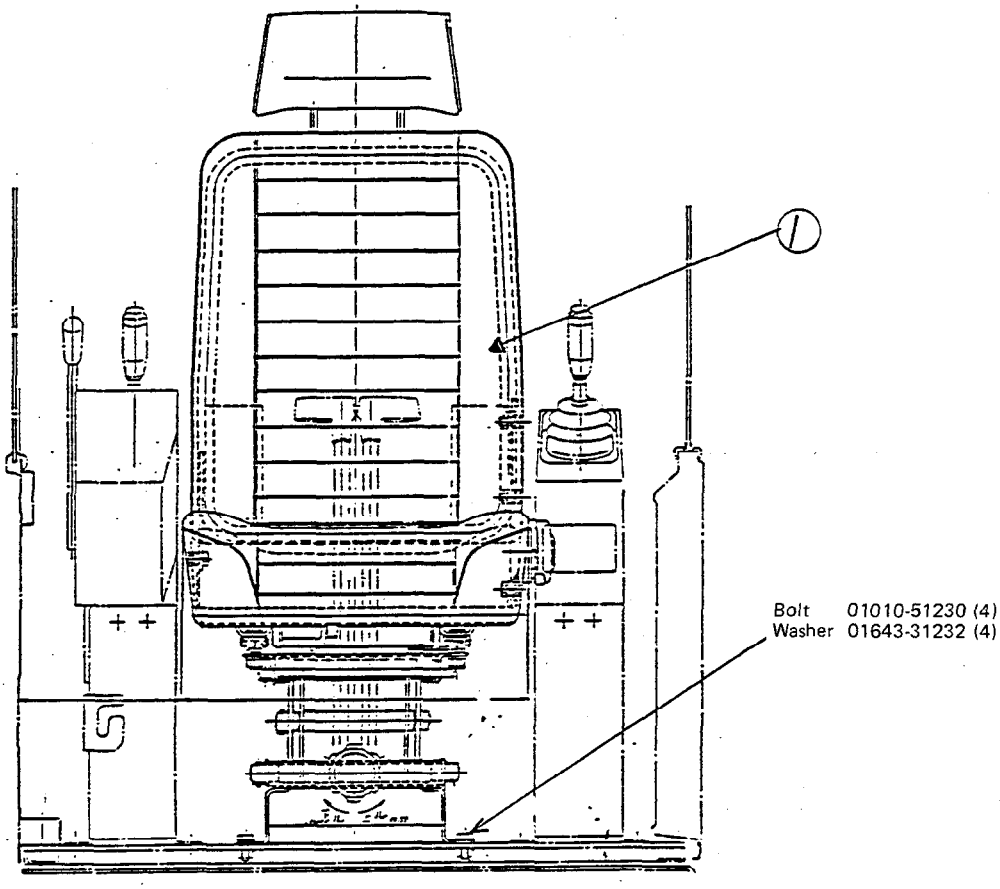
kg Operator's seat assembly: 37 kg

★ When raising, be careful not to damage the seat with the wire.

Part No. 21N-57-11000 (standard)
or
205-57-71500 (optional)

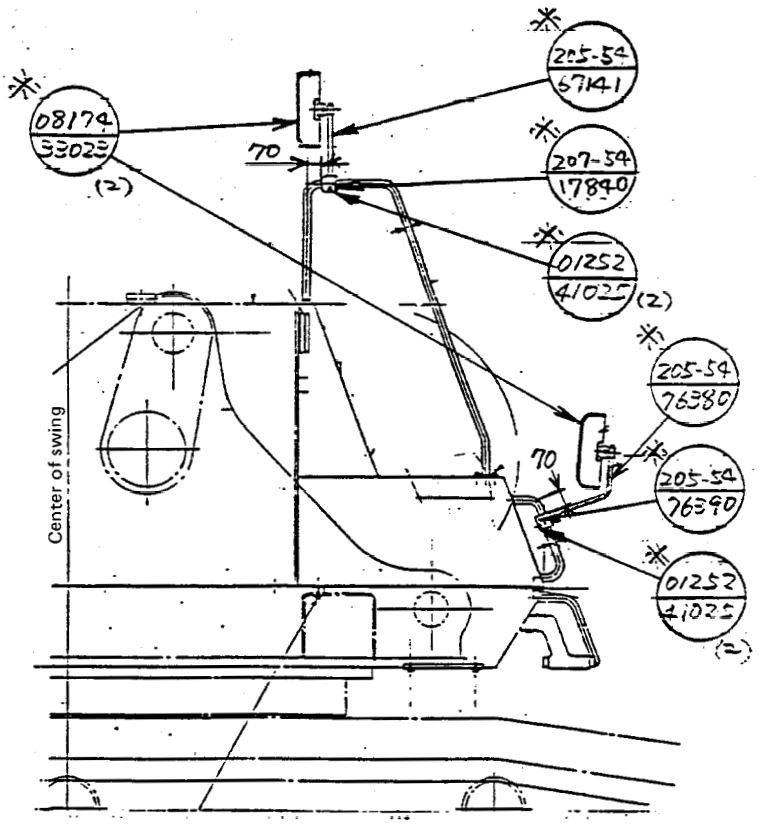
Types of mounting bolts (Sent as individual parts)

Part No.	Part Name	Q'ty
01010-51230	Bolt	4
01643-31232	Washer	4



C-9: INSTALLATION OF ADDITIONAL REAR VIEW MIRROR (option)

Install the mirrors (※08174-33023 x 2) to the outside stay. (Install at a position approx. 70 mm from the stay corner.)



View from right side of machine

C-10: INSTALLATION OF FOPS (option)

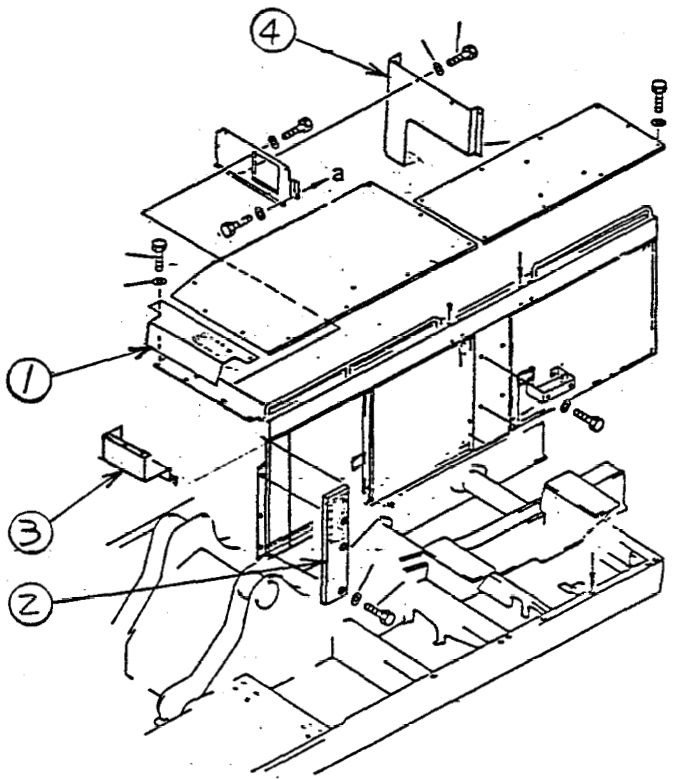
A. Installation of FOPS for low-mount cab specification

(1) Loosen mounting bolts, and remove covers ① and ② .

(2) Loosen mounting bolts, and remove cover ③ . The mounting bolts are installed from the top of cover ① and from the inside of the machine cab. (Open the front side door at the left side of the machine, and the bolts inside the machine cab can be removed.)

★ Cover ③ is installed only for machines with air conditioner specification.

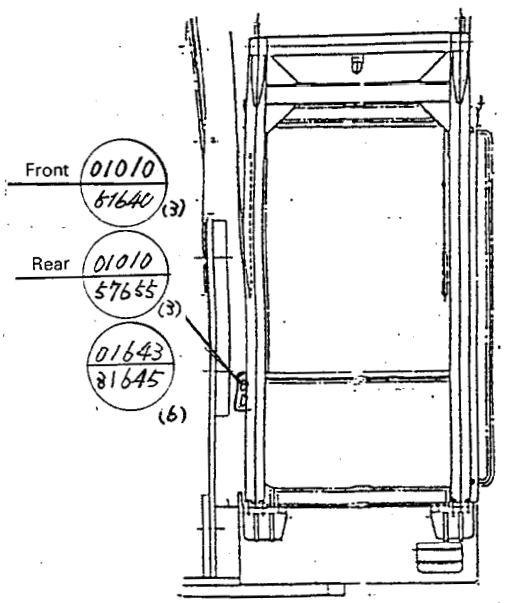
(3) Remove cover ④ from inside the machine cab.



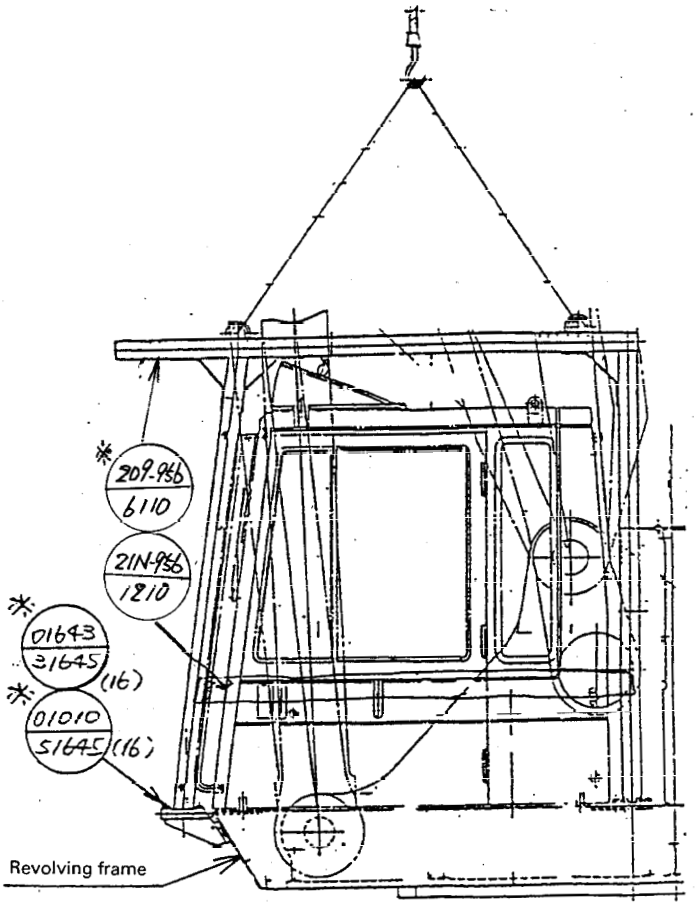
(4) Raise FOPS (※209-956-6110) with a crane, align with the mounting holes on the revolving frame, then install with 16 bolts (※01010-51645) and 16 washers (※01643-31645).

kg FOPS: 280 kg

(5) Reinstall covers ①, ②, ③, and ④ in the reverse order from disassembly.



View from front of machine



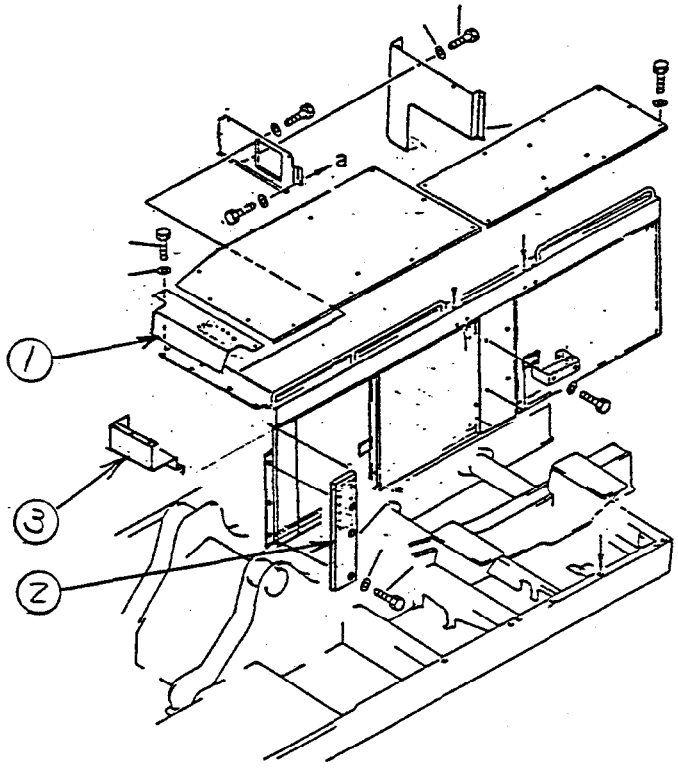
View from left side of machine

B. Installation of FOPS for high-mount cab specification

(1) Loosen mounting bolts, and remove covers ① and ② .

(2) Loosen mounting bolts, and remove cover ③ . The mounting bolts are installed from the top of cover ① and from the inside of the machine cab. (Open the front side door at the left side of the machine, and the bolts inside the machine cab can be removed.)

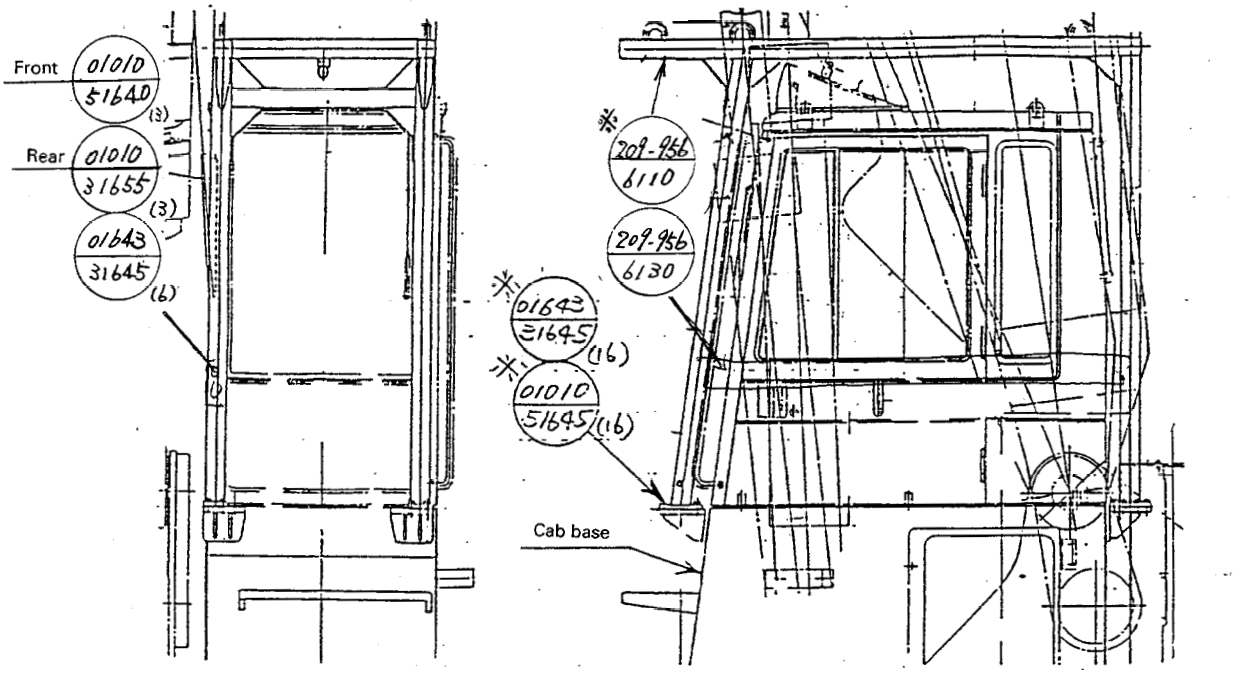
★ Cover ③ is installed only for machines with air conditioner specification.



(3) Raise FOPS (※ 209-956-6110) with a crane, align with the mounting holes on the cab base, then install with 16 bolts (※01010-51645) and 16 washers (※01643-31645).

kg FOPS: 280 kg

(4) Reinstall covers ① , ② , and ③ in the reverse order from disassembly.



View from front of machine

View from left side of machine

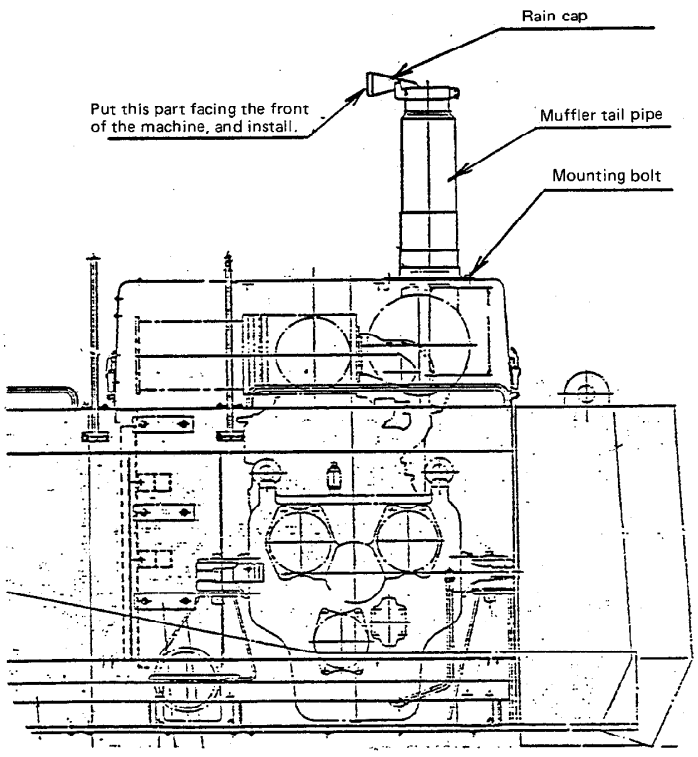
C-11 : INSTALLATION OF MUFFLER TAIL PIPE

Install the muffler tail pipe.
Part No. 6162-13-5280 or 6162-13-5080 (For Pre cleaner spec. (Sandy and dusty area))
Mounting bolt : 01010-51230 x 6
01643-31232 x 6

(The rain cap forms a sub-assembly with the muffler tail pipe.)
Part No. 6162-13-5250

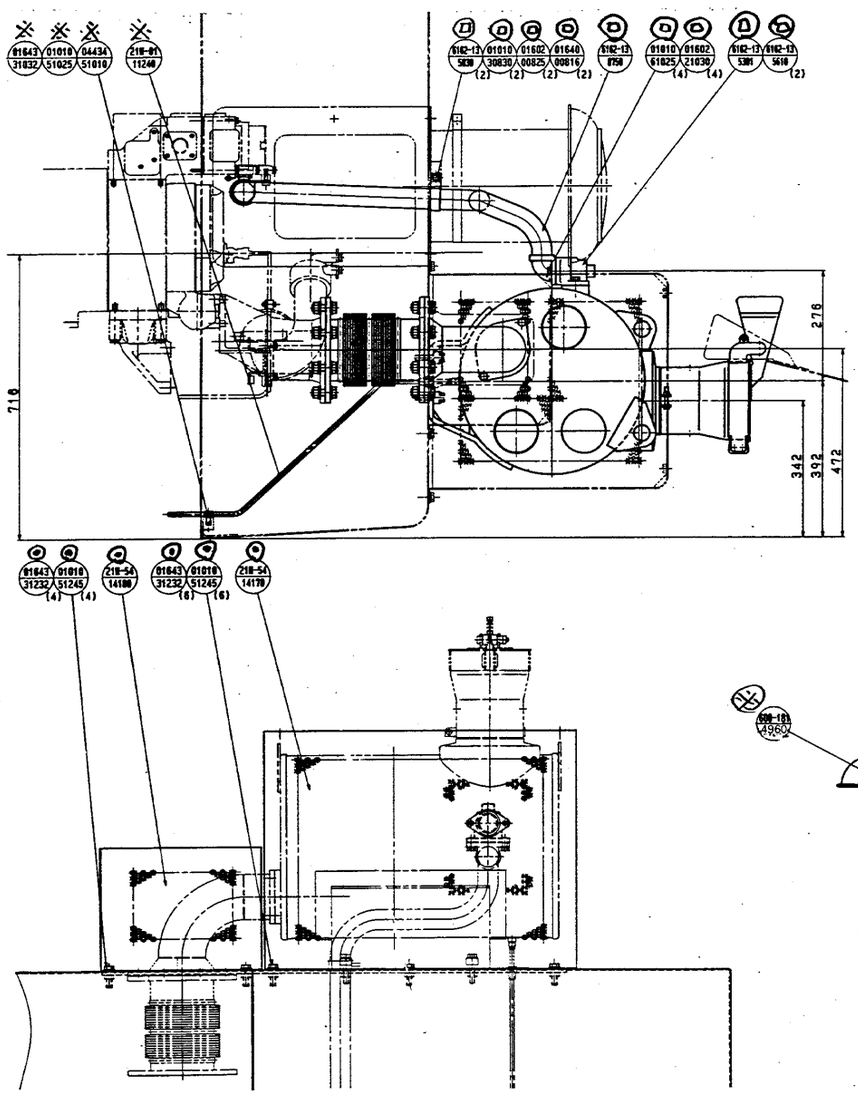
Mounting bolts (Parts sent individually)

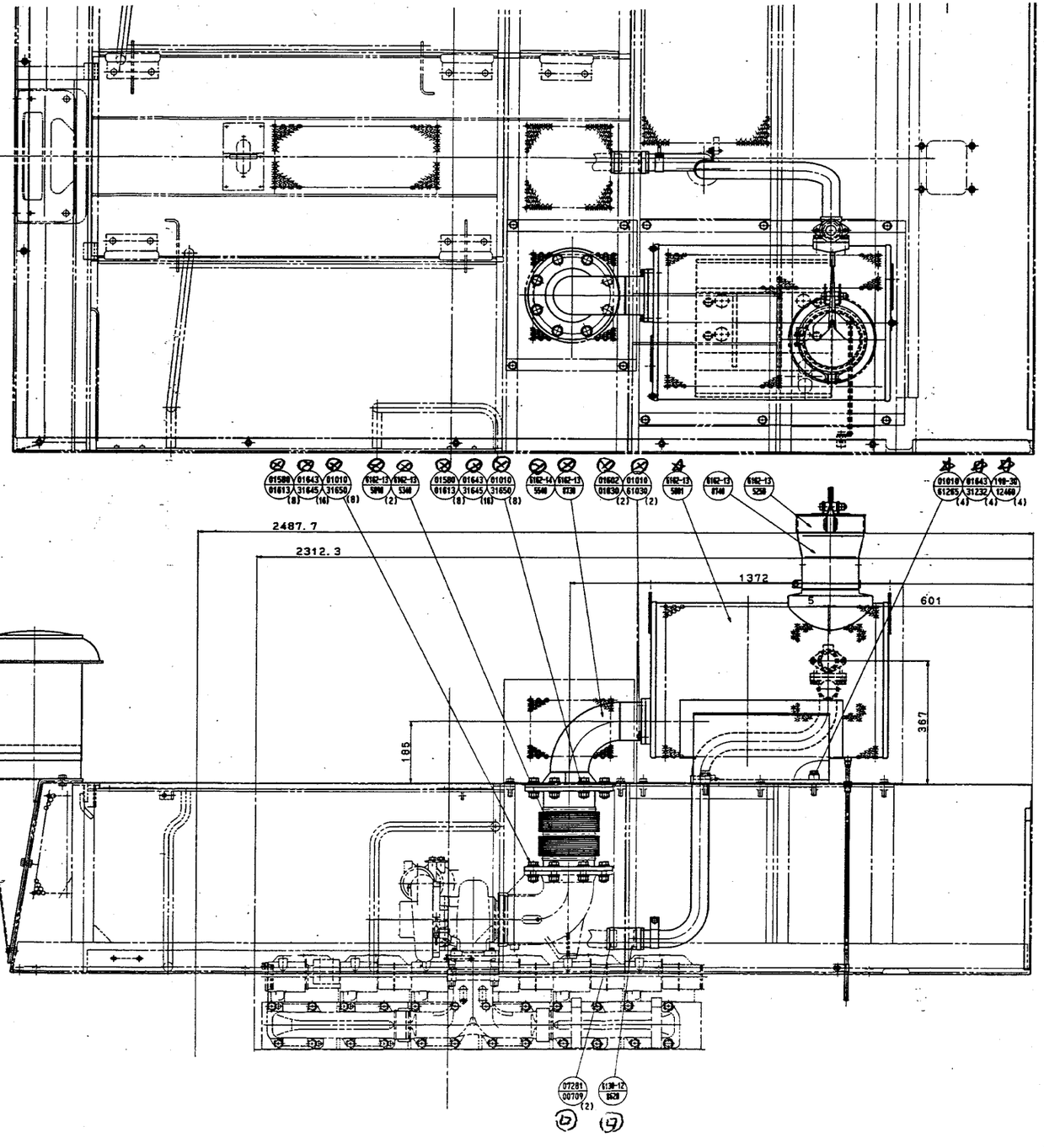
Part No.	Part Name	Q'ty
6162-13-5280	Tail pipe (STD)	1
6162-13-5080	Tail pipe (Pre cleaner spec.)	1
6162-13-5250	Rain cap	1
01010-51230	Bolt	6
01643-31232	Washer	6



[Outside muffler + precleaner (sandy and dusty area) specification]

(1) Install muffler to engine hood. (Parts marked ☆)
(2) Install muffler water drain tube. (Parts marked ※)
(3) Install piping between muffler and turbocharger. (Parts marked ⊗)
(4) Install muffler cover. (Parts marked ⊙)
(5) Install ejector piping. (Parts marked ▢)
(6) Install air conditioner hood. (Parts marked ⊛)





C-12: INSTALLATION OF COUNTERWEIGHT ASSEMBLY

Tools and facilities required

No.	Name	Q'ty
1	Power wrench x16 (input side 28 kgm)	1
2	Socket 38.1□ x 65	1
3	Torque wrench (use at 50 kgm)	1

Parts sent individually

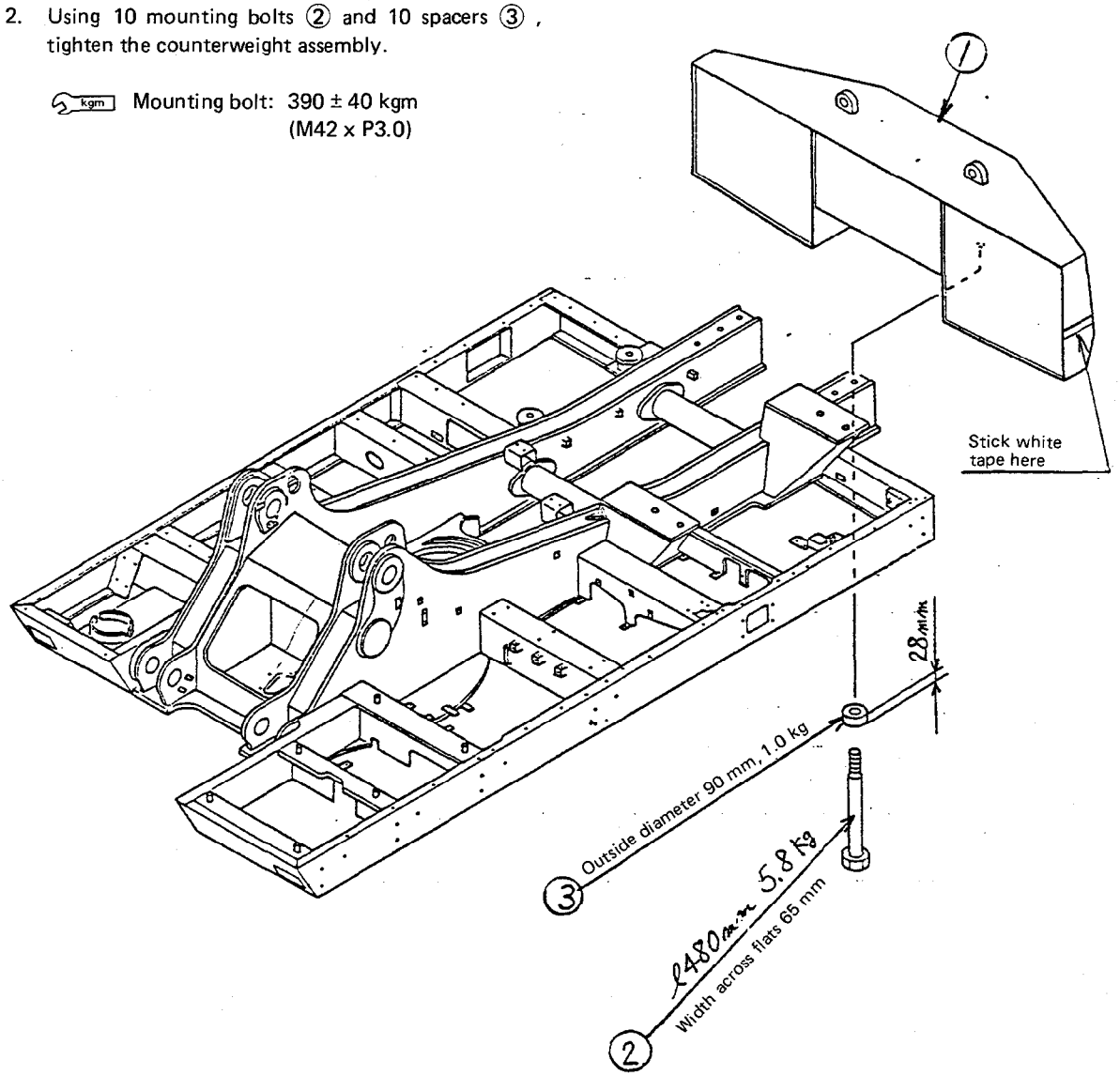
Part No.	Part Name	Q'ty
① 21N-46-12110	Counterweight	1
② 209-46-51190	Bolt	10
③ 209-46-11210	Washer	10

1. Raise counterweight assembly ① and install it to the chassis.

   kg Counterweight assembly: 14000 kg

   ★ Install the counterweight so that the clearance is the standard clearance of 15 mm or there is a uniform step on the left and right.
2. Using 10 mounting bolts ② and 10 spacers ③, tighten the counterweight assembly.

   kgm Mounting bolt: 390 ± 40 kgm (M42 x P3.0)



C-13: EXCHANGING RETURN FILTER
(standard part → special flushing part)

Carry out only when machine is divided into three parts for transportation.

Carry out exchanging return filter according to process No. B-3 (See page 37).

C-14: CHECK OF OIL AND WATER LEVELS

Check all oil and water levels according to process No. B-4 (See page 39).

C-15: CHECK CENTRAL MONITOR (carry out only when machine is divided into three parts for transportation)

Carry out checks according to process No. B-5 (See page 40).

Next, carry out follows.

(1) Start the engine and run at low idling for at least ten minutes.
   - ★ When doing this, do not operate the control levers in the operator's compartment.
   - ★ Lower the hydraulic safety lock to the LOCK position.

(2) Clean the machine to make it easier to locate any problem points.
   Be particularly careful to keep the greasing points and oil level gauges clean and to prevent the entry of dirt or dust.

C-16: BLEEDING AIR FROM TRAVEL MOTOR CIRCUIT

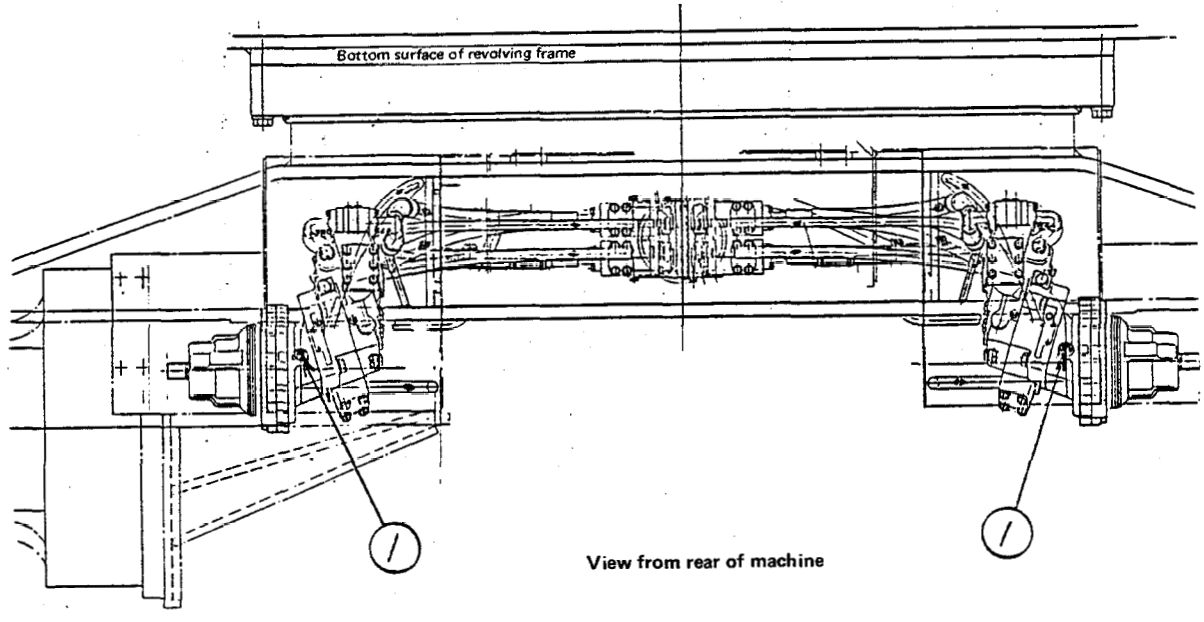
1. Loosen plugs ① (2 places: left and right) one turn.

   ⚠ Do not loosen plugs ① more than one turn.

2. Start the engine and run at low idling.

3. Operate the control lever slowly 4 – 5 times between FORWARD and REVERSE.

4. Check that no more cloudy white oil comes out from plugs ① (2 places: left and right), then tighten air bleed plugs ① (2 places: left and right).

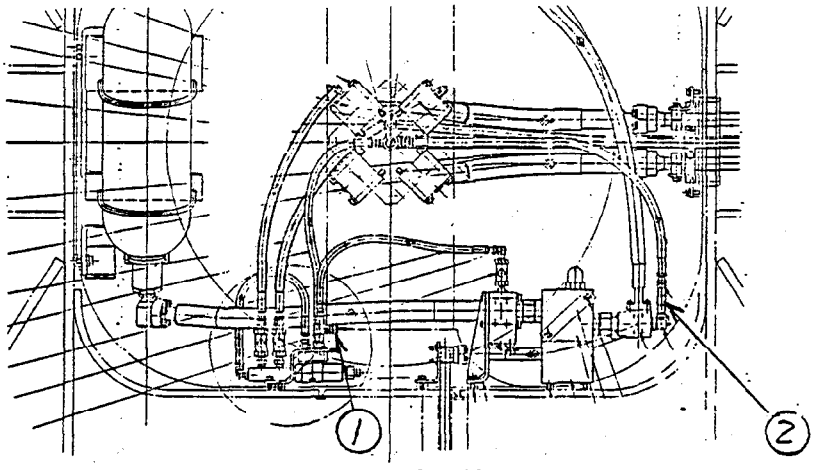


View from rear of machine

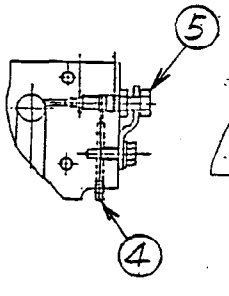
C-17: BLEEDING AIR FROM HYDRAULIC IDLER CUSHION CIRCUIT

★ When opening and closing stop valve ① and drain valve ② , use the special handle.
★ If drain valve ② is suddenly loosened, high pressure forms in the tank circuit, so avoid loosening quickly.
★ Do not loosen air bleed plugs ③ and ⑤ more than one turn.

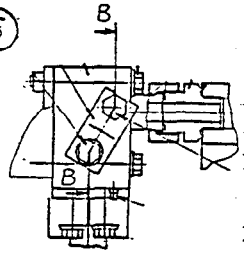
1. Open stop valve ① and drain valve ② completely.
2. Loosen air bleed plugs ③ (2 places: left and right) one turn, then remove plug ④ in Section B—B and loosen plug ⑤ one turn.
3. Start the engine and run at idling for 2 – 3 minutes.
4. Fit a block under the front of the right track shoe to block the track, then operate the right travel lever slowly to the FORWARD position 2 – 3 times.



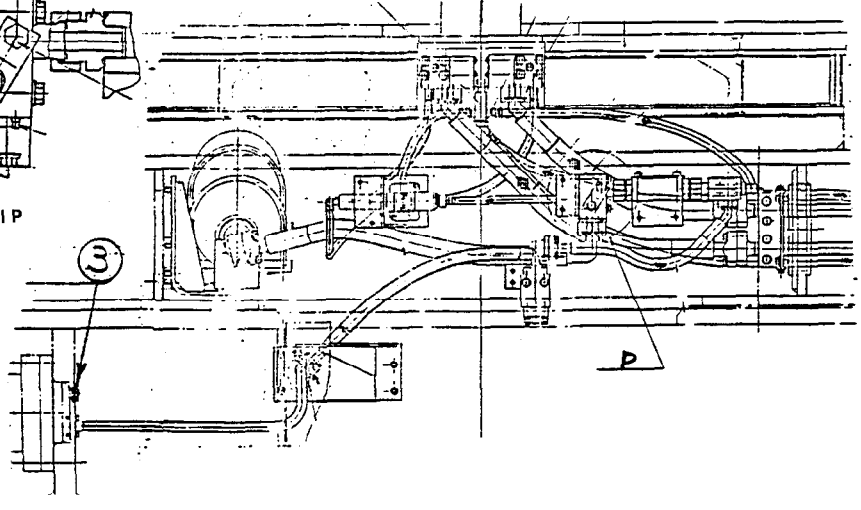
View from top of machine



Section B – B



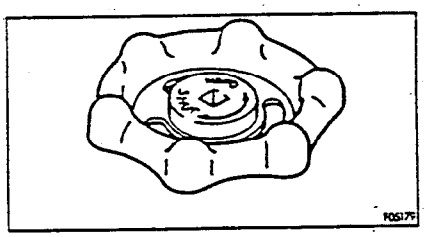
Detail P



View from left side of machine

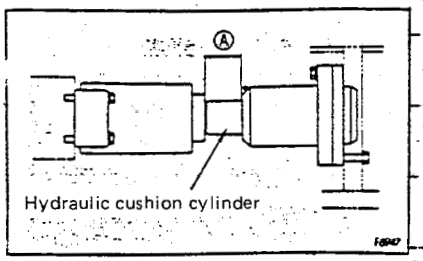
5. Check that oil comes out from air bleed plugs ③ (2 places: left and right) and plug ④ , then tighten drain valve ② and air bleed plugs ③ and ⑤ .
6. Install plug ④ .

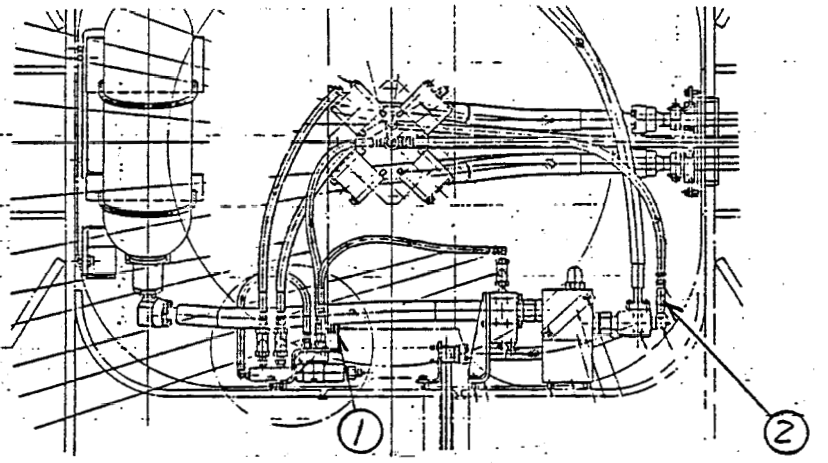
This completes the bleeding of air from the idler cushion circuit.



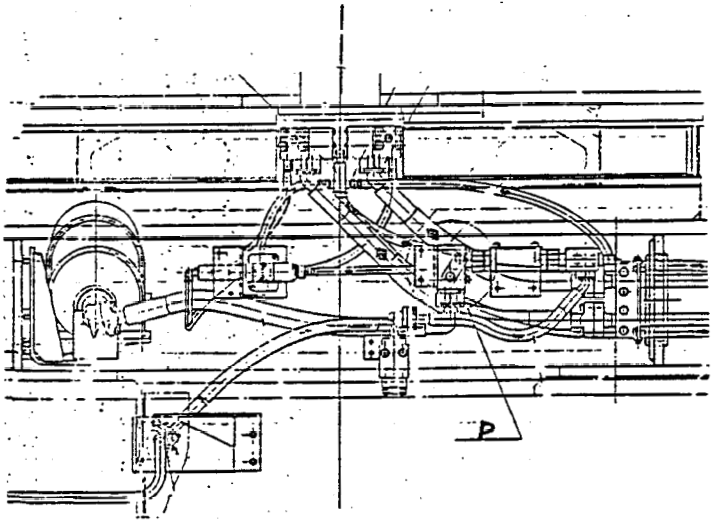
C-18: ADJUSTMENT OF HYDRAULIC IDLER CUSHION CYLINDER

1. Check that drain valve ② is completely at the CLOSE position.
2. Check that stop valve ① is open.
3. Operate the right travel lever to the FORWARD and REVERSE positions intermittently (2 – 3 seconds) 3 or 4 times.
4. Check that protrusion Ⓐ of the hydraulic cushion cylinder plunger is 120 ± 3 mm on the left and right.
5. Close stop valve ① fully.





View from top of machine



View from left side machine

C-19: ADJUSTING TRACK TENSION

Precautions

- After adjusting the HiC cylinder, adjust the track tension.
- Check that protrusion Ⓐ of hydraulic cushion cylinder Ⓑ is 120 ± 3 mm. (Left and right)
  For details, see the procedure for adjusting the HiC cylinder.
- Always check that stop valve ① and drain valve ② are closed.

Inspection

Raise the machine body with the boom and arm, and measure the clearance between the roller contact surface of the track link and the tread of the 4th track roller from the sprocket. The standard clearance is 100 – 150 mm.

If the clearance is not the standard, adjust it as follows.

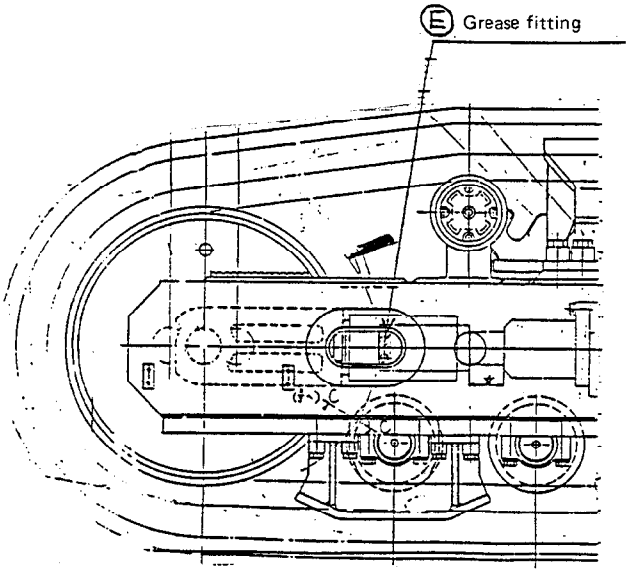
Adjustment

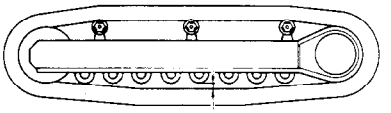
1. To increase the tension, pump in grease through grease fitting Ⓔ ; to reduce the track tension, loosen grease fitting Ⓔ one turn to let some of the grease out.
2. Grease can be pumped in to make Ⓒ 155 mm, but if the tension is still loose, it means that the pins and bushing are worn, so it is necessary to turn or replace the pins and bushings.

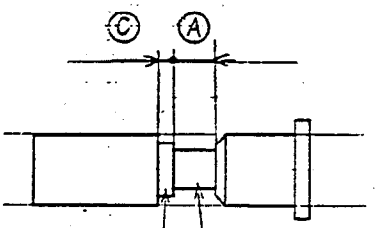
⚠ Grease fitting Ⓔ is under high pressure from the internal grease, so there is danger that it may fly out. For this reason, never loosen the fitting more than one turn.
Never loosen any part other than grease fitting Ⓔ . If the grease does not come out easily, move the machine a short distance backwards and forwards.

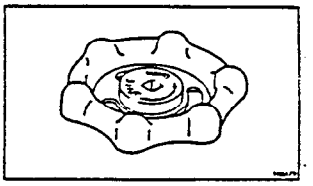
⚠ If the track tension is adjusted only by pumping in grease, without adjusting the hydraulic cushion cylinder, excessive load will be brought to bear on the undercarriage and this may damage the undercarriage. [Stroke Ⓐ (120 ± 3 mm) of cushion cylinder Ⓑ cannot be maintained.]

⚠ Use the special handle when opening and closing stop valve ① and drain valve ② .









D. PROCEDURE FOR ASSEMBLY OF WORK EQUIPMENT (BACKHOE SPECIFICATION)

THIS MANUAL GIVES THE PROCEDURE FOR ASSEMBLY OF THE BACKHOE WORK EQUIPMENT.

1. Part numbers marked ※ in this manual are parts sent individually.

D-1: ASSEMBLY OF BOOM ASSEMBLY

1. Remove the boom foot pin stopper fitted to the chassis, and pull out the pin.

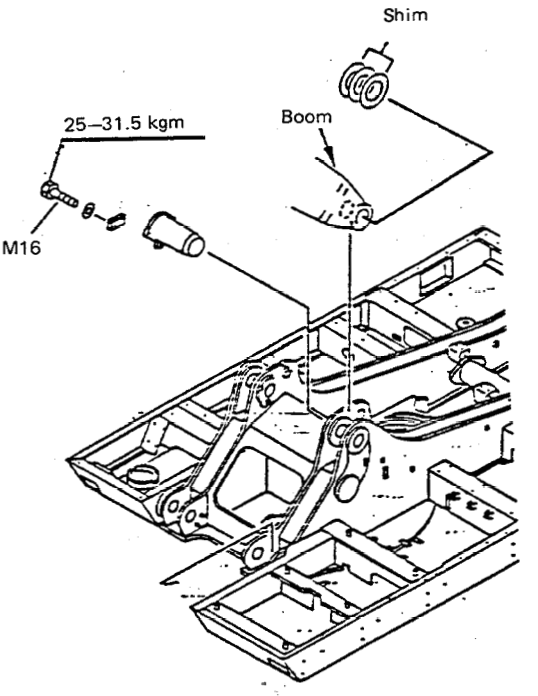
2. Remove the boom cylinder foot pin stopper fitted to the chassis, and pull out the pin.

★ Use a forcing screw (Dia. = 24 mm, Pitch = 3.0 mm) to remove the pin.

3. Raise the boom assembly with a crane and align it with the pin hole in the chassis.

   kg Boom assembly: 9600 kg (9200 boom)
   8900 kg (7900 boom)
   9300 kg (7500 boom)

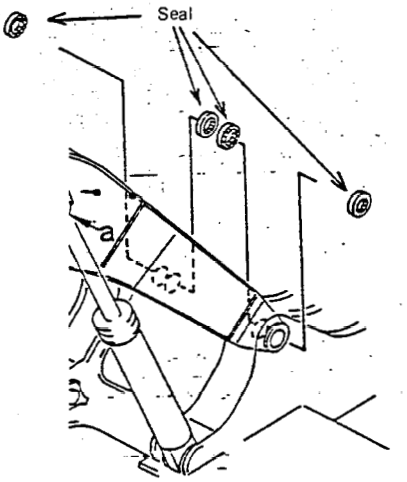
4. Install the boom foot pin. (See the figure on the right.)
   Insert the boom foot pin (installed at the revolving frame end) on one side as far as it will go, then align the pin hole on the other side. When doing this, if the boom is tilted to the left or right, use a jib crane to balance the boom.



   ★ Four seals (209-72-11311 x 4) are assembled to the boom foot as shown in the figure below. When pushing in the pins, be careful not to damage the seals.

   ★ Check the clearance of the boom foot and the outside of the machine. Decide the thickess of the adjustment shims to make the clearance less than 1 mm, and fit the shims.

   Combine the following shim thicknesses to make the shim adjustment.
   (※21N-72-11210 x 3) t1.0
   (※21N-72-11220 x 3) t1.5
   (Adjust with shims at one place on the outside of the left side of the boom.)



Parts sent individually

Part No.	Part Name	Q'ty
21N-72-11210	Shim (t1.0)	3
21N-72-11220	Shim (t1.5)	3

5. Insert the boom foot pins completely on both the left and right, then install the lock plates.
   Inside of bushing: Anti-friction compound (LM-P)

D-2: RELEASING PRESSURE FROM HYDRAULIC CIRCUIT

When removing the hydraulic piping, always release the pressure as follows.

1. Leave the safety lock lever in the FREE position.

2. Remove the cap of the hydraulic tank.

3. Start the engine, run for approx. 10 seconds, then stop the engine.
   - ★ Do not run the engine above 1000 rpm.
   - ★ Keep the control levers at neutral.
   - ★ Raise the safety lock lever and leave it in the FREE position.

4. After stopping the engine, operate the work equipment levers to the end of their stroke within 5 – 6 seconds.
   - ★ Repeat Steps 3 and 4 three times.

   When removing the oil filler cap from the hydraulic tank, turn it slowly to release the internal pressure, then remove it.

   - ★ When the remaining pressure has been released, install the oil filler cap on the hydraulic tank to prevent dust from getting in.
   - ★ Lower the safety lock lever to the LOCK position.

D-3: WORK EQUIPMENT PIPING
(Between chassis and boom)
(Between chassis and boom cylinder)

Connecting piping for flushing work equipment piping

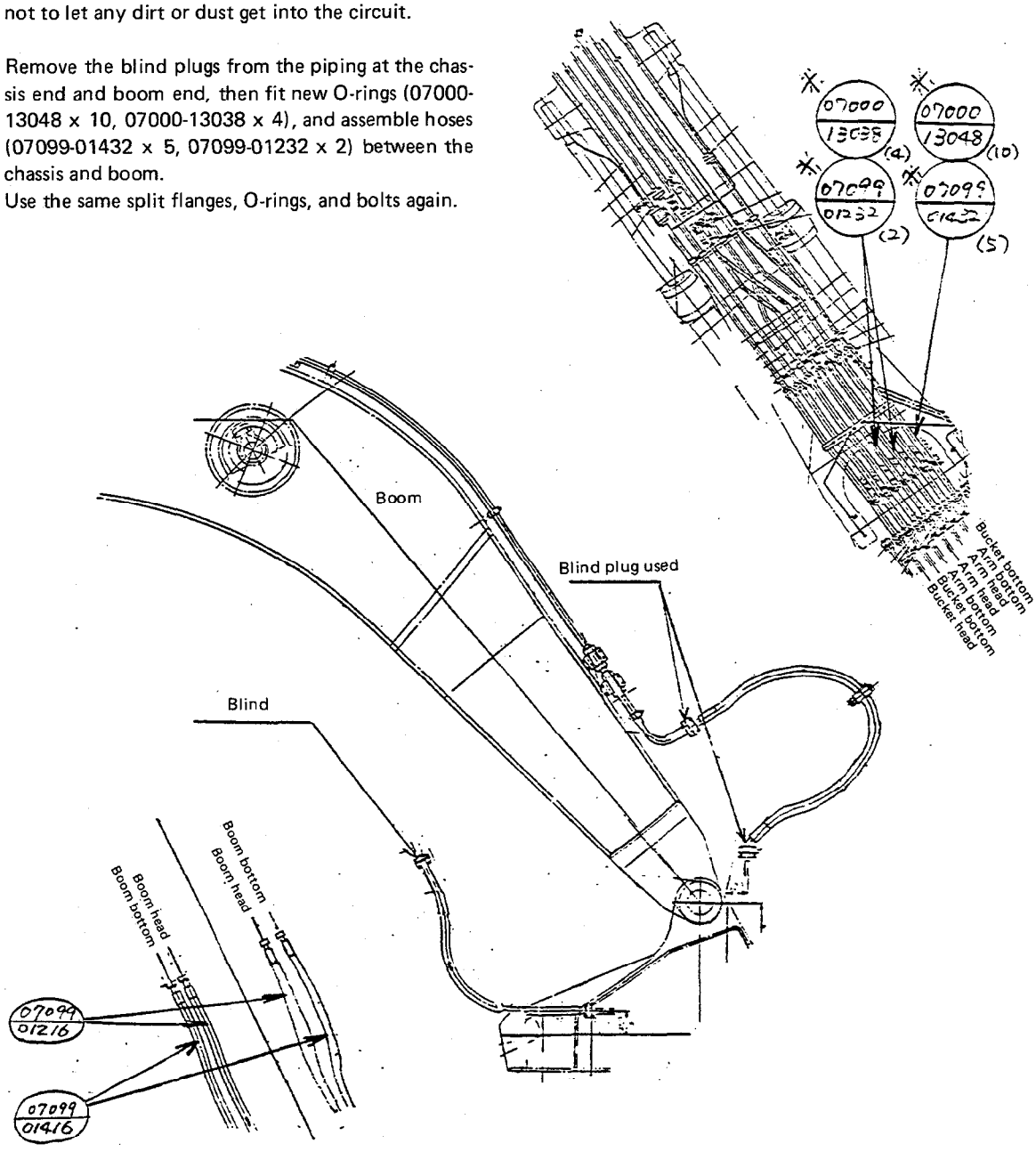
Precautions

1) Keep the flanges, O-rings, and heads used during transportation in a safe place so that they can be used again.
2) When connecting the hoses, be careful not to get the O-rings caught.
3) Install the hoses without twisting or interference.
4) When connecting the hoses, be extremely careful not to let any dirt or dust get into the circuit.

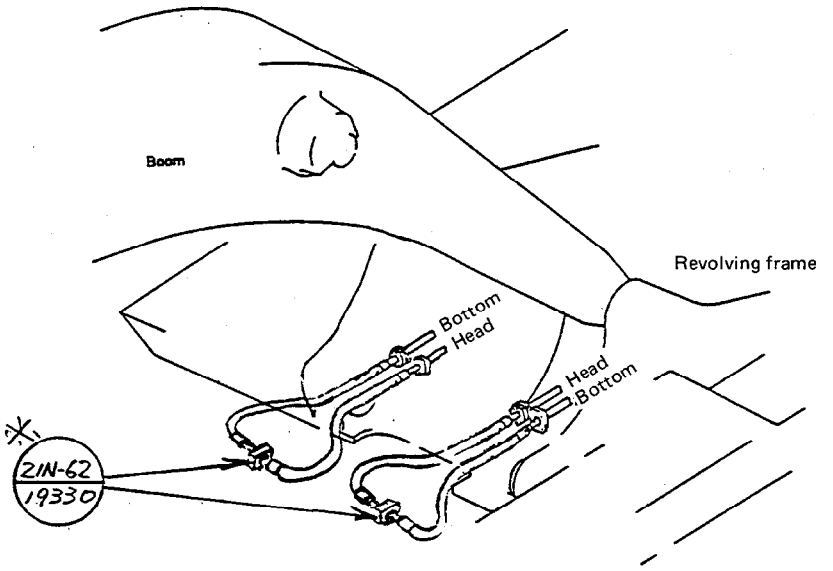
1. Remove the blind plugs from the piping at the chassis end and boom end, then fit new O-rings (07000-13048 x 10, 07000-13038 x 4), and assemble hoses (07099-01432 x 5, 07099-01232 x 2) between the chassis and boom.
   Use the same split flanges, O-rings, and bolts again.

Parts sent individually

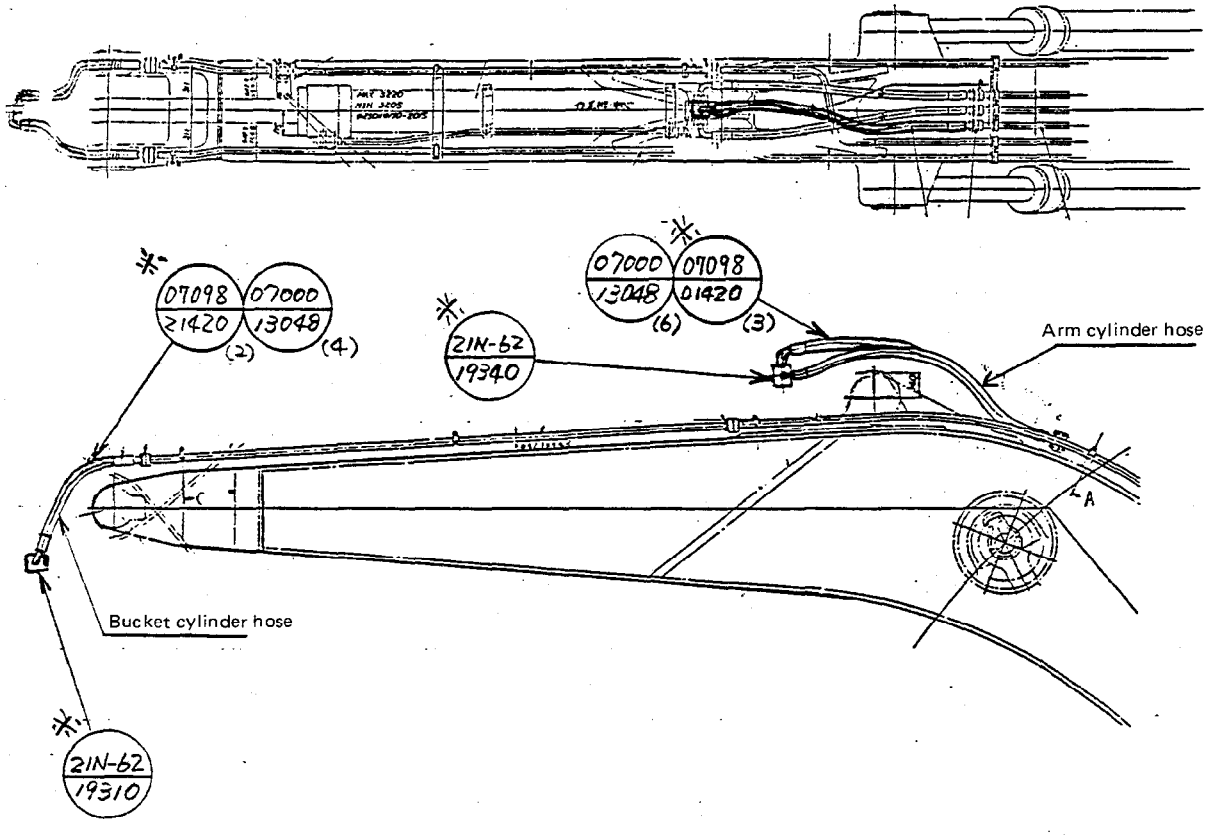
Part No.	Part Name	Q'ty
07099-01432	Hose	5
07099-01232	Hose	2
07000-13048	O-ring	10
07000-13038	O-ring	4



2. Remove the blind plugs from the boom cylinder hoses, then use flanges (21N-62-19330 x 2) to short circuit the head and bottom ends.
   Use the same split flanges, O-rings, and bolts again.



3. Using the hose (sent as an individual part), join the bottom and head ends to short circuit the arm cylinder piping and bucket cylinder piping.
   Use the same O-rings, split flanges, bolts, and washers again.



D-4: FLUSHING WORK EQUIPMENT PIPING

Purpose

To remove the dirt and dust which gets into the system during assembly of the attachments, work equipment, and disassembled parts of the body.

Flushing is carried out on the machine when it is shipped from the factory.

1. Flush the system.
   1) Run the engine at low idling for 30 minutes.
      ★ When doing this, do not move the control levers in the operator's compartment.
   2) Run the engine at mid-range speed for 30 minutes.
      ★ When doing this, do not move the control levers in the operator's compartment.
   3) Run the engine at high idling and operate the control levers as follows.

      [BOOM RAISE] → [BOOM LOWER] →
      [ARM IN] → [ARM OUT] → [BUCKET TILT]
      → [BUCKET DUMP] →

      Hold the lever at each position for 1 min. – 1 min. 30 sec. Repeat this pattern 4 – 5 times.

   ★ When operating the control levers, raise the hydraulic safety lock and set it to the FREE position.

      If the filter caution lamp on the monitor inside the operator's cab lights up during flushing, stop the engine immediately and replace the flushing element.
      If no special flushing element is available, replace with the standard element (07063-01210).

This completes the flushing.

Before starting operations, do the following.

1. Check the level of contamination of the oil.
   (If the flushing is carried out according to the instructions given, the contamination should be within the standard, but for safety and to provide data for future reference, measure the level of contamination.)
   The results of the measurement are not known until later, but if they are not within the standard range, carry out flushing again.
2. Replace the special flushing element with the standard parts (07063-01210 x 4), and replace the flushing plates (21T-60-13730 x 4) with the valve and strainer. Be sure not to forget this operation. If the element is replaced, replace the O-rings of the return filter case with new parts (※07000-05175 x 4), then tighten the cover.

Precaution

Be careful not to assemble the element with the bottom resting on the stepped part at the bottom of the case as shown in Fig. 2.

When there is oil inside the filter case, it is particularly difficult to judge if the element is assembled correctly, so after inserting the element, rotate it by hand and check that it rotates smoothly. If it rotates smoothly, it can be considered that it is installed correctly.

3. Releasing pressure from hydraulic circuit
   Release the pressure from hydraulic circuit according to process No. D-2 (See page 73).

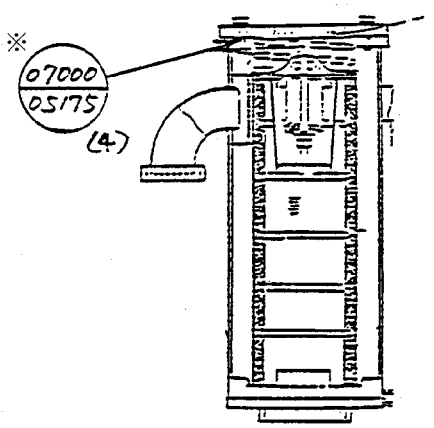


Fig. 1 Correct installation

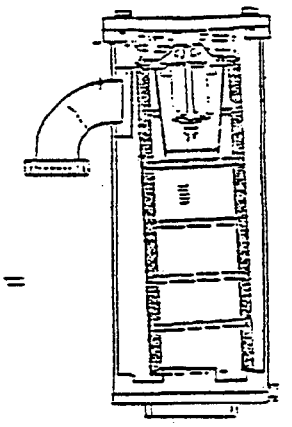


Fig. 2 Incorrect installation

D-5: INSTALLATION OF BOOM CYLINDER FOOT PIN

1. Raise the boom cylinder with a crane, align with the chassis pin holes, then push in the pins.

   kg Boom cylinder assembly: 1150 kg

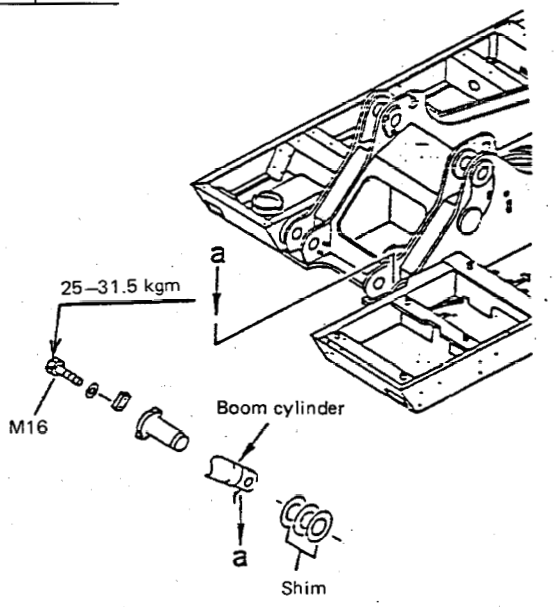
   Inside of bushing: Anti-friction compound (LM-P)

2. Check the clearance (at the outside of the chassis) between the chassis and the end of the cylinder boss. Select a shim thickness to make the clearance 2 – 3 mm, and assemble the shims. Adjust both the left and right cylinders with shims.
   (Outside of chassis)
3. Push the boom foot pin in fully, then install the lock plate.
4. Install the left and right sides in the same way.

★ Assemble so that the boom cylinder bottom greasing hole is at the bottom.
★ Combine the following shim thicknesses to make the adjustment shim.
(※21N-72-11230 x 8) t1.0

Parts sent individually

Part No.	Part Name	Q'ty
21N-72-11230	Shim (t1.0)	8



D-6: INSTALLING BOOM CYLINDER HOSES

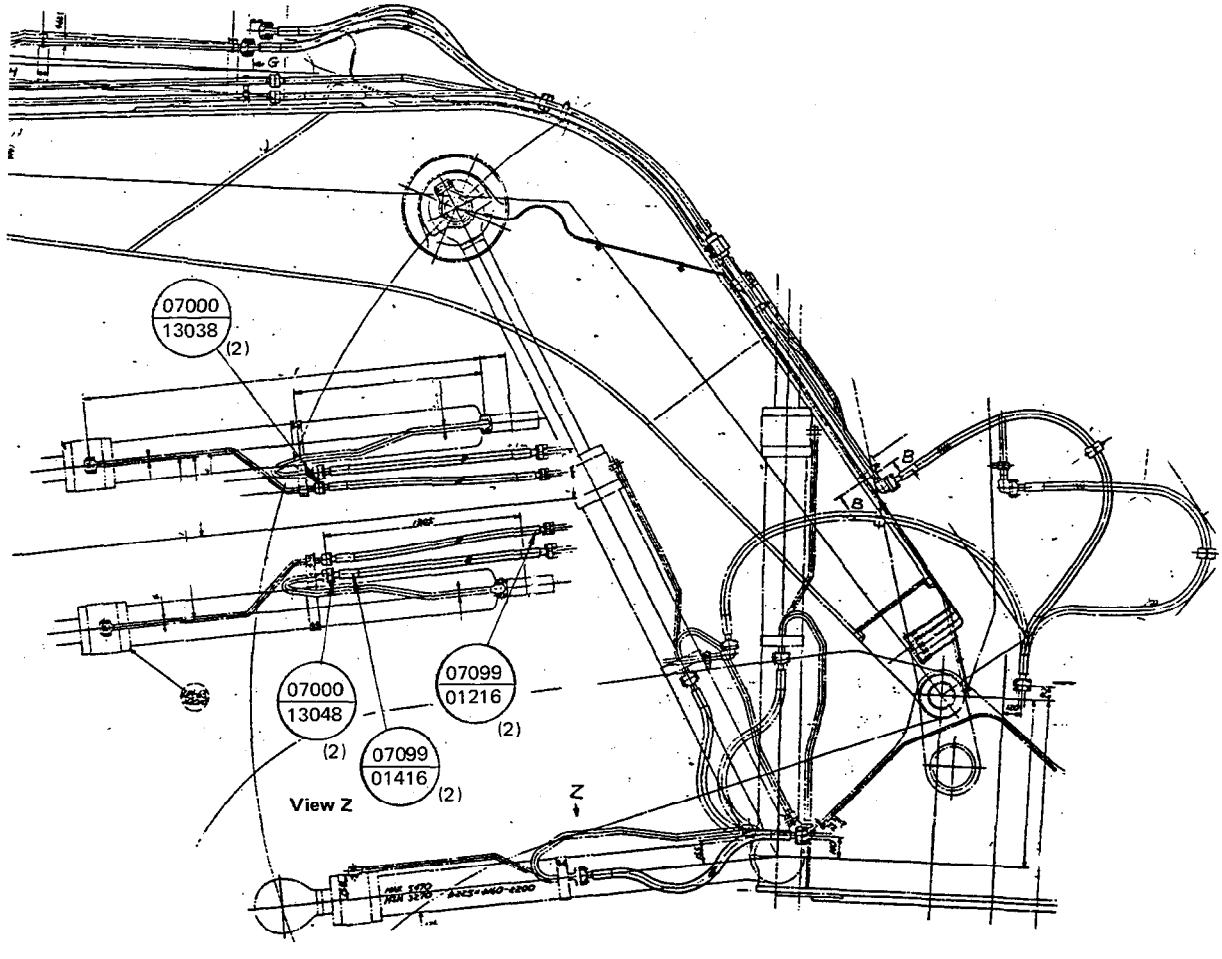
Precautions

1) Keep the flanges, O-rings, and heads used during transportation in a safe place so that they can be used again.
2) When connecting the hoses, be careful not to get the O-rings caught.
3) Install the hoses without twisting or interference.

1. Remove the short circuit for flushing the boom cylinder hoses.
2. Remove the blind plugs in the tube at the boom cylinder end.
3. Install the boom cylinder hoses (07099-01416 x 2, 07099-01216 x 2) to the standard circuit as shown in the diagram below, then replace the O-rings (※07000-13048 x 2, 07000-13038 x 2) at the hose mount with new parts sent individually.
4. Install the left and right cylinder hoses in the same way.

Parts sent individually

Part No.	Part Name	Q'ty
07000-13038	O-ring	2
07000-13048	O-ring	2



D-7: INSTALLATION OF BOOM CYLINDER TOP PIN

1. Remove the stoppers fixed to the boom, then remove the boom cylinder top pin.

   kg Boom cylinder top pin: 42 kg

   kg Boom cylinder assembly: 1150 kg

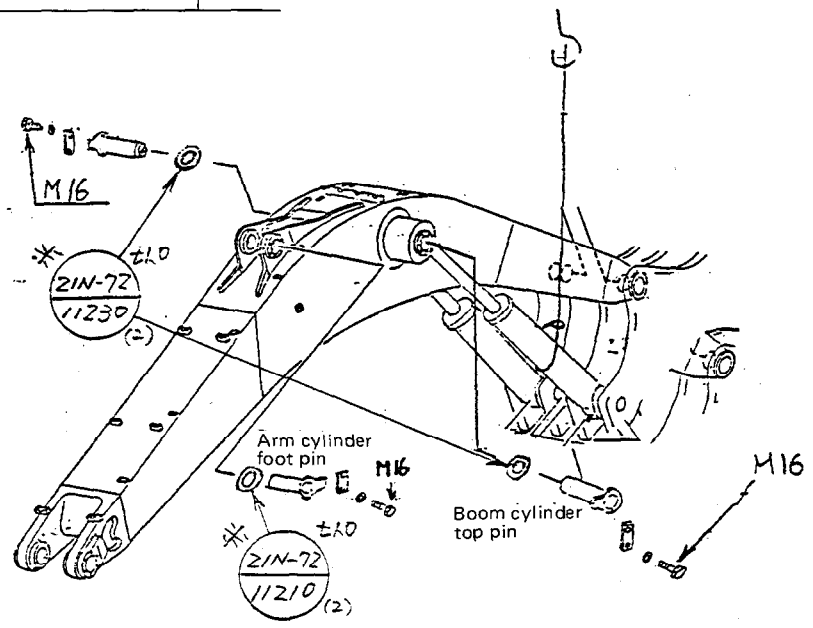
2. Start the engine and run at low idling.
3. Raise the cylinder, extend the rod slowly to align the pin hole, then push in the pin.
4. Check the clearance between the end of the boom boss and the end of the cylinder boss. Select a shim thickness to make the clearance 2 — 3 mm, and assemble the shims.
5. Knock in the cylinder top pin.

   Inside of bushing: Anti-friction compound (LM-P)

   ★ When operating the cylinder, extend it slowly. Do not operate the cylinder suddenly or operate it to the end of its stroke.
   At first there is air inside the cylinder, so the cylinder may not move for the first ten seconds. In such cases, do not operate the lever to the end of its travel.
6. Install the left and right cylinders in the same way.
7. Install the stopper.

Parts sent individually

Part No.	Part Name	Q'ty
21N-72-11230	Shim (t1.0)	2



D-8: INSTALLATION OF ARM CYLINDER FOOT PIN

1. Remove the stopper fixed to the boom, then remove the arm cylinder foot pin.

   kg Arm cylinder foot pin: 70 kg

   kg Arm cylinder: 1360 kg

2. Raise the arm cylinder, align with holes at the boom end, then push in the pin.
3. Check the clearance between the end of the boom boss and the end of the cylinder boss. Select a shim thickness to make the clearance 2 – 3 mm, and assemble the shims.
4. Knock in the arm cylinder foot pin.

   Inside of bushing: Anti-friction compound (LM-P)

5. Install the stopper.

Parts sent individually

Part No.	Part Name	Q'ty
21N-72-11210	Shim (t1.0)	2

D-9: WORK EQUIPMENT PIPING
(arm cylinder)

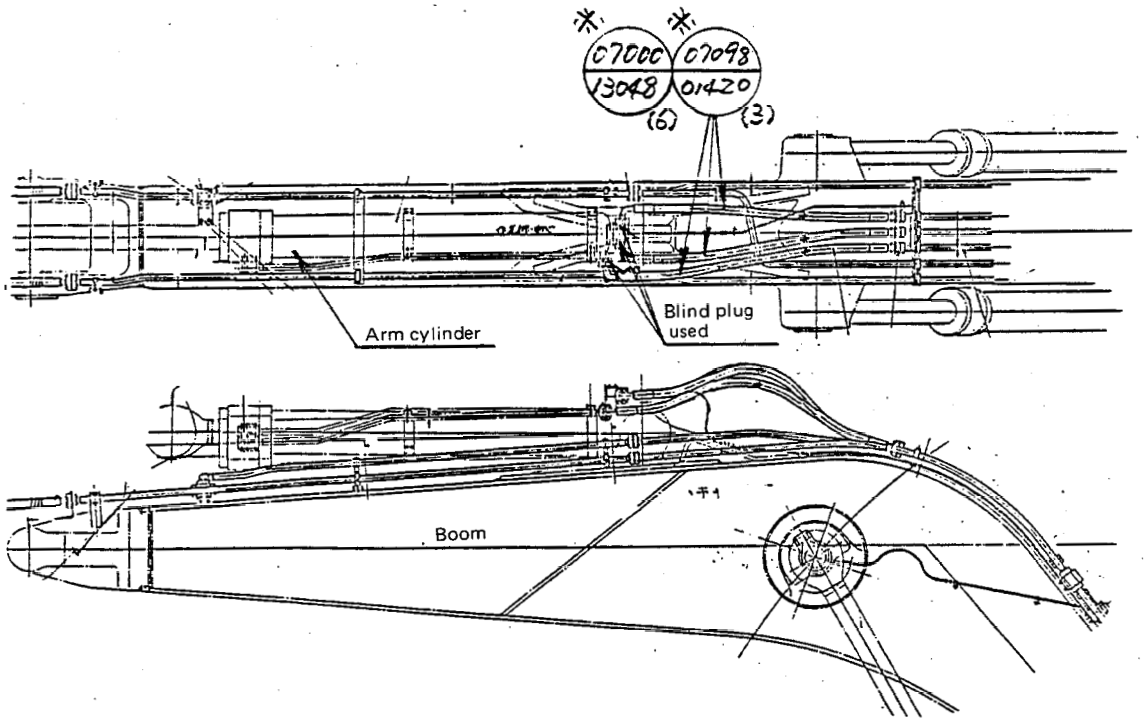
Precautions

1) Be careful that the rod of the arm cylinder does not fly out during the operation.
2) Keep the flanges, O-rings, and heads used during transportation in a safe place so that they can be used again.
3) When connecting the hoses, be careful not to get the O-rings caught.
4) When connecting the hoses, be extremely careful not to let any dirt or dust get into the circuit.

1. Remove the short circuit for flushing the arm cylinder hose.
2. Remove the blind plugs from the arm cylinder piping, replace the O-rings (※07000-13048 x 6) at the hose mount with new parts, then connect the arm cylinder hoses (※07098-01420 x 3).
   Use the same split flanges and bolts again.

Parts sent individually

Part No.	Part Name	Q'ty
07000-13048	O-ring	6
07098-01420	Hose	3



D-10: INSTALLATION OF ARM AND ARM CYLINDER TOP PIN

Tools and facilities required

No.	Name	Q'ty
1	Crane	1
2	Wire rope	

Parts sent individually

Part No.	Part Name	Q'ty
21N-72-11210	Shim (t1.0)	4

1. Remove the boom top pin stopper fixed to the boom, then pull out the top pin.

   kg Boom top pin: 135 kg

   kg Arm assembly (with link, cylinder):
   5000 kg
   5500 kg (SE spec.)
   5800 kg (SP spec.)

2. Raise the arm assembly, align with the boom hole, then insert a shim (※21N-72-11210) (t1.0) to make the clearance less than 1.0 mm, and push in the pin.
   ★ There are 2 seals (209-72-11311) installed inside the bushing at the arm end, so be careful not to damage them when pushing in the pin.

   Inside of bushing: Anti-friction compound (LM-P)

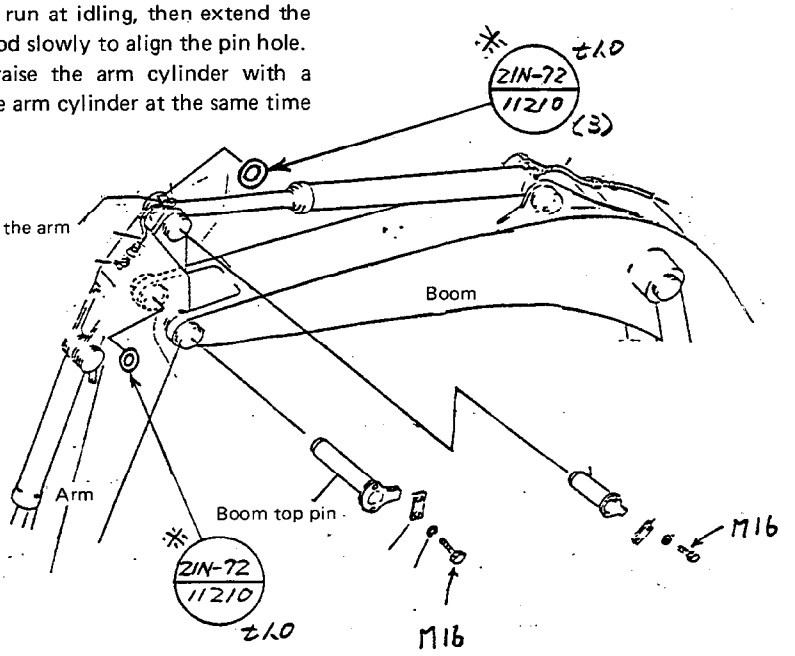
3. Install the stopper.
4. Remove the arm cylinder top pin stopper fixed to the arm, then pull out the top pin.

   kg Arm cylinder top pin: 70 kg

5. Start the engine and run at idling, then extend the arm cylinder piston rod slowly to align the pin hole. (When doing this, raise the arm cylinder with a crane and operate the arm cylinder at the same time to align the position.)

Be careful of the position of the arm cylinder rod grease hole.

Assemble so that the grease hole is at the top.



6. Align the arm cylinder top pin hole with the arm hole, then insert a shim (※21N-72-11210) (t1.0) to make the clearance less than 2 – 3 mm, and push in the pin.

   Inside of bushing: Anti-friction compound (LM-P)

7. Install the stopper.

★ When operating the cylinder, extend it slowly. Do not operate the cylinder suddenly or operate it to the end of its stroke.
At first there is air inside the cylinder, so the cylinder may not move for the first ten seconds. In such cases, do not operate the lever to the end of its travel.

★ When installing the arm, be extremely careful that the bucket cylinder rod does not fly out.

D-11: WORK EQUIPMENT PIPING
(boom — bucket cylinder)

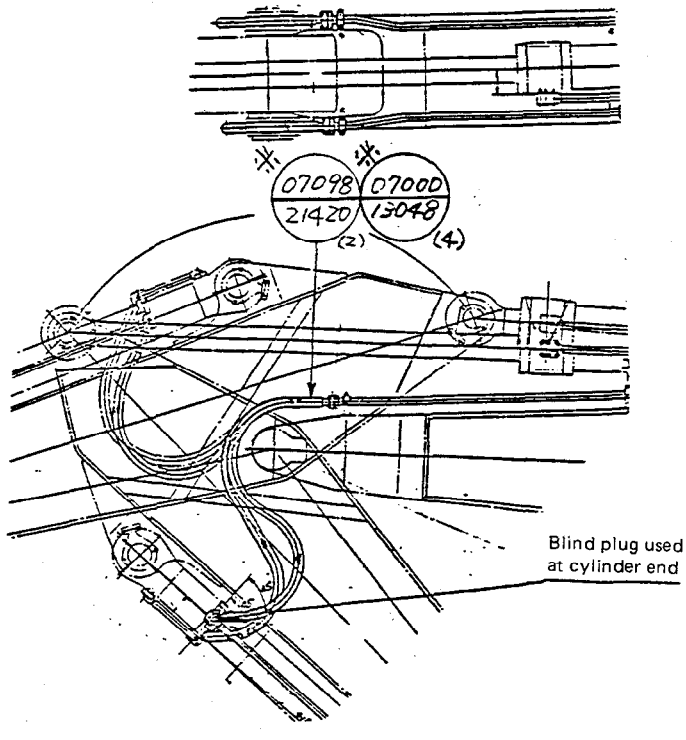
Precautions

1) Keep the flanges, O-rings, and heads used during transportation in a safe place so that they can be used again.
2) When connecting the hoses, be careful not to get the O-rings caught.
3) Install the hoses without twisting or interference.

1. Remove the short circuit for flushing the bucket cylinder hoses.
2. Remove the blind plugs from the tubes at the bucket cylinder end, fit new O-rings (※07000-13048 x 4), then connect the bucket cylinder hoses (07098-21420 x 2).
   Use the same split flanges and bolts again.

Parts sent individually

Part No.	Part Name	Q'ty
07098-21420	Hose	2
07000-13048	O-ring	4



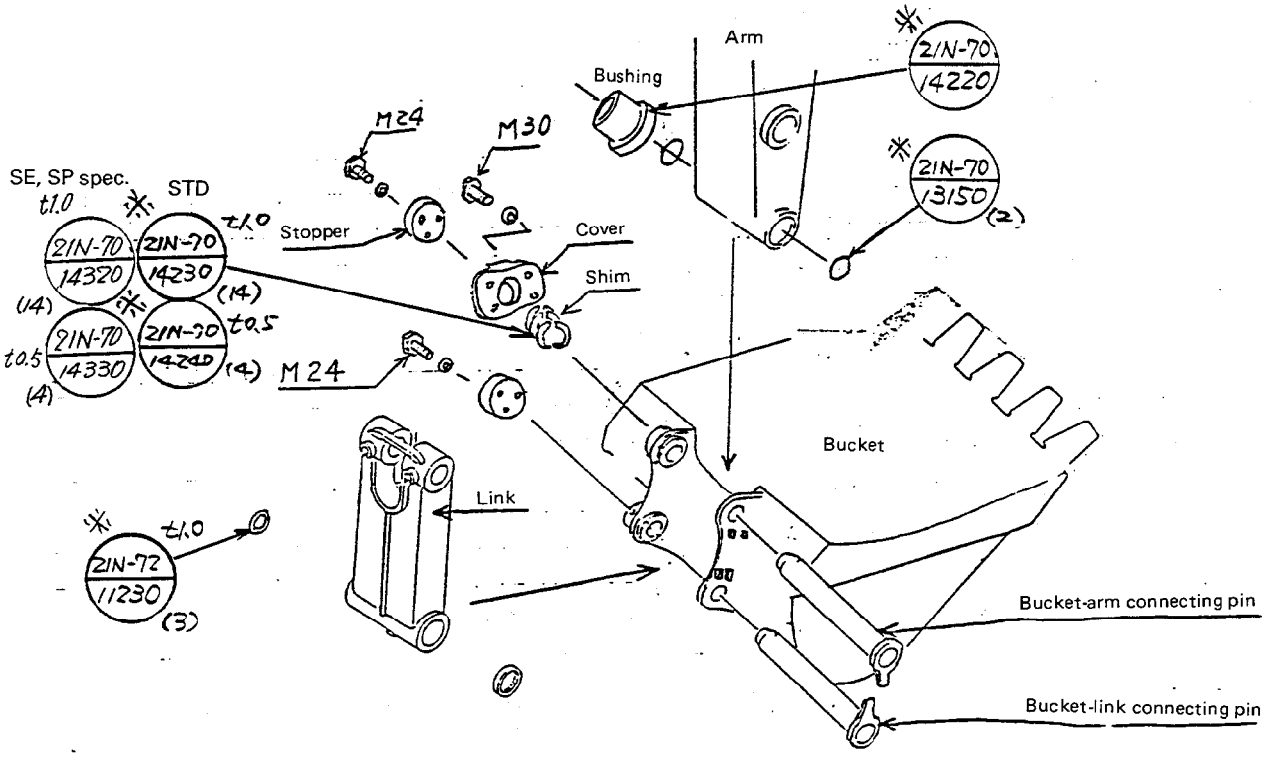
D-12 : ASSEMBLY OF BUCKET ASSEMBLY

Bucket assembly: 4000 kg (STD spec.)
5400 kg (SE, SP spec.)

1. Remove the stoppers of the bucket-arm connecting pin (fixed to the arm) and bucket-link connecting pin (fixed to the link), then remove each pin.
2. Fit the bushing (※ 21N-70-14220) (sent sa an individual part) and O-rings (※ 21N-70-13150 x 2) to the bucket boss.
3. Start the engine, run at idling and operate the boom and arm cylinders slowly to align the position of the holes for the bucket-arm connecting pins.

Parts sent individually

Part No.	Part Name	Q'ty
21N-70-14220	Bushing	1
21N-70-14230	Shim (t1.0)	14
21N-70-14320	Shim (t1.0) (SE, SP)	1
21N-70-14240	Shim (t0.5)	4
21N-70-14330	Shim (t0.5) (SE, SP)	4
21N-70-13150	O-ring	2
21N-70-11230	Shim (t1.0)	3



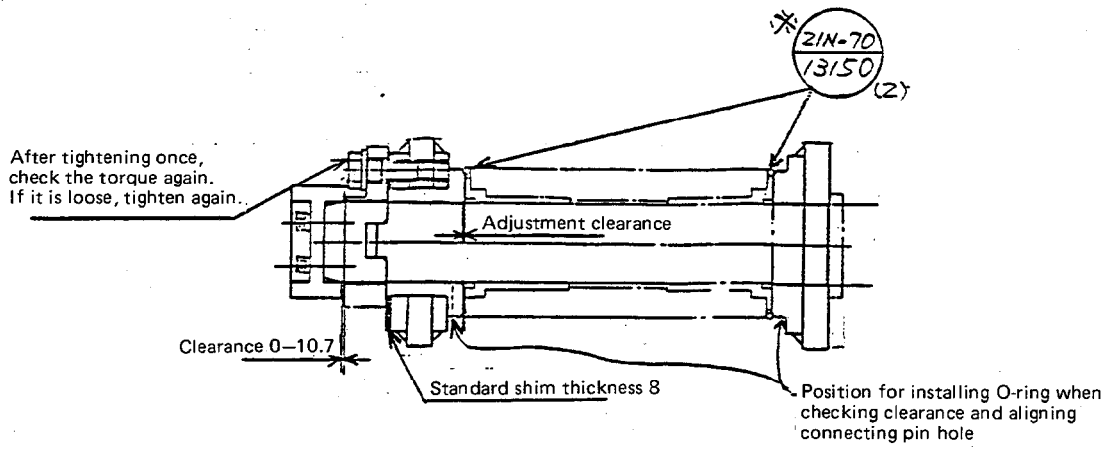
4. Push in the arm-bucket connecting pin, adjust with shims (※ 21N-70-14230 (t1.0) x 14) (※ 21N-70-14240 (t0.5) x 4) (sent as individual parts) so that the clearance is 0.5 — 1.0 mm, then tighten the cover mounting bolts (M36).

   Inside of bushing: Anti-friction compound (LM-P)

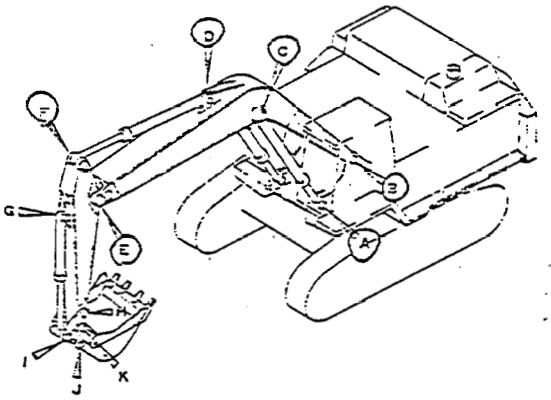
5. Assemble O-rings (※21N-70-13150 x 2) for prevention of entry of dirt and sand at the bucket-arm connection pin in the specified position, then install the pin stopper.
6. There are seals (209-72-11261 x 2) assembled to the link boss (link-bucket connection). Be careful not to damage them when pushing in the pin.
7. Raise the link, then operate the bucket cylinder to align the position of the bucket-link connecting pin hole.
8. Push in the bucket-link connecting pin, push in the pin, insert the shims (※21N-72-11230 x 3) (t1.0) (sent as individual parts) to adjust the clearance to less than 1 mm, then install the stopper.

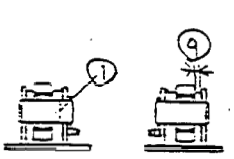
Note: When operating the cylinder, extend it slowly. Do not operate the cylinder suddenly or operate it to the end of its stroke.
At first there is air inside the cylinder, so the cylinder may not move for the first ten seconds. In such cases, do not operate the lever to the end of its travel.

★ The clearance at the joints should be according to the maintenance standard.

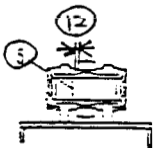


Detail of bucket-arm connecting pin portion

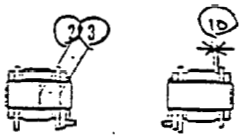




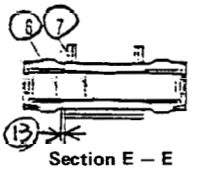
Section A – A



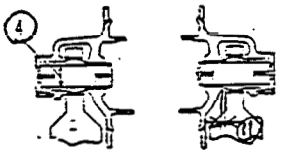
Section D – D



Section B – B

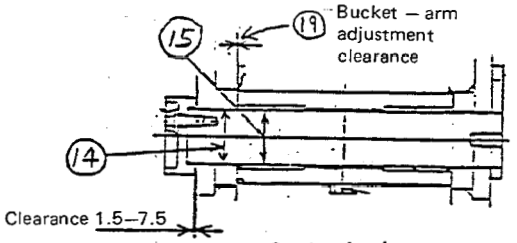


Section E – E

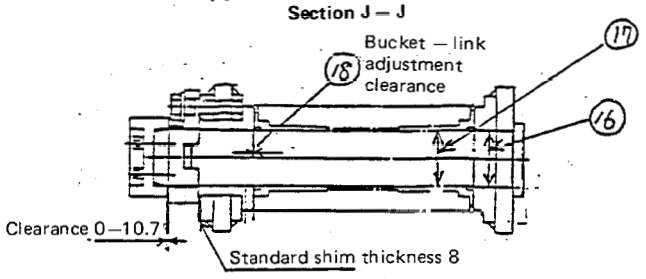


Section C – C

Section F – F



Section J – J



Section K – K

Standard number of shims

A:	21N-72-11230 (8)	1.0 mm
B:	21N-72-11210 (1)	1.0 mm
	21N-72-11220 (3)	1.5 mm
C:	21N-72-11230 (2)	1.0 mm
D:	21N-72-11210 (2)	1.0 mm
E:	21N-72-11210 (1)	1.0 mm
F:	21N-72-11210 (3)	1.0 mm

Unit: mm

No.		Check item	Criteria					
			Serial No.	Standard size	Tolerance		Standard clearance	Clearance limit
					Shaft	Hole		
A	1	Clearance between boss hole and pin mounting the boom cylinder and revolving frame	10001–	140	–0.043 –0.106	+0.100 0	0.043– 0.206	1.5
B	2	Clearance between bushing and pin mounting the boom and revolving frame	10001–	160	–0.043 –0.106	+0.436 +0.350	0.393– 0.542	1.5
B	3	Clearance between boss hole and pin mounting the boom and revolving frame	10001–	160	–0.043 –0.106	+0.063 0	0.043– 0.162	1.5
C	4	Clearance between boss hole and pin mounting the boom and boom cylinder	10001–	140	–0.043 –0.106	+0.100 0	0.043– 0.206	1.5
D	5	Clearance between boss hole and pin mounting the boom and arm cylinder	10001–	160	–0.043 –0.106	+0.100 0	0.043– 0.206	1.5
E	6	Clearance between boss hole and pin mounting the boom and arm	10001–	160	–0.043 –0.106	+0.100 0	0.043– 0.206	1.5
E	7	Clearance between bushing and pin mounting the boom and arm	10001–	160	–0.043 –0.106	+0.442 +0.357	0.400– 0.548	1.5
F	8	Clearance between boss hole and pin mounting the arm and arm cylinder	10001–	160	–0.043 –0.106	+0.100 0	0.043– 0.206	1.5
A	9	Clearance between revolving frame and boom cylinder	10001–				Adjust shims so that clearance is 2 – 3 mm.	
B	10	Clearance between revolving frame and boom	10001–				Adjust shims so that clearance is less than 1 mm.	
C	11	Clearance between boom and boom cylinder	10001–				Adjust shims so that clearance is 2 – 3 mm.	
D	12	Clearance between boom and arm cylinder	10001–				Adjust shims so that clearance is 2 – 3 mm.	
E	13	Clearance between boom and arm	10001–				Adjust shims so that clearance is less than 1 mm.	
J	14	Clearance between boss hole and pin mounting the link and bucket	10001–	140	–0.043 –0.106	+0.200 0	0.043– 0.306	1.5
J	15	Clearance between bushing and pin mounting the link and bucket	10001–	140	–0.043 –0.106	+0.404 +0.321	0.369– 0.510	1.5
K	16	Clearance between boss hole and pin mounting the arm and bucket	10001–	140	–0.043 –0.106	+0.200 0	0.043– 0.306	1.5
K	17	Clearance between buhing and pin mounting the arm and bucket	10001–	140	–0.043 –0.106	+0.397 +0.312	0.355– 0.503	1.5
K	18	Clearance between bucket and arm	10001–	–	–	–	Adjust shims so that clearance is 0.5 – 1 mm.	
J	19	Clearance between bucket and link	10001–	–	–	–	Adjust shims so that clearance is less than 1 mm.	
F	20	Clearance between arm and arm cylinder	10001–				Adjust shims so that clearance is 2 – 3 mm.	

D-14: INSTALLATION OF WORK EQUIPMENT GREASE PIPING

1. Remove the blind plug at the cylinder end and the blind plug at the hose nipple end of the boom cylinder top grease hoses (2 places) at portion ⓐ, then remove the nipple (205-70-51390) from the hose, assemble to the cylinder end, and connect.

2. Remove the blind plug at the cylinder end and the blind plug at the hose elbow end of the arm cylinder foot grease hoses at portion ⓑ, then remove the elbow (205-70-51380) from the hose, assemble to the cylinder end, and connect.

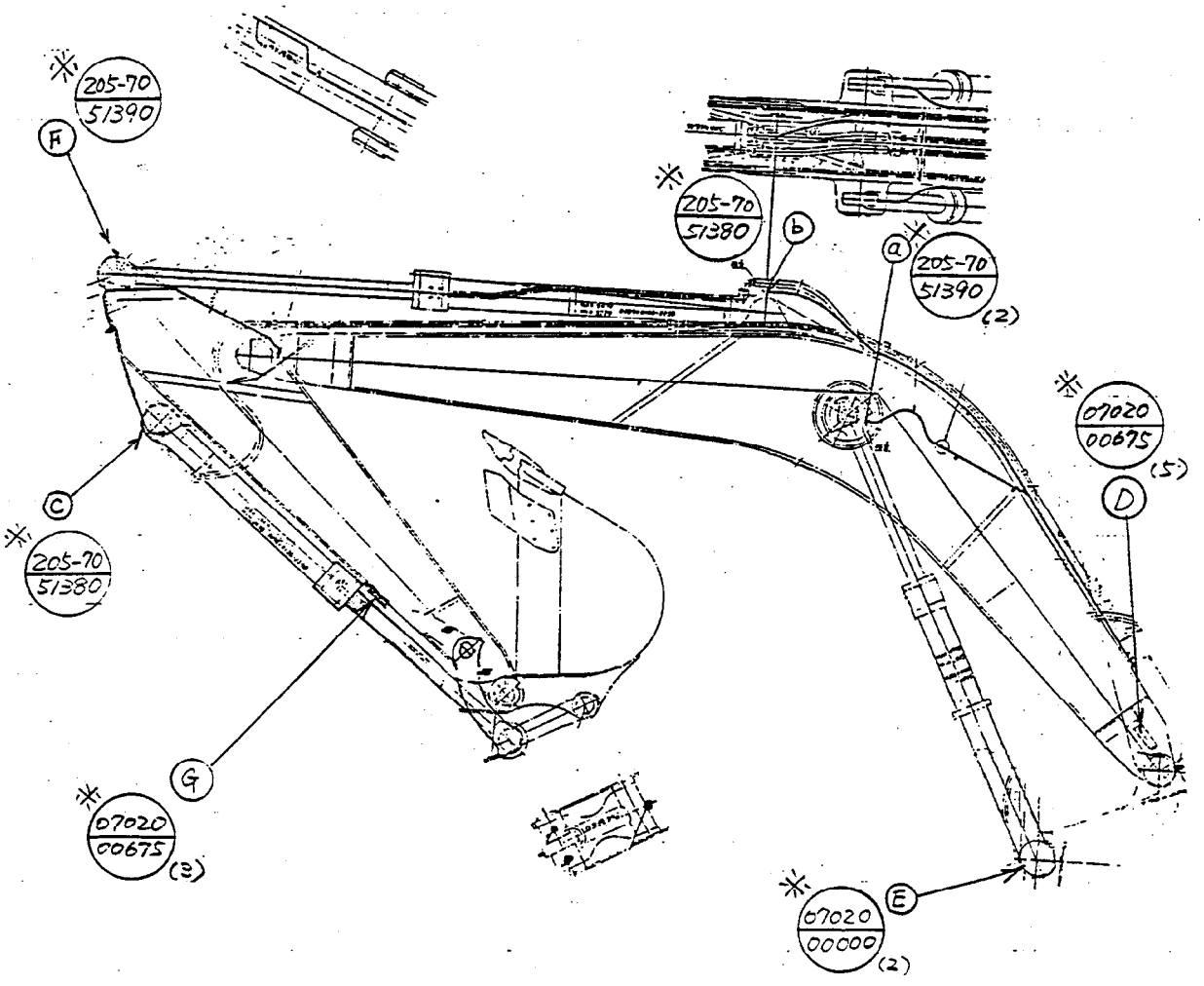
3. Remove the blind plug at the cylinder end, then assemble the bucket cylinder foot elbow (※205-70-51380) at portion Ⓒ.

4. Assemble 5 grease nipples (※07020-00675) to the central greasing block at the right side of the boom at portion Ⓓ.

5. Remove the blind plugs at the left and right cylinder ends, then assemble the 2 boom cylinder foot grease nipples (※07020-00000) at portion Ⓔ.

6. Remove the blind plug at the cylinder end, then assemble the arm cylinder top nipple (※205-70-51390) at portion Ⓕ.

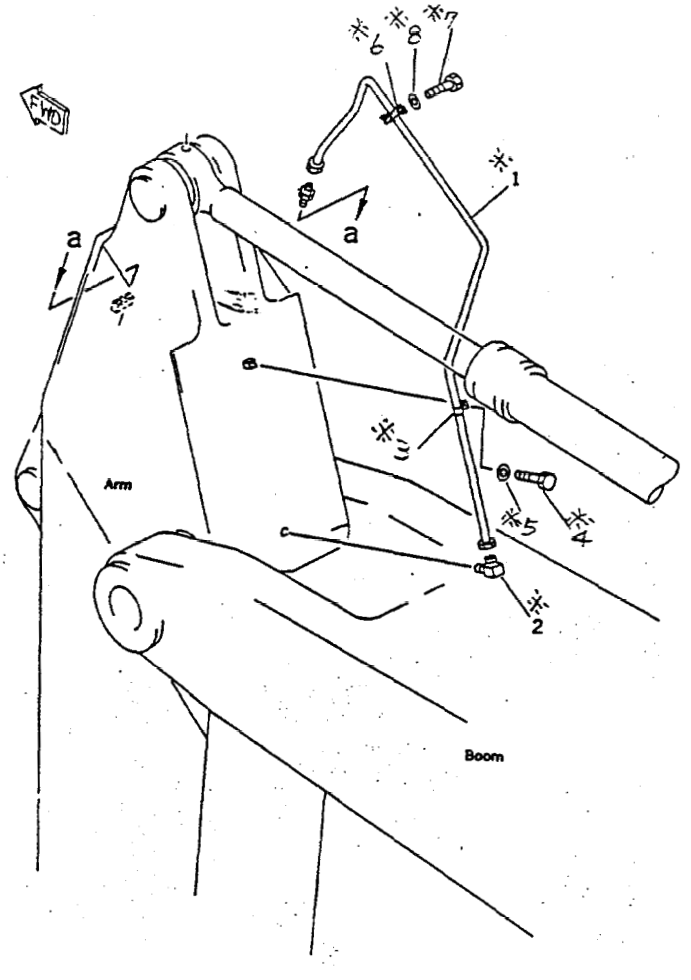
7. Assemble 3 grease nipples (※07020-00675) to the arm central greasing block at portion Ⓖ.



8. instal the grease piping as shown in the figure on the right. (for boom-arm connecting pin)

Parts sent individually

No.	Part No.	Part Name	Q'ty
1	21N-70-15171	Tube	1
	21N-70-12540	Tube (SE, SP spec.)	1
2	209-72-16140	Elbow	1
3	176-43-54580	Clip	1
4	01010-51016	Bolt	1
5	01643-31032	Washer	1
6	07282-01048	Clamp	1
7	01010-50612	Bolt	2
8	01643-30623	Washer	2



D-15: INSTALLATION OF WORK EQUIPMENT WIRING AND WORK EQUIPMENT HOSE CLAMPS

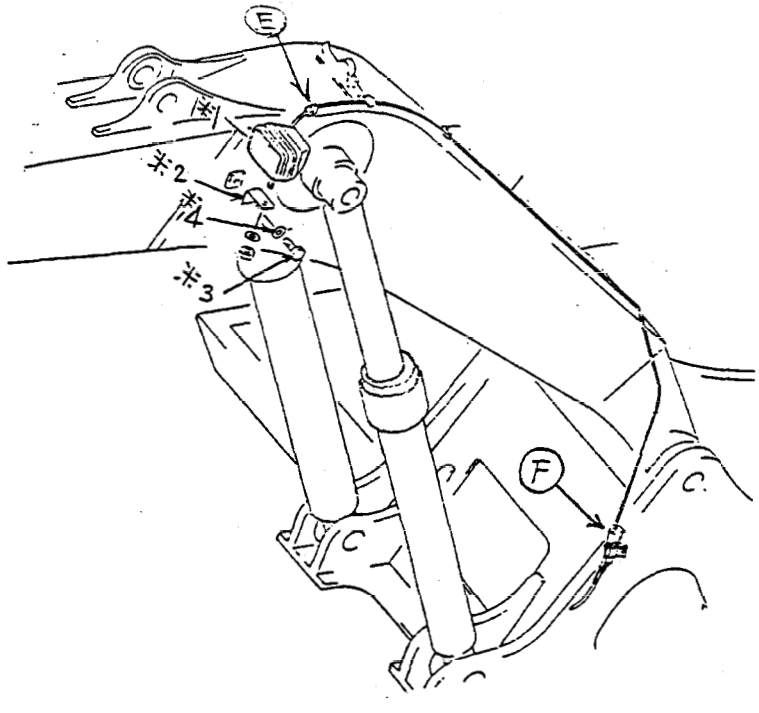
Precautions

1) Keep the blind plugs used for transportation in a safe place so that they can be used again.
2) Be careful to install the hoses without twisting or interference.
   (After completion of assembly, operate the work equipment and check again that there is no twisting or interference of the hoses.)

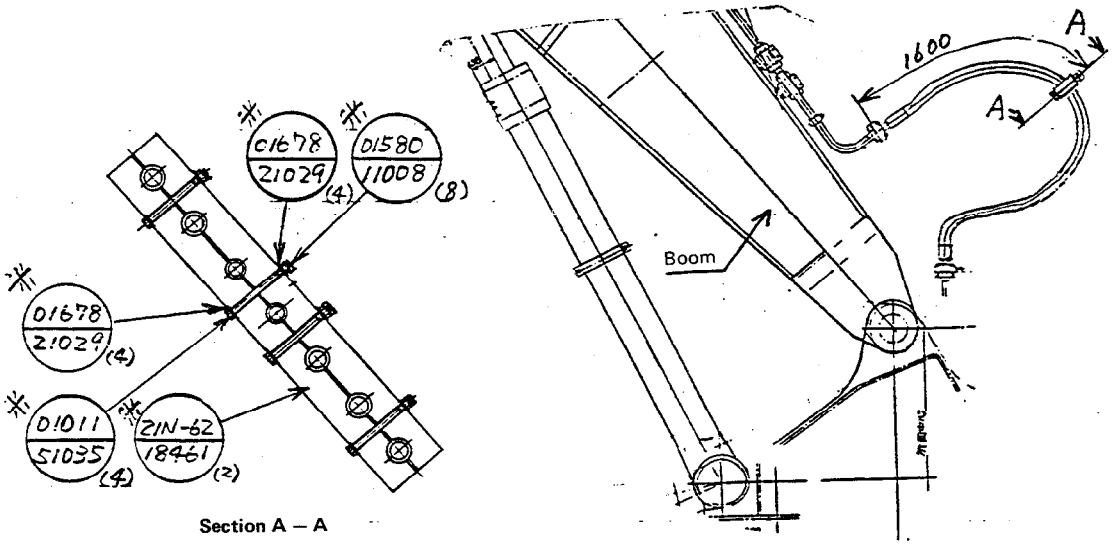
1. Remove the blind plugs at portions Ⓔ and Ⓕ from the connector for the working lamp wiring, then connect the connector.
   Install the working lamp as shown in the figure on the right.
   After installing, always check that the system works.

Parts sent individually

No.	Part No.	Part Name	Q'ty
1	203-06-56140	Work lamp ass'y	1
2	203-06-21290	Plate	1
3	01010-51430	Bolt	1
4	01643-31445	Washer	1



2. Fit the clamps (※21N-62-18461 x 2, ※01011-51035 x 4, ※01678-21029 x 8, ※01580-11008 x 8) of the connecting hoses between the boom and chassis.
   Be careful not to twist the hoses when installing.



Section A – A

D-16: BLEEDING AIR FROM CYLINDER

After completion of assembly, bleed the air from the system. Run the engine at low idling, and do as follows.

1. Extend and retract each cylinder 4 or 5 times without going to the end of its stroke (stop approx. 100 mm before the end of the stroke).
   ★ At first there is a large amount of air inside the cylinder, so the cylinder may not move for the first ten seconds. In such cases, do not operate the lever to the end of its travel.

2. Keep the engine running at low idling, and operate each cylinder from a point 100 mm from the end of its stroke slowly (take at least 10 seconds) to the end of its stroke (fully extended), and hold the work equipment control lever at the full stroke position for 3 minutes.

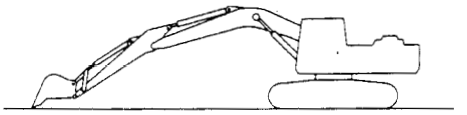
3. Next, run the engine at high idling, and operate each cylinder from a point 100 mm from the end of its stroke slowly (take at least 10 seconds) to the end of its stroke (fully retracted), and hold the work equipment control lever at the full stroke position for 1 minute.

★ Repeat Steps 1 – 3 to bleed the air from the cylinders.

★ If this operation is carried out from the first with the engine running at high speed or with the cylinder operated to the end of its stroke, the air contained inside the cylinder may cause damage to the piston packing.

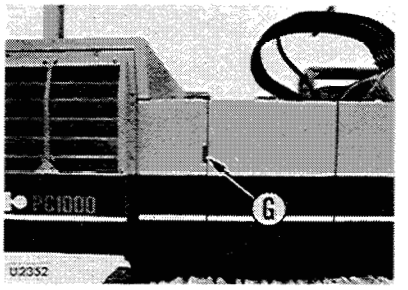
D-17: CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL

1. Run the engine at low idling, retract the arm and bucket cylinders, lower the boom so that the tips of the teeth are in contact with the ground, then stop the engine.



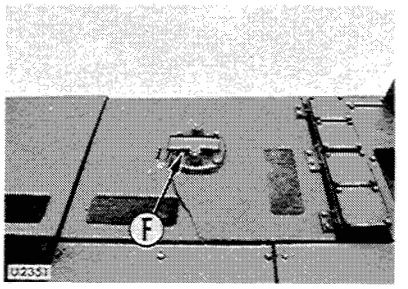
2. Operate each control lever (work equipment, travel) to the end of its stroke in each direction to release the internal pressure.

3. If the oil level is not between the H and L lines on sight gauge (G) , add engine oil (CD class SAE10W regardless of ambient temperature) through oil filler (F) . (10 mm in height is 11 litres.)
   ★ Do not add oil above the H line.



The inside of the tank is pressurized, so loosen the cap gradually, and leave for several minutes to release the air pressure completely before taking off the cap.

★ The oil level differs according to the oil temperature, so use the following as a guide.
- Before operation: Near L line
  (oil temperature: 10 – 30°C)
- During operation: Near H line
  (oil temperature: 50 – 80°C)



E. PROCEDURE FOR ASSEMBLY OF WORK EQUIPMENT (FRONT LOADING SHOVEL SPECIFICATION)

THIS MANUAL GIVES THE PROCEDURE FOR ASSEMBLY OF THE FRONT LOADING SHOVEL WORK EQUIPMENT.

1. Part numbers marked ※ in this manual are parts sent individually.

E-1: INSTALLATION OF ARM CYLINDER FOOT PIN

1. Remove the stopper fitted to the boom, then remove the arm cylinder foot pin.

   kg Arm cylinder foot pin: 92 kg

   ★ Use a forcing screw (Dia. = 16 mm, Pitch = 2.0 mm) to remove the pin.

2. Set the 2 arm cylinders horizontal and lay on wooden blocks.

   kg Arm cylinder assembly: 610 kg

3. Insert O-rings (※07000-12130 x 4) in the O-ring grooves of the 2 bushings of each cylinder at the arm cylinder foot.

4. Raise the boom with a crane, align the pin hole at the boom end with the arm cylinder foot hole, then push in the pin.

   Inside of bushing
   Anti-friction compound (LM-P)

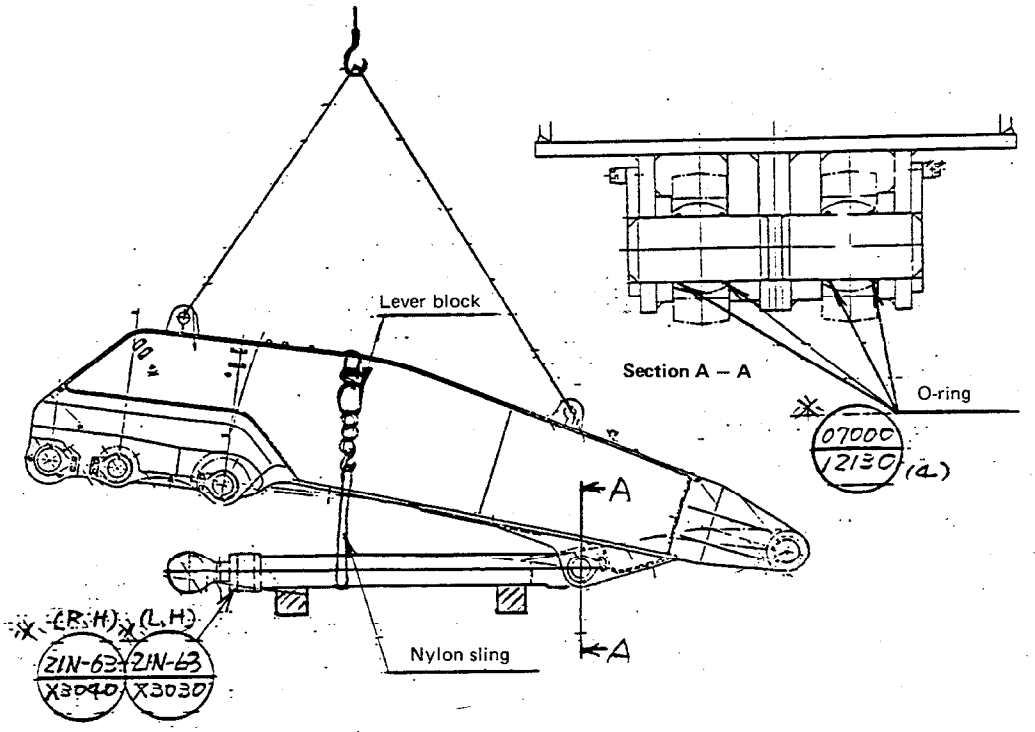
   kg Boom assembly: 6700 kg

   ★ Assemble so that the greasing hole in the arm cylinder foot is facing down.

5. Install on the left and right in the same way.

6. Install the stopper.

7. Using a nylon sling, secure the arm cylinder with a lever block.



E-2: CONNECTION OF BOOM AND ARM

1. Remove the stopper fitted to the boom, then remove the boom-arm connecting pin.
   Set the arm cylinder fully extended.

   kg Boom-arm connecting pin: 81 kg

   ★ Use a forcing screw (Dia. = 16 mm, Pitch = 2.0 mm) to remove the pin.

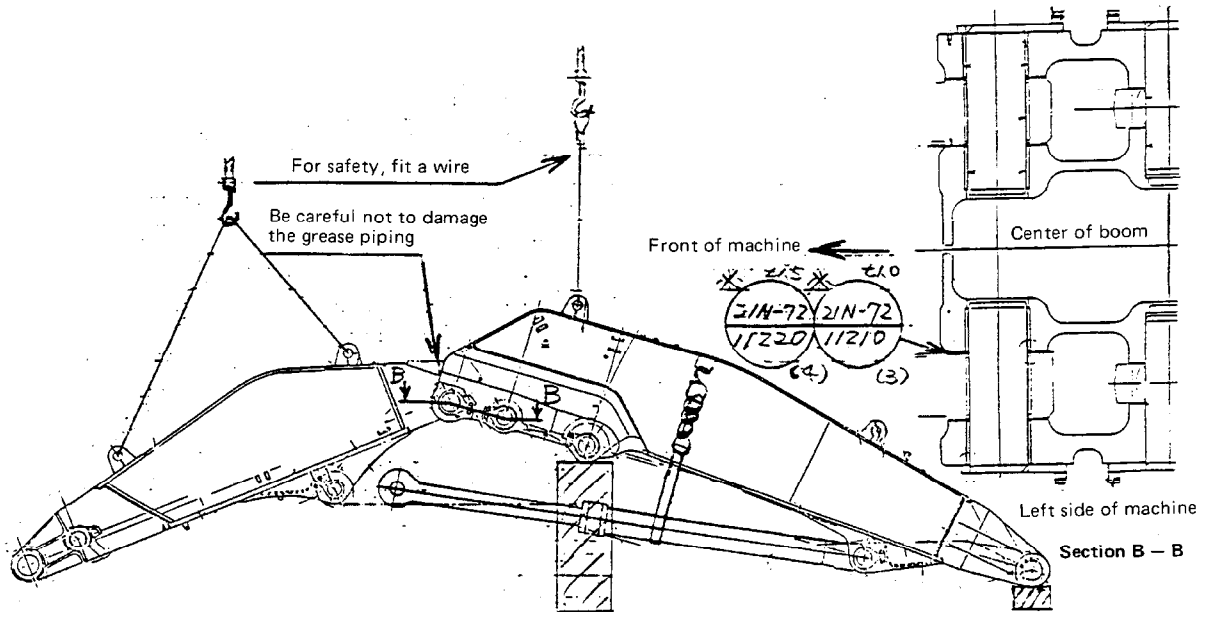
2. Raise the arm assembly with a crane, align with the boom hole, then push in the pin on the right side of the machine. Next, insert shims (※21N-72-11210 t1.0, ※21N-72-11220 t1.5) in the clearance between the boom and arm boss on the left side of the machine to adjust the clearance to less than 1.0 mm, then push in the pin.

   kg Arm assembly: 4500 kg

   ★ There are seals (209-72-11311 x 4) assembled inside the bushing on the arm side, so be careful not to damage them when pushing in the pin.
   ★ When connecting, be careful not to damage the grease piping of the arm boss.

   Inside of bushing:
   Anti-friction compound (LM-P)

3. Install the stopper.



E-3: INSTALLATION OF ARM CYLINDER TOP PIN

1. Remove the stopper fitted to the arm, then remove the arm cylinder top pin.

   kg Arm cylinder top pin: 25 kg

   ★ Use a forcing screw (Dia. = 16 mm, Pitch = 2.0 mm) to remove the pin.

2. Raise the boom and arm with a crane, align with the arm hole, and push in the pin.

   kg Boom assembly: 6700 kg
   Arm assembly: 4500 kg

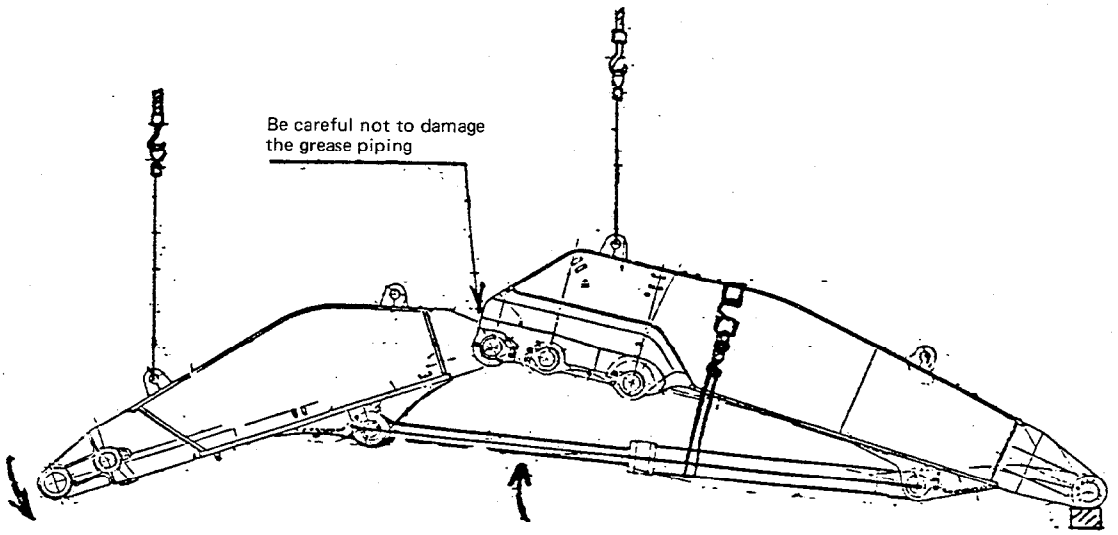
   Inside of bushing:
   Anti-friction compound (LM-P)

   ★ Assemble so that the greasing hole in the arm cylinder top is facing down.

3. Install on the left and right in the same way.

4. Install the stopper.

5. Remove the nylon sling holding the arm cylinder.



E-4: INSTALLATION OF BUCKET CYLINDER FOOT PIN

1. Remove the stopper fitted to the boom, then remove the bucket cylinder foot pin.

   kg Bucket cylinder foot pin: 49 kg

   ★ Use a forcing screw (Dia. = 16 mm, Pitch = 2.0 mm) to remove the pin.

2. Insert O-rings (※07000-12130 x 4) in the O-ring grooves of the 2 bushings of each cylinder at the bucket cylinder foot.

3. Fit a nylon sling to the bucket cylinder, raise it with a crane, align it with the pin holes at the boom end, then push in the pin.

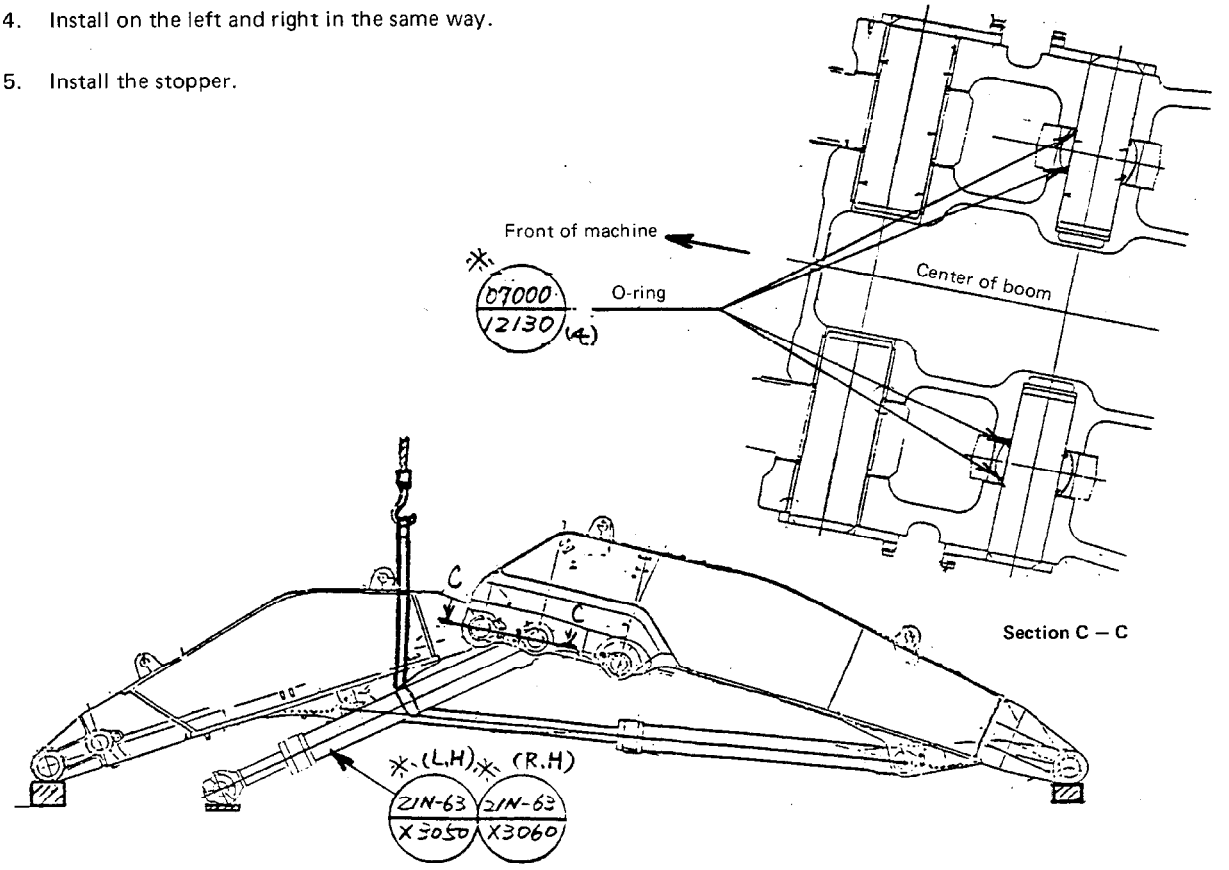
   Inside of bushing:
   Anti-friction compound (LM-P)

   ★ Assemble so that the greasing hole in the bucket cylinder foot is facing down.

   kg Bucket cylinder assembly: 710 kg

4. Install on the left and right in the same way.

5. Install the stopper.



E-5: CONNECTION OF LINK AND BUCKET CYLINDER TOP PIN

1. Remove the stopper fitted to the arm, then remove the wrist link pin.

   kg Wrist link pin: 52 kg

   ★ Use a forcing screw (Dia. = 16 mm, Pitch = 2.0 mm) to remove the pin.

2. Raise wrist links ① (※21N-72-13110 x 4) with a crane, align with the pin holes at the arm end, then push in the pin from the outside.

   kg Wrist link: 77 kg

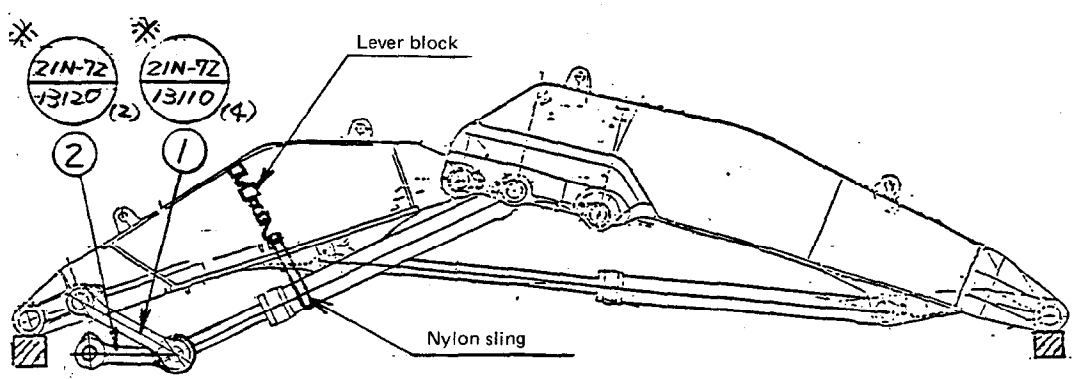
   Inside of arm bushing:
   Anti-friction compound (LM-P)

3. Raise front links ② (※21N-72-13120 x 2) with a crane, align with the pin holes of wrist link ①, then push in the separately sent pins ③ (※21N-72-13140 x 2) from the outside of the machine so that each link is hooked on the pin.

   kg Front link: 160 kg
   Link connecting pin: 52 kg

   Inside of bushing:
   Anti-friction compound (LM-P)

4. Insert O-rings ④ (※07000-12130 x 4) in the O-ring grooves of the 2 bushings of each cylinder at the bucket cylinder top.



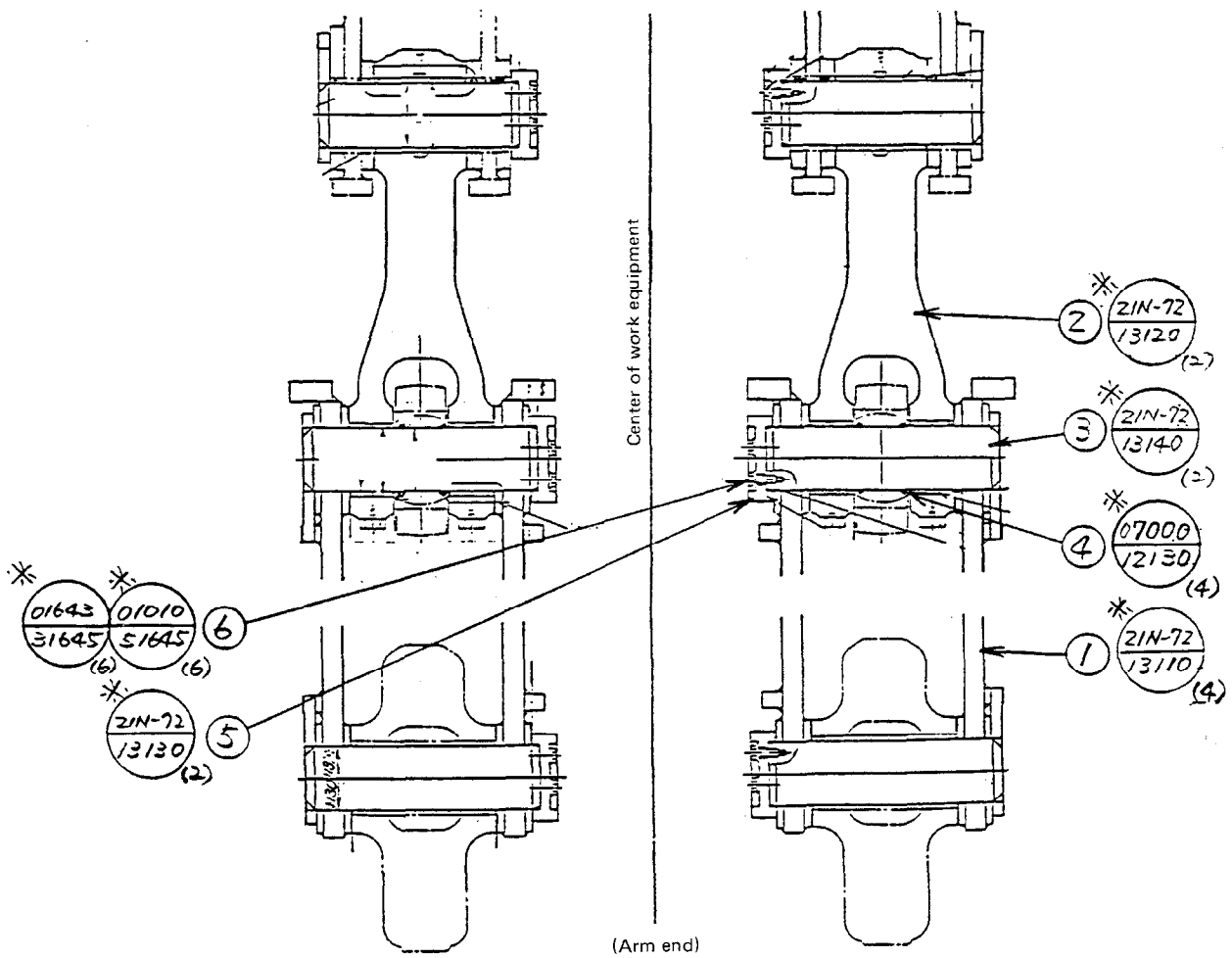
5. Fit a nylon sling to the bucket cylinder, align the bucket cylinder top hole with the pin holes at the link end using the lever block, then push in pin ③.

   Inside of cylinder bushing:
   Anti-friction compound (LM-P)

   ★ Assemble so that the greasing hole in the bucket cylinder top is facing up.

6. Install on the left and right in the same way.

7. Install stopper ⑤.
   (Including the arm and wrist link connecting pin)



E-6: ASSEMBLY OF BOOM ASSEMBLY

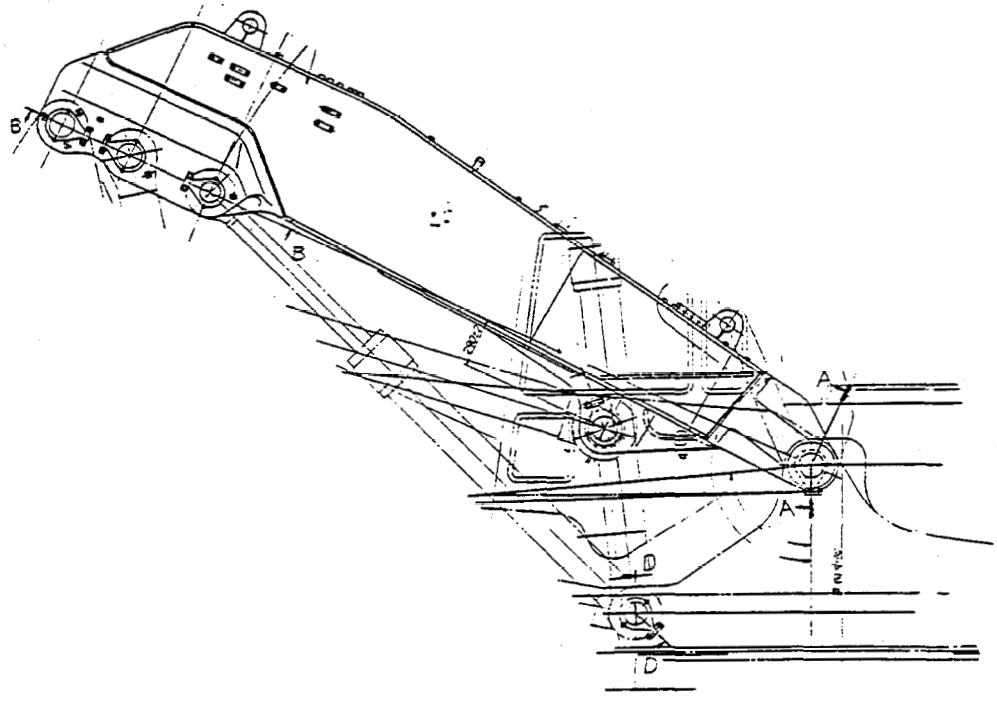
1. Remove the boom foot pin stopper fitted to the chassis, and pull out the pin.

2. Remove the boom cylinder foot pin stopper fitted to the chassis, and pull out the pin.
   ★ Use a forcing screw (Dia. = 24 mm, Pitch = 3.0 mm) to remove the pin.

3. Raise the work equipment assembly with a crane and align the boom foot pin hole.

   kg Work equipment assembly: 14800 kg

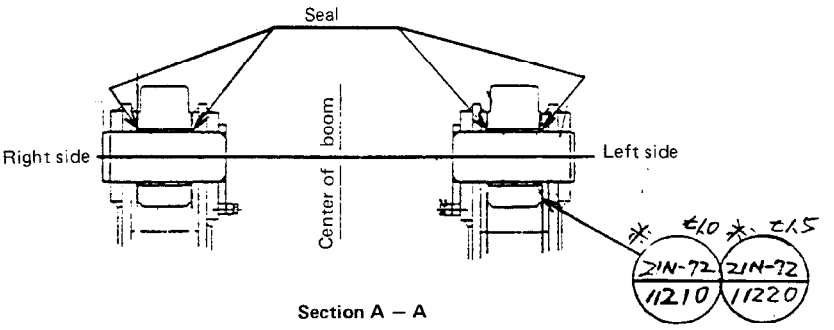
4. Install the boom foot pin.
   ★ Insert the boom foot pin on one side as far as it will go, then align the pin hole on the other side. When doing this, if the boom is tilted to the left or right, use a jib crane to balance the boom.
   ★ Check the clearance of the boom foot pin and the outside of the machine. Decide the thickness of the adjustment shims to make the clearance less than 1 mm.
   Combine the following shim thicknesses to make the adjustment shim.
   (※21N-72-11220) t1.5 x 3
   (※21N-72-11210) t1.0 x 3
   (Adjust with shims at one place on the outside.)



5. Insert the boom foot pins completely on the left and right, then install the lock plates.

Inside of bushing:
Anti-friction compound (LM-P)

When pushing in the pin, be careful not to damage the seals (209-72-11311 x 4).



Section A – A

E-7: RELEASING PRESSURE FROM HYDRAULIC CIRCUIT

When removing the hydraulic piping, always release the pressure as follows.

1. Leave the safety lock lever in the FREE position.

2. Remove the cap of the hydraulic tank.

3. Start the engine, run for approx. 10 seconds, then stop the engine.
   - ★ Do not run the engine above 1000 rpm.
   - ★ Keep the control levers at neutral.
   - ★ Raise the safety lock lever and leave it in the FREE position.

4. After stopping the engine, operate the work equipment levers to the end of their stroke within 5 – 6 seconds to release the remaining pressure in the travel circuit.
   - ★ Repeat Steps 3 and 4 three times.

   ⚠ When removing the oil filler cap from the hydraulic tank, turn it slowly to release the internal pressure, then remove it.

5. • When the remaining pressure has been released, install the oil filler cap on the hydraulic tank to prevent dust from getting in.
   • Lower the safety lock lever to the LOCK position.

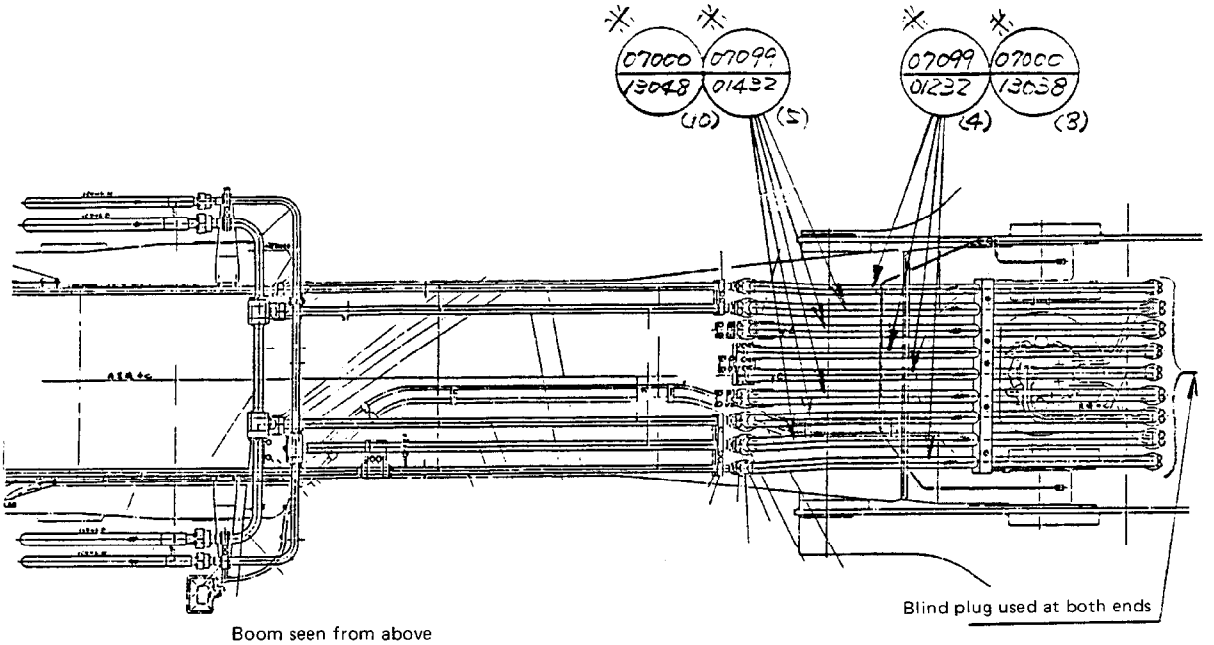
E-8: WORK EQUIPMENT PIPING
(between chassis and boom)

Precautions

1) Keep the flanges, O-rings, and heads used during transportation in a safe place so that they can be used again.

2) When connecting the hoses, be careful not to get the O-rings caught.

3) When connecting the hoses, be extremely careful not to let any dirt or dust get into the circuit.



Boom seen from above

1. Remove the blind plugs from the piping at the chassis end piping and the boom end piping, then assemble the hoses between the chassis and boom.

   For bottom dump, arm head:
   Hose (※07099-01232 x 4), O-ring (※07000-13038 x 8), split flange (07371-51260 x 16), bolt (01010-51245 x 32), washer (01643-31232 x 32)

   For bucket, arm bottom:
   Hose (※07099-01432 x 5), O-ring (※07000-13048 x 10), split flange (07371-51470 x 20), bolt (01010-51455 x 40), washer (01643-31445 x 40)

   (Use the removed split flanges, bolts, washers, and O-rings again. Be careful not to twist the hoses when installing.)

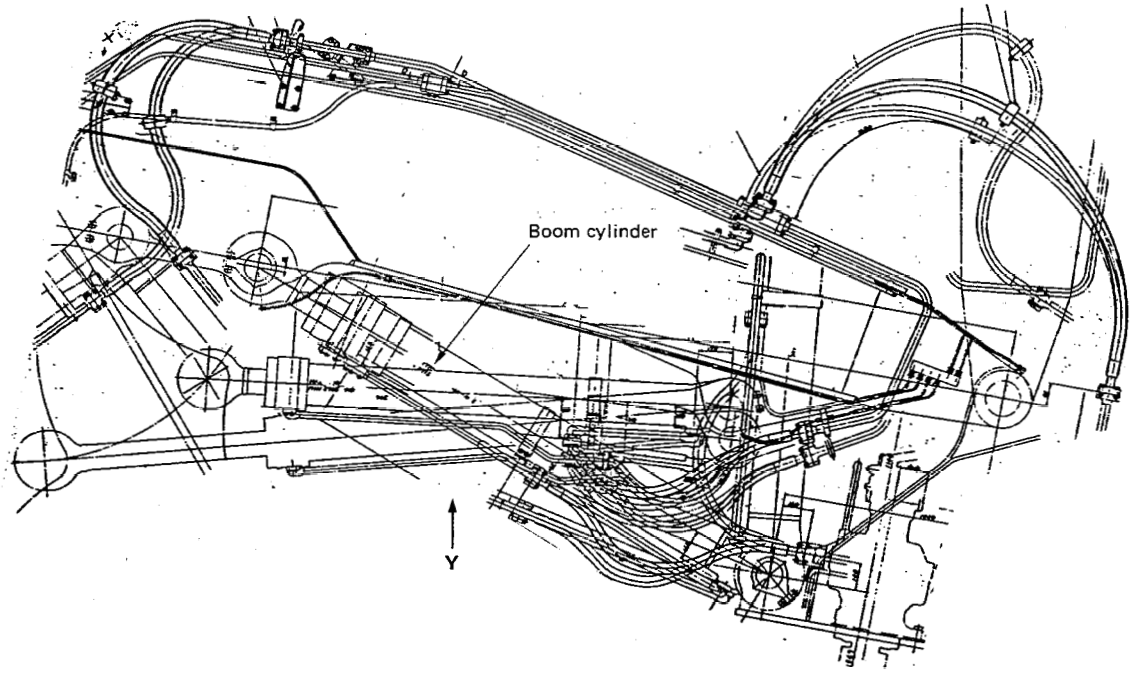
E-9: WORK EQUIPMENT PIPING

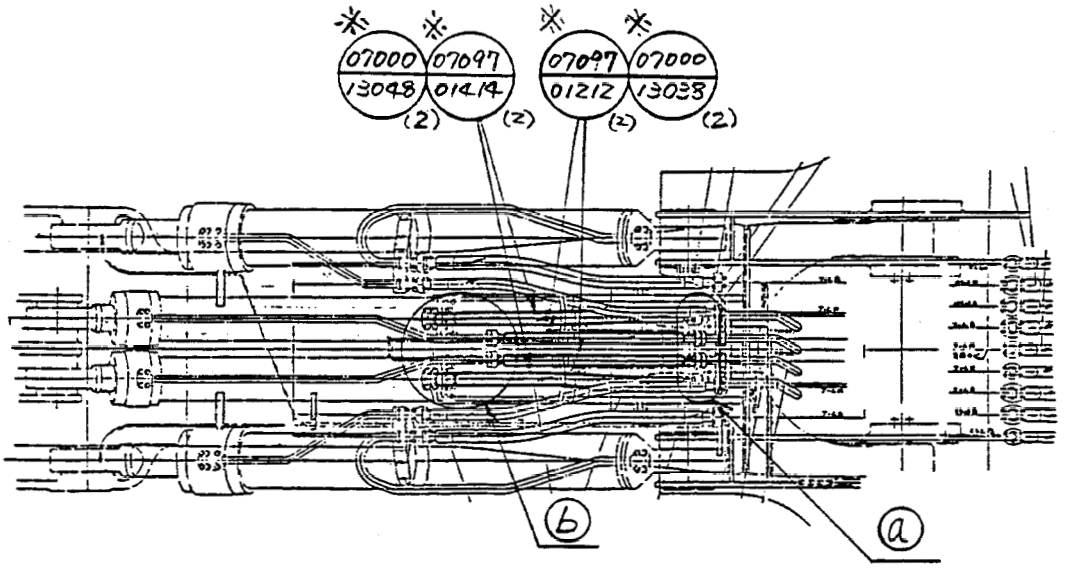
Precautions

1) Keep the flanges, O-rings, and heads used during transportation in a safe place so that they can be used again.

2) When connecting the hoses, be careful not to get the O-rings caught.

3) When connecting the hoses, be extremely careful not to let any dirt or dust get into the circuit.





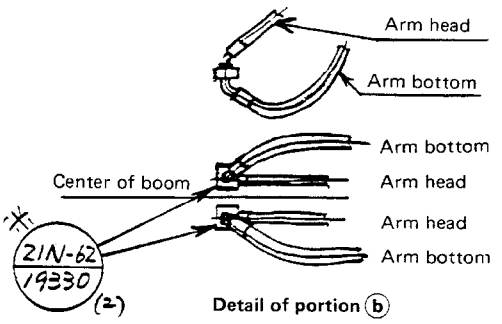
View Y

1. Remove the blind plugs from portion (a) of the boom piping and portion (b) of the arm cylinder piping, then fit new O-rings (※07000-13048 x 2, ※07000-13038 x 2) to portion (a), and install hoses (※07097-01414 x 2, ※07097-01212 x 2).

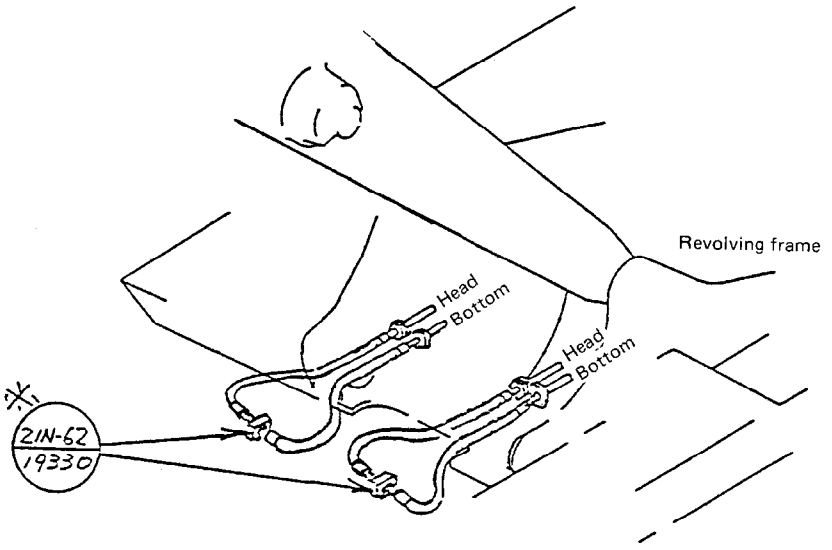
2. Using flanges (※21N-62-19330 x 2) at portion (b), short circuit the head end and bottom end. (See diagram on right)

   (Use the removed split flanges, bolts, washers, and O-rings again. Be careful not to let dust get in.)

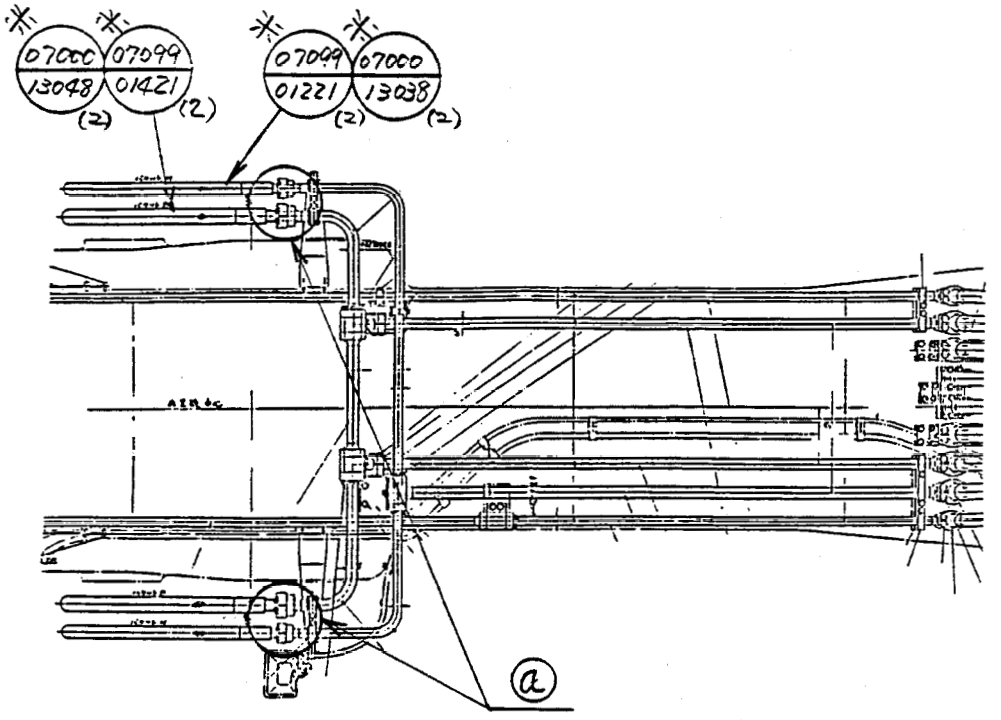
3. Remove blind plug from boom cylinder hose, then using flanges (21N-62-19330 x 2), short circuit the head end and bottom end.
   Use the removed split flanges, botls, and O-rings again.



Detail of portion (b)

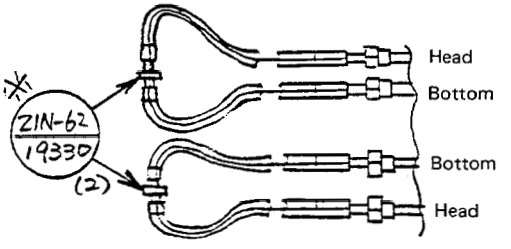


4. Remove the blind plugs from portion ⓐ of the boom piping and portion ⓑ of the bucket cylinder piping, then fit new O-rings (※07000-13048 x 2, ※07000-13038 x 2), and install hoses (※07099-01421 x 2, ※07099-01221 x 2).

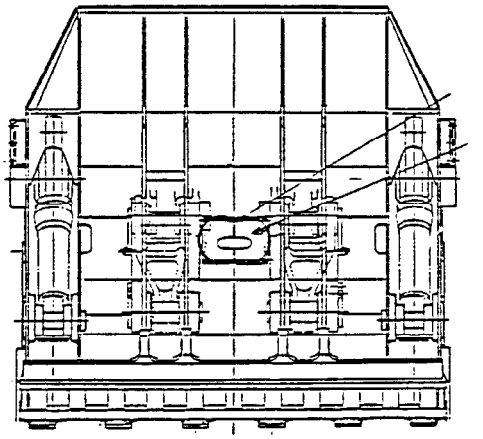


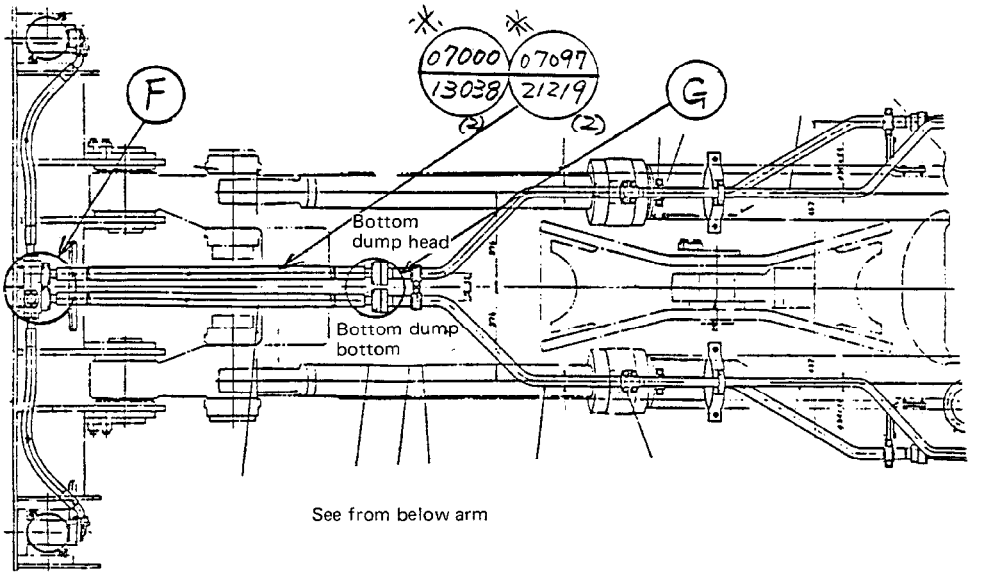
5. Using flanges (※21N-62-19330 x 2) at the tip of the hose, short circuit the head end and bottom end. (See diagram on left)

   (Use the removed split flanges, bolts, and O-rings again.)



6. Remove the blind plugs from portion Ⓖ of the arm piping, then fit new O-rings (※07000-13038 x 2), and install hoses (※07097-21219 x 2) to portion Ⓖ.

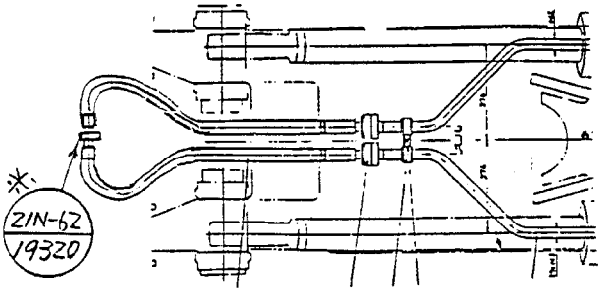




See from below arm

7. Using flange (※21N-62-19320 x 1) at tip of the hose, short circuit the head end and bottom end. (See diagram on left)

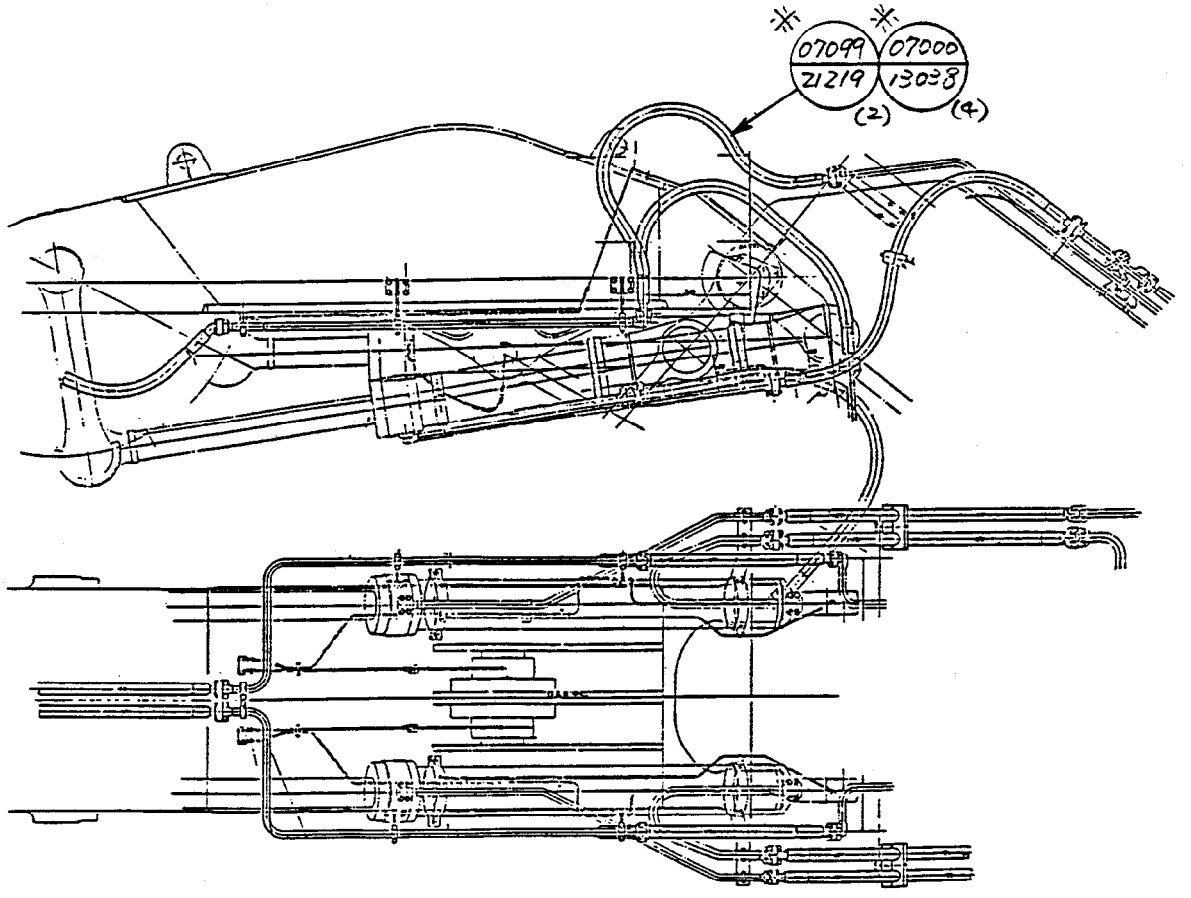
(Use the removed split flanges, bolt, washers, and O-rings again.)



Condition when short circuited

8. Remove the blind plugs from the boom piping and arm piping of the bottom dump cylinder circuit, then fit new O-rings (※07000-13038 x 4), and install the hoses (※07099-21219 x 2).

   (Use the removed split flanges, bolts, and washers again.)
   (Be careful not to twist the hoses when installing.)



E-10: FLUSHING WORK EQUIPMENT PIPING

Purpose
To remove the dirt and dust which gets into the system during assembly of the attachments, work equipment, and disassembled parts of the body.
Flushing is carried out on the machine when it is shipped from the factory.

1. Flush the system.
   1) Run the engine at low idling for 30 minutes.
      (When doing this, do not move the control levers in the operator's compartment.)
   2) Run the engine at mid-range speed for 30 minutes.
      (When doing this, do not move the control levers in the operator's compartment.)
   3) Run the engine at high idling and operate the control levers as follows.

      [BOOM RAISE] → [BOOM LOWER] → [ARM IN] → [ARM OUT] → [BUCKET TILT] → [BUCKET DUMP] → [BOTTOM OPEN] → [BOTTOM CLOSE]

      Hold the lever at each position for 1 min. – 1 min. 30 sec. Repeat this pattern 4 – 5 times.
      ★ When operating the control levers, raise the hydraulic safety lock and set it to the FREE position.

★ If the filter caution lamp on the monitor inside the operator's cab lights up during flushing, stop the engine immediately and replace the flushing element.
If no special flushing element is available, replace with the standard element (07063-01210).

This completes the flushing.

Before starting operations, do the following.

1. Check the level of contamination of the oil.
   (If the flushing is carried out according to the instructions given, the contamination should be within the standard, but for safety and to provide data for future reference, measure the level of contamination.)
   The results of the measurement are not know until later, but if they are not within the standard range, carry out flushing again.

2. Replace the special flushing element with the standard parts (07063-01210 x 4), and replace the flushing plates (21T-60-13730 x 4) with the valve and strainer. Be sure not to forget this operation. If the element is replaced, replace the O-rings of the return filter case with new parts (※07000-05175 x 4), then tighten the cover.

   Condition of element when installed:

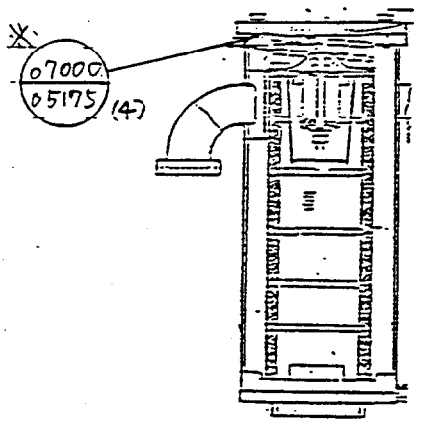


Fig. 1 Correct installation

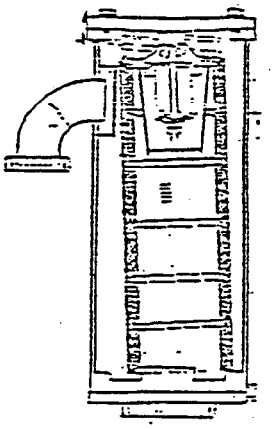


Fig. 2 Incorrect installation

Precaution:
Be careful not to assemble the element with the bottom resting on the stepped part at the bottom of the case as shown in Fig. 2.
When there is oil inside the filter case, it is particularly difficult to judge if the element is assembled correctly, so after inserting the element, rotate it by hand and check that it rotates smoothly. If it rotates smoothly, it can be considered that it is installed correctly.

3. Releasing pressure from hydraulic circuit.
   Release the pressure from hydraulic circuit according to process No. E-7 (See page 106).

E-11: INSTALLATION OF BOOM CYLINDER FOOT PIN

1. Raise the boom cylinder with a crane, align with the chassis pin holes, then push in the pins.

   kg Boom cylinder assembly: 1300 kg

   Inside of bushing:
   Anti-friction compound (LM-P)

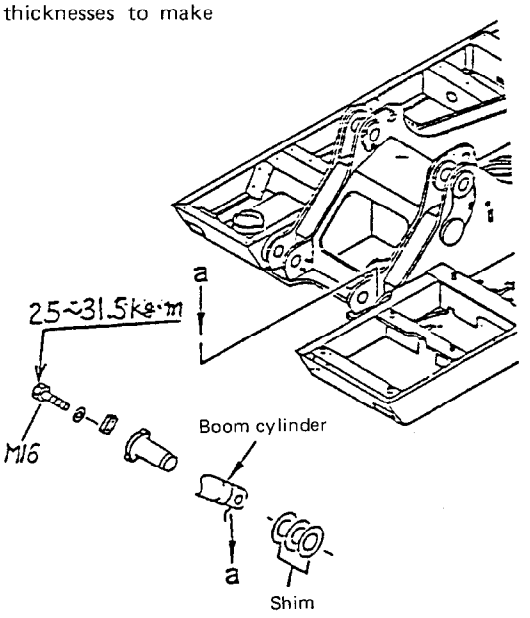
2. Check the clearance (at the outside of the chassis) between the chassis and the end of the cylinder boss. Select a shim thickness to make the clearance 2 – 3 mm, and assemble the shims. Adjust both the left and right cylinders with shims. (Outside of chassis).

3. Push the boom foot pin in fully, then install the lock plate.

4. Install the left and right sides in the same way.

★ Assemble so that the boom cylinder bottom greasing hole is at the bottom.

★ Combine the following shim thicknesses to make the adjustment shim.
(※ 21N-72-11230 x 8) t1.0



Parts sent individually

No.	Part No.	Part Name	Q'ty
1	21N-72-11230	(Shim t1.0)	8
2	21N-63-3010	(Boom cylinder assembly) L.H.	1
3	21N-63-3020	(Boom cylinder assembly) R.H.	1

E-12: INSTALLATION OF BOOM CYLINDER HOSES

Precautions

1) Keep the flanges, O-rings, and heads used during transportation in a safe place so that they can be used again.

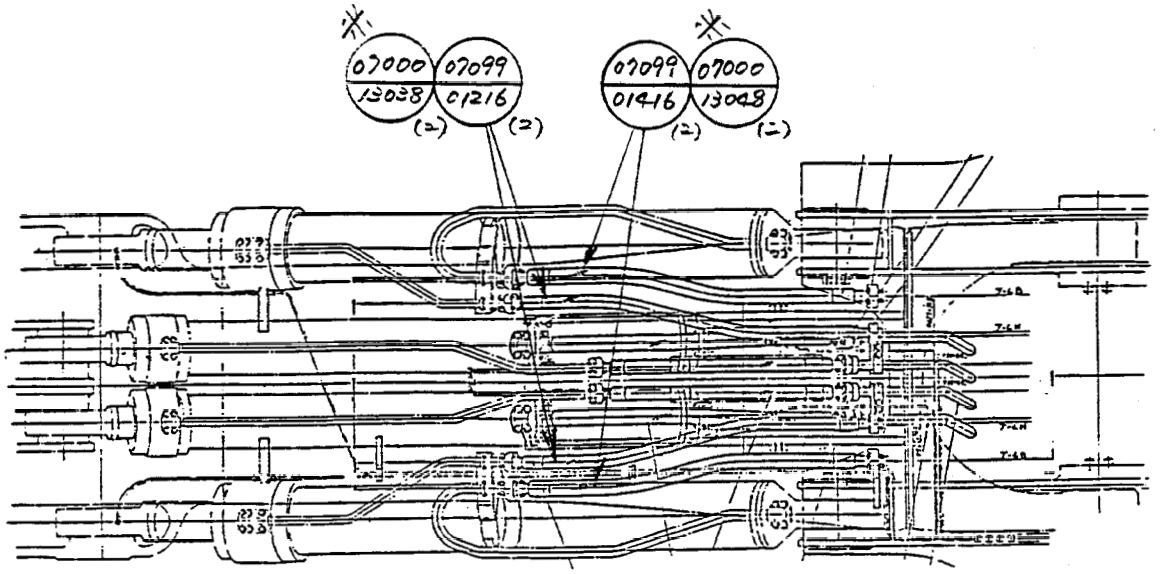
2) When connecting the hoses, be careful not to get the O-rings caught.

3) When connecting the hoses, be extremely careful not to let any dirt or dust get into the circuit.

1. Remove the blind plugs in the tube at the boom cylinder end.

2. Instal the flushing short circuit to the standard circuit (as shown in the diagram below), then replace the O-rings (※07000-13048 x 2, ※07000-13038 x 2) at the hose mount with new parts.

   (Be careful not to twist the hoses when installing.)



Boom seen from below

E-13: INSTALLATION OF BOOM CYLINDER TOP PIN

1. Remove the stoppers fixed to the boom, then remove the boom cylinder top pin.

   kg Boom cylinder top pin: 42 kg

2. Start the engine and run at low idling.

3. Raise the cylinder, extend the rod slowly, align the pin hole, then push in the pin.
   (Install so that the greasing hole at the boom cylinder top is at the bottom.)

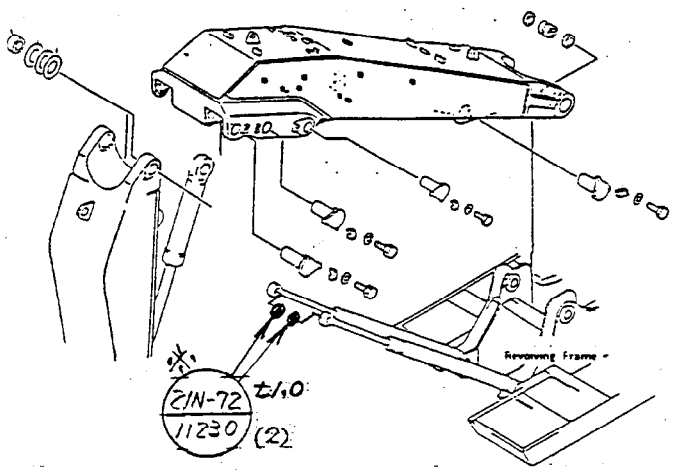
4. Check the clearance between the end of the cylinder boss and the end of the boom boss, determine the shim thickness to make the clearance 2 – 3 mm, then install the shims.

5. Knock in the cylinder top pin.

   Inside of bushing:
   Anti-freeze compound (LM-P)

6. Install the left and right cylinders in the same way.

7. Install the stopper.
   (Tightening torque of bolt M16: 15 – 31.5 kgm)
   ★ When operating the cylinder, extend it slowly. Do not operate the cylinder suddenly or operate it to the end of its stroke.
   At first there is air inside the cylinder, so the cylinder may not move for the first ten seconds. In such cases, do not operate the lever to the end of its travel.



E-14: INSTALLATION OF ARM CYLINDER HOSES

Precautions

1) Keep the flanges, O-rings, and heads used during transportation in a safe place so that they can be used again.

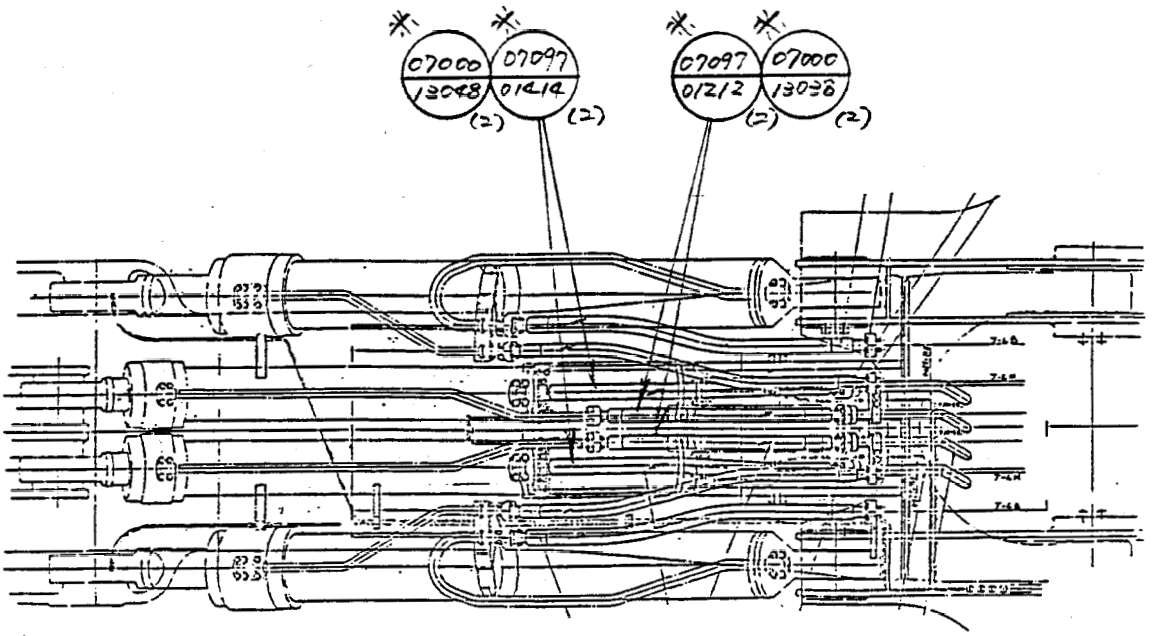
2) When connecting the hoses, be careful not to get the O-rings caught.

3) When connecting the hoses, be extremely careful not to let any dirt or dust get into the circuit.

1. Remove the blind plugs in the tube at the arm cylinder end.

2. Install the flushing short circuit to the standard circuit (as shown in the diagram below), then replace the O-rings (※07000-13048 x 2, ※07000-13048 x 2) at the hose mount with new parts.

   (Be careful not to twist the hoses when assembling.)



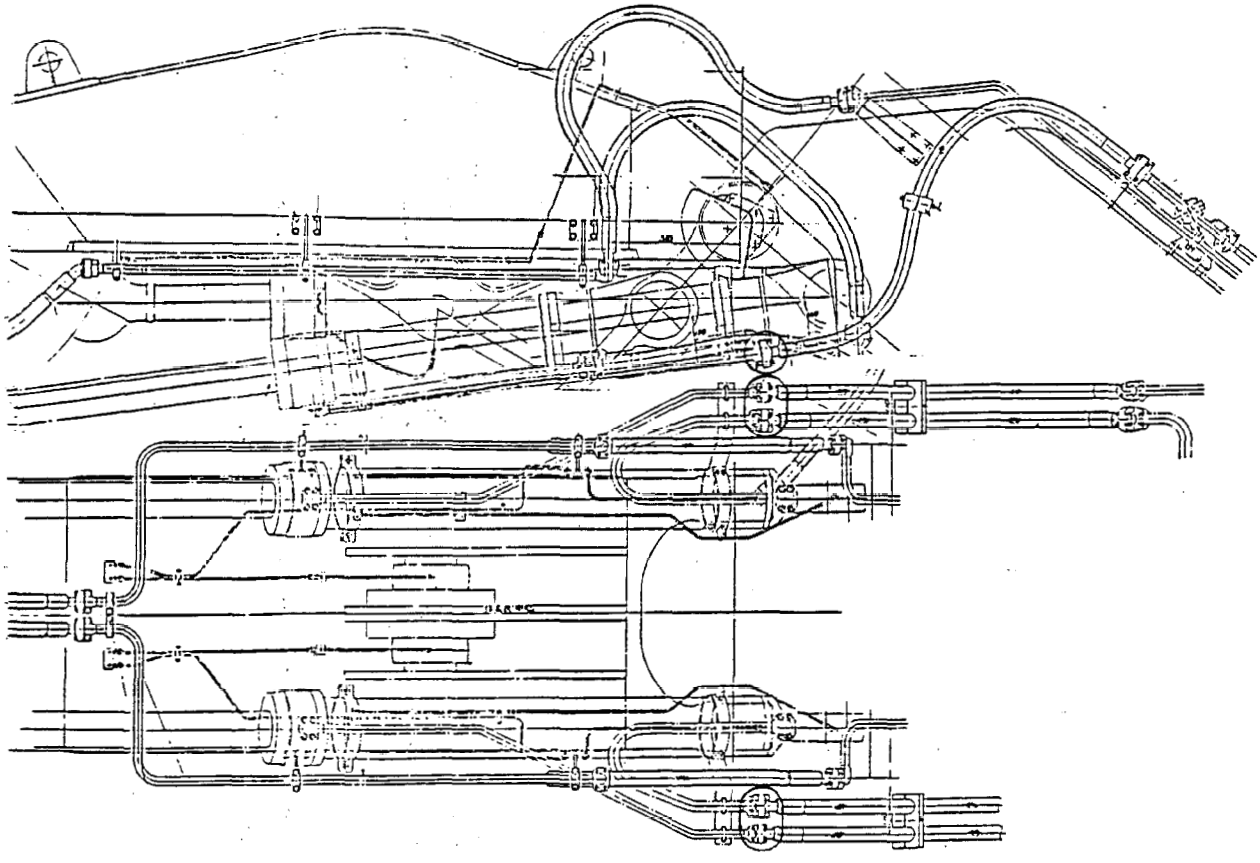
Boom seen from below

E-15: INSTALLATION OF BUCKET CYLINDER PIPING

1. Assemble the hoses short circuited for flushing to the bucket cylinder piping.

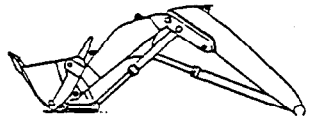
2. Replace the O-rings (※07000-13048 x 2, ※07000-13038 x 2) at the hose mount with new parts.

   (Be careful not to twist the hoses when assembling.)



E-16: INSTALLATION OF BOTTOM DUMP CYLINDER PIPING

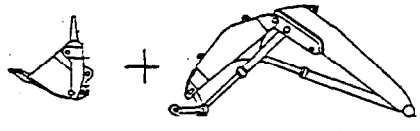
[A] When the bucket assembly is installed to the arm as shown in the diagram on the right.



(1) Install the bottom dump cylinder (07099-21214 x 2) short circuited for flushing in their original positions.
Replace the O-rings (※07000-13038 x 3) at the hose mount with new parts.

(2) Install the 2 removed rear bucket covers (209-72-54271) to their original positions.

[B] When the bucket assembly has been disassembled as shown in the figure on the right, use the procedure given on the following pages to assemble the bucket, then install the 2 bottom dump cylinder hoses (※07099-21214).
Replace the O-rings (※07000-13038 x 4) at the hose mount with new parts in the same way as in [A]. Then install the 2 covers (209-72-54271).

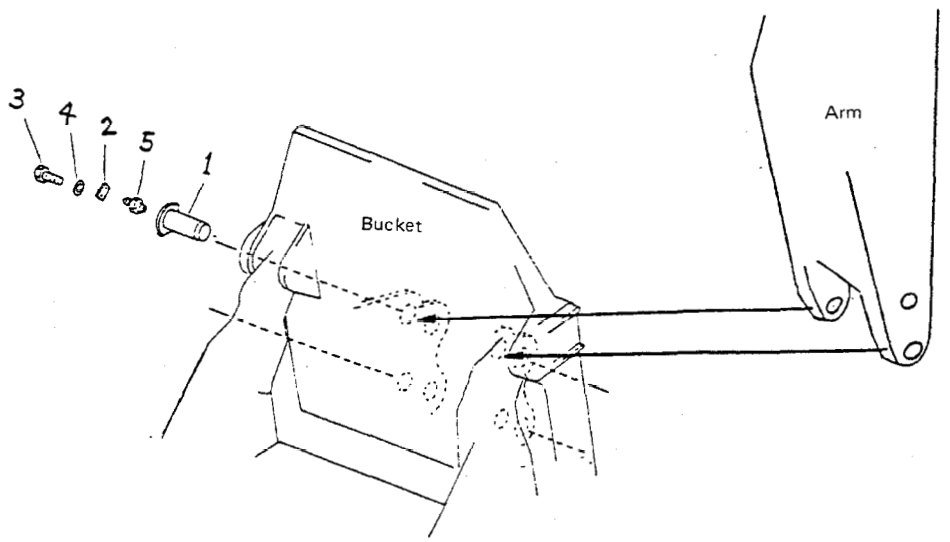


E-17: INSTALLATION OF BUCKET ASSEMBLY

1. Remove the bucket-arm connecting pin (fixed to the bucket) and bucket-link connecting pin (fixed to the bucket).
   ★ Use a forcing screw (Dia. = 16, Pitch = 2.0 mm) to remove the pin.

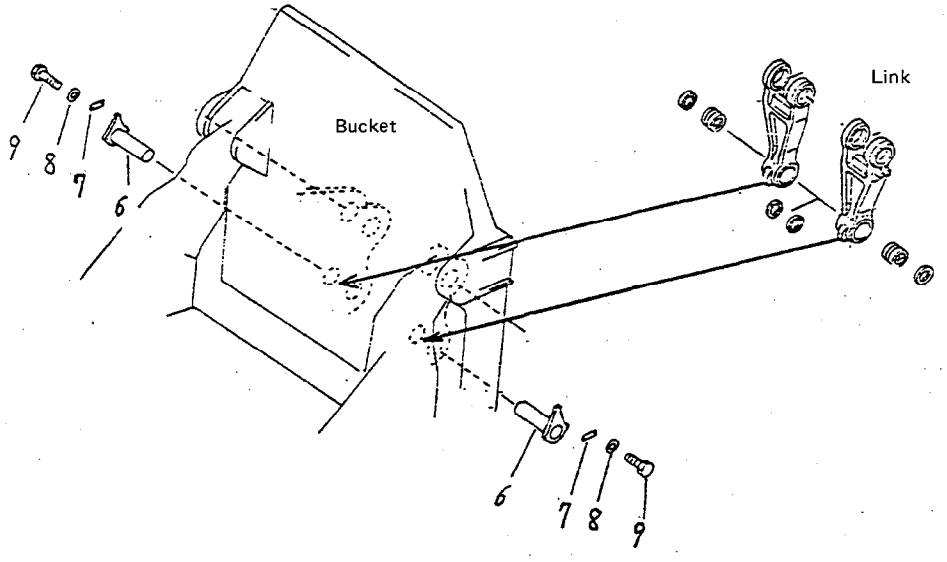
2. Start the engine, run at idling and operate the boom and arm cylinders slowly to align the position of the holes for the bucket-arm connecting pins.

   ⚠
   - When operating the cylinder, extend it slowly. Do not operate the cylinder suddenly or operate it to the end of its stroke.
   - At first there is air inside the cylinder, so the cylinder may not move for the first ten seconds. In such cases, do not operate the lever to the end of its travel.
   - Set the arc/horizontal selector siwtch to arc digging.



3. Push in arm-bucket connecting pin (1), and install plate (2) with bolt (3) and washer (4).
(Tightening torque: 15 – 31.5 kgm)

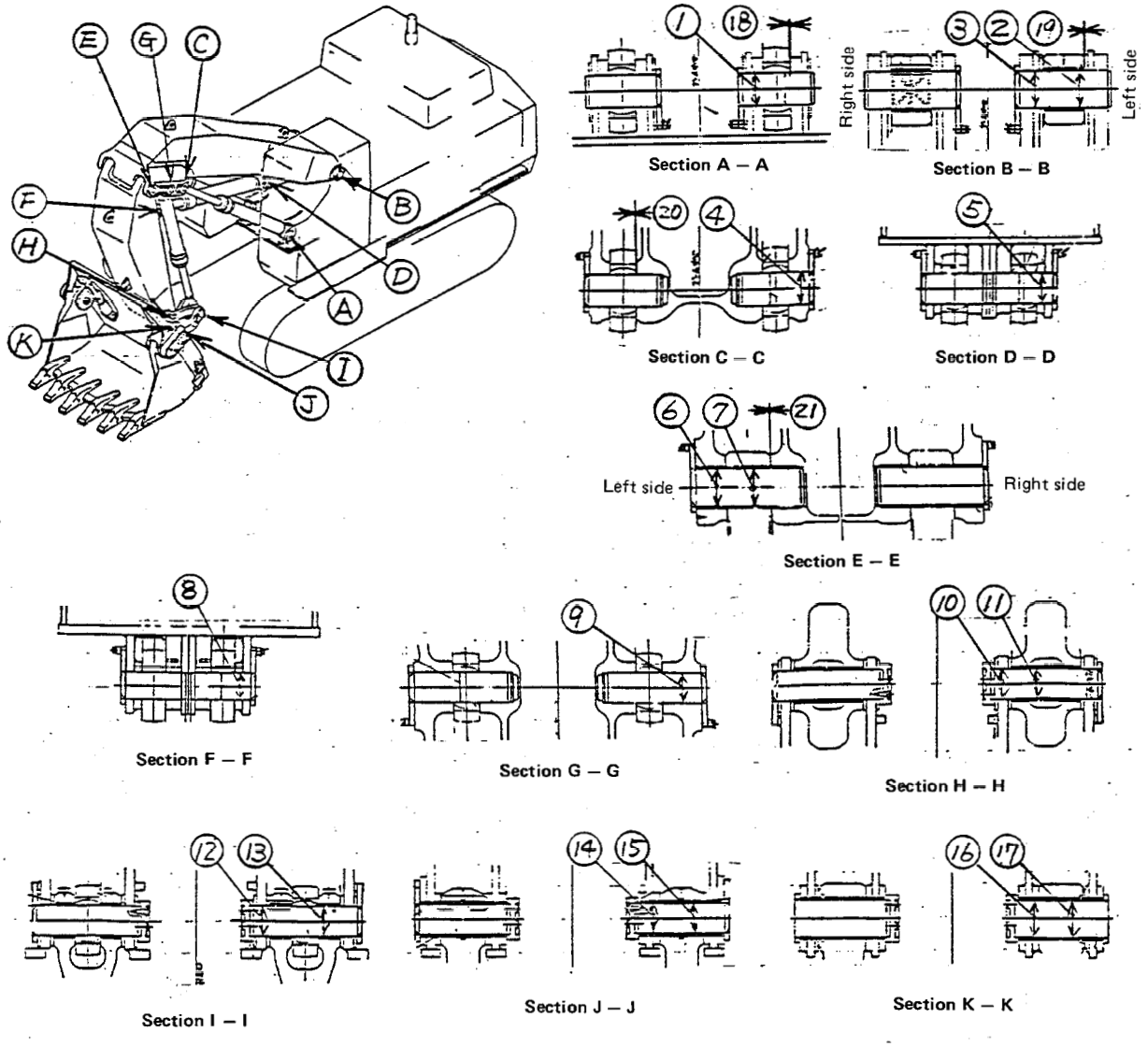
4. Install 2 fittings (5) (※07020-00000).



5. Align the position of the hole for the link-bucket connecting pin.

6. Push in link-bucket connecting pin (6), and install plate (7) with bolt (9) and washer (8).

kgm Tightening torque: 15 – 31.5 kgm


E
G
C
F
H
K
B
D
A
I
J
1
18
Right side
3
2
19
Left side
Section A – A
Section B – B
20
4
5
Section C – C
Section D – D
6
7
21
Left side
Right side
Section E – E
8
Section F – F
9
Section G – G
10
11
Section H – H
12
13
Section I – I
14
15
Section J – J
16
17
Section K – K

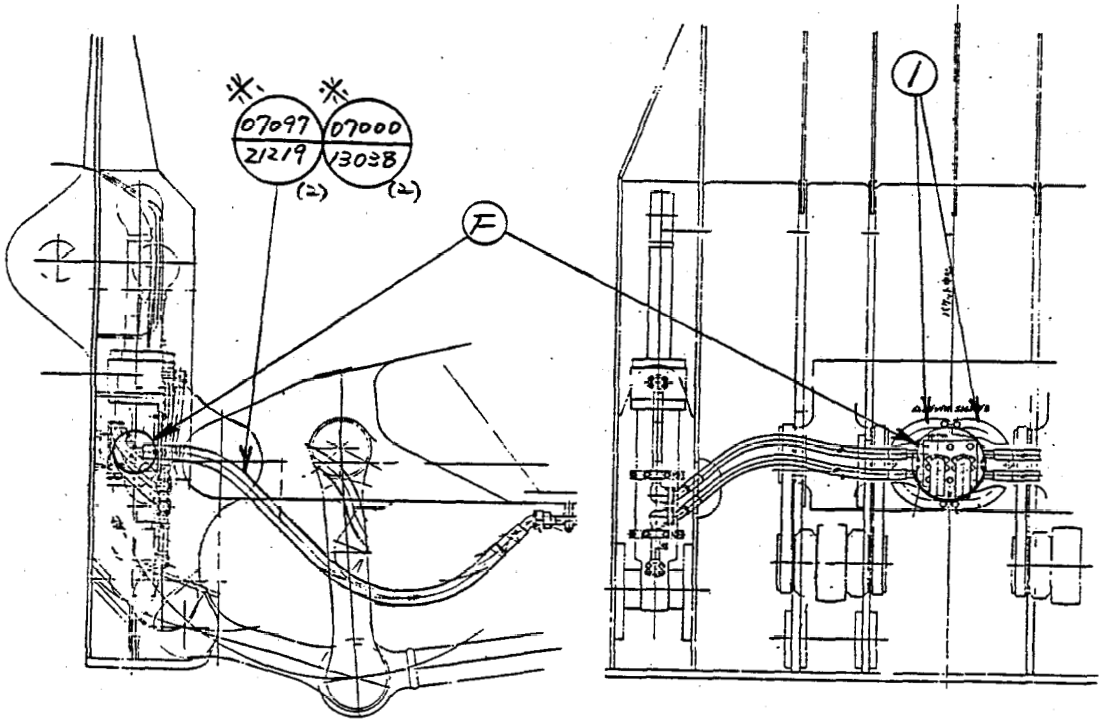
Unit: mm

No.		Check item	Criteria					
			Serial No.	Standard size	Tolerance		Standard clearance	Clearance limit
					Shaft	Hole		
A	1	Clearance between boss hole and pin mounting the boom cylinder and revolving frame	10001 –	140	–0.043 –0.106	+0.100 0	0.043 – 0.206	1.5
B	2	Clearance between bushing and pin mounting the boom and revolving frame	10001 –	160	–0.043 –0.106	+0.100 0	0.043 – 0.206	1.5
B	3	Clearance between boss hole and pin mounting the boom and revolving frame	10001 –	160	–0.043 –0.106	+0.439 +0.353	0.396 – 0.545	1.5
C	4	Clearance between boss hole and pin mounting the boom and boom cylinder	10001 –	140	–0.043 –0.106	+0.100 0	0.043 – 0.206	1.5
D	5	Clearance between boss hole and pin mounting the boom and arm cylinder	10001 –	130	–0.043 –0.106	+0.100 0	0.043 – 0.206	1.5
E	6	Clearance between boom bushing and pin mounting the boom and arm	10001 –	160	–0.043 –0.106	+0.439 +0.353	0.396 – 0.545	1.5
E	7	Clearance between arm bushing and pin mounting the boom and arm	10001 –	160	–0.043 –0.106	+0.439 +0.353	0.396 – 0.545	1.5
F	8	Clearnce between boss hole and pin mounting the arm and arm cylinder	10001 –	115	–0.036 –0.090	+0.100 0	0.036 – 0.190	1.5
G	9	Clearance between boss hole and pin mounting the boom and bucket cylinder	10001 –	130	–0.043 –0.106	+0.100 0	0.043 – 0.206	1.5
H	10	Clearance between link boss hole and pin mounting the arm and link	10001 –	130	–0.043 –0.106	+0.063 0	0.043 – 0.169	1.5
H	11	Clearance between arm bushing and pin mounting the arm and link	10001 –	130	–0.043 –0.106	+0.404 +0.321	0.364 – 0.510	1.5
I	12	Clearance between wrist link boss hole and pin mounting the front link and wrist link	10001 –	130	–0.043 –0.106	+0.063 0	0.043 – 0.169	1.5
I	13	Clearance between front link bushing and pin mounting the front link and wrist link	10001 –	130	–0.043 –0.106	+0.396 +0.310	0.353 – 0.502	1.5
J	14	Clearance between bucket bushing hole and pin mounting the front link and bucket	10001 –	130	–0.043 –0.106	+0.404 +0.321	0.364 – 0.510	1.5
J	15	Clearance between front link bushing and pin mounting the front link and bucket	10001 –	130	–0.043 –0.106	+0.404 +0.321	0.364 – 0.510	1.5
K	16	Clearance between bucket bushing hole and pin mounting the arm and bucket	10001 –	160	–0.043 –0.106	+0.439 +0.353	0.396 – 0.545	1.5
K	17	Clearance between arm bushing hole and pin mounting the arm and bucket	10001 –	160	–0.043 –0.106	+0.439 +0.353	0.396 – 0.545	1.5
A	18	Clearance between revolving frame and boom cylinder	10001 –				Adjust shims so that clearance is 2 – 3 mm	
B	19	Clearance between revolving frame and boom	10001 –				Adjust shims so that clearance is less than 1 mm	
C	20	Clearance between boom and boom cylinder	10001 –				Adjust shims so that clearance is 2 – 3 mm	
E	21	Clearance between boom and arm	10001 –				Adjust shims so that clearance is less than 1 mm	

E-19: INSTALLATION OF BOTTOM DUMP CYLINDER PIPING

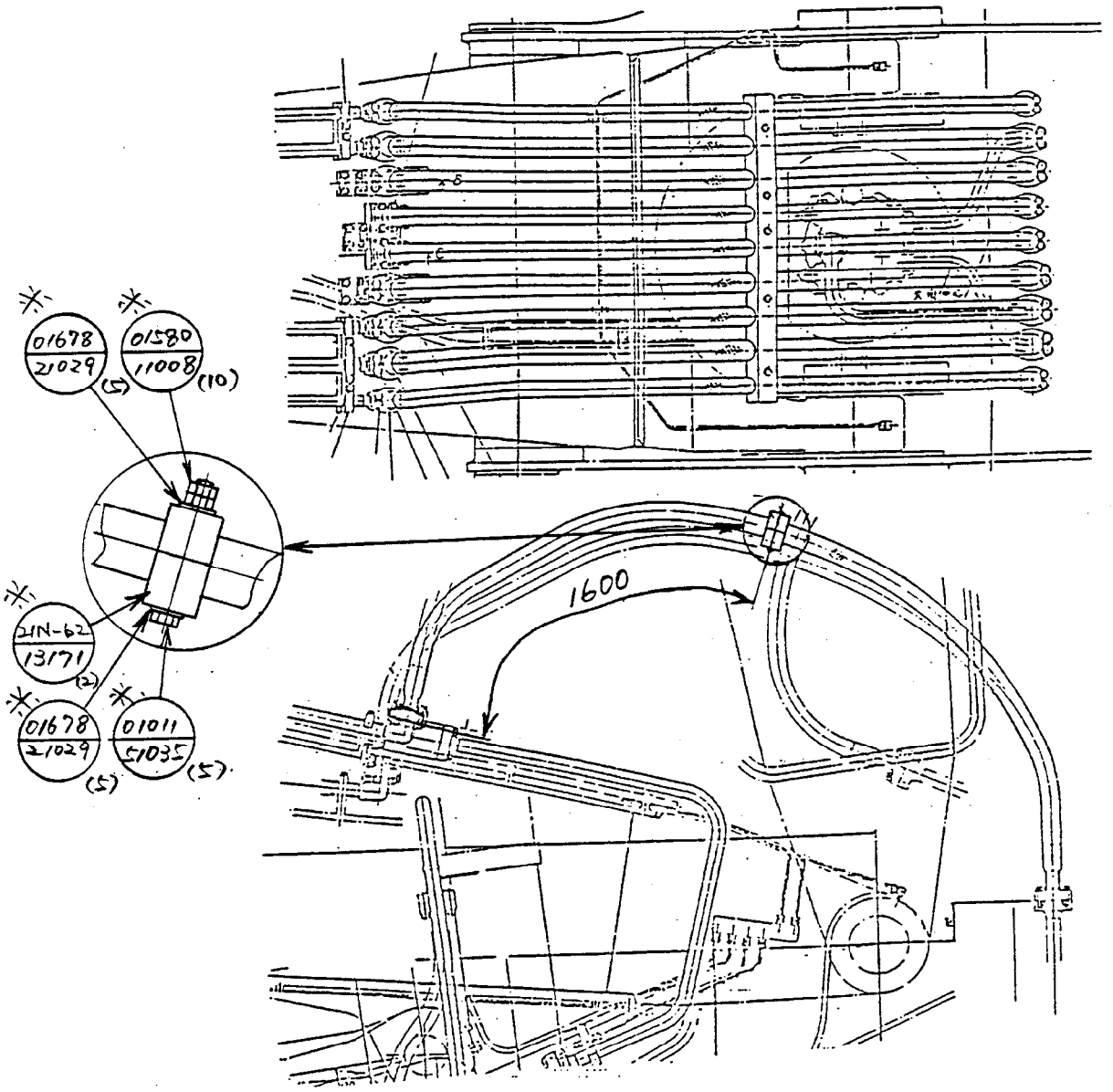
1. Remove cover ① at rear of rear bucket.
2. Remove blind plugs from portion Ⓕ.
3. Fit new O-rings (※07000-13038 x 2) to the hose short circuited for flushing, then install to portion Ⓕ.
4. Assemble cover ① in its original position.
   (Use the removed split flanges, bolts, and washers again.)

   (Be careful not to twist the hose when assembling.)

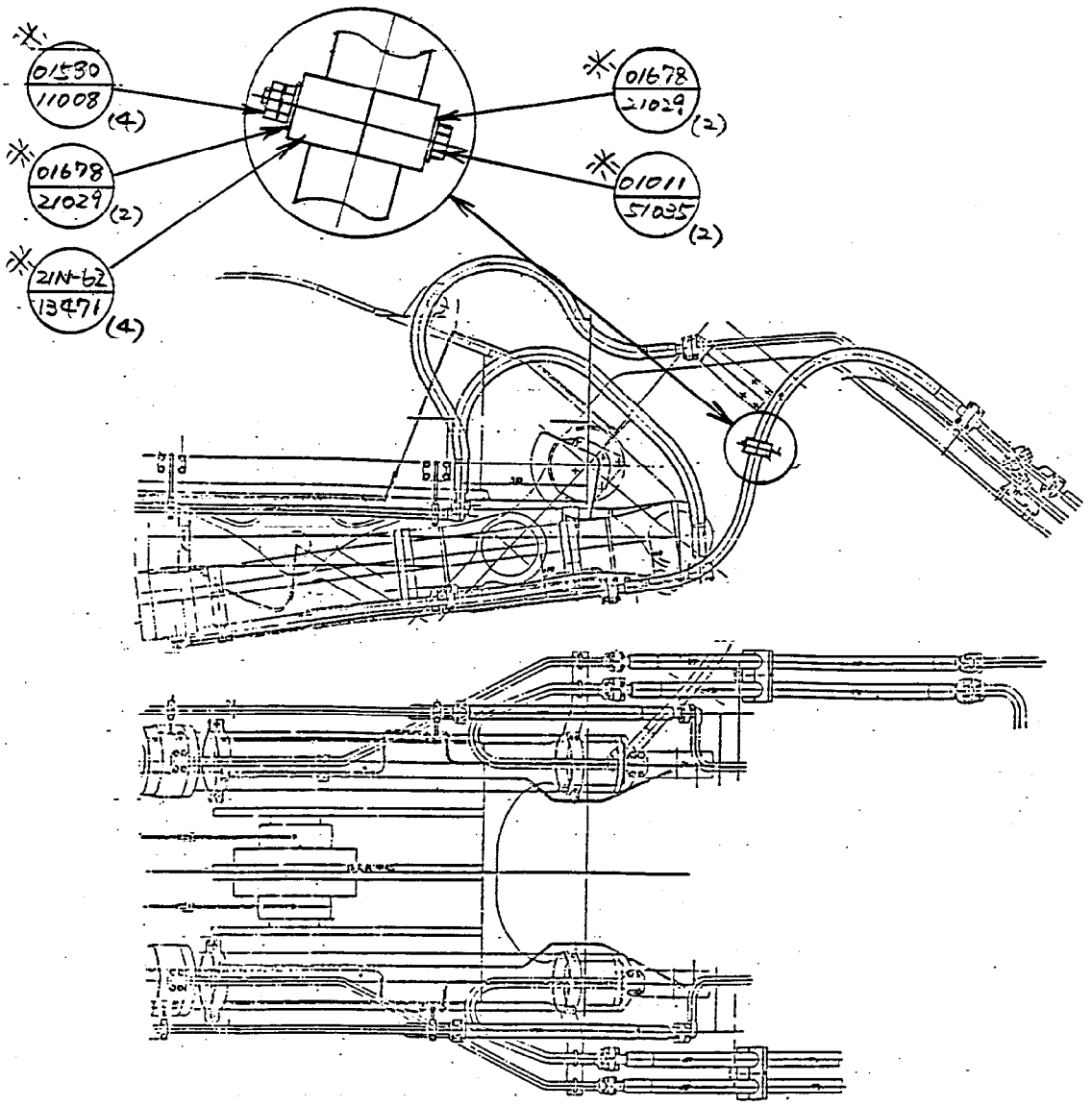


E-20: INSTALLATION OF WORK EQUIPMENT PIPING CLAMPS

1. Install the clamps to the hose connecting the boom and chassis.
   (Be careful not to twist the hose when assembling.)



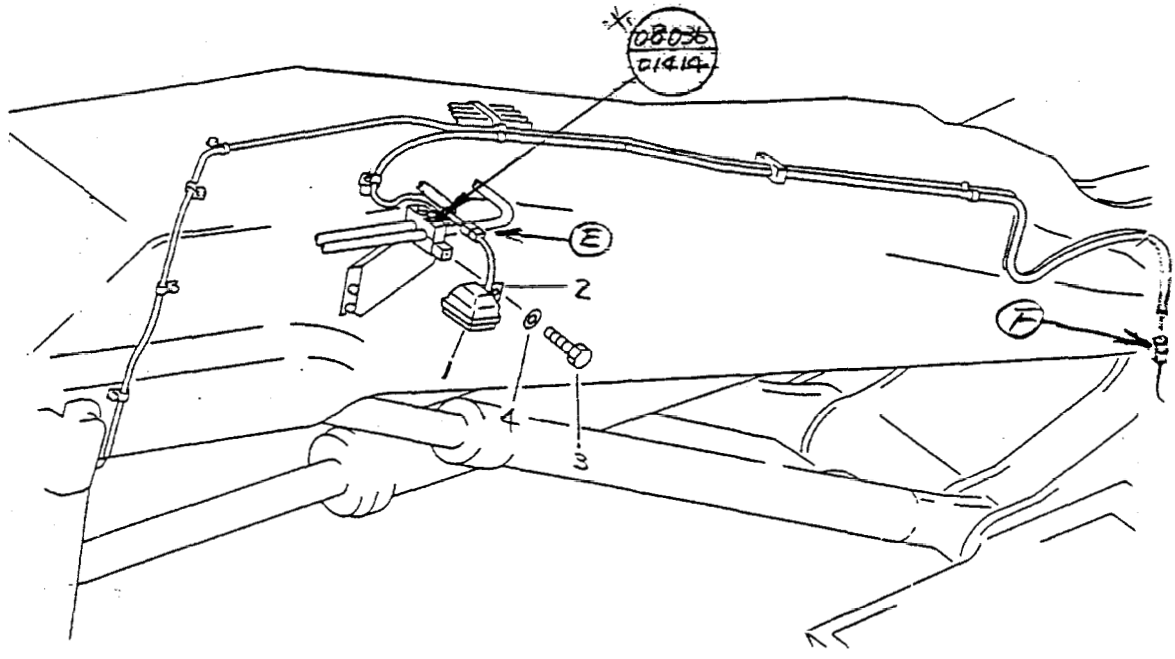
2. Install the clamps to the hose connecting the piping at the boom end and bucket cylinder end of the bucket circuit.
(Be careful not to twist the hose when assembling.)



E-21: INSTALLATION OF WORKING LAMP

1. Install lamp (1) (※22W-06-12381) with plate (2) (※203-06-21290), bolt (3) (※01010-51430) and washer (4) (※01643-31445), then remove the blind plug and connect the connectors at portions Ⓔ and Ⓕ.

2. Using the bolt of the piping clamp, install the clip (※08036-01414 x 1).



Parts sent individually

No.	Part No.	Part Name	Q'ty
1	22W-06-72381	Lamp	1
2	203-06-21290	Plate	1
3	01010-51430	Bolt	1
4	01643-31445	Washer	1

E-22: INSTALLATION OF WORK EQUIPMENT GREASE PIPING

1. Install 2 grease fittings (※07020-00000) to boom cylinder foot portion ⓐ.

2. Remove the blind plug from the cylinder end and the hose elbow end of the boom cylinder top greasing hose at portion ⓑ, then remove the elbows (205-70-51380 x 2) from the hose, assemble to the cylinder end, then connect.

3. Remove the blind plug from the cylinder end and the hose elbow end of the arm cylinder top greasing hose at portion ⓒ, then remove the elbows (205-70-65780 x 2) from the hose, assemble to the cylinder end, then connect.

4. Assemble the greasing nipples (※07020-00675 x 6) to the central greasing block at the right side of the boom at portion ⓓ.

5. Remove the blind plug from the cylinder end and the hose nipple end of the arm cylinder top greasing hose at portion ⓔ, then remove the elbows (205-70-51390 x 2) from the hose, assemble to the cylinder end, then connect.

6. Assemble the elbows (※209-72-16140 x 2) to the central greasing block at the boom-arm connecting boss at portion ⓕ.

7. Assemble the greasing nipples (※07020-00000 x 4) to the arm central greasing block at portion ⓖ.

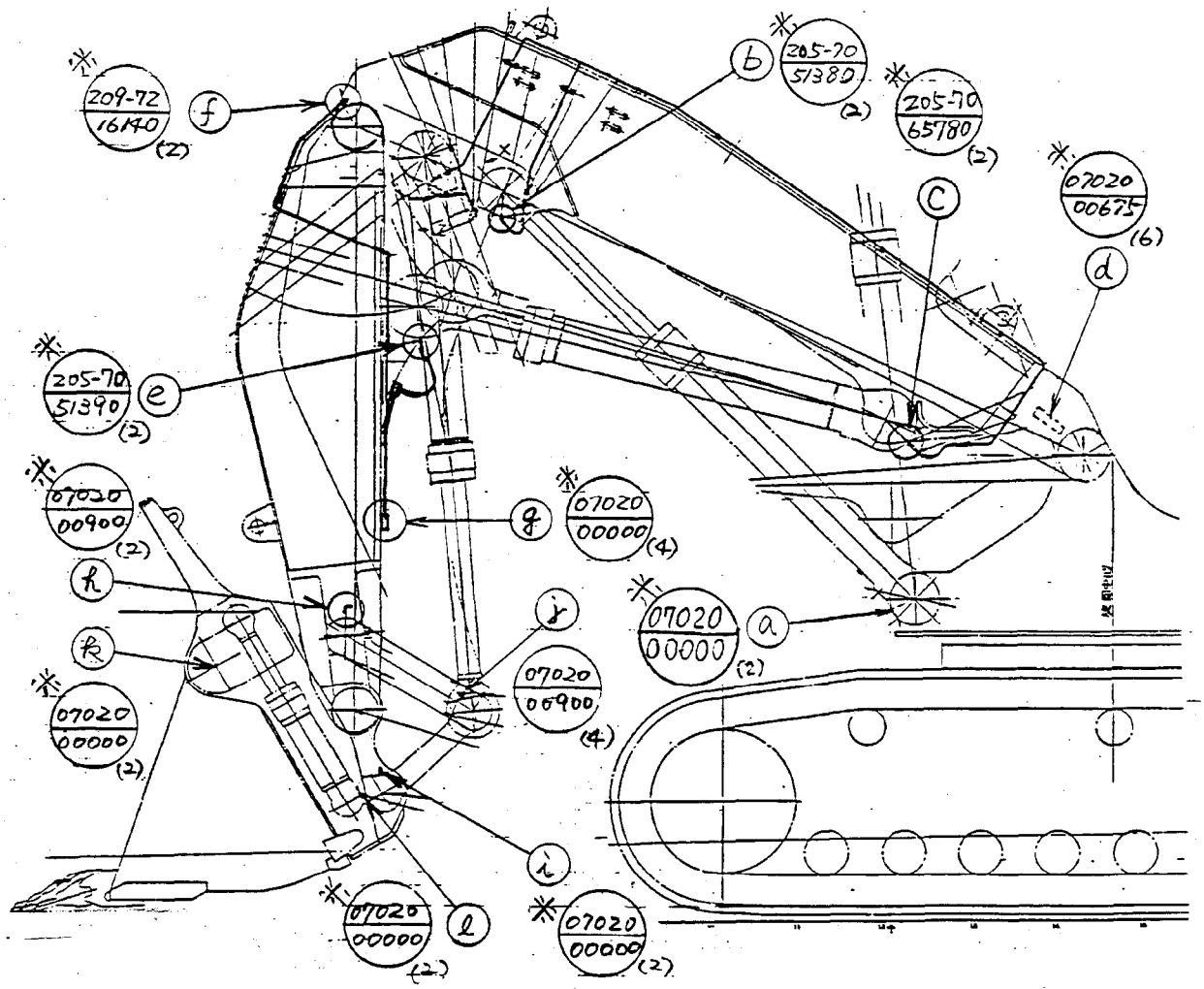
8. Assemble the greasing nipples (※07020-00900 x 2) to the link connecting boss at the arm top end at portion ⓗ.

9. Assemble the greasing nipples (※07020-00000 x 2) to the front link boss at portion ⓘ.

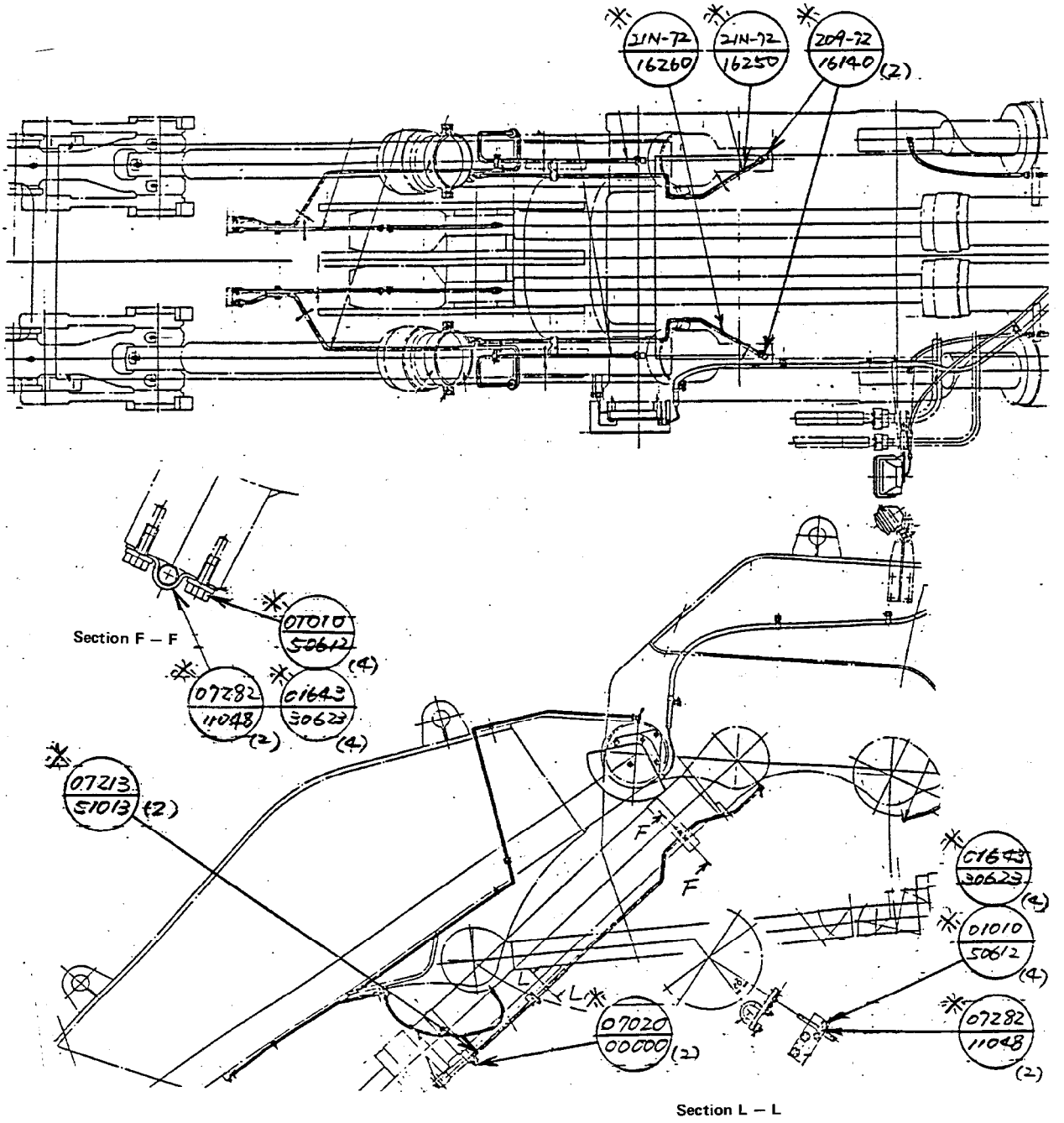
10. Assemble the greasing nipples (※07020-00900 x 4) to the front link boss at portion ⓙ.

11. Assemble the greasing nipples (※07020-00000 x 2) to the bucket hinge pin at portion ⓚ.

12. Assemble the greasing nipples (※07020-00000 x 2) to the bottom dump cylinder bottom boss at portion ①.


209-72 16140 (2)
f
b
205-70 51380 (2)
205-70 65780 (2)
07020 00675 (6)
C
d
205-70 51390 (2)
e
07020 00900 (2)
07020 00000 (4)
g
h
i
07020 00000 (2)
k
07020 00900 (4)
07020 00000 (2)
l
07020 00000 (2)
07020 00000 (2)

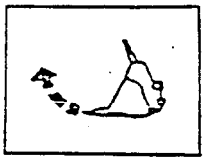
13. Install the grease piping for the bucket cylinder bottom boss.



E-23: BLEEDING AIR FROM WORK EQUIPMENT CIRCUIT

After completion of assembly of the work equipment piping, bleed the air from the system.

1. Be sure to set the arc/horizontal selector switch to arc digging.



Arc digging symbol

2. Run the engine at low idling

3. Extend and retract each cylinder 4 or 5 times without going to the end of its stroke (stop approx. 100 mm before the end of the stroke).
   ★ At first there is a large amount of air inside the cylinder, so the cylinder may not move for the first ten seconds. In such cases, do not operate the lever to the end of its travel.

4. Keep the engine running at low idling, and operate each cylinder from a point 100 mm from the end of its stroke slowly (take at least 10 seconds) to the end of its stroke (fully extended), and hold the work equipment control lever at the full stroke position for 3 minutes.
   (The air is bled from the boom, arm, and bucket cylinders when they are fully extended, but air is bled from the bottom dump cylinder when it is fully retracted (bucket open).)

5. Next, run the engine at high idling, and operate each cylinder from a point 100 mm from the end of its stroke slowly (take at least 10 seconds) to the end of its stroke (fully extended), and hold the work equipment control lever at the full stroke position for 1 minute.
   (The air is bled from the boom, arm, and bucket cylinders when they are fully extended, but air is bled from the bottom dump cylinder when it is fully retracted (bucket open).)

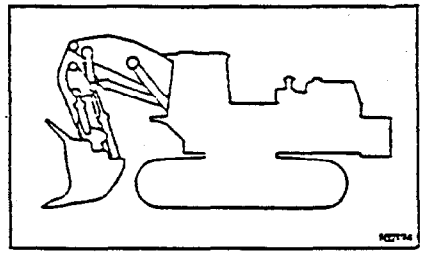
★ Repeat Steps 3 – 5 to bleed the air from the cylinders.

★ If this operation is carried out from the first with the engine running at high speed or with the cylinder operated to the end of its stroke, the air contained inside the cylinder may cause damage to the piston packing.

E-24: CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL

1. Run the engine at low idling, retract the arm cylinder and extend the bucket cylinder. Lower the boom so that the bottom of the bucket is in contact with the ground, then stop the engine.

2. Operate each control lever (work equipment, travel) to the end of its stroke in each direction to release the internal pressure.



3. Check the oil level in sight gauge Ⓖ.

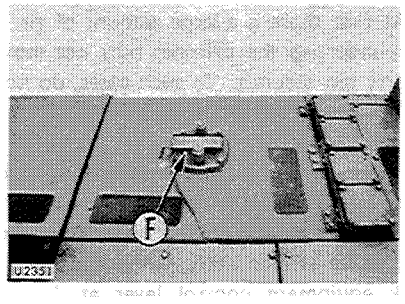
4. If the oil level is not between the H and L lines on sight gauge Ⓖ, add engine oil (CD class SAE10W regardless of ambient temperature) through oil filler Ⓕ. (10 mm in height is 11 liters)

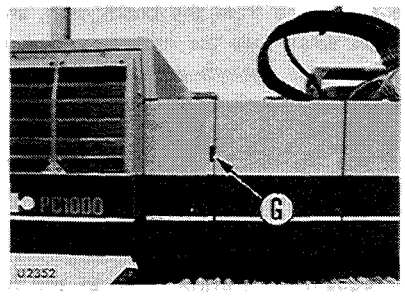
★ Do not add oil above the H line.

The linside of the tank is under pressure, so loosen the cap gradually, and leave for several minutes to release the air pressure completely before taking off the cap.

★ The oil level differs according to the oil temperature, so use the following as a guide.

- Before operation: Near L line
  (oil temperature: 10 – 30°C)
- During operation: Near H line
  (oil temperature: 50 – 80°C)





E-25: INSTALLATION OF BOOM FOOT POTENTIOMETER

Tools and facilities required

Part Name	Q'ty
Digital voltmeter	1
3-pin T-adapter	1

1. Extend the bucket and arm cylinders fully, and lower the boom to put the bucket in contact with the ground.

2. Stop the engine. (Starting switch OFF)

3. Install shaft (15) (※21N-06-11150) to the boom foot with 2 bolts (16) (※01010-51230) and 2 washers (17) (※01643-31232).

4. Remove cover (19), then install the potentiometer sub-assembly to the revolving frame with 3 bolts (11) (※01011-51205) and 3 washers (12) (※01643-31232).
   When doing this, assemble so that shaft (15) enters the notch in lever (13).

5. Connect boom foot Econoseal connectors (CN-42: for boom potentiometer; CN-45: for working lamp; CN-43: for arm potentiometer).

   ⚠ When removing or installing the Econoseal connector, turn the main switch OFF first.

6. Install a 3-pin T-adapter to the Econoseal connector (CN-42) of the boom foot potentiometer.

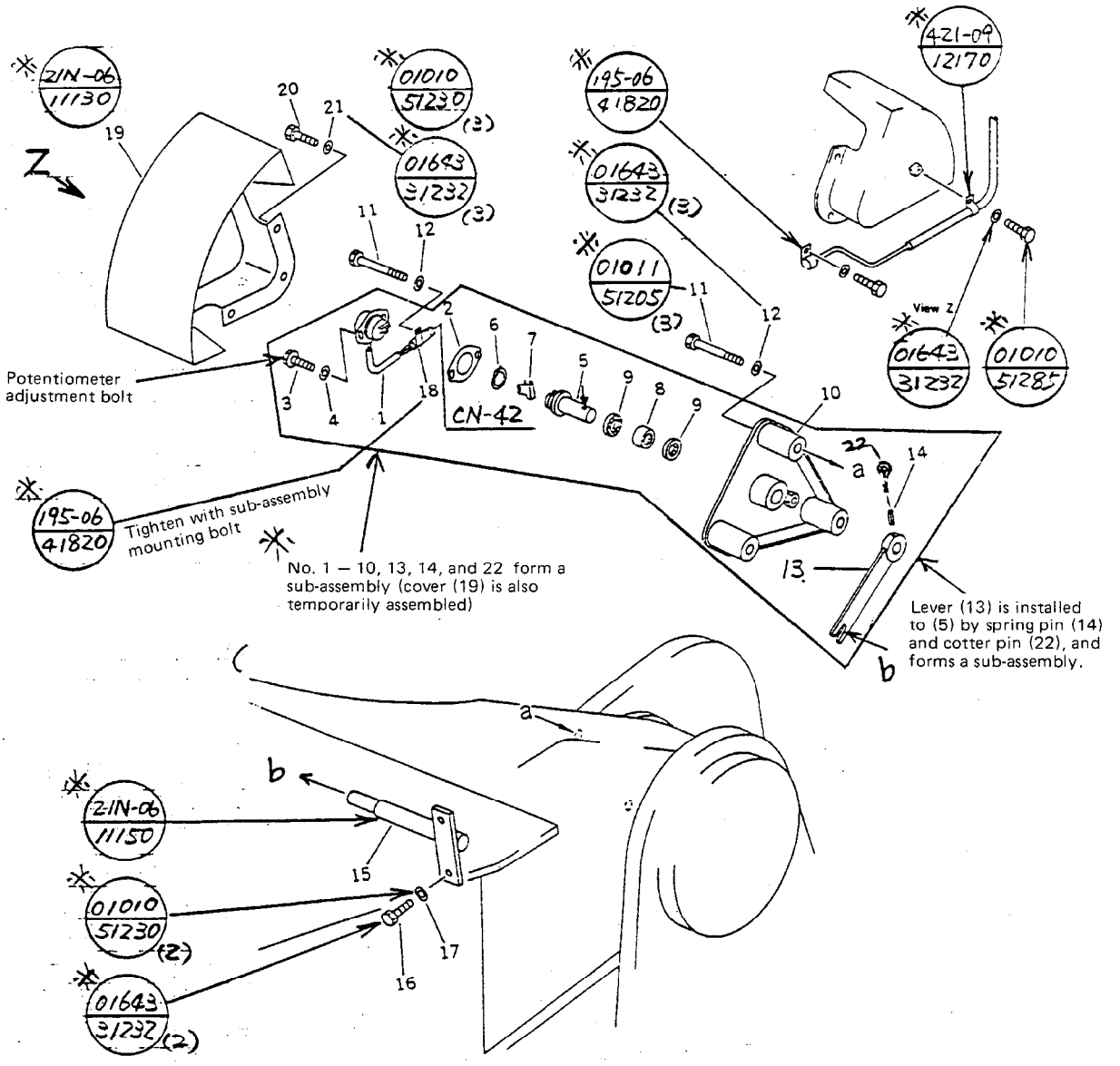
   ⚠ When removing or installing the Econoseal connector, turn the starting switch OFF first.

7. Start the engine, extend the boom cylinder fully, set the arc/horizontal selector switch to the horizontal digging mode, then check that the voltage between ① and ② of the T-adapter is 4.27 ± 0.08V. (Starting switch ON, engine stopped)
   If the voltage is not 4.27 ± 0.08V, loosen bolts (3) (01010-50612 x 2) mounting the potentiometer, and rotate the potentiometer slightly to adjust the voltage to 4.27 ± 0.08V, then tighten bolts (3).

   Reference value
   [Voltage between ① and ② of the boom foot potentiometer when the boom cylinder is at MIN. (Fully retracted)] = 1.25 ± 0.08V

8. After completing adjustment of the boom foot potentiometer, remove the T-adapter and connect the Econoseal connector (CN-42).

   ⚠ When removing or installing the Econoseal connector, turn the main switch OFF first.


Potentiometer adjustment bolt
Tighten with sub-assembly mounting bolt
No. 1 — 10, 13, 14, and 22 form a sub-assembly (cover (19) is also temporarily assembled)
Lever (13) is installed to (5) by spring pin (14) and cotter pin (22), and forms a sub-assembly.
View Z
CN-42
2IN-06 11130
01010 51230 (2)
01643 31232 (3)
195-06 41820
01011 51205 (3)
421-09 12170
01643 31232
01010 51285
2IN-06 11150
01010 51230 (2)
01643 31232 (2)

E-26: INSTALLATION AND ADJUSTMENT OF BOOM TOP POTENTIOMETER (boom – arm joint)

Tools and facilities required

Part Name	Q'ty
Digital voltmeter	1
3-pin T-adapter	1

1. Extend the bucket and arm cylinders fully, and lower the boom to put the bucket in contact with the ground.
   Assemble in as the same way for the boom foot potentiometer.
   Stop the engine and turn the starting switch OFF.

2. Install a 3-pin T-adapter to Econoseal connector (CN-69) of the boom top potentiometer.

   ⚠ When removing or installing the Econoseal connector, turn the starting switch OFF first.

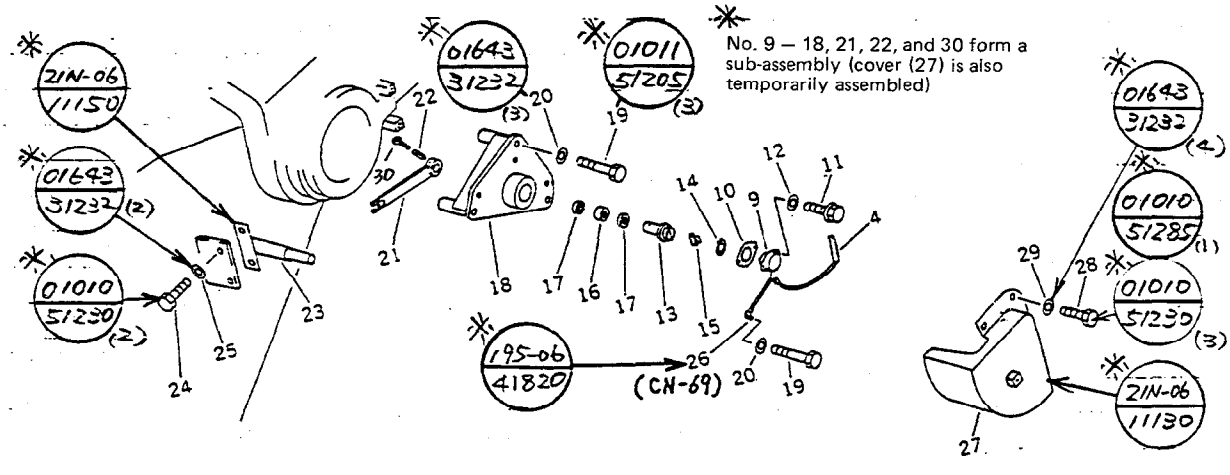
3. Turn the main switch ON, set the arc/horizontal selector switch to the horizontal digging mode, then check that the voltage between ① and ② of the T-adapter is 0.88 ± 0.08V. (arm cylinder fully extended)

Reference value
[Voltage between ① and ② of the boom top potentiometer when the arm cylinder is at MIN. (Fully retracted)] = 4.47 ± 0.08V

4. If the voltage is not 0.88 ± 0.08V, remove cover (27) and adjust the potentiometer in the same way as for the boom foot potentiometer.

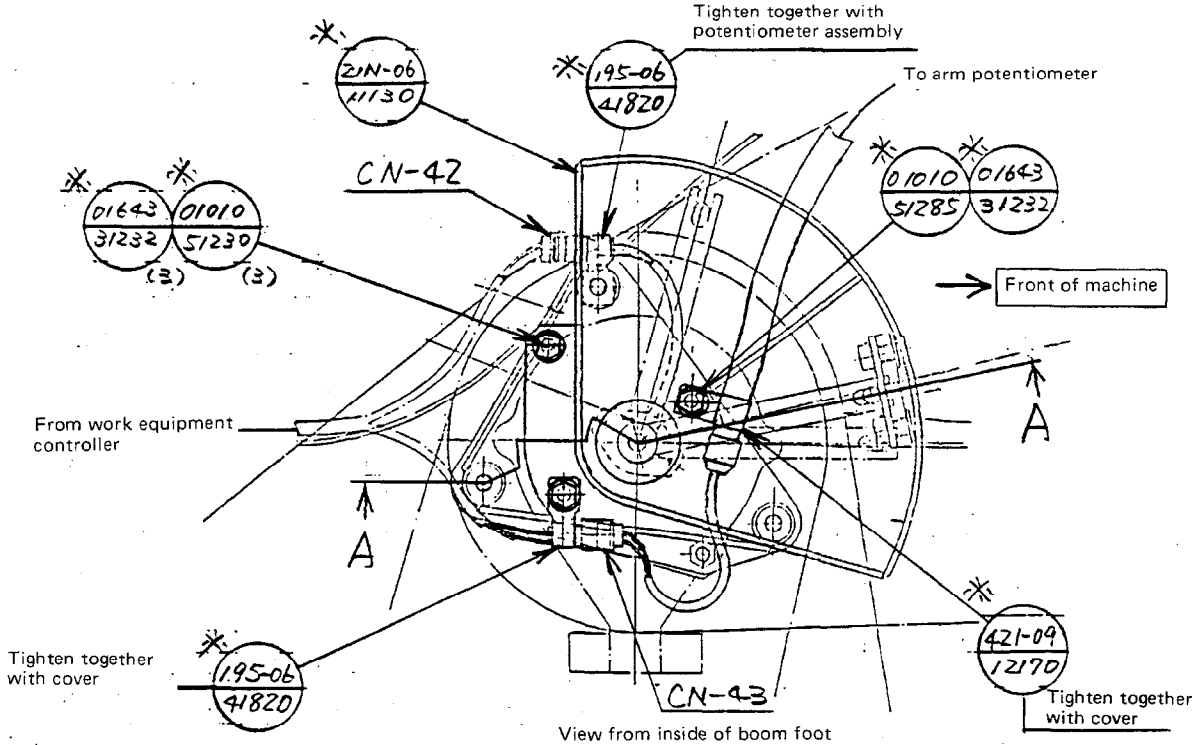
5. After completing adjustment of the boom top potentiometer, remove the T-adapter and connect the Econoseal connector (CN-69).

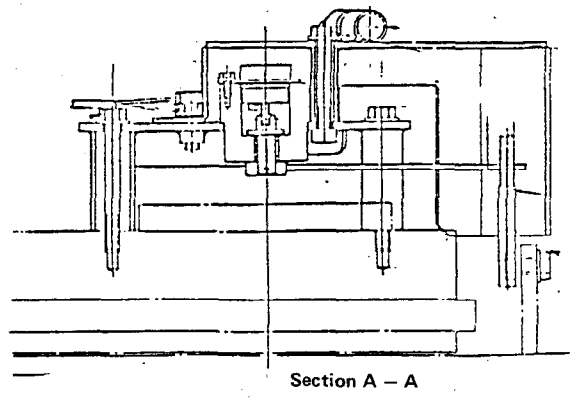
   ⚠ When removing of installing the Econoseal connector, turn the starting switch OFF first.



E-27: INSTALLATION OF CLAMLPS AND COVER FOR BOOM FOOT POTENTIOMETER

Install clamps and cover

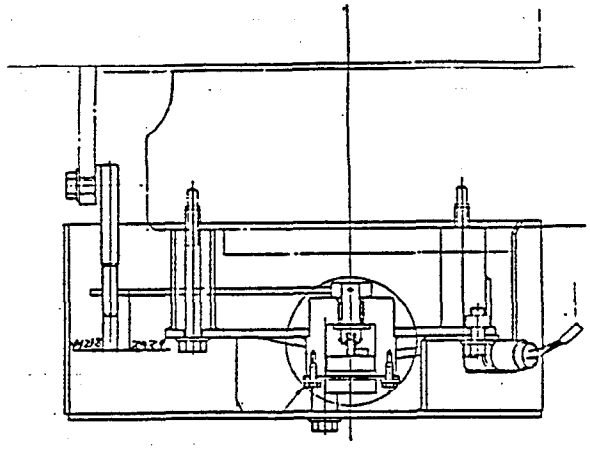




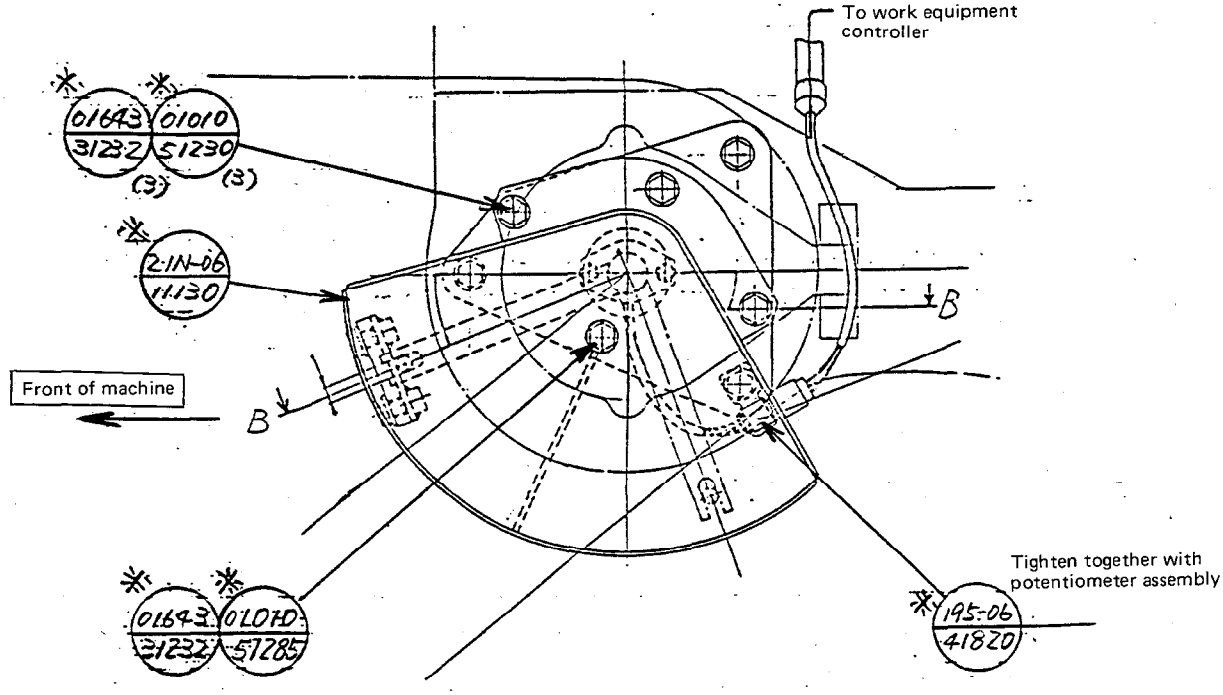
Section A – A

E-28: INSTALLATION OF CLAMPS AND COVER FOR BOOM TOP POTENTIOMETER

Install clamps and cover



Section B — B



E-29: ADJUSTMENT OF WORK EQUIPMENT CONTROLLER
(for automatic control of loading shovel)

⚠ Note:

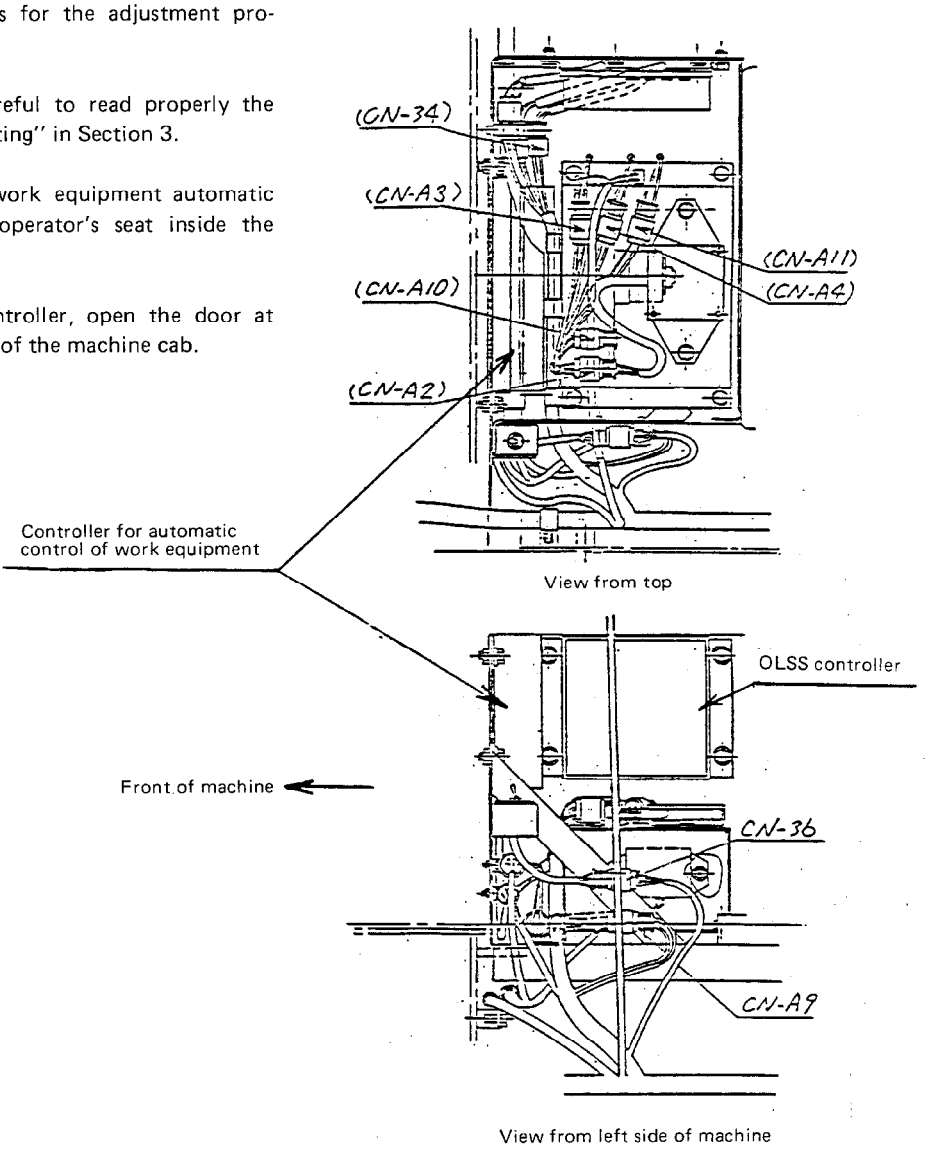
1) As a basic rule, do not adjust the work equipment controller.
   After installing the potentiometer in the standard condition, carry out automatic horizontal digging and make adjustments only if necessary.

2) See the following pages for the adjustment procedure.

3) Before adjusting, be careful to read properly the "Precautions when adjusting" in Section 3.

- The controller or the work equipment automatic control is behind the operator's seat inside the machine cab.

- When adjusting the controller, open the door at the front on the left side of the machine cab.



1. **Adjustment of controller carried out when installed on machine**

   The controller basically does not need adjustment and is set to provide the specified function. However, there are variations in components other than the controller, so it may be necessary to adjust on the machine. The following are examples of where this may be necessary.

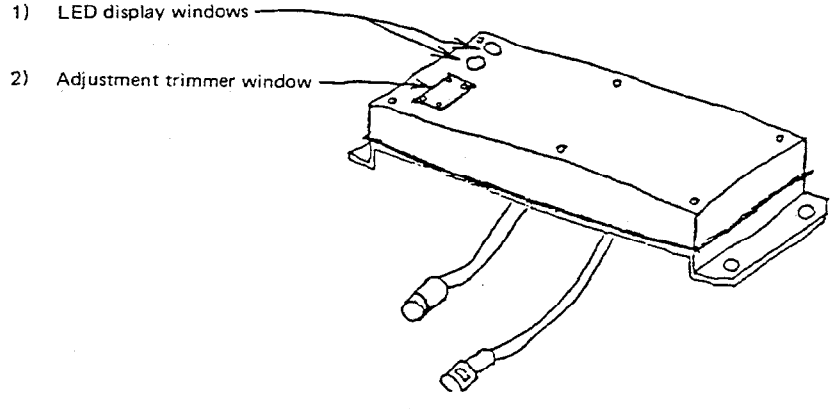
   1) When newly assembling the machine
   2) When replacing the work equipment potentiometer (or when re-assembling the work equipment), and the horizontal digging and bucket angle compensation (option) do not provide the specified performance.

   Adjust only in these cases.

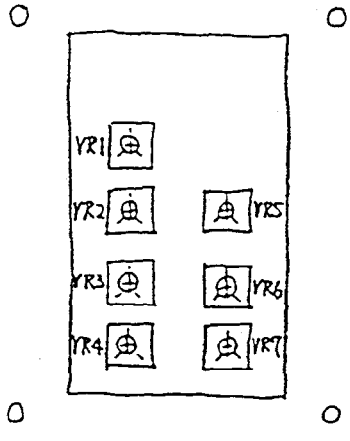
   When replacing the controller, set the controller trimmers VR1 – VR7 on the new controller to same position are adjustment trimmers VR1 – VR7 on the old controller, then install.

2. **Explanation of control box parts**

External appearance of control box



Inside of adjustment trimmer window



1) LED display windows

   The LED display windows are peepholes to see the four LED lamps showing the operating condition of the controller without opening the cover of the control box. (For details of the LED displays, see TROUBLESHOOTING.)

2) Adjustment trimmer window
The adjustment trimmer window is a window with a cover held by four screws. When adjusting, remove this cover. Inside, there are seven trimmers as shown in the diagram. Turn the trimmers indicated where necessary.

★ VR1: When carrying out horizontal digging operations, this is used to adjust the height of the work equipment movement so that the horizontal digging can be carried out at a higher or lower position than the machine level.

VR2: With the bucket angle compensation, this trimmer is used to make the compensation (angle) larger or smaller.

VR3: To prevent shock at the stroke end when carrying out horizontal digging operations, the horizontal path moves slightly upward near the end of the stroke. Use this trimmer to adjust when changing the position for the upward movement.

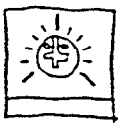
VR4: This trimmer basically does not need adjustment; therefore, never turn it.

VR5: This trimmer can be used to change the response of BOOM LOWER when controlling horizontal digging. If it is turned too far clockwise, it is liable to cause hunting (vibration) in the work equipment when manual intervention is made.

VR6: This trimmer can be used to adjust the amount of compensation of the dead band of the hydraulic valves.

VR7: Spare (no function)

Note: When these seven trimmers are shipped from the Electrical and Electronics Center, they are set to the central value (with the trimmer in the position shown in the diagram below).



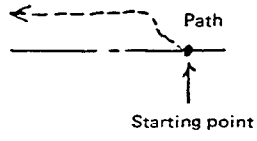
3. Precautions when adjusting

1) Stop the machine on level ground when adjusting.
2) When removing the screws from the adjustment trimmer window, be careful not to lose them.
3) No water, oil, metal particles (screws, etc.) or dirt or dust must be allowed to get inside the adjustment trimmer window. For this reason, adjustment must not be carried out when it is raining or snowing.
4) Always turn the starting switch OFF before turning any trimmer.
5) When turning the trimmer, use a small flat head or cross head screwdriver. If force is used with other tools or with a tool which has a thicker tip, the screw groove will be damaged and it will become impossible to turn the trimmer. (Use jeweler's screwdrivers)
6) When turning the trimmer, be careful not to let the screwdrive rtouch any other parts inside the controller.
7) Carry out the adjustment with the hydraulic oil at the temperature at which it is actually used.
8) Carryo out adjustment according to the procedure given in Section 4 Adjustment Methods. Do not carry out any adjustment for items where there is no problem.
9) After completion of adjustment, always put the cover back on the adjustment trimmer window and fasten it with the four screws. (Tightening torque: 0.15 – 0.2 kgm)

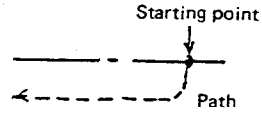
4. Adjustment Methods

1) When path suddenly rises at the beginning of horizontal digging.
When path suddenly goes down at the beginning of horizontal digging.

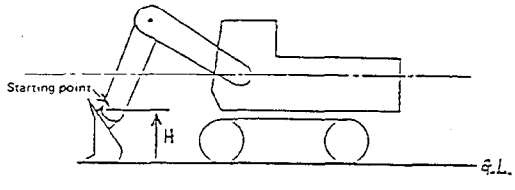
a) When path suddenly rises



b) When path suddenly goes down

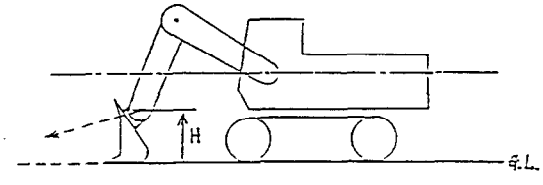


In the horizontal digging mode, when fine control in the ARM IN direction is carried out from where the arm is nearly perpendicular, adjust trimmer VR6 so that the path of the arm top pin does not go up and down as shown in the diagram above.
The relationship between trimmer VR6 and the up and down movement of the arm top pin is as shown below.
If arm top pin goes UP, turn trimmer VR6 CLOCKWISE.
If arm top pin goes DOWN, turn trimmer VR6 COUNTERCLOCKWISE.

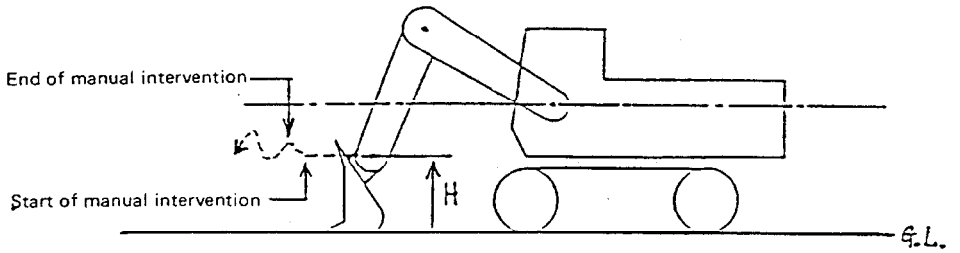


2) When making the path of horizontal digging face up or down compared to the level of the machine.
Turn adjustment trimmer VR1 to make the path horizontal. It is also possible to set the direction facing up and down to meet the preferences of the user. However, it is not possible to make big changes in the angle to give angles such as used in slope finishing. (Possible adjustment range: Approx. ±3°)
The relationship between trimmer VR1 and the direction of the work equipemnt path is as shown below.
When path moves UP, turn VR1 CLOCKWISE.
When path moves DOWN, turn VR1 COUNTERCLOCKWISE.
Carry out this adjustment at the ehight most commonly used by the bucket in actual operation. (Note: If the arm top pin height is more than 2.5 m, the horizontal digging control does not work.)

Example: Facing down



3) During horizontal diggin control, when stopping gradually before the end of the stroke, if the delay in stopping the downward of movement of the boom is too great;
During horizontal digging control, when there is manual intervention, if hunting occurs in the work equipment:
Example: When there is manual intervention, if hunting occurs in the work equipment,

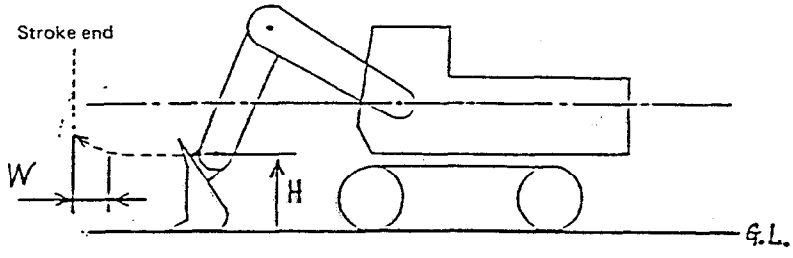


Turn adjustment trimmer VR5 and adjust the response of the work equipment. In other words:

a) If the boom goes down too far when stopping before the end of the stroke:
Turn trimmer VR5 clockwise to improve the response. However, if trimmer VR5 is turned too far in the clockwise direction, it will cause hunting (vibration) during manual intervention operations.

b) When there is hunting during manual intervention operations:
Turn trimmer VR5 counterclockwise to lower the response. However, if trimmer VR5 is turned too far in the counterclockwise direction, the boom will go down when stopping before the end of the stroke.

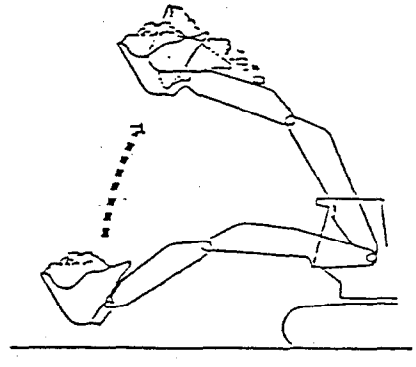
4) If there is shock when stopping BOOM LOWER at the end of the stroke in horizontal digging control;
If it is desired to adjust upward direction before the end of the stroke in horizontal digging control,



Turn adjustment trimmer VR3 to give the suitable path. Trimmer VR3 can be used to change width W in the diagram above. However, the setting can be made to suit the preferences of the user.
The relationship between trimmer VR3 and width W in the diagram above is as shown below.
If width W is too LARGE, turn trimmer VR3 COUNTERCLOCKWISE.
(Make this adjustment if the upward movement before the end of the stroke is excessive.)
If width W is too SMALL, turn trimmer VR3 CLOCKWISE.
(Make this adjustment if the bucket suddenly drops at the end of the stroke.)

5) When the amount of compensation (angle) of the bucket angle compensation (option) is too large or too small:

Example: When the amount of compensation is too small



Turn adjustment trimmer VR2 to give a suitable amount of adjustment. However, the setting can be made slightly larger or slightly smaller to meet the preferences of the user.
The relationship between trimmer VR2 and the amount of compensation is as shown below.
If the amount of compensation is too LARGE, turn trimmer VR2 CLOCKWISE.
If the amount of compensation is too SMALL, turn trimmer VR2 COUNTERCLOCKWISE.
Carry out this adjustment at the BOOM RAISE speed most commonly used in actual operations. Carry out the adjustment with the bucket loaded.

F. ASSEMBLY OF MACHINE (Part Ⅲ)

F-1: EXTENDING TRACK FRAME GAUGE WIDTH
(only when divided into three parts for transportation)

Tools and facilities required

Part Name	Q'ty
Power wrench x12 or x16	1
Torque wrench (50 kgm)	1
Socket for x12 25.4° x 60	1
Socket for x16 38.1° x 60	1
Hydraulic jack	2

Precautions

After extending the gauge width, check there is no interference with the travel motor or twisting of the piping.

Extending gauge width

1. Remove center frame mounting bolts ② (front and rear, one side x 12) at the front and rear of the track frame on the side to be extended.

   Mounting bolt: 21N-30-11190 x 12,
   M39 x 3, width across flats:
   60 mm, length: 125

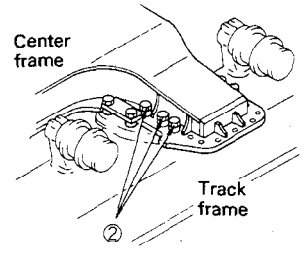
   Spacer: 21N-30-11170 x 12
   Outside diameter: 77 mm, height: 45 mm

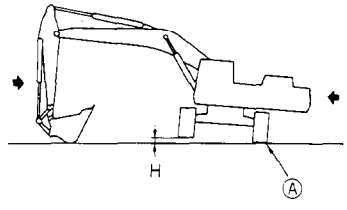
2. Swing the work equipment to face at right angles to track frame Ⓐ on the opposite side to the side to be extended.
   ★ When raising the track frame, keep height H to less than 50 mm.
   If the track frame is raised too high, the stopper bolt will be twisted and the bolt will bend.

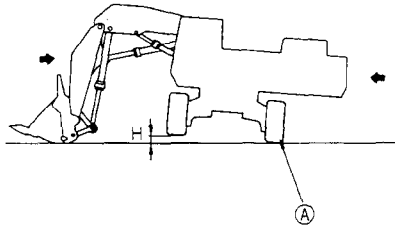
3. Using the arm, pull the machine forward to slide the track frame.

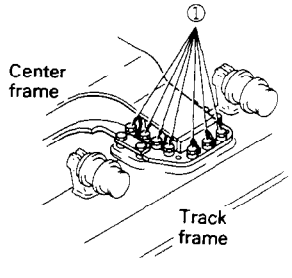
4. Extend the track gauge until it contacts the stopper, then lower the machine to the ground slowly and tighten bolts ① (front and rear on each side x 30).
   ★ Tightening torque: 335 ± 35 kgm
   Bolts ① and ② are the same bolts.

5. Repeat the same procedure for the track frame on the other side.
   ★ Carry out the operation for extending or retracting the track frame gauge width on firm level ground.
   ★ When extending or retracting the track frame gauge width, it is dangerous to move the cylinder suddenly, so never do this.







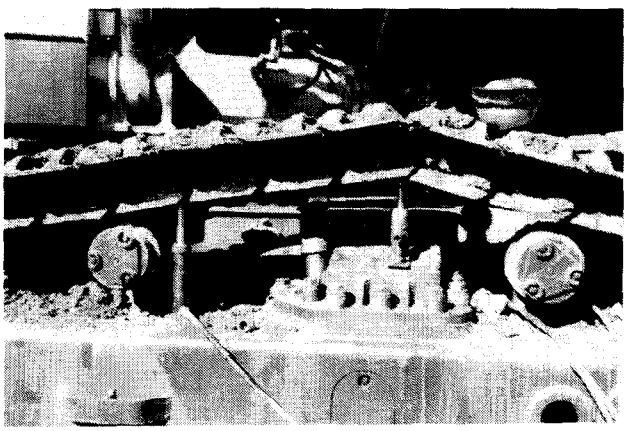


Mounting bolts (Parts sent individually)

No.	Part No.	Part Name	Q'ty
1	21N-30-11190	Bolt	36
2	21N-30-11170	Spacer	36

★ When tightening the bolts, use hydraulic jacks as shown on the right to jack up the track and ensure space for the tightening operation.

⚠ Never operate the machine with the track frame retracted.



F-2: INSTALLATION OF TRAVEL PIPING COVERS

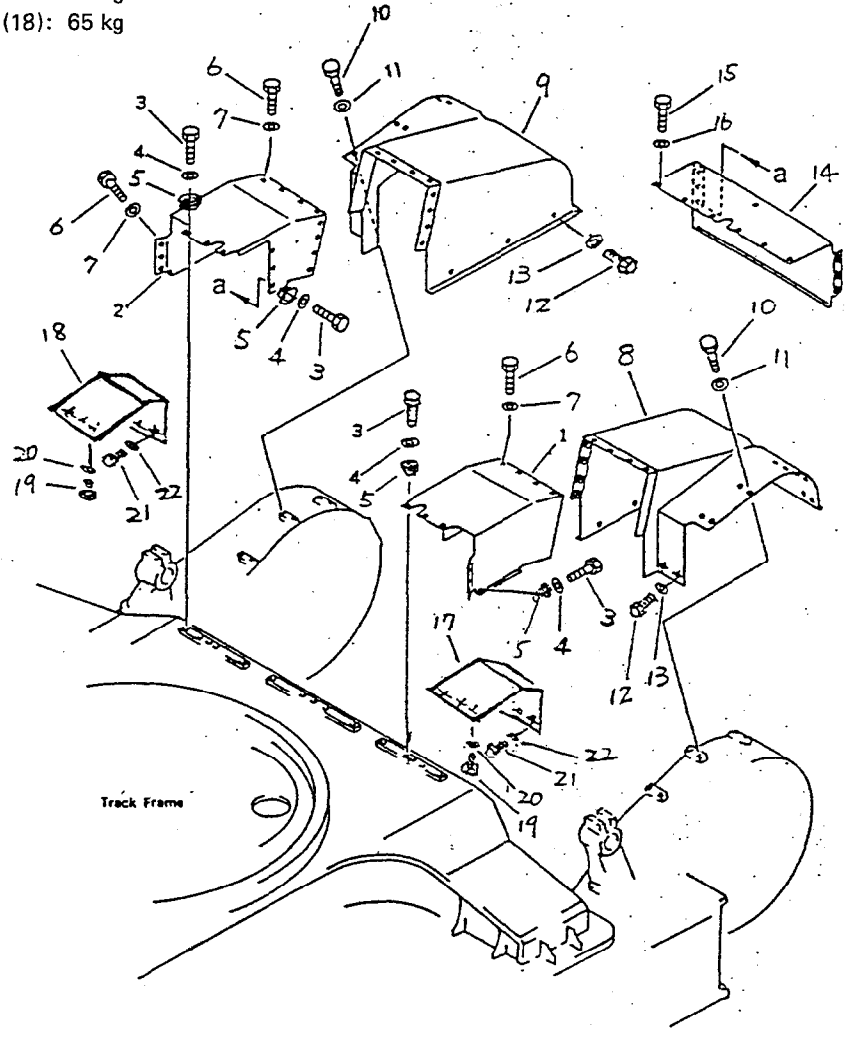
1. Install covers (1), (2), (8), (9), (14), (17), and (18).

⚠ Install the travel motor cover as follows.

1) Extend the track frame gauge width.
2) Check for any leakage of oil from the travel piping.
3) Swing the upper structure to bring the work equipment to face the side of the machine, then lower the work equipment to the ground.

kg

Covers (1), (2): 27 kg
Covers (8), (9): 106 kg
Cover (14): 32 kg
Covers (17), (18): 65 kg



Travel motor cover related sent as individual parts

No.	Part No.	Part Name	Q'ty
1	21N-30-11262	Cover (L.H)	1
2	21N-30-11272	Cover (R.H)	1
3	01010-51225	Bolt	16
4	01643-31232	Washer	16
5	21N-30-11340	Coller	16
6	01010-51225	Bolt	18
7	175-54-34170	Washer	18
8	21N-30-11242	Cover (L.H)	1
9	21N-30-11252	Cover (R.H)	1
10	01010-52040	Bolt	16
11	156-54-11350	Washer	16
12	01010-52040	Bolt	10
13	156-54-11350	Washer	10
14	21N-30-11281	Cover	1
15	01010-51225	Bolt	10
16	175-54-34170	Washer	10
17	21N-30-11321	Cover (L.H)	1
18	21N-30-11331	Cover (R.H)	1
19	01010-52480	Bolt	8
20	01643-32460	Washer	8
21	01010-52480	Bolt	8
22	01643-32460	Washer	8

G. CHECK OF ALL PARTS DURING AND AFTER ASSEMBLY

CHECK OF ALL PARTS DURING AND AFTER ASSEMBLY WITH FIELD ASSEMBLY INSPECTION REPORT

Check for loose nuts and bolts, tighten

Check all parts for loose nuts and bolts, and tighten them if they are loose.

Be particularly careful to check the following parts.

- Track roller
- Sprocket teeth
- Engine
- Pumps
- Swing circle
- Swing machinery
- Travel motor

Check for leakage of water and oil

Walk around the machine and check for any signs of oil or water leakage.

Be particularly careful to check the following parts.

- High pressure hoses and piping joints
- Hydraulic cylinders
- Floating seals at rotating parts of undercarriage
- Area around radiator
- Area around engine

Check electrical wiring for disconnections, short circuits, loose terminals

Check the electrical wiring for any signs of disconnections or short circuits. Check also for loose terminals and tightn them if they are loose.

Be particularly careful to check the wiring of the following parts.

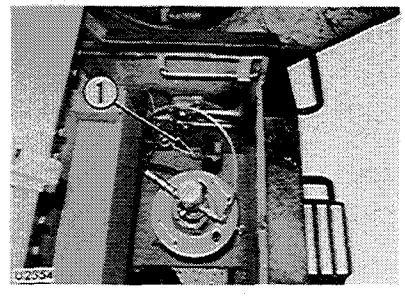
- Battery
- Starting motor
- Alternator

Drain water and sediment from fuel tank

Loosen valve ① at the bottom of the tank, and drain the water and sediment collected at the bottom together with the fuel.

Check operation of air conditioner
(See operation manual)
Check operation of working lamp
Check operation of wiper

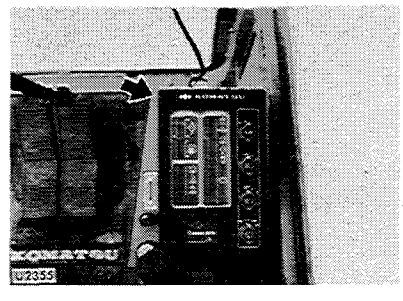
(Inside case on front right side of machine)



Check central warning monitor

To prevent failure of the central warning monitor to give warning because of broken lamp bulbs or buzzers, carry out the following checks.

1. Turn the starting switch to the ON position before starting the engine.
   All the monitor lamps should light up for 3 seconds and the alarm buzzer should sound.



H. PC1000-1 55°C Australia specification

ADDITIONAL OIL COOLER PROCEDURE FOR LOCAL MODIFICATION

No.	Part No.	Part Name	Q'ty	Remarks
	Additional parts (Parts installed to body, non-standard parts)			
1	21N-54-14140	BRACKET	2	
2	01010-51225	BOLT	2	
3	01643-31232	WASHER	2	
4	21N-62-14510	PLATE	1	
5	01010-51635	BOLT	4	
6	01643-31645	WASHER	4	
7	21N-62-14520	BRACKET	1	
8	01010-51235	BOLT	2	
9	01643-31232	WASHER	2	
10	04434-53412	CLIP	3	
11	01010-51225	BOLT	3	
12	01643-31232	WASHER	3	
13	21N-62-14540	BRACKET	1	
14	01010-51640	BOLT	8	
15	01643-31645	WASHER	8	
16	21N-62-14630	ROD	1	
17	01010-51640	BOLT	4	
18	01643-31645	WASHER	4	
19	21N-46-11240	FRAME	1	
20	21N-54-14130	FRAME	1	
21	21N-54-14150	DOOR	1	
22	21N-54-14160	DOOR	1	

LOCALLY PROCURED PARTS

No.	Part No.	Part Name	Q'ty	Remarks
(01)		HOSE	1	# 10 ℓ = 2300
(02)		HOSE	1	# 10 ℓ = 1300
(03)		HOSE	1	# 08 ℓ = 800
(04)		HOSE	1	# 06 ℓ = 900
(05)		HOSE	1	# 14 ℓ = 1100
(06)		HOSE	1	# 14 ℓ = 800
(07)	07371-31049	FLANGE	4	
(08)	07372-21035	BOLT	8	
(09)	01643-51032	WASHER	8	
(10)	07000-03032	O-RING	2	
(11)	08036-93014	CLIP	1	
(12)		CHECK VALVE	1	
(13)		OIL COOLER	1	
(14)		HOSE	1	# 10 ℓ = 650
(15)		FAN MOTOR	1	
(16)		FLOW DIVIDER	1	
(17)	01010-51025	BOLT	2	
(18)	01643-31032	WASHER	2	
(19)	07371-31465	FLANGE	4	
(20)	07372-21240	BOLT	8	
(21)	01643-51232	WASHER	8	
(22)	07000-03048	O-RING	2	
(23)		CUSHION	2	
(24)	01010-51020	BOLT	2	
(25)	01643-31032	WASHER	2	

INDIVIDUAL SHIPMENT PARTS (FOR BLIND PLUGS)

No.	Part No.	Part Name	Q'ty	Remarks
	07378-11000	HEAD	2	
	07000-03032	O-RING	2	
	07378-11400	HEAD	2	
	07000-83048	O-RING	2	

1-1 MODIFICATION PROCEDURE

For details of disassembly, assembly, and maintenance procedures not given in this modification manual, see the Shop Manual.

1-2 PREPARATIONS BEFORE MODIFICATION

SETTING MACHINE IN POSITION
Park the machine on firm level ground, stop the engine, and set to the posture shown below.

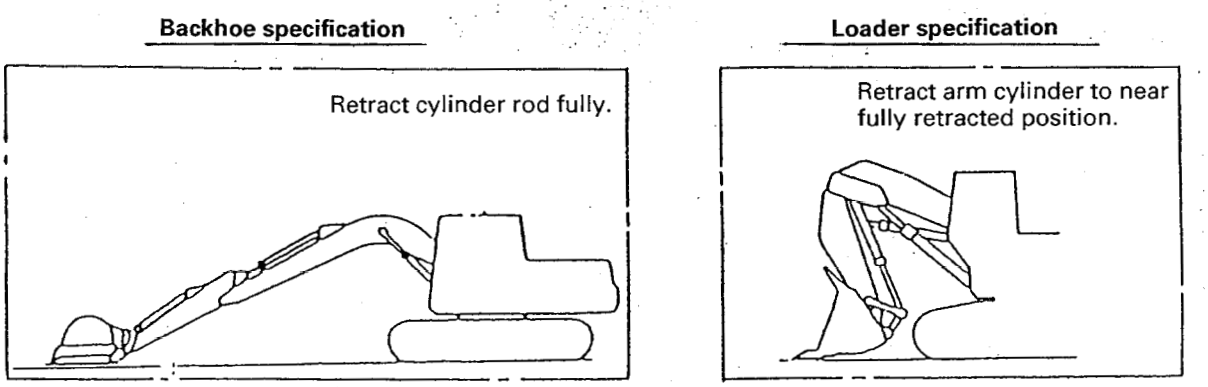
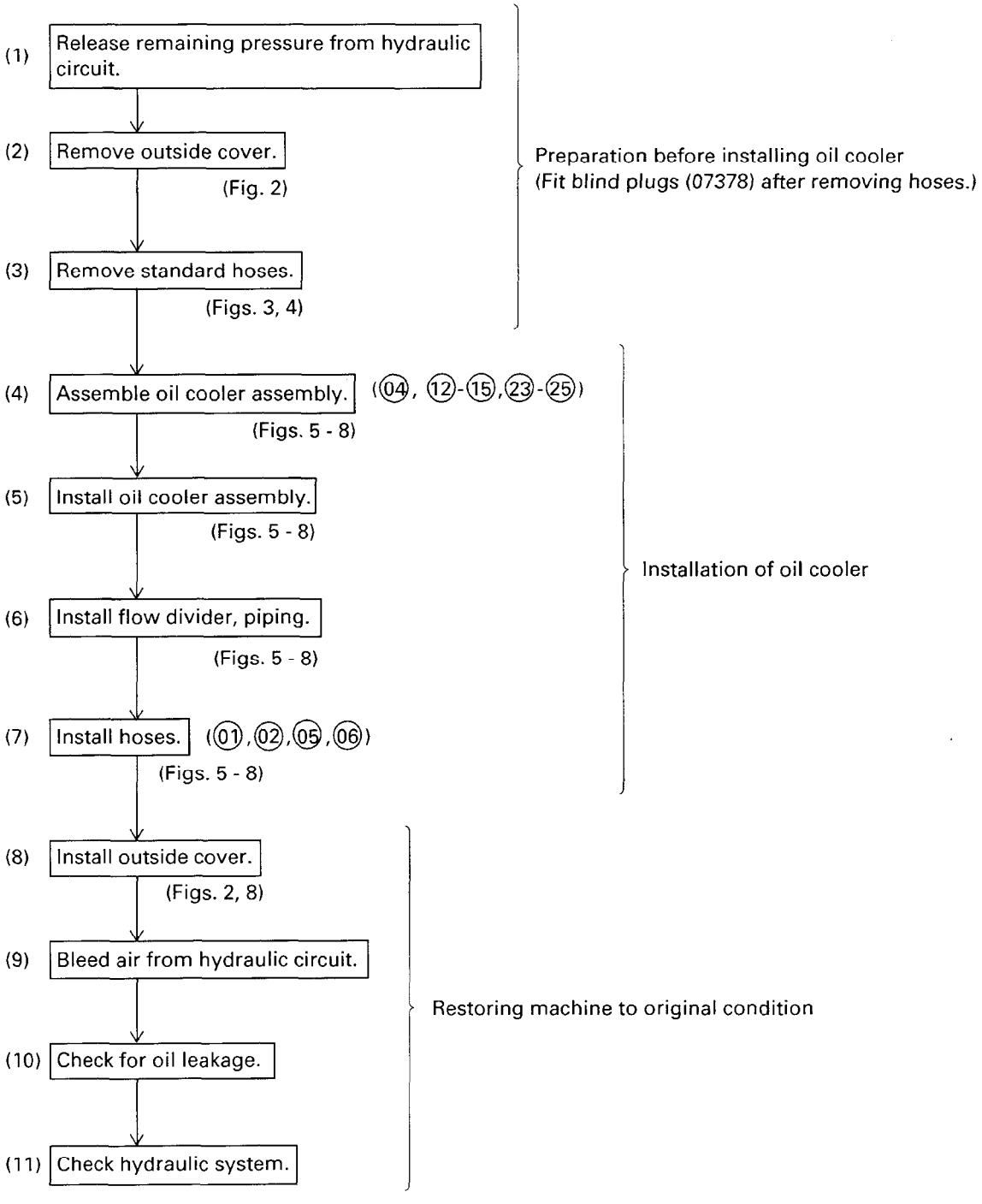


Fig. 1

2. MODIFICATION PROCEDURE



(2) Remove outside cover.
(Preparation before installing oil cooler
To make it easier to install.)

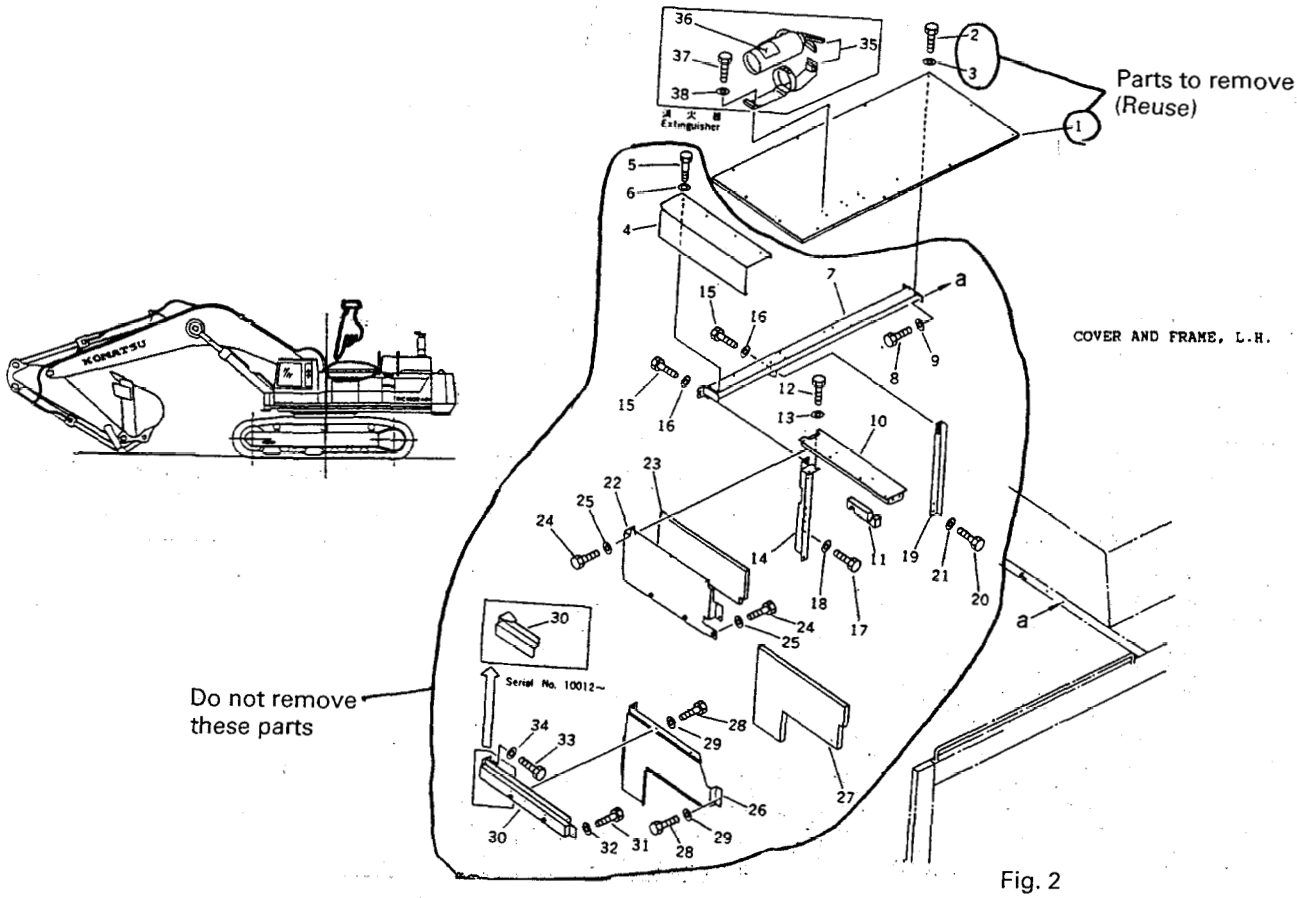


Fig. 2

INDEX	PART NO.	DESCRIPTION	Q'TY	SERIAL NO.	REMARKS
①	21N-54-11420	COVER	1	10001–	Remove (Reuse)
②	01010-51230	BOLT	14	10001–	
③	01643-31232	WASHER	14	10001–	
4	21N-54-11411	COVER	1	10001–	
5	01010-51230	BOLT	4	10001–	
6	01643-31232	WASHER	4	10001–	
7	21N-54-11730	BRACKET	1	10001–	
8	01010-51230	BOLT	2	10001–	
9	01643-31232	WASHER	2	10001–	
10	21N-54-11711	BRACKET	1	10001–	
11	21N-54-11880	• SHEET	1	10001–	
12	01010-51230	BOLT	4	10001–	
13	01643-31232	WASHER	4	10001–	
14	21N-54-11720	BRACKET	1	10001–	
15	01010-51230	BOLT	4	10001–	
16	01643-31232	WASHER	4	10001–	
17	01010-51225	BOLT	2	10001–	
18	01643-31232	WASHER	2	10001–	
19	21N-54-11741	BRACKET	1	10001–	
	(⊗ 21N-54-11740)	BRACKET	1	(10001–10217)	
20	01010-51225	BOLT	2	10001–	
21	01643-31232	WASHER	2	10001–	
22	21N-54-11511	COVER	1	10001–	
23	209-54-56370	• SHEET	1	10001–	
24	01010-51230	BOLT	9	10001–	
25	01643-31232	WASHER	9	10001–	
26	21N-54-11531	COVER	1	10001–	
27	21N-54-11541	• SHEET	1	10001–	
28	01010-51230	BOLT	5	10001–	
29	01643-31232	WASHER	5	10001–	
30	21N-54-11891	FRAME	1	10012–	
	□ 21N-54-11890	FRAME	1	10001–10011	
31	01010-51225	BOLT	2	10001–	
32	01643-31232	WASHER	2	10001–	
33	01010-51235	BOLT	2	10001–	
34	01643-31232	WASHER	2	10001–	
G1	(⊙ 21N-54-X4600)	EXTINGUISHER GROUP	1	10001–	
35	09495-00010	EXTINGUISHER	1	10001–	
36	09495-40210	PLATE , (ENGLISH)	1	10001–	
37	01010-50616	BOLT	6	10001–	
38	01602-20619	WASHER	6	10001–	

(3) Remove standard hoses.
(Preparation before installing oil cooler)

RETURN PIPING (BLOCK TO TANK)

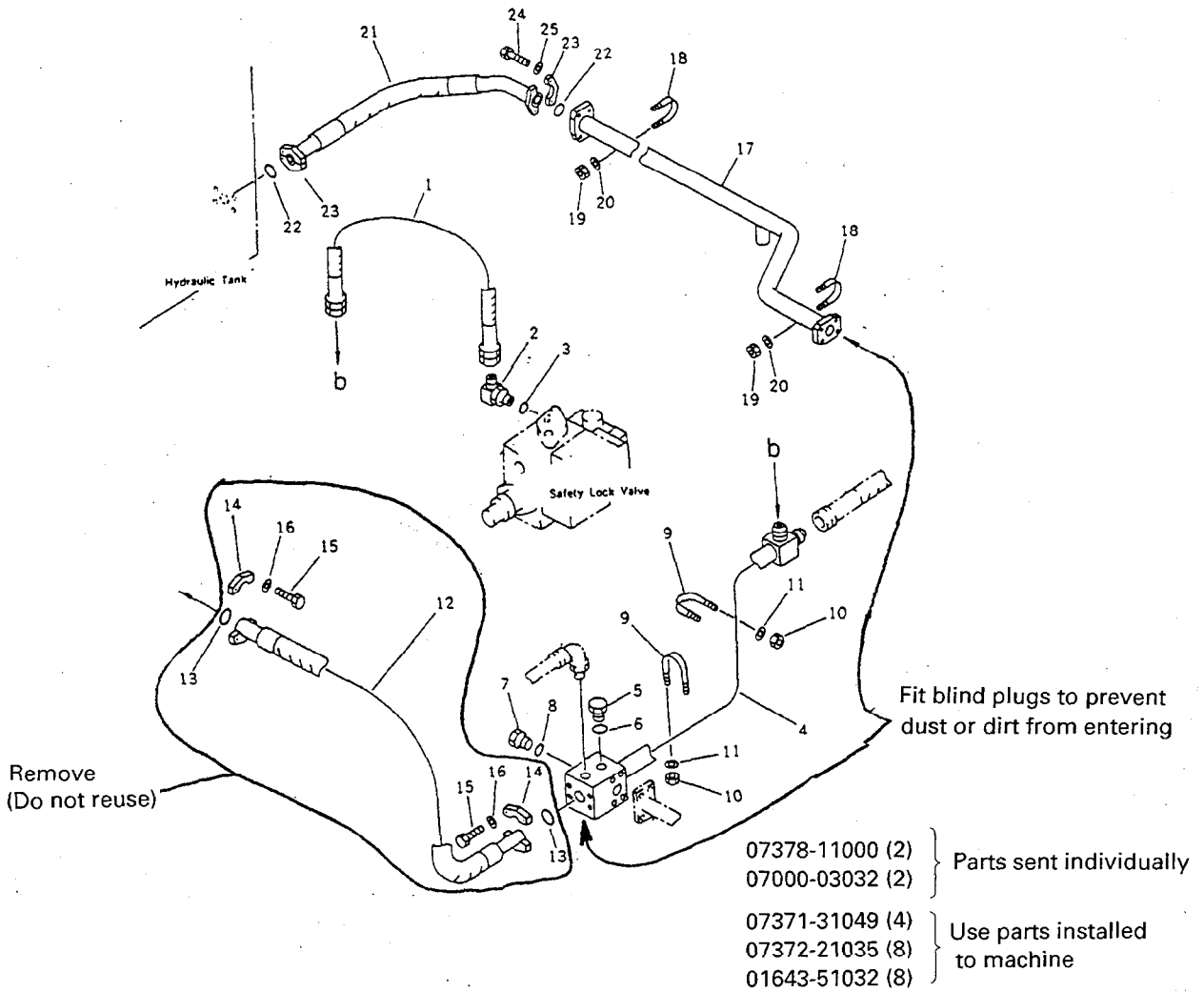


Fig. 3

INDEX	PART NO.	DESCRIPTION	Q'TY	SERIAL NO.	REMARKS
1	07102-20606	HOSE	1	10001–	
2	07235-10628	ELBOW	1	10001–	
3	07002-02434	O-RING	1	10001–	
4	21N-62-17261	TUBE	1	10001–	
5	07040-12012	PLUG	1	10001–	
6	07002-02034	O-RING	1	10001–	
7	07040-01409	PLUG	1	10001–	
8	07002-01423	O-RING	1	10001–	Remove (Do not reuse)
9	07283-23442	CLIP	2	10001–	
10	01559-31011	NUT	4	10001–	
11	01643-31022	WASHER	4	10001–	
12	07298-01010	HOSE	1	10001–	
13	07002-03032	O-RING	2	10001–	
14	07371-31049	FLANGE, SPLIT	4	10001–	
15	07372-21035	BOLT	8	10001–	
16	01643-51032	WASHER	8	10001–	
17	209-62-57232	TUBE	1	10001–	
18	07283-33442	CLIP	2	10001–	
19	01599-01011	NUT	4	10001–	
20	01643-31032	WASHER	4	10001–	
21	07297-01008	HOSE	1	10001–	
22	07000-03032	O-RING	2	10001–	
23	07371-31049	FLANGE, SPLIT	4	10001–	
24	07372-21035	BOLT	8	10001–	
25	01643-51032	WASHER	8	10001–	

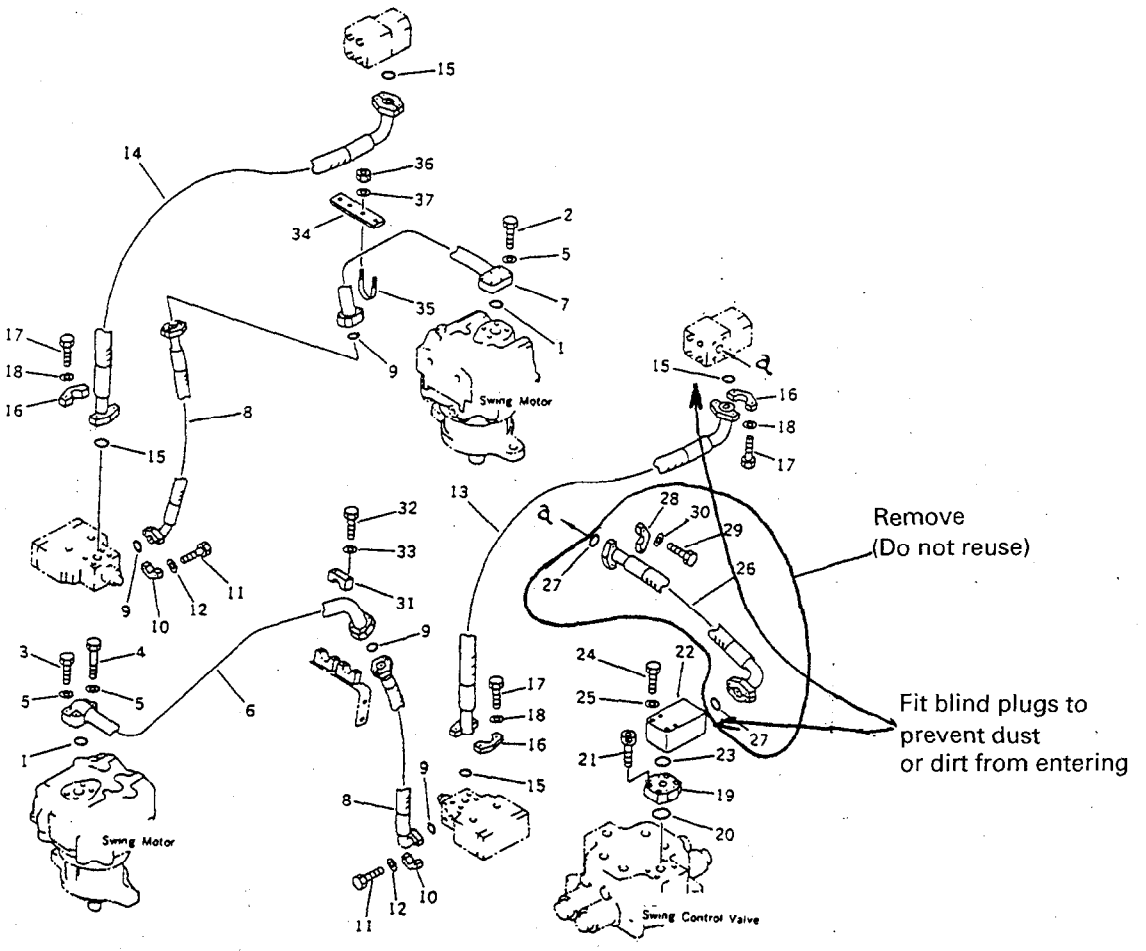
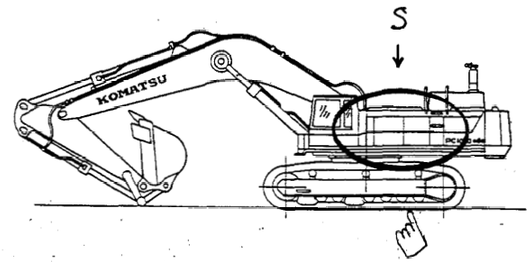

Swing Motor
Swing Motor
Swing Control Valve
Remove
(Do not reuse)
Fit blind plugs to
prevent dust
or dirt from entering
07378-11400 (2)
07000-83048 (2)
Parts sent individually
07371-31465 (4)
07372-21240 (8)
01643-51232 (8)
Use parts installed
to machine

Fig. 4

INDEX	PART NO.	DESCRIPTION	Q'TY	SERIAL NO.	REMARKS
1	07000-03045	O-RING	2	10001–	
2	01010-51285	BOLT	2	10001–	
3	01010-51265	BOLT	2	10001–	
4	01010-51270	BOLT	4	10001–	
5	01643-31232	WASHER	8	10001–	
6	21N-62-16120	TUBE	1	10001–	
7	21N-62-16131	TUBE	1	10001–	
8	07298-01008	HOSE	2	10001–	
9	07000-03032	O-RING	4	10001–	
10	07371-31049	FLANGE, SPLIT	8	10001–	
11	07372-21035	BOLT	16	10001–	
12	01643-51032	WASHER	16	10001–	
13	07298-01415	HOSE	1	10001–	
14	07298-01417	HOSE	1	10001–	
15	07000-03048	O-RING	4	10001–	
16	07371-31465	FLANGE, SPLIT	8	10001–	
17	07372-21240	BOLT	16	10001–	
18	01643-51232	WASHER	16	10001–	
19	21N-62-16150	FLANGE	1	10001–	
20	07000-02060	O-RING	1	10001–	
21	01252-41240	BOLT	4	10001–	
22	21N-62-16141	BLOCK	1	10001–	
23	07000-03048	O-RING	1	10001–	
24	01010-51295	BOLT	4	10001–	
25	01643-31232	WASHER	4	10001–	
26	07298-01407	HOSE	1	10001–	Remove (Do not reuse)
27	07000-03048	O-RING	2	10001–	
28	07371-31465	FLANGE, SPLIT	4	10001–	
29	07372-21240	BOLT	8	10001–	
30	01643-51232	WASHER	8	10001–	
31	176-61-41330	CLAMP	1	10001	
32	01010-51250	BOLT	2	10001–	
33	01643-31232	WASHER	2	10001–	
34	21N-62-16160	PLATE	1	10001–	
35	07283-24346	CLIP	1	10001–	
36	01599-01011	NUT	2	10001–	
37	01643	WASHER	2	10001–	

(5) Installation procedure for oil cooler assembly.
Note: ◯ : Locally installed parts
□ : Parts installed to machine

1) Secure oil cooler assembly to bracket 1 (Fig. 7) and 4 (Fig. 6).
2) Secure flow divider ⑯ (Fig. 7) to bracket 7 (Fig. 7).
(The operation is easier if bracket 7 is removed temporarily.)



Oil cooler installation portion

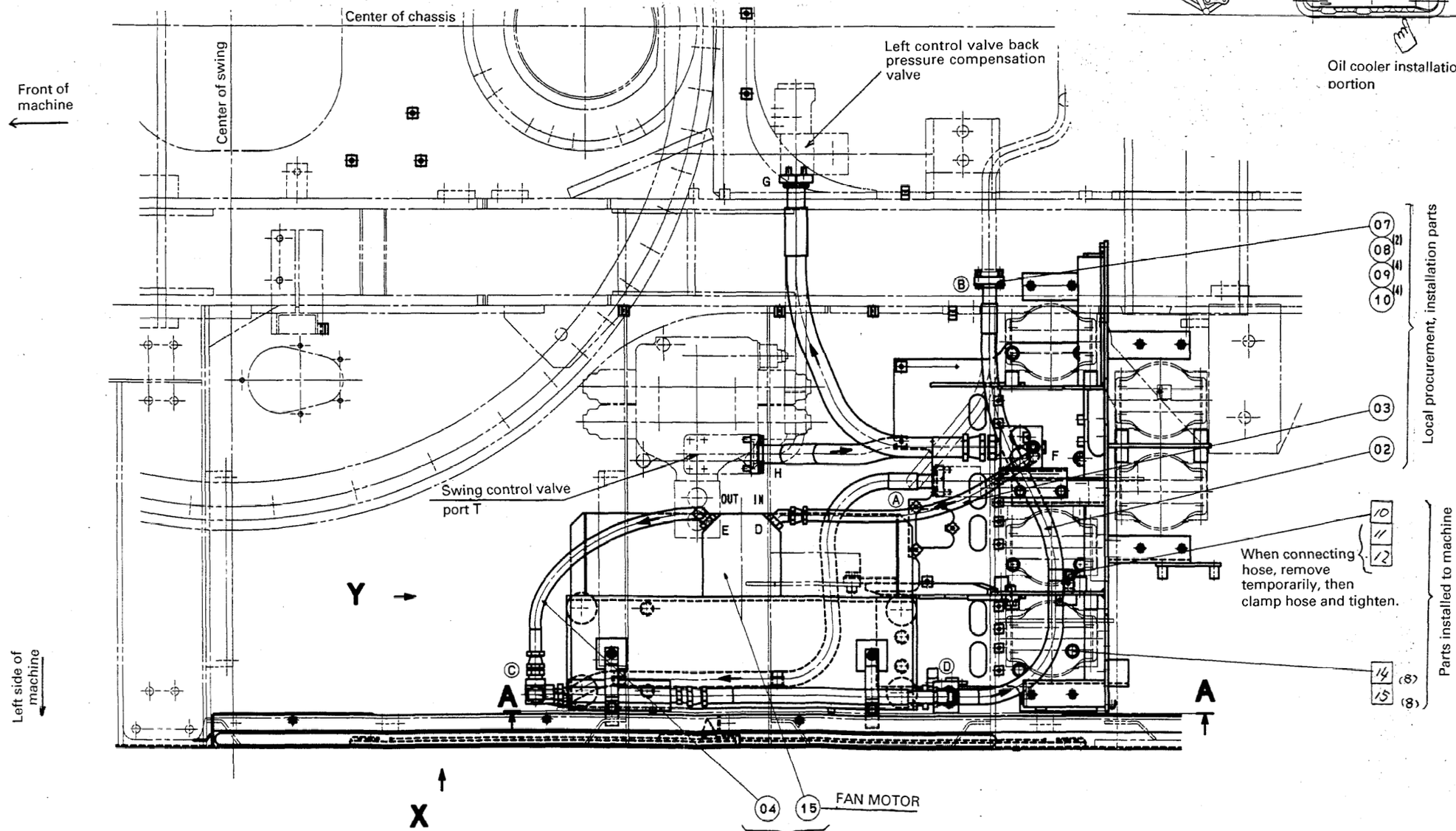


Fig. 5

View S

Seen from top of machine

3) Connect hoses (01) (Fig. 6), (02) (Fig. 7), and (05) and (06) (Fig. 6).
(Remove blind plugs installed during preparatory work.)
4) Flow divider electric wiring
(Prepare locally.)

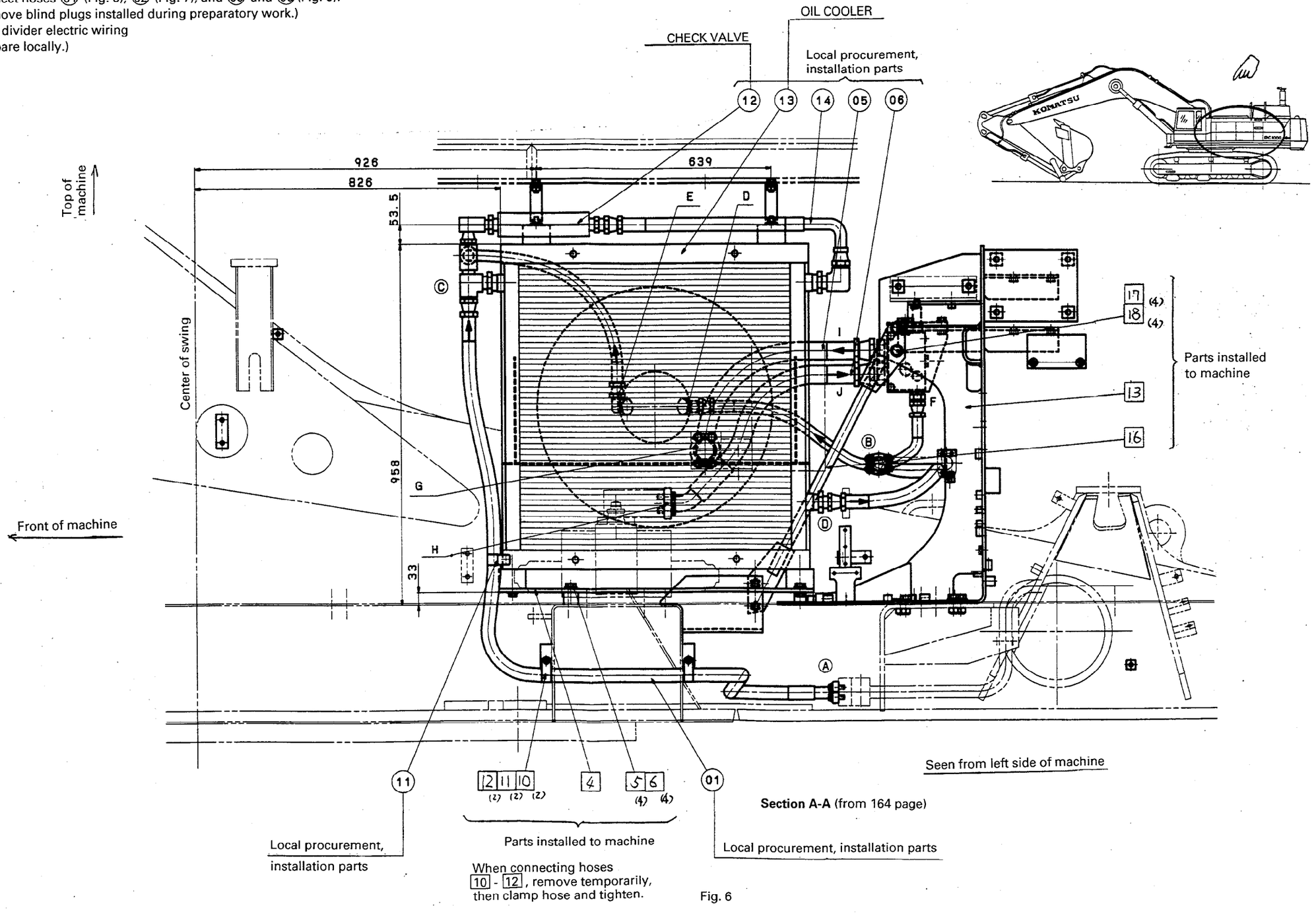


Fig. 6

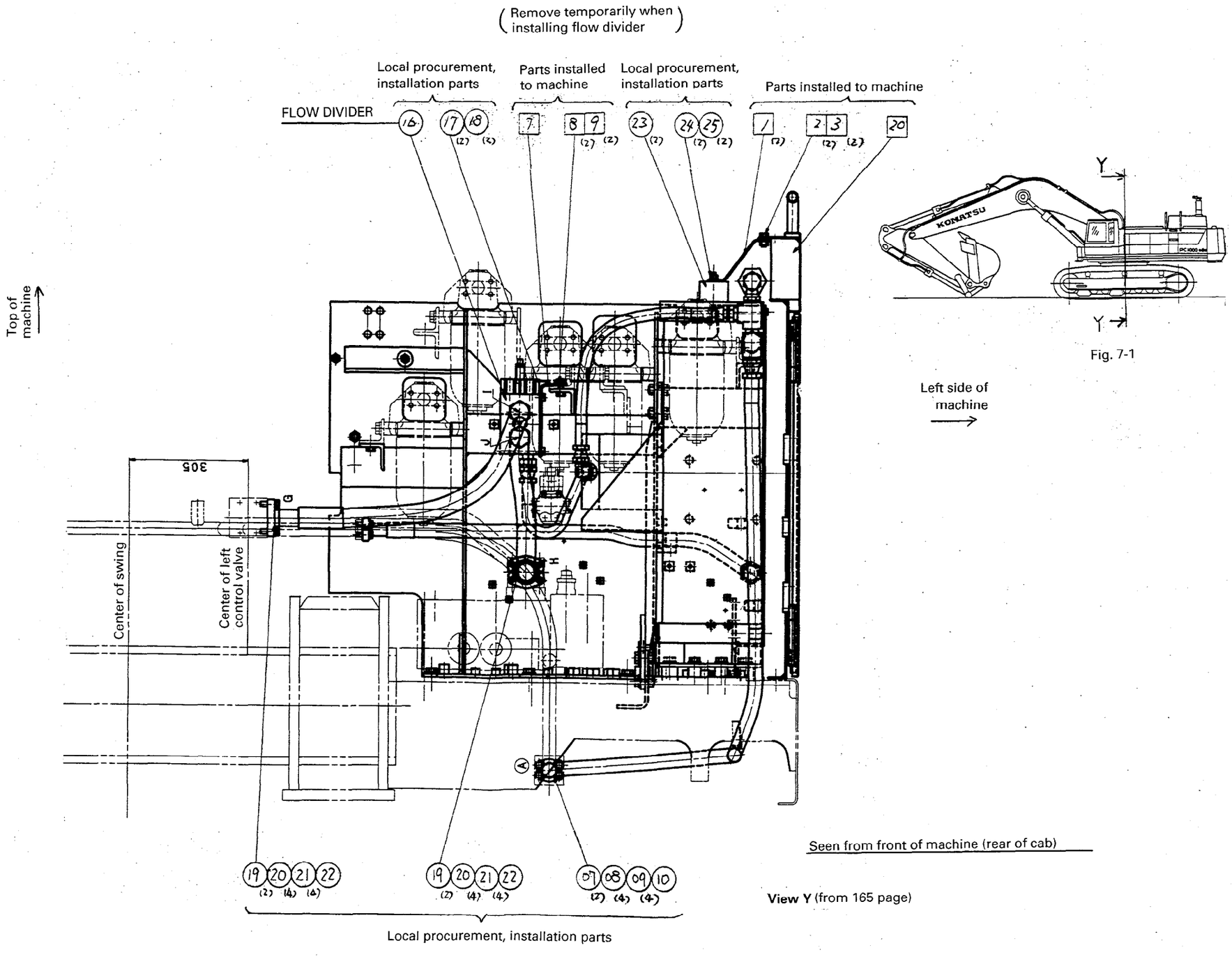
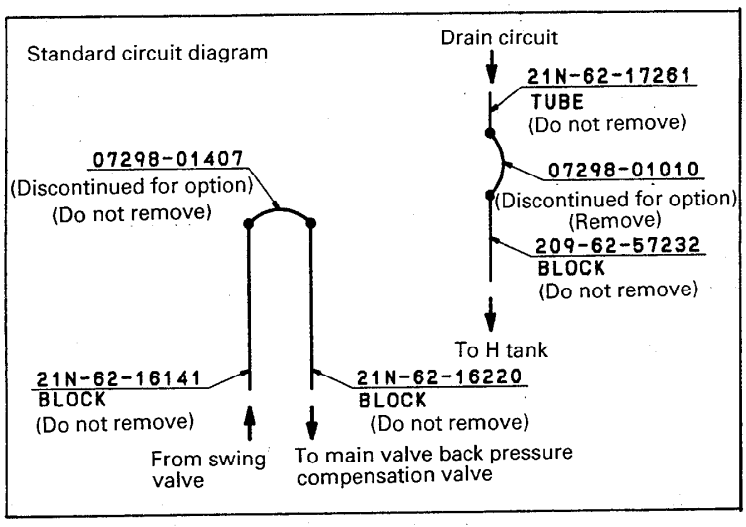
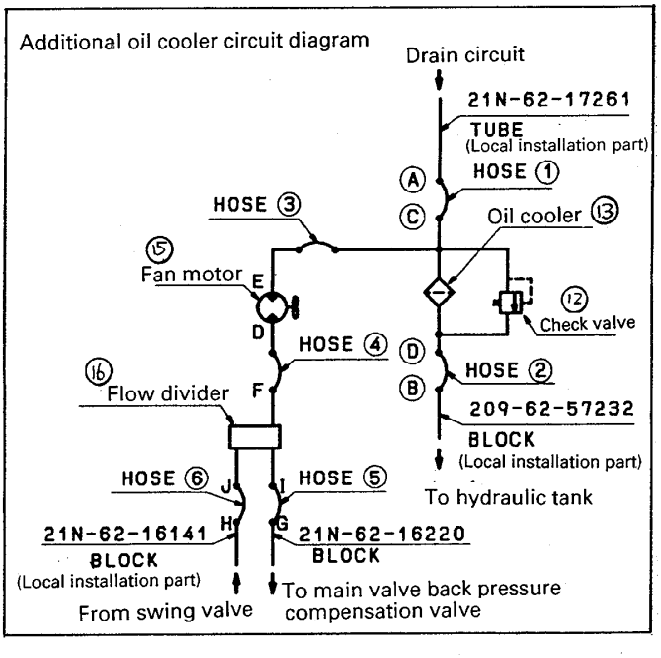

(Remove temporarily when installing flow divider)
Local procurement, installation parts
Parts installed to machine
Local procurement, installation parts
Parts installed to machine
FLOW DIVIDER
16
17 (2)
18 (2)
7
8 (2)
9 (2)
23 (2)
24 (2)
25 (2)
1 (2)
2 (2)
3 (2)
20
Top of machine
305
G
H
A
Center of swing
Center of left control valve
19 (2)
20 (4)
21 (4)
22
19 (2)
20 (4)
21 (4)
22
07 (2)
08 (4)
09 (4)
10
Local procurement, installation parts
Left side of machine
Y
Y
KOMATSU
PC1000 e8e
Seen from front of machine (rear of cab)
View Y (from 165 page)

Fig. 7-1

Fig. 7

Circuit diagram (Diagram for procedure for installation of oil cooler, hoses)





(8) Restoring machine to original condition
Install outside cover removed in Step (2).

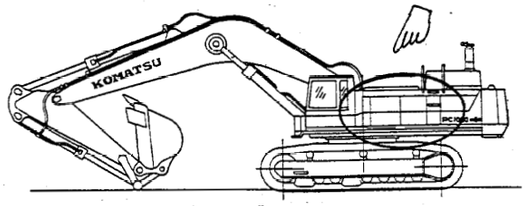
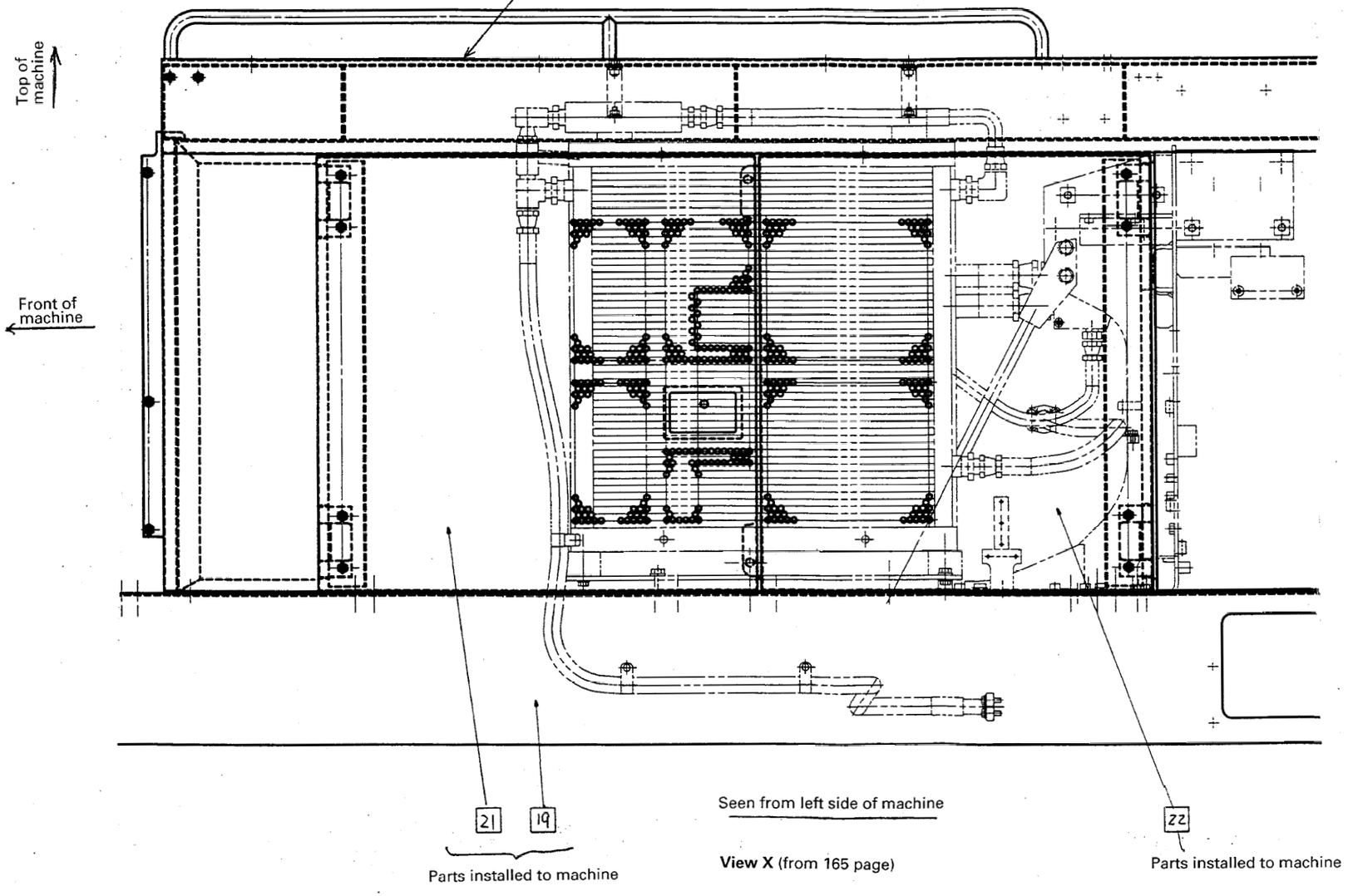


Fig. 8-1



KOMATSU

Report No. _____

FIELD ASSEMBLY INSPECTION REPORT

After completion of assembling a machine, make inspections according to these check sheets for assuring machine performance and quality.

Model — Type	Machine Serial No.	User Unit No.	Engine Model	Engine Serial No.
Backhoe spec.			**SA6D170-B-1**	

Service Meter Reading	Date of Inspection

Location of Machine at Inspection

Distributor's Name

	Attachment 1	Attachment 2
Manufacture		
Model		
Serial No.		

Customer's Name	Address:	Signature:	Delivery Report No. attached
		Date:	

Inspector's Comments:

Inspector's Name:	KOMATSU USE ONLY:
Title	C. Sheet Receiving Date:
Signature:	By :
	Remark:

Check sheets filling instructions:

1. Use following indexes for entry of judgement
   - ☑ ..... Normal
   - ☒ ..... Abnormal
   - ⊠ ..... Correction made on abnormal point
   - ☑ ..... Not applied
2. Enter actually measured values in parenthese, [ ].

Notes:

(1) Criteria are based on the standards when the machine is shipped out of the factory.

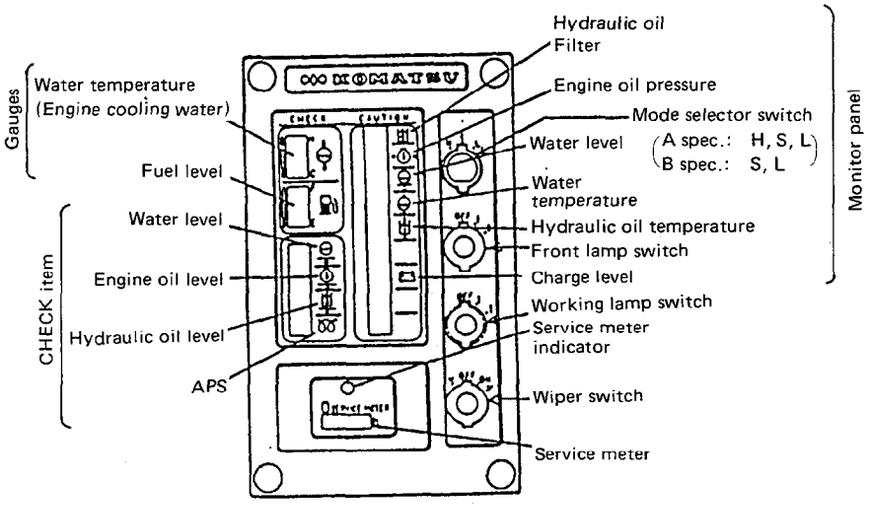
(2) **This FIELD ASSEMBLY INSPECTION REPORT is for "A" specification.**

SUBMITTANCE OF THIS REPORT (AND CHECK SHEETS) TO KOMATSU IS ONE OF THE CONDITIONS OF WARRANTY VALIDATION, COPY FOR KOMATSU SHALL BE FORWARDED TO THE KOMATSU REGIONAL OFFICE TOGETHER WITH THE COPY OF DELIVERY SERVICE REPORT.

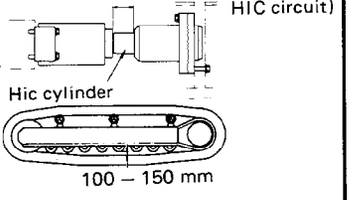
② Komatsu copy

Category	Revision	Check item			Local assembly time		After hours of operation		Judgement standard
Checks before assembly		Oil and water levels		Actual measurement					
		Cooling water	Soft water	[ ]					 Within 70 mm
		Anti-freeze (A, B, C, D, E)	Yes/No	[ ]					
			Density of anti-freeze	[ ]					A: –50 – –40°C D: –20 – –10°C B: –40 – –30°C E: –20 – –10°C C: –30 – –20°C (Not necessary in summer)
		Engine oil	EO10W EO30	[ ]					$L-H^{+5mn}$ (10 minutes after stopping engine)
		PTO oil	EO10W EO30	[ ]					$L^{+5}-H$ (10 minutes after stopping engine)
		Swing machinery gear case oil – Front	EO30						$L^{+5}-H^{+10}$ (10 minutes after stopping engine)
		Swing machinery gear case oil – Rear	EO30						
		Final drive gear case oil – Right	EO30	[ ]					Bottom edge of level plug: 0 to –10 mm
		Final drive gear case oil – Left	EO30	[ ]					
		Hydraulic oil	EO10	[ ]					Above center of level gauge
		Battery electrolyte	–	[ ]					Within 13 mm from bottom surface of filler port
		Engine No. [ ]							
		Service meter [When accepted] [After check]							
		Revolving frame No. [ ]							Must match Serial No.
Checks during assembly									
		Loose, untightened lock bolts for connecting pins							There must be none.
		Loose, untightened split falnge bolts for work equipment piping							There must be none.
		Forgotten, missing, catching O-rings for work equipment piping							There must be none.
		Loose, twisted connections for grease piping							There must be none.
		Shim adjustment for work equipment pins							Max. 1 mm (for locations, see assembly procedure manual)
		Improperly inserted wiring, unconnected wiring							There must be none.
		Loose, untightened ladder mounting bolts							There must be none.

Category	Revision	Check item	Local assembly time		After hours of operation		Judgement standard
Checks during assembly		Loose, untightened counterweight bolts					There must be none.
		Stepped clearance between counterweight and frame					Max. 5 mm
		Loose, untightened operator's cab mounting bolts					There must be none.
		Loose, untightened operator's seat mounting bolts					There must be none.
		Loose, untightened mounting bolts and joints for travel, HIC piping					There must be none.
		Forgotten, missing, catching O-rings for travel, HIC piping					There must be none.
		Loose, untightened track frame mounting bolts					There must be none.
		Loose, untightened bolts for travel motor cover					There must be none.
		Are there any other parts not yet installed (rear view mirror, etc.)?					There must be none.
		Bleed air from pump					Follow instructions in assembly procedure manual.
		Bleed air from travel motor					Follow instructions in assembly procedure manual.
		Bleed air from HIC circuit and charge					Follow instructions in assembly procedure manual.
		Flush hydraulic circuit					Follow instructions in assembly procedure manual.
		Bleed air from work equipment cylinder circuit					Follow instructions in assembly procedure manual.
		Grease all parts of work equipment					All locations must be greased.
		Add hydraulic oil					Add to between L and H marks at inspection posture
		Add fuel, washer fluid					Fill tank.
		Dirty oil on paintwork, damage to paintwork at any part					Clean, repair damaged paintwork

Category	Revision	Check item	Local assembly time	After hours of operation	Judgement standard
Check monitor		Monitor display 1. Check of monitor function When the starting switch is turned ON, the gauges, CHECK items, and all display items on the monitor should light up. At the same the alarm buzzer should sound.			Display should be as on left.
		2. Check of gauges and CHECK items When starting switch is turned to ON (all lamps on), all display lamps should go out after approx. 3 sec. *For another 2 seconds, only the gauges are displayed,* and the CHECK and monitor items disappear.			
		3. Check of monitor items After starting the engine, the caution lamps should not light up and the alarm buzzer should not sound when the engine speed is low idling – high idling.			
		Operation of service meter			*There should be no scratches or mist*-ing of the lens or variation in operation.
		Operation of APS (short circuit water temperature sensor to check)			Main key ON: Lights up APS switch ON: Flashes, then lights up *Water temperature sensor discon*-nected: Goes out
		MONITOR  			

Category	Revision	Check item	Local assembly time	After hours of operation	Judgement standard
Check of switches, control levers		Operation of mode selector switch			BOOM RAISE speed should become slower in order H, S, L.
		Operation of front lamp switches			I. Panel lamps light up. II. Front lamps or working lamps light up.
		Operation of operating lamp switch			
		Operation of wiper switches			ON: Wiper actuated W: Washer fluid sprayed out
		Operation of starting switch			ON: Monitor actuated START: Engine started
		Operation of auto-deceleration switch (Deceleration speed: 1st stage 1700 ± 100 rpm, 2nd stage 1300 ± 100 rpm)			When control lever is moved to ON speed immediately rises; when control lever is moved to OFF speed drops immediately to 1st stage, then after 5 seconds switches to 2nd stage.
		Operation of swing brake switch			Must be possible to switch between AUTO and RELEASE.
		Operation of swing parking brake switch			• When switch is ON, swing parking brake lamp must light up.
					• In this condition, swing circuit must relieved.
		Operation of travel speed selector switch			Must be possible to switch between high and low speed.
		Operation of horn switch			When depressed, horn must sound (no vibration or rough sound).
		Operation of room lamp switch			When switch is ON, room lamp must light up.
		Operation of cigar lighter			When switch is ON, it must glow red and automatically pop out.
		Operation of lock lever			Actuator must not work at LOCK position.
		Operation of fuel control lever			• Must contact governor stopper at FULL position.
					• Engine must stop at STOP position.
		Operation of travel lever			• Must be possible to switch between FORWARD and REVERSE. • Must be possible to operate smoothly.
		Operation of work equipment levers			• Each actuator must move in accordance with operating pattern.
					• Must be possible to operate smoothly.
		Operation of air conditioner			Must operate according to switch position.
		Operation of radio			Must operate normally.

Category	Revision	Check item	Local assembly time	After ___ hours of operation	Judgement standard
Swing performance		Swing operation running in: Engine midrange speed, left and right swing 10 times, pressurized; left and right relief 2 minutes, chock 10 times (Work equipement posture: Boom cylinder fully extended, arm cylinder fully extended, bucket cylinder fully extended)			
		Constant swing speed [Right rpm] [Left rpm]			4.5 ± 0.2 rpm
		Brake angle			Max. 30° (Feeling)
		Swing variation, hunting			There must be none.
		Abnormal noise, irregular swing			There must be none.
Travel performance		Travel operation running in: Engine speed. FORWARD/REVERSE 5m x 5 times (both high speed and low speed), pressurized; each port relief 1 minute (high speed, steering) (Work equipment posture: Travel posture)			
		Abnormal noise, heat from carrier roller, track roller, idler			There must be no abnormal noise or abnormal heat.
		Operation of travel brake			Must brake securely without pulling to one side.
		Abnormal noise, irregular travel			There must be none.
		Travel deviation (feeling)			There must be no abnormal deviation from fine control range to full stroke range (feeling).
		Travel deviation (measured) High speed [Forward mm/20m] [Reverse mm/20m]			Max. 200 mm/20 m
		(Only when it is considered that there is abnormality.) Low speed [Forward mm/20m] [Reverse mm/20m]			Max. 200 mm/20 m
		Track rotating speed — High speed — Right [Forward sec] [Reverse sec]			26 ± 2 sec/2 turns Difference between left and right: Max. 1.2 sec
		High speed — Left [Forward sec] [Reverse sec]			
		Low speed — Right [Forward sec] [Reverse sec]			40 ± 2 sec/2 turns Difference between left and right: Max. 1.2 sec
		Low speed — Left [Forward sec] [Reverse sec]			
					120 ± 3 mm (When charging HIC circuit) 
		Amount of extension of hydraulic idler cushion cylinder [Right mm]			
		[Left mm]			
		Track tension [Right mm] [Left mm]			

Note: All judgement standard values for speeds are the values in H mode.

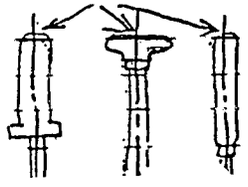
Category	Revision	Check item	Local assembly time	After hours of operation	Judgement standard
Work equipment performance		Work equipement operation running in: Engine midrange speed, all cylinders full stroke 3 times (Note: Boom cylinder to ground level)			
		Pressurized; each port relief 2 minutes, shock 20 times (except BOOM LOWER).			
		Work equipment posture: (When operating boom • Bucket cylinder fully retracted. • Arm cylinder fully retracted. • Bucket teeth at ground level) (When operating arm • Top surface of boom horizontal with ground level. • Bucket cylinder fully retracted.) (When operating bucket • Top surface of boom horizontal with ground level. • Arm cylinder fully retracted.)			
		Work equipment speed — Boom [RAISE sec] [LOWER sec]			RAISE: 6.0 ± 0.6 sec. LOWER: 4.5 ± 0.5 sec.
		Arm [IN sec] [OUT sec]			IN : 5.0 ± 0.5 spec. OUT : 3.8 ± 0.5 sec. (STD) 4.0 ± 0.5 sec. (SE, SP spec.)
		Bucket [CURL sec] [DUMP sec]			CURL : 3.6 ± 0.4 sec. (STD) 4.2 ± 0.4 sec. (SE, SP spec.) DUMP : 3.5 ± 0.4 sec. (STD) 3.9 ± 0.4 sec. (SE, SP spec.)
		Work equipment time lag (Engine low idling) — Boom [LOWER sec] Only when there is considered to be abnormality.			Max. 2 sec.
		Arm [IN sec] Only when there is considered to be abnormality.			Max. 2 sec.
		Bucket [DUMP sec] Only when there is considered to be abnormality.			Max. 2 sec.
		Abnormal noise from pump, PTO			There must be no abnormality during operation under no load and during relief.
		Generation of heat by PTO			There must no abnormal generation of heat.
		Engine partial performance			There must be no hunting in BOOM RAISE at above 1000 rpm; there must be no stalling of engine.
		Fine control performance			Must operate smoothly.
		Operation when raising chassis			There must be no escape of boom, arm, or bucket.
		Abnormal noise, grating noise from work equipment			There must be none.
		Shock at end of cylinder stroke (Shock at end of stroke for BOOM RAISE and ARM OUT)			Cushion must be fully effective.
		Function of accumulator			30 seconds after engine is stopped, boom cylinder must move from fully extended position to ground level. (Arm at max. reach)

Category	Revision	Check item	Local assembly time		After hours of operation		Judgement standard
During operation		Check all parts					
		Operating force of control lever when each actuator is actuated.					· There must be no catching during operation. · Must return naturally to neutral.
		Feeling and noise of vibration in operator's cab					There must be none.
		Vibration noise from frame, guard, ladder					There must be none.
Around operator's cab		Movement of doors and windows					Must move smoothly.
		Door, window locks					Must lock securely.
		Adjustment of operator's seat					Must be possible to make all adjustments.
Undercarriage		Oil leakage					There must be none.
		(Idler, roller, sprocket, final drive gear case, motor, brake valve, reducing valve, HIC circuit, piping)					
		Interference at any part					There must be none.
		Looseness of track shoe bolt					There must be none.
		Contact of link tread					There must be no overlapping, separation, or missing or broken parts.
Around chassis		Oil leakage					There must be none.
		(Center swivel, pump, solenoid valve, relief valve, control valve, PPC valve, swing motor, brake valve, shuttle valve, swing machinery, hydraulic tank, piping)					
		Leakage of fuel					There must be none.
		[Fuel tank, engine, piping]					
		Leakage of water from engine cooling water system					There must be none.
		Leakage of oil from engine lubrication system					There must be none.
		Leakage of gas from engine gas system					There must be none.
		Movement of covers					Must move smoothly.
		Cover locks					Must lock securely.

Category	Revision	Check item	Local assembly time		After hours of operation		Judgement standard
Around chassis		Operation of grease pump					Must work smoothly.
		Looseness, insufficient insertion of electric wiring terminals					There must be none.
		Position for passing electrical wiring through					There must be a clearance of at least 10mm from any moving part or edge.
		Leakage of air from air system					There must be none.
		Interference at any part					There must be none.
Around work equipment		Oil leakage					There must be none.
		[Cylinder, piping, block, slow return]					
		Grease leakage from grease piping					There must be none.
		Interference of work equipment					There must be none.
		Looseness of work equipment piping clamps, play in piping					There must be none.
		Twisting of hydraulic hoses and operation of work equipment when turning over					There must be none.

Note: If the operation or function is defective, measure as necessary. All judgement standard values for speeds are the values in H mode.

Category	Revision	Check item	Local assembly time	After hours of operation	Judgement standard
Main measurement items		**1 Engine speed**			
		Low idling speed [rpm]			675 ± 50 rpm
		Full throttle [rpm]			1850 ± 50 rpm
		Speed at arm OUT relief [rpm]			Min. 1650 rpm
		Speed at bucket DUMP relief [rpm]			Min. 1700 rpm
		Speed at swing relief [rpm]			Min. 1750 rpm
		2 Radiator fan speed			
		Speed at engine rated speed [rpm]			950 ± 30 rpm at 1700 rpm 1107 ± 30 rpm at 1750 rpm (When radiator cap. up spec.)
		3 Oil pressure measurement (measure at pump outlet port)			
		Control valve main set pressure 4-spool valve [kg/cm²]			320 ± 10 kg/cm² — At engine full, arm OUT, relief
		Control valve main set pressure 5-spool valve [kg/cm²]			320 ± 10 kg/cm²
		Control valve main set pressure S valve [kg/cm²]			290 ± 10 kg/cm²
		Travel relief valve set pressure Right travel [kg/cm²]			295 ± 10 kg/cm² — Relieved on one side
		Travel relief valve set pressure Left travel [kg/cm²]			295 ± 10 kg/cm²
		Pilot relief valve set pressure [kg/cm²]			30^{+5}_{0} kg/cm² (At engine full, neutral)
		At neutral / Boom RAISE			
		NC valve output pressure (at top surface of NC valve) FF pump [kg/cm²] [kg/cm²]			Max. 4 kg/cm² — Engine full, at neutral — Min. 14kg/cm² — At engine full, boom RAISE operated
		NC valve output pressure (at top surface of NC vlave) FR pump [kg/cm²] [kg/cm²]			Max. 4 kg/cm² — Min. 14kg/cm²
		NC valve output pressure (at top surface of NC valve) S pump [kg/cm²] [kg/cm²]			Max. 4 kg/cm² — —
		Note: Measure the following J/S differential pressure only if the NC valve output pressure does not pass the test.			
		At neutral / At relief			
		J/S differential pressure (differential pressure at input and output ports of jet sensor) FF pump [kg/cm²] [kg/cm²]			20±1.5 kg/cm² — Engine full, at neutral — Max. 2kg/cm² — At engine full, arm OUT, swing relief
		J/S differential pressure (differential pressure at input and output ports of jet sensor) FR pump [kg/cm²] [kg/cm²]			20±1.5 kg/cm² — Max. 2kg/cm²
		J/S differential pressure (differential pressure at input and output ports of jet sensor) S pump [kg/cm²] [kg/cm²]			16.5±1.5 kg/cm² — Max. 2kg/cm²

Category	Revision	Check item	Local assembly time	After hours of operation	Judgement standard
Main measurement items		**4 Hydraulic drift of work equipment** (bucket unloaded, 50 ± 5°C)			
		Bucket tooth tip [mm]			Max. 700 mm/15 minutes
		Note: Measure the hydraulic drift of the following cylinders only if the hydraulic drift at the bucket tooth tip does not pass the test.			
		Boom cylinder [mm]			
		Arm cylinder [mm]			
		Bucket cylinder [mm]			
		5 Operating force, travel			
		Boom lever — Operating force [RAISE kg] [LOWER kg]			2.3±0.5 kg
		Boom lever — Stroke [RAISE mm] [LOWER mm] [PLAY mm]			Stroke: 64±8mm Play: Max. 6mm
		Swing lever — Operating force [RIGHT kg] [LEFT kg]			2.3±0.5 kg
		Swing lever — Stroke [RIGHT mm] [LEFT mm] [PLAY mm]			Stroke: 64±8mm Play: Max. 6mm
		Bucket lever — Operating force [CURL kg] [DUMP kg]			1.8±0.5 kg
		Bucket lever — Stroke [CURL mm] [DUMP mm] [PLAY mm]			Stroke: 64±8mm Play: Max. 6mm
		Arm lever — Operating force [IN kg] [OUT kg]			1.8±0.5 kg
		Arm lever — Stroke [IN mm] [OUT mm] [PLAY mm]			Stroke: 64±8mm Play: Max. 6mm
		Right travel lever — Operating force [FORWARD kg] [REVERSE kg]			2.3±0.5 kg
		Right travel lever — Stroke [FORWARD mm] [REVERSE mm] [PLAY mm]			Stroke: 132±10mm Play: Max. 20mm
		Left travel lever — Operating force [FORWARD kg] [REVERSE kg]			2.3±0.5 kg
		Left travel lever — Stroke [FORWARD mm] [REVERSE mm] [PLAY mm]			Stroke: 132±10mm Play: Max. 20mm
					Note: For export specifications, the arm and swing operations are reversed.
		Measure the travel of the lever at the center of the lever tip 			

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PROPOSAL FOR MANUAL REVISION

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PROPOSER		
	NAME OF COMPANY:	LOCATION: PHONE NO:
	DEPARTMENT:	DATE:
	NAME:	

MANUAL NAME:				
MANUAL NO:				
MACHINE MODEL: S/N IF APPLICABLE:				

PAGE NO:

PROBLEM:

Attach photo or sketch.
If more space is needed, use another sheet.

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CORRECTIVE ACTION: