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1. STRUCTURE

This service manual has been prepared as an aid to improve the quality of repairs by giving the serviceman an accurate understanding of the product and by showing him the correct way to perform repairs and make judgements. Make sure you understand the contents of this manual and use it to full effect at every opportunity.

This service manual mainly contains the necessary technical information for operations performed in a service workshop.

For ease of understanding, the manual is divided into the following sections.

SECTION 1 GENERAL

This section explains the safety hints and gives the specification of the machine and major components.

SECTION 2 STRUCTURE AND FUNCTION

This section explains the structure and function of each component. It serves not only to give an understanding of the structure, but also serves as reference material for troubleshooting.

SECTION 3 HYDRAULIC SYSTEM

This section explains the hydraulic circuit, single and combined operation.

SECTION 4 ELECTRICAL SYSTEM

This section explains the electrical circuit, monitoring system and each component. It serves not only to give an understanding electrical system, but also serves as reference material for trouble shooting.

SECTION 5 TROUBLESHOOTING

This section explains the troubleshooting charts correlating problems to causes.

SECTION 6 MAINTENANCE STANDARD

This section gives the judgement standards when inspecting disassembled parts.

SECTION 7 DISASSEMBLY AND ASSEMBLY

This section explains the order to be followed when removing, installing, disassembling or assembling each component, as well as precautions to be taken for these operations.

SECTION 8 COMPONENT MOUNTING TORQUE

This section shows bolt specifications and standard torque values needed when mounting components to the machine.

The specifications contained in this shop manual are subject to change at any time and without any advance notice. Contact your HYUNDAI distributor for the latest information.

2. HOW TO READ THE SERVICE MANUAL

Distribution and updating

Any additions, amendments or other changes will be sent to HYUNDAI distributors.
Get the most up-to-date information before you start any work.

Filing method

1. See the page number on the bottom of the page.
   File the pages in correct order.
2. Following examples shows how to read the page number.
   Example 1
   2 - 3
   - Item number (2. Structure and Function)
   - Consecutive page number for each item.
3. Additional pages : Additional pages are indicated by a hyphen(-) and number after the page number. File as in the example.
   10 - 4
   10 - 4 - 1
   10 - 4 - 2 } Added pages
   10 - 5

Revised edition mark (①②③···)

When a manual is revised, an edition mark is recorded on the bottom outside corner of the pages.

Revisions

Revised pages are shown at the list of revised pages on the between the contents page and section 1 page.

Symbols

So that the shop manual can be of ample practical use, important places for safety and quality are marked with the following symbols.

Symbol	Item	Remarks
	Safety	Special safety precautions are necessary when performing the work.
		Extra special safety precautions are necessary when performing the work because it is under internal pressure.
※	Caution	Special technical precautions or other precautions for preserving standards are necessary when performing the work.

3. CONVERSION TABLE

Method of using the Conversion Table
The Conversion Table in this section is provided to enable simple conversion of figures. For details of the method of using the Conversion Table, see the example given below.

Example

1. **Method of using the Conversion Table to convert from millimeters to inches**
   Convert 55mm into inches.
   (1) Locate the number 50in the vertical column at the left side, take this as ⓐ, then draw a horizontal line from ⓐ.
   (2) Locate the number 5 in the row across the top, take this as ⓑ, then draw a perpendicular line down from ⓑ.
   (3) Take the point where the two lines cross as ⓒ. This point ⓒ gives the value when converting from millimeters to inches. Therefore, 55 mm = 2.165 inches.

2. Convert 550mm into inches.
   (1) The number 550 does not appear in the table, so divide by 10(Move the decimal point one place to the left) to convert it to 55 mm.
   (2) Carry out the same procedure as above to convert 55 mm to 2.165 inches.
   (3) The original value (550 mm) was divided by 10, so multiply 2.165 inches by 10 (Move the decimal point one place to the right) to return to the original value.
   This gives 550 mm = 21.65 inches.

Millimeters to inches

ⓑ

1 mm = 0.03937 in

	0	1	2	3	4	5	6	7	8	9
0		0.039	0.079	0.118	0.157	0.197	0.236	0.276	0.315	0.354
10	0.394	0.433	0.472	0.512	0.551	0.591	0.630	0.669	0.709	0.748
20	0.787	0.827	0.866	0.906	0.945	0.984	1.024	1.063	1.102	1.142
30	1.181	1.220	1.260	1.299	1.339	1.378	1.417	1.457	1.496	1.536
40	1.575	1.614	1.654	1.693	1.732	1.772	1.811	1.850	1.890	1.929
ⓐ 50	1.969	2.008	2.047	2.087	2.126	ⓒ 2.165	2.205	2.244	2.283	2.323
60	2.362	2.402	2.441	2.480	2.520	2.559	2.598	2.638	2.677	2.717
70	2.756	2.795	2.835	2.874	2.913	2.953	2.992	3.032	3.071	3.110
80	3.150	3.189	3.228	3.268	3.307	3.346	3.386	3.425	3.465	3.504
90	3.543	3.583	3.622	3.661	3.701	3.740	3.780	3.819	3.858	3.898

Millimeters to inches

1 mm = 0.03937 in

	0	1	2	3	4	5	6	7	8	9
0		0.039	0.079	0.118	0.157	0.197	0.236	0.276	0.315	0.354
10	0.394	0.433	0.472	0.512	0.551	0.591	0.630	0.669	0.709	0.748
20	0.787	0.827	0.866	0.906	0.945	0.984	1.024	1.063	1.102	1.142
30	1.181	1.220	1.260	1.299	1.339	1.378	1.417	1.457	1.496	1.536
40	1.575	1.614	1.654	1.693	1.732	1.772	1.811	1.850	1.890	1.929
50	1.969	2.008	2.047	2.087	2.126	2.165	2.205	2.244	2.283	2.323
60	2.362	2.402	2.441	2.480	2.520	2.559	2.598	2.638	2.677	2.717
70	2.756	2.795	2.835	2.874	2.913	2.953	2.992	3.032	3.071	3.110
80	3.150	3.189	3.228	3.268	3.307	3.346	3.386	3.425	3.465	3.504
90	3.543	3.583	3.622	3.661	3.701	3.740	3.780	3.819	3.858	3.898

Kilogram to Pound

1 kg = 2.2046 lb

	0	1	2	3	4	5	6	7	8	9
0		2.20	4.41	6.61	8.82	11.02	13.23	15.43	17.64	19.84
10	22.05	24.25	26.46	28.66	30.86	33.07	35.27	37.48	39.68	41.89
20	44.09	46.30	48.50	50.71	51.91	55.12	57.32	59.5.	61.73	63.93
30	66.14	68.34	70.55	72.75	74.96	77.16	79.37	81.57	83.78	85.98
40	88.18	90.39	92.59	94.80	97.00	99.21	101.41	103.62	105.82	108.03
50	110.23	112.44	114.64	116.85	119.05	121.25	123.46	125.66	127.87	130.07
60	132.28	134.48	136.69	138.89	141.10	143.30	145.51	147.71	149.91	152.12
70	154.32	156.53	158.73	160.94	163.14	165.35	167.55	169.76	171.96	174.17
80	176.37	178.57	180.78	182.98	185.19	187.39	189.60	191.80	194.01	196.21
90	198.42	200.62	202.83	205.03	207.24	209.44	211.64	213.85	216.05	218.26

Liter to U.S. Gallon

1 ℓ = 0.2642 U.S.Gal

	0	1	2	3	4	5	6	7	8	9
0		0.264	0.528	0.793	1.057	1.321	1.585	1.849	2.113	2.378
10	2.642	2.906	3.170	3.434	3.698	3.963	4.227	4.491	4.755	5.019
20	5.283	5.548	5.812	6.6076	6.340	6.604	6.869	7.133	7.397	7.661
30	7.925	8.189	8.454	8.718	8.982	9.246	9.510	9.774	10.039	10.303
40	10.567	10.831	11.095	11.359	11.624	11.888	12.152	12.416	12.680	12.944
50	13.209	13.473	13.737	14.001	14.265	14.529	14.795	15.058	15.322	15.586
60	15.850	16.115	16.379	16.643	16.907	17.171	17.435	17.700	17.964	18.228
70	18.492	18.756	19.020	19.285	19.549	19.813	20.077	20.341	20.605	20.870
80	21.134	21.398	21.662	21.926	22.190	22.455	22.719	22.983	23.247	23.511
90	23.775	24.040	24.304	24.568	24.832	25.096	25.631	25.625	25.889	26.153

Liter to U.K. Gallon

1 ℓ = 0.21997 U.K.Gal

	0	1	2	3	4	5	6	7	8	9
0		0.220	0.440	0.660	0.880	1.100	1.320	1.540	1.760	1.980
10	2.200	2.420	2.640	2.860	3.080	3.300	3.520	3.740	3.950	4.179
20	4.399	4.619	4.839	5.059	5.279	5.499	5.719	5.939	6.159	6.379
30	6.599	6.819	7.039	7.259	7.479	7.969	7.919	8.139	8.359	8.579
40	8.799	9.019	9.239	9.459	9.679	9.899	10.119	10.339	10.559	10.778
50	10.998	11.281	11.438	11.658	11.878	12.098	12.318	12.528	12.758	12.978
60	13.198	13.418	13.638	13.858	14.078	14.298	14.518	14.738	14.958	15.178
70	15.398	15.618	15.838	16.058	16.278	16.498	16.718	16.938	17.158	17.378
80	17.598	17.818	18.037	18.257	18.477	18.697	18.917	19.137	19.357	19.577
90	19.797	20.017	20.237	20.457	20.677	20.897	21.117	21.337	21.557	21.777

kgf · m to lbf · ft

1 kgf · m = 7.233 lbf · ft

	0	1	2	3	4	5	6	7	8	9
		7.2	14.5	21.7	28.9	36.2	43.4	50.6	57.9	65.1
10	72.3	79.6	86.8	94.0	101.3	108.5	115.7	123.0	130.2	137.4
20	144.7	151.9	159.1	166.4	173.6	180.8	188.1	195.3	202.5	209.8
30	217.0	224.2	231.5	238.7	245.9	253.2	260.4	267.6	274.9	282.1
40	289.3	396.6	303.8	311.0	318.3	325.5	332.7	340.0	347.2	354.4
50	361.7	368.9	376.1	383.4	390.6	397.8	405.1	412.3	419.5	426.8
60	434.0	441.2	448.5	455.7	462.9	470.2	477.4	484.6	491.8	499.1
70	506.3	513.5	520.8	528.0	535.2	542.5	549.7	556.9	564.2	571.4
80	578.6	585.9	593.1	600.3	607.6	614.8	622.0	629.3	636.5	643.7
90	651.0	658.2	665.4	672.7	679.9	687.1	694.4	701.6	708.8	716.1
100	723.3	730.5	737.8	745.0	752.2	759.5	766.7	773.9	781.2	788.4
110	795.6	802.9	810.1	817.3	824.6	831.8	839.0	846.3	853.5	860.7
120	868.0	875.2	882.4	889.7	896.9	904.1	911.4	918.6	925.8	933.1
130	940.3	947.5	954.8	962.0	969.2	976.5	983.7	990.9	998.2	10005.4
140	1012.6	1019.9	1027.1	1034.3	1041.5	1048.8	1056.0	1063.2	1070.5	1077.7
150	1084.9	1092.2	1099.4	1106.6	1113.9	1121.1	1128.3	1135.6	1142.8	1150.0
160	1157.3	1164.5	1171.7	1179.0	1186.2	1193.4	1200.7	1207.9	1215.1	1222.4
170	1129.6	1236.8	1244.1	1251.3	1258.5	1265.8	1273.0	1280.1	1287.5	1294.7
180	1301.9	1309.2	1316.4	1323.6	1330.9	1338.1	1345.3	1352.6	1359.8	1367.0
190	1374.3	1381.5	1388.7	1396.0	1403.2	1410.4	1417.7	1424.9	1432.1	1439.4

kgf/cm² to lbf/in²

1 kgf / cm² = 14.2233 lbf / in²

	0	1	2	3	4	5	6	7	8	9
		14.2	28.4	42.7	56.9	71.1	85.3	99.6	113.8	128.0
10	142.2	156.5	170.7	184.9	199.1	213.4	227.6	241.8	256.0	270.2
20	284.5	298.7	312.9	327.1	341.4	355.6	369.8	384.0	398.3	412.5
30	426.7	440.9	455.1	469.4	483.6	497.8	512.0	526.3	540.5	554.7
40	568.9	583.2	597.4	611.6	625.8	640.1	654.3	668.5	682.7	696.9
50	711.2	725.4	739.6	753.8	768.1	782.3	796.5	810.7	825.0	839.2
60	853.4	867.6	881.8	896.1	910.3	924.5	938.7	953.0	967.2	981.4
70	995.6	1010	1024	1038	1053	1067	1081	1095	1109	1124
80	1138	1152	1166	1181	1195	1209	1223	1237	1252	1266
90	1280	1294	1309	1323	1337	1351	1365	1380	1394	1408
100	1422	1437	1451	1465	1479	1493	1508	1522	1536	1550
110	1565	1579	1593	1607	1621	1636	1650	1664	1678	1693
120	1707	1721	1735	1749	1764	1778	1792	1806	1821	1835
130	1849	2863	1877	1892	1906	1920	1934	1949	1963	1977
140	1991	2005	2020	2034	2048	2062	2077	2091	2105	2119
150	2134	2148	2162	2176	2190	2205	2219	2233	2247	2262
160	2276	2290	2304	2318	2333	2347	2361	2375	2389	2404
170	2418	2432	2446	2460	2475	2489	2503	2518	2532	2546
180	2560	2574	2589	5603	2617	2631	2646	2660	2674	2688
200	2845	2859	2873	2887	2901	2916	2930	2944	2958	2973
210	2987	3001	3015	3030	3044	3058	3072	3086	3101	3115
220	3129	3143	3158	3172	3186	3200	3214	3229	3243	3257
230	3271	3286	3300	3314	3328	3343	3357	3371	3385	3399
240	3414	3428	3442	3456	3470	3485	3499	3513	3527	3542

TEMPERATURE

Fahrenheit-Centigrade Conversion.

A simple way to convert a fahrenheit temperature reading into a centigrade temperature reading or vice verse is to enter the accompanying table in the center or boldface column of figures.

These figures refer to the temperature in either Fahrenheit or Centigrade degrees.

If it is desired to convert from Fahrenheit to Centigrade degrees, consider the center column as a table of Fahrenheit temperatures and read the corresponding Centigrade temperature in the column at the left.

If it is desired to convert from Centigrade to Fahrenheit degrees, consider the center column as a table of Centigrade values, and read the corresponding Fahrenheit temperature on the right.

˚C		˚F	˚C		˚F	˚C		˚F	˚C		˚F
-40.4	-40	-40.0	-11.7	11	51.8	7.8	46	114.8	27.2	81	117.8
-37.2	-35	-31.0	-11.1	12	53.6	8.3	47	116.6	27.8	82	179.6
-34.4	-30	-22.0	-10.6	13	55.4	8.9	48	118.4	28.3	83	181.4
-31.7	-25	-13.0	-10.0	14	57.2	9.4	49	120.2	28.9	84	183.2
-28.9	-20	-4.0	-9.4	15	59.0	10.0	50	122.0	29.4	85	185.0
-28.3	-19	-2.2	-8.9	16	60.8	10.6	51	123.8	30.0	86	186.8
-27.8	-18	-0.4	-8.3	17	62.6	11.1	52	125.6	30.6	87	188.6
-27.2	-17	1.4	-7.8	18	64.4	11.7	53	127.4	31.1	88	190.4
-26.7	-16	3.2	-6.7	20	68.0	12.8	55	131.0	32.2	90	194.0
-26.1	-15	5.0	-6.7	20	68.0	12.8	55	131.0	32.2	90	194.0
-25.6	-14	6.8	-6.1	21	69.8	13.3	56	132.8	32.8	91	195.8
-25.0	-13	8.6	-5.6	22	71.6	13.9	57	134.6	33.3	92	197.6
-24.4	-12	10.4	-5.0	23	73.4	14.4	58	136.4	33.9	93	199.4
-23.9	-11	12.2	-4.4	24	75.2	15.0	59	138.2	34.4	94	201.2
-23.3	-10	14.0	-3.9	25	77.0	15.6	60	140.0	35.0	95	203.0
-22.8	-9	15.8	-3.3	26	78.8	16.1	61	141.8	35.6	96	204.8
-22.2	-8	17.6	-2.8	27	80.6	16.7	62	143.6	36.1	97	206.6
-21.7	-7	19.4	-2.2	28	82.4	17.2	63	145.4	36.7	98	208.4
-21.1	-6	21.2	-1.7	29	84.2	17.8	64	147.2	37.2	99	210.2
-20.6	-5	23.0	-1.1	35	95.0	21.1	70	158.0	51.7	125	257.0
-20.0	-4	24.8	-0.6	31	87.8	18.9	66	150.8	40.6	105	221.0
-19.4	-3	26.6	0	32	89.6	19.4	67	152.6	43.3	110	230.0
-18.9	-2	28.4	0.6	33	91.4	20.0	68	154.4	46.1	115	239.0
-18.3	-1	30.2	1.1	34	93.2	20.6	69	156.2	48.9	120	248.0
-17.8	0	32.0	1.7	35	95.0	21.1	70	158.0	51.7	125	257.0
-17.2	1	33.8	2.2	36	96.8	21.7	71	159.8	54.4	130	266.0
-16.7	2	35.6	2.8	37	98.6	22.2	72	161.6	57.2	135	275.0
-16.1	3	37.4	3.3	38	100.4	22.8	73	163.4	60.0	140	284.0
-15.6	4	39.2	3.9	39	102.2	23.3	74	165.2	62.7	145	293.0
-15.0	5	41.0	4.4	40	104.0	23.9	75	167.0	65.6	150	302.0
-14.4	6	42.8	5.0	41	105.8	24.4	76	168.8	68.3	155	311.0
-13.9	7	44.6	5.6	42	107.6	25.0	77	170.6	71.1	160	320.0
-13.3	8	46.4	6.1	43	109.4	25.6	78	172.4	73.9	165	329.0
-12.8	9	48.2	6.7	44	111.2	26.1	79	174.2	76.7	170	338.0
-12.2	10	50.0	7.2	45	113.0	26.7	80	176.0	79.4	172	347.0

SECTION 1 GENERAL

SECTION 1 GENERAL

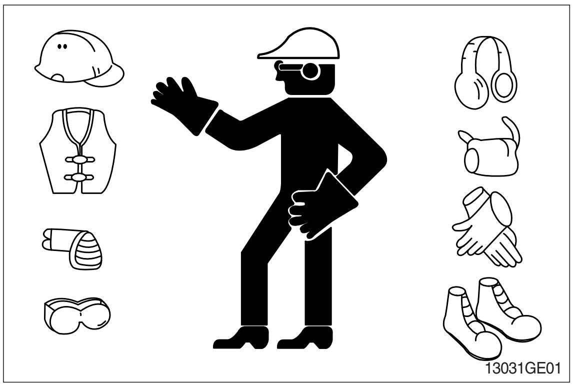
GROUP 1 SAFETY

FOLLOW SAFE PROCEDURE

Unsafe work practices are dangerous. Understand service procedure before doing work; Do not attempt shortcuts.

WEAR PROTECTIVE CLOTHING

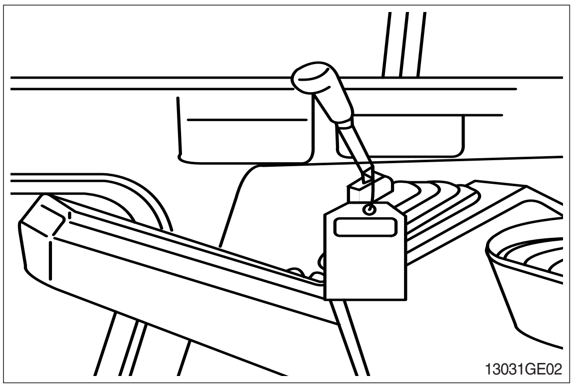
Wear close fitting clothing and safety equipment appropriate to the job.



13031GE01

WARN OTHERS OF SERVICE WORK

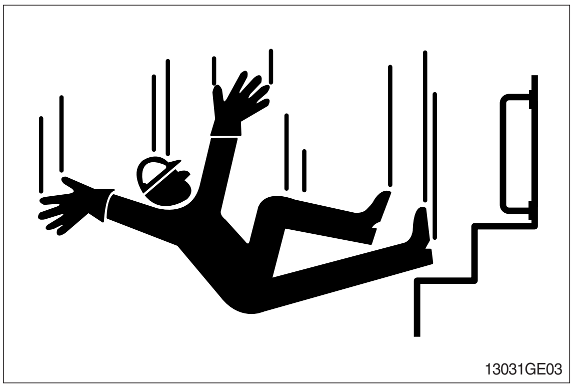
Unexpected machine movement can cause serious injury.
Before performing any work on the excavator, attach a「**Do Not Operate**」tag on the right side control lever.



13031GE02

USE HANDHOLDS AND STEPS

Falling is one of the major causes of personal injury.
When you get on and off the machine, always maintain a three point contact with the steps and handrails and face the machine. Do not use any controls as handholds.
Never jump on or off the machine. Never mount or dismount a moving machine.
Be careful of slippery conditions on platforms, steps, and handrails when leaving the machine.



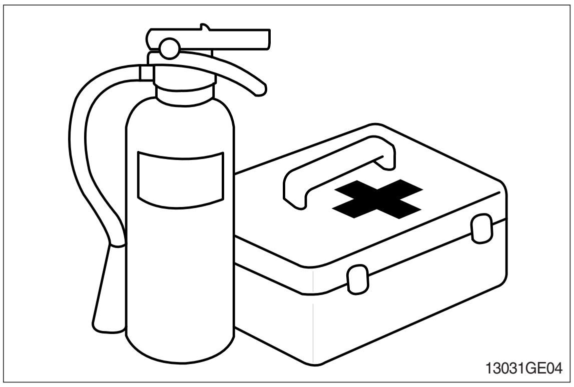
13031GE03

PREPARE FOR EMERGENCIES

Be prepared if a fire starts.

Keep a first aid kit and fire extinguisher handy.

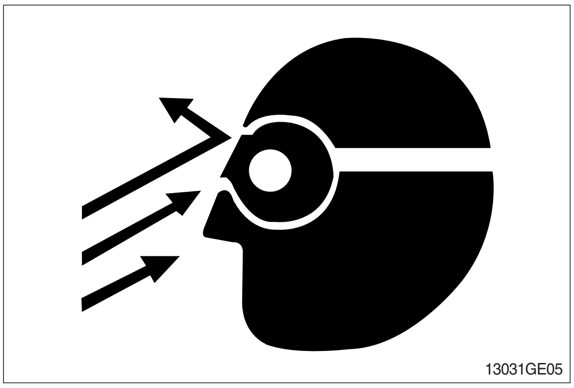
Keep emergency numbers for doctors, ambulance service, hospital, and fire department near your telephone.



13031GE04

PROTECT AGAINST FLYING DEBRIS

Guard against injury from flying pieces of metal or debris; Wear goggles or safety glasses.

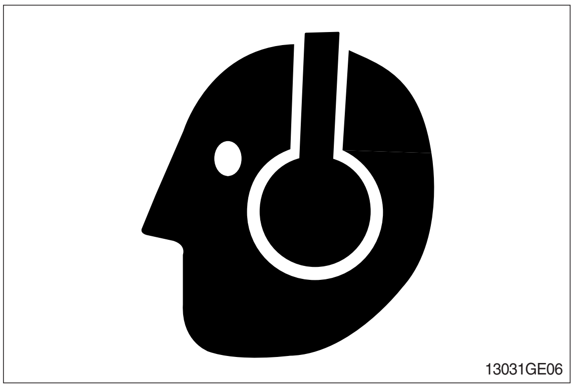


13031GE05

PROTECT AGAINST NOISE

Prolonged exposure to loud noise can cause impairment or loss of hearing.

Wear a suitable hearing protective device such as earmuffs or earplugs to protect against objectionable or uncomfortable loud noises.

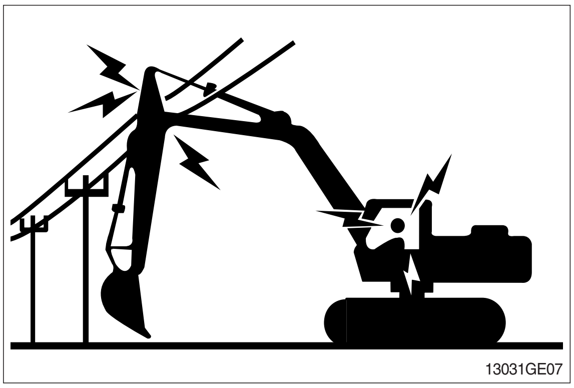


13031GE06

AVOID POWER LINES

Serious injury or death can result from contact with electric lines.

Never move any part of the machine or load closer to electric line than 3m(10ft) plus twice the line insulator length.

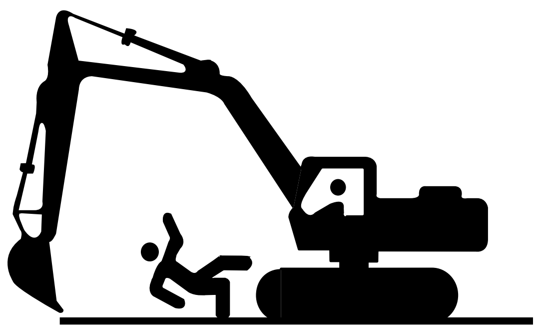


13031GE07

KEEP RIDERS OFF EXCAVATOR

Only allow the operator on the excavator. Keep riders off.

Riders on excavator are subject to injury such as being struck by foreign objects and being thrown off the excavator. Riders also obstruct the operator's view resulting in the excavator being operated in an unsafe manner.

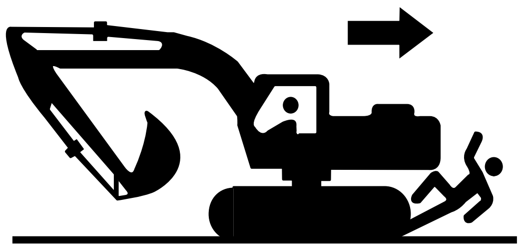

13031GE08

MOVE AND OPERATE MACHINE SAFELY

Bystanders can be run over. Know the location of bystanders before moving, swinging, or operating the machine.

Always keep the travel alarm in working condition. It warns people when the excavator starts to move.

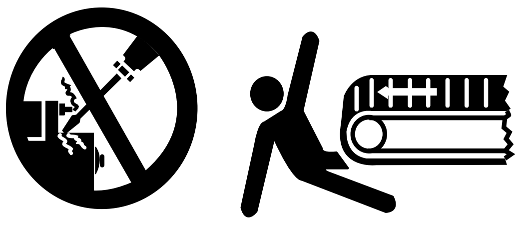
Use a signal person when moving, swinging, or operating the machine in congested areas. Coordinate hand signals before starting the excavator.


13031GE09

OPERATE ONLY FORM OPERATOR'S SEAT

Avoid possible injury machine damage. Do not start engine by shorting across starter terminals.

NEVER start engine while standing on ground. Start engine only from operator's seat.


13031GE26

PARK MACHINE SAFELY

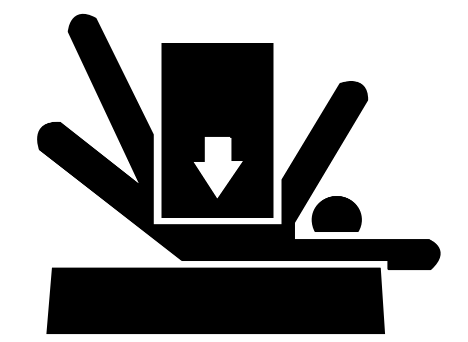
Before working on the machine:

· Park machine on a level surface.
· Lower bucket to the ground.
· Turn auto idle switch off.
· Run engine at 1/2 speed without load for 2 minutes.
· Turn key switch to OFF to stop engine.
  Remove key from switch.
· Move pilot control shutoff lever to locked position.
· Allow engine to cool.

SUPPORT MACHINE PROPERLY

Always lower the attachment or implement to the ground before you work on the machine. If you must work on a lifted machine or attachment, securely support the machine or attachment.

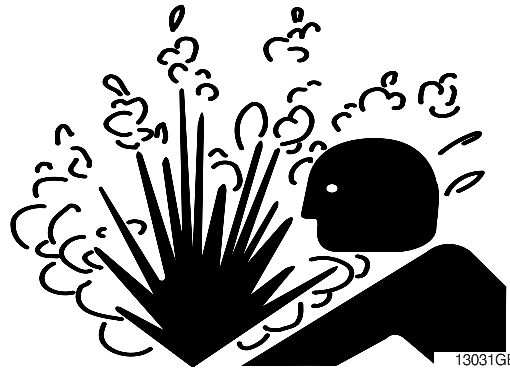
Do not support the machine on cinder blocks, hollow tiles, or props that may crumble under continuous load.
Do not work under a machine that is supported solely by a jack. Follow recommended procedures in this manual.


13031GE10

SERVICE COOLING SYSTEM SAFELY

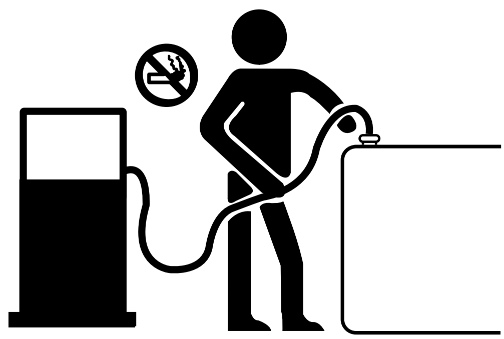
Explosive release of fluids from pressurized cooling system can cause serious burns.

Shut off engine. Only remove filler cap when cool enough to touch with bare hands.


13031GE11

HANDLE FLUIDS SAFELY-AVOID FIRES

Handle fuel with care; It is highly flammable. Do not refuel the machine while smoking or when near open flame or sparks. Always stop engine before refueling machine.
Fill fuel tank outdoors.


13031GE12

Store flammable fluids away from fire hazards. Do not incinerate or puncture pressurized containers.

Make sure machine is clean of trash, grease, and debris.

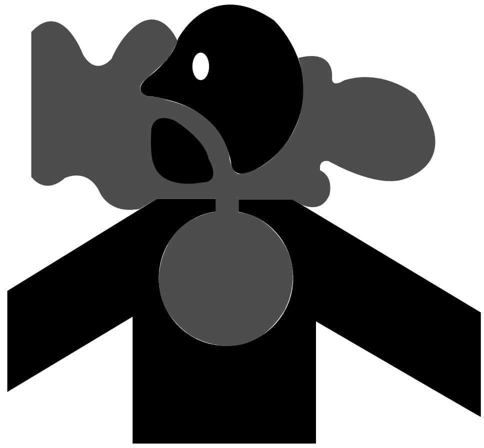
Do not store oily rags; They can ignite and burn spontaneously.


13031GE13

BEWARE OF EXHAUST FUMES

Prevent asphyxiation. Engine exhaust fumes can cause sickness or death.

If you must operate in a building, be positive there is adequate ventilation. Either use an exhaust pipe extension to remove the exhaust fumes or open doors and windows to bring enough outside air into the area.



13031GE14

REMOVE PAINT BEFORE WELDING OR HEATING

Avoid potentially toxic fumes and dust.

Hazardous fumes can be generated when paint is heated by welding, soldering, or using a torch.

Do all work outside or in a well ventilated area. Dispose of paint and solvent properly.

Remove paint before welding or heating:

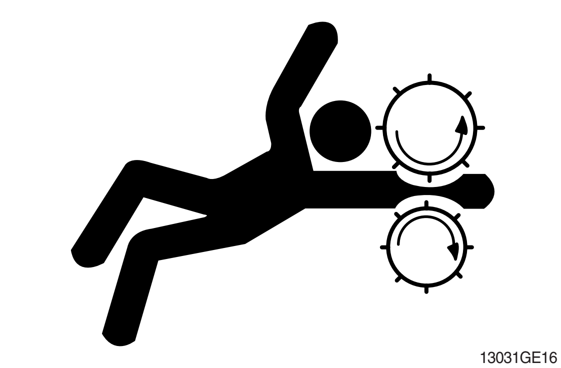
· If you sand or grind paint, avoid breathing the dust. Wear an approved respirator.

· If you use solvent or paint stripper, remove stripper with soap and water before welding. Remove solvent or paint stripper containers and other flammable material from area. Allow fumes to disperse at least 15 minutes before welding or heating.

ILLUMINATE WORK AREA SAFELY

Illuminate your work area adequately but safely. Use a portable safety light for working inside or under the machine. Make sure the bulb is enclosed by a wire cage. The hot filament of an accidentally broken bulb can ignite spilled fuel or oil.

13031GE15

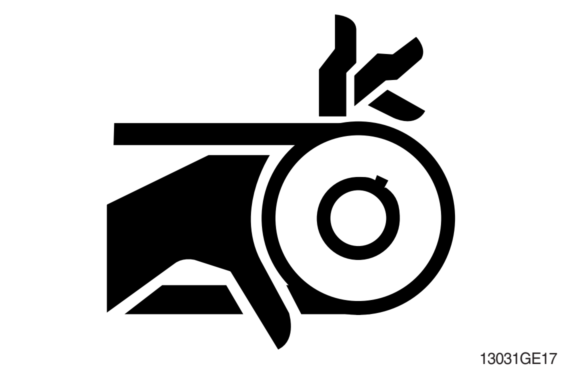


13031GE16

STAY CLEAR OF MOVING PARTS

Entanglements in moving parts can cause serious injury.

To prevent accidents, use care when working around rotating parts.



13031GE17

AVOID HIGH PRESSURE FLUIDS

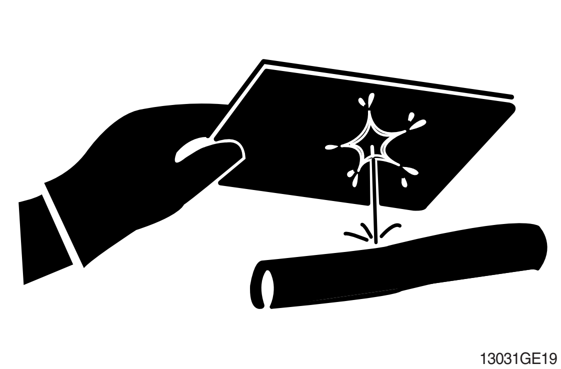
Escaping fluid under pressure can penetrate the skin causing serious injury.

Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure.

Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.

If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.

13031GE18



13031GE19

AVOID HEATING NEAR PRESSURIZED FLUID LINES

Flammable spray can be generated by heating near pressurized fluid lines, resulting in severe burns to yourself and bystanders. Do not heat by welding, soldering, or using a torch near pressurized fluid lines or other flammable materials.

Pressurized lines can be accidentally cut when heat goes beyond the immediate flame area. Install fire resisting guards to protect hoses or other materials.

13031GE20

PREVENT BATTERY EXPLOSIONS

Keep sparks, lighted matches, and flame away from the top of battery. Battery gas can explode.

Never check battery charge by placing a metal object across the posts. Use a volt-meter or hydrometer.

Do not charge a frozen battery; It may explode. Warm battery to 16°C (60°F).

13031GE21

PREVENT ACID BURNS

Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skin, eat holes in clothing, and cause blindness if splashed into eyes.

Avoid the hazard by:

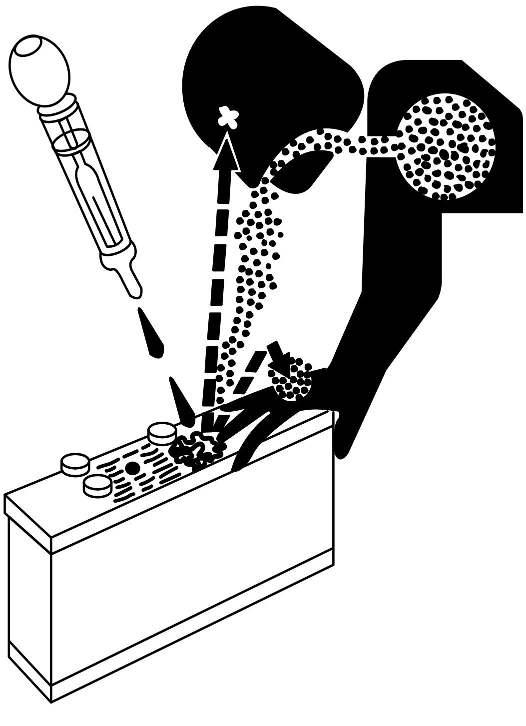
1. Filling batteries in a well-ventilated area.
2. Wearing eye protection and rubber gloves.
3. Avoiding breathing fumes when electrolyte is added.
4. Avoiding spilling of dripping electrolyte.
5. Use proper jump start procedure.

If you spill acid on yourself:

1. Flush your skin with water.
2. Apply baking soda or lime to help neutralize the acid.
3. Flush your eyes with water for 10-15 minutes. Get medical attention immediately.

If acid is swallowed:

1. Drink large amounts of water or milk.
2. Then drink milk of magnesia, beaten eggs, or vegetable oil.
3. Get medical attention immediately.



13031GE22

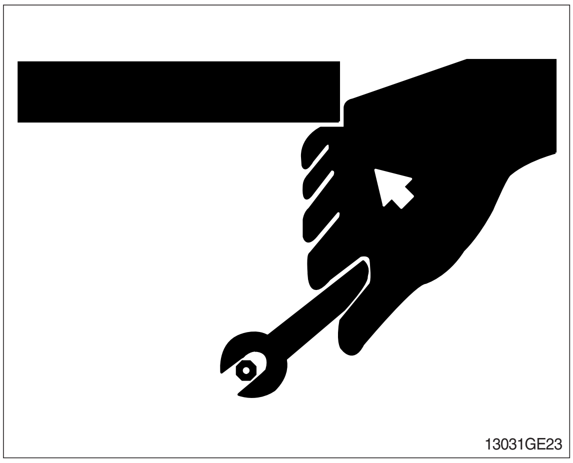
USE TOOLS PROPERLY

Use tools appropriate to the work. Makeshift tools, parts, and procedures can create safety hazards.

Use power tools only to loosen threaded tools and fasteners.

For loosening and tightening hardware, use the correct size tools. DO NOT use U.S. measurement tools on metric fasteners. Avoid bodily injury caused by slipping wrenches.

Use only recommended replacement parts. (See Parts catalogue.)



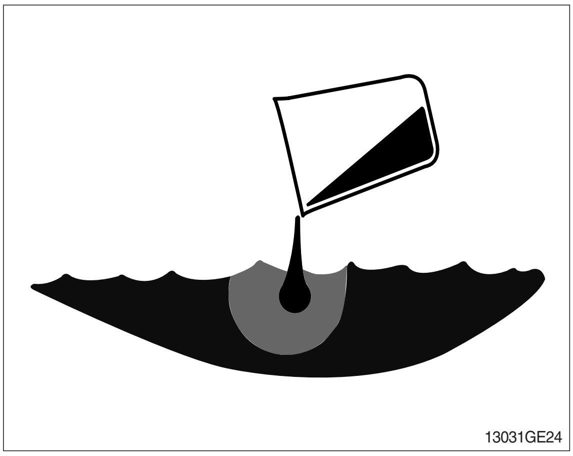
13031GE23

DISPOSE OF FLUIDS PROPERLY

Improperly disposing of fluids can harm the environment and ecology. Before draining any fluids, find out the proper way to dispose of waste from your local environmental agency.

Use proper containers when draining fluids. Do not use food or beverage containers that may mislead someone into drinking from them.

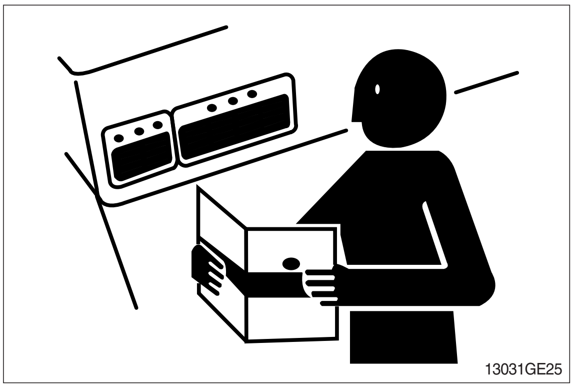
DO NOT pour oil into the ground, down a drain, or into a stream, pond, or lake. Observe relevant environmental protection regulations when disposing of oil, fuel, coolant, brake fluid, filters, batteries, and other harmful waste.



13031GE24

REPLACE SAFETY SIGNS

Replace missing or damaged safety signs. See the machine operator's manual for correct safety sign placement.



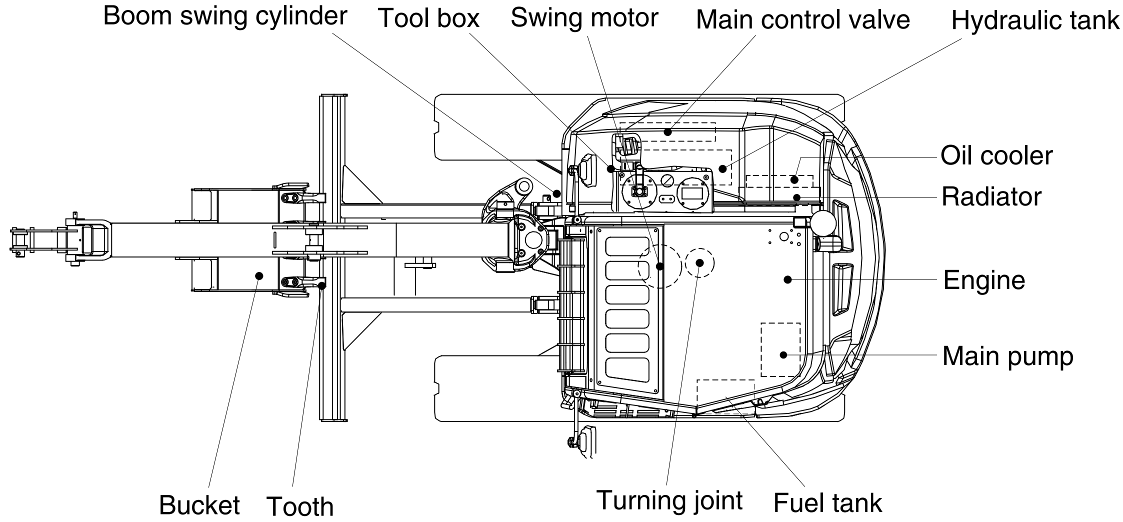
13031GE25

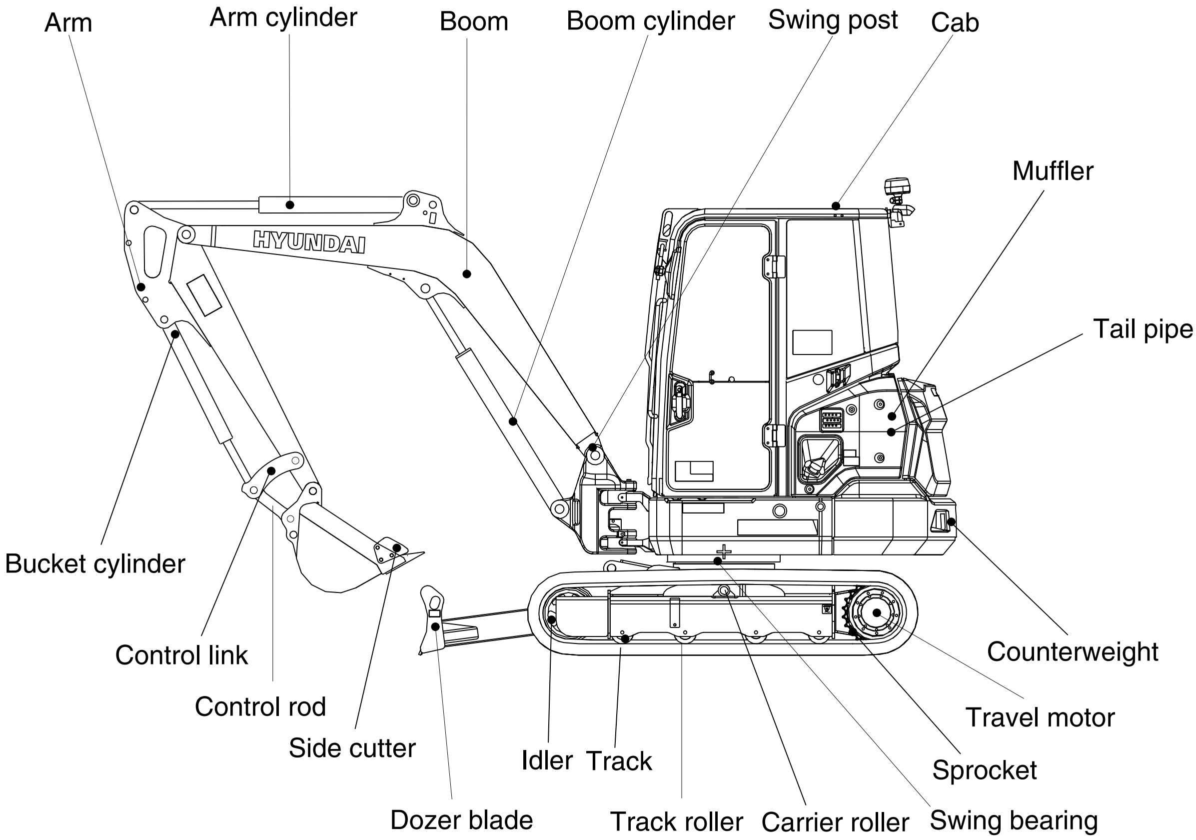
LIVE WITH SAFETY

Before returning machine to customer, make sure machine is functioning properly, especially the safety systems. Install all guards and shields.

GROUP 2 SPECIFICATIONS

1. MAJOR COMPONENT



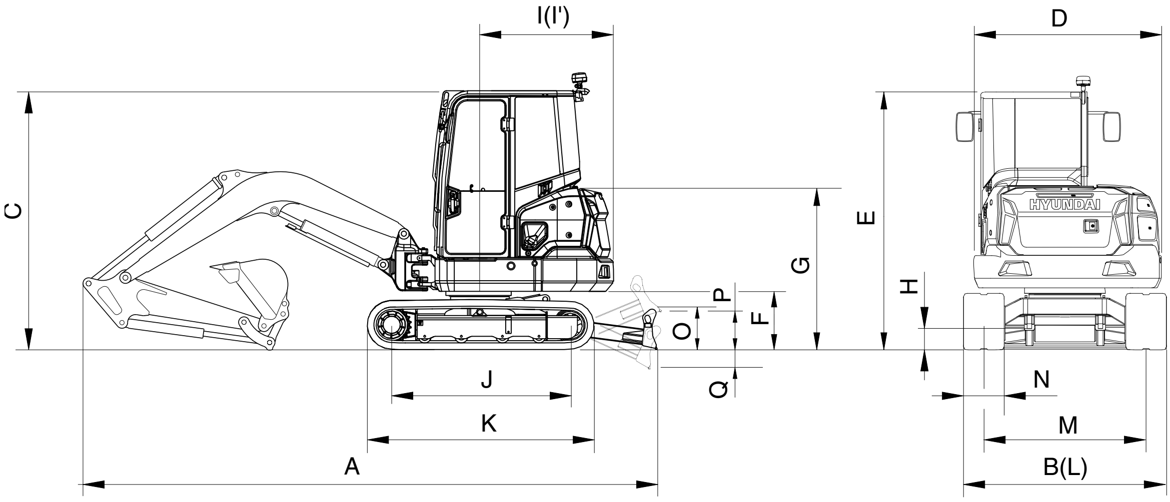


40AZ2SP01

2. SPECIFICATIONS

1) CAB TYPE

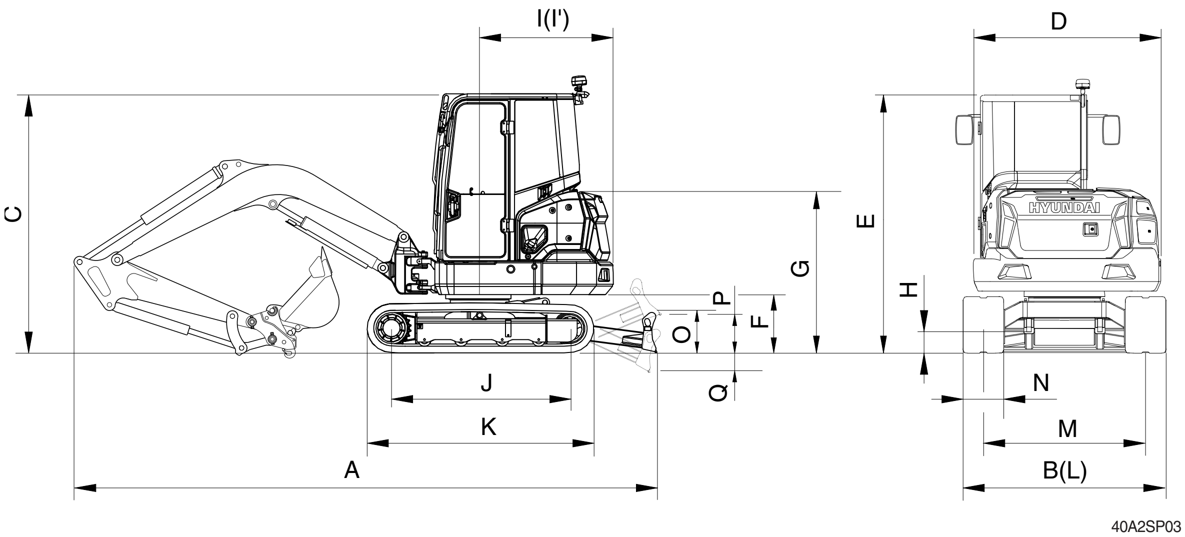
(1) 2.6 m (8' 6") boom, 1.6 m (5' 3") thumb bracket arm, rubber track, without quick coupler



40A2SP02

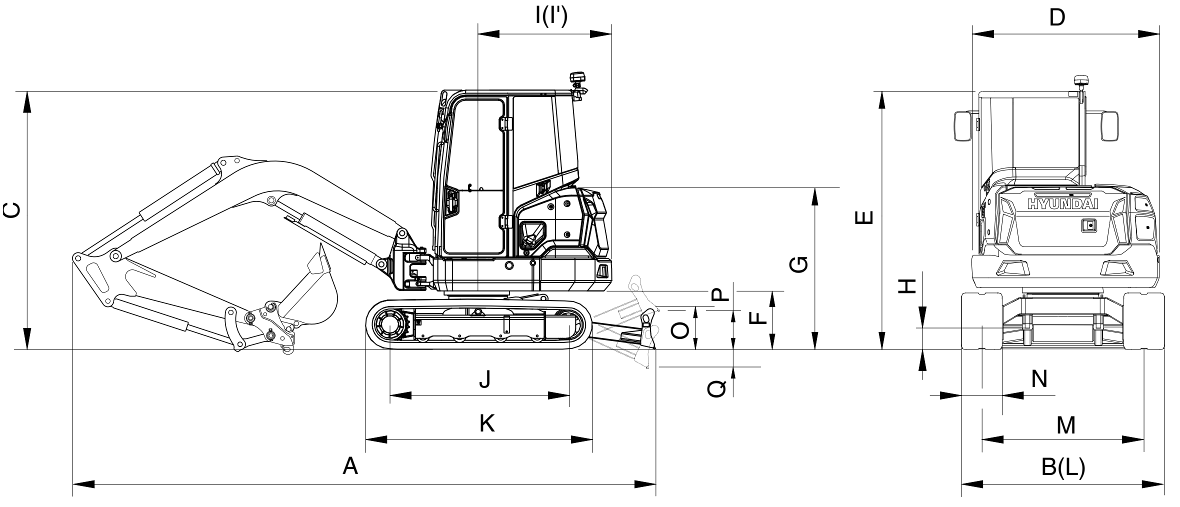
Description		Unit	Specification
Operating weight		kg (lb)	4390 (9680)
Bucket capacity (SAE heaped), standard		m3 (yd3)	0.11 (0.14)
Overall length	A	mm (ft-in)	5425 (17' 10")
Overall width, with 350 mm shoe	B		1740 (5' 9")
Overall width, with dozer	-		1740 (5' 9")
Overall height	C		2525 (8' 3")
Overall width of upper structure	D		1700 (5' 7")
Overall height of cab	E		2525 (8' 3")
Ground clearance of counterweight	F		555 (1' 10")
Overall height of engine hood	G		1550 (5' 1")
Minimum ground clearance	H		185 (0' 7")
Rear-end distance	I		1300 (4' 3")
Rear-end swing radius	I'		1300 (4' 3")
Distance between tumblers	J		1720 (5' 8")
Undercarriage length (without grouser)	K		2185 (7' 2")
Undercarriage width	L		1740 (5' 9")
Track gauge	M		1390 (4' 7")
Track shoe width, standard	N		350 (1' 2")
Height of blade	O		380 (1' 3")
Ground clearance of blade up	P		400 (1' 4")
Depth of blade down	Q		480 (1' 7")
Travel speed (low/high)		km/hr (mph)	3.3/4.9 (2.1/3.0)
Swing speed		rpm	9.9
Gradeability		Degree (%)	35 (70)
Ground pressure		kgf/cm^2 (psi)	0.34 (4.82)
Max traction force		kg (lb)	3013 (6640)

(2) 2.6 m (8' 6") boom, 1.6 m (5' 3") arm, rubber track, quick coupler



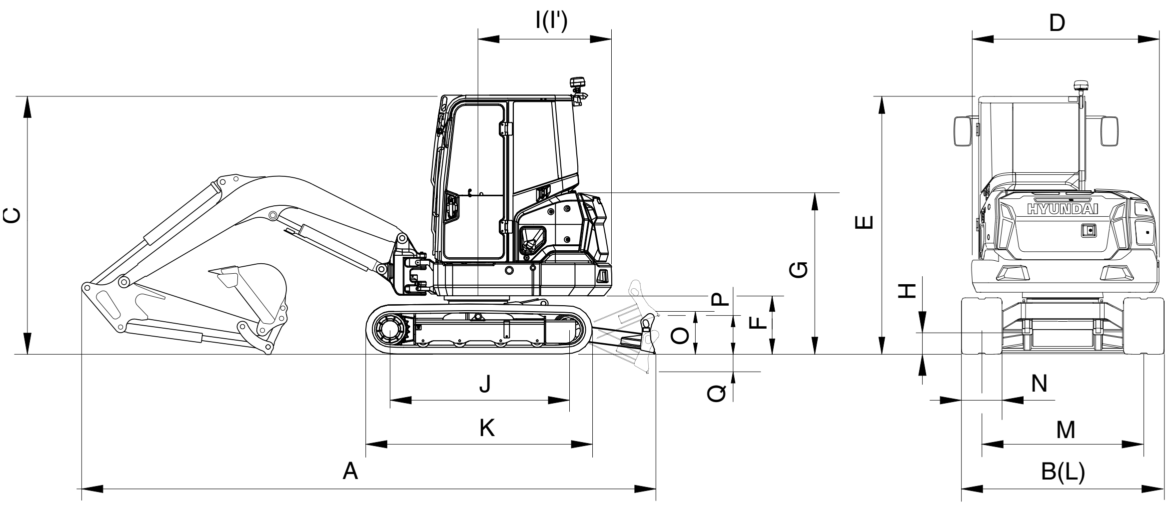
Description		Unit	Specification
Operating weight		kg (lb)	4390 (9780)
Bucket capacity (SAE heaped), standard		m3 (yd3)	0.11 (0.14)
Overall length	A	mm (ft-in)	5425 (17' 10")
Overall width, with 350 mm shoe	B		1740 (5' 9")
Overall width, with dozer	-		1740 (5' 9")
Overall height	C		2525 (8' 3")
Overall width of upper structure	D		1700 (5' 7")
Overall height of cab	E		2525 (8' 3")
Ground clearance of counterweight	F		555 (1' 10")
Overall height of engine hood	G		1550 (5' 1")
Minimum ground clearance	H		185 (0' 7")
Rear-end distance	I		1300 (4' 3")
Rear-end swing radius	I'		1300 (4' 3")
Distance between tumblers	J		1720 (5' 8")
Undercarriage length (without grouser)	K		2185 (7' 2")
Undercarriage width	L		1740 (5' 9")
Track gauge	M		1390 (4' 7")
Track shoe width, standard	N		350 (1' 2")
Height of blade	O		380 (1' 3")
Ground clearance of blade up	P		400 (1' 4")
Depth of blade down	Q		480 (1' 7")
Travel speed (low/high)		km/hr (mph)	3.3/4.9 (2.1/3.0)
Swing speed		rpm	9.9
Gradeability		Degree (%)	35 (70)
G0round pressure		kgf/cm^2 (psi)	0.34 (4.86)
Max traction force		kg (lb)	3013 (6640)

(3) 2.6 m (8' 6") boom, 1.6 m (5' 3") thumb bracket arm, rubber track, quick coupler, angle dozer



Description		Unit	Specification
Operating weight		kg (lb)	4585 (10110)
Bucket capacity (SAE heaped), standard		m3 (yd3)	0.11 (0.14)
Overall length	A	mm (ft-in)	5480 (18' 0")
Overall width, with 350 mm shoe	B		1740 (5' 9")
Overall width, with dozer	-		1740 (5' 9")
Overall height	C		2525 (8' 3")
Overall width of upper structure	D		1700 (5' 7")
Overall height of cab	E		2525 (8' 3")
Ground clearance of counterweight	F		555 (1' 10")
Overall height of engine hood	G		1550 (5' 1")
Minimum ground clearance	H		185 (0' 7")
Rear-end distance	I		1300 (4' 3")
Rear-end swing radius	I'		1300 (4' 3")
Distance between tumblers	J		1720 (5' 8")
Undercarriage length (without grouser)	K		2185 (7' 2")
Undercarriage width	L		1740 (5' 9")
Track gauge	M		1390 (4' 7")
Track shoe width, standard	N		350 (1' 2")
Height of blade	O		410 (1' 4")
Ground clearance of blade up	P		360 (1' 42)
Depth of blade down	Q		525 (1' 9")
Travel speed (low/high)		km/hr (mph)	3.3/4.9 (2.1/3.0)
Swing speed		rpm	9.9
Gradeability		Degree (%)	35 (70)
G0round pressure		kgf/cm^2 (psi)	0.35 (5.04)
Max traction force		kg (lb)	3013 (6640)

(4) 2.6 m (8' 6") boom, 1.6 m (5' 3") arm, rubber track, without quick coupler (europe option)

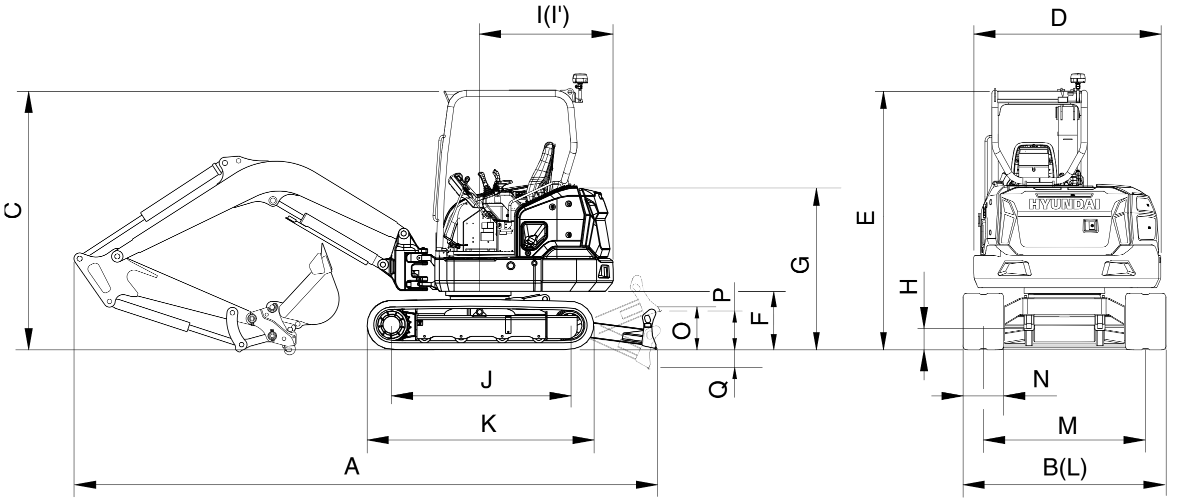


40A2SP02

Description		Unit	Specification
Operating weight		kg (lb)	4395 (9690)
Bucket capacity (SAE heaped), standard		m3 (yd3)	0.11 (0.14)
Overall length	A	mm (ft-in)	5425 (17' 10")
Overall width, with 350 mm shoe	B		1740 (5' 9")
Overall width, with dozer	-		1740 (5' 9")
Overall height	C		2525 (8' 3")
Overall width of upper structure	D		1700 (5' 7")
Overall height of cab	E		2525 (8' 3")
Ground clearance of counterweight	F		555 (1' 10")
Overall height of engine hood	G		1550 (5' 1")
Minimum ground clearance	H		185 (0' 7")
Rear-end distance	I		1300 (4' 3")
Rear-end swing radius	I'		1300 (4' 3")
Distance between tumblers	J		1720 (5' 8")
Undercarriage length (without grouser)	K		2185 (7' 2")
Undercarriage width	L		1740 (5' 9")
Track gauge	M		1390 (4' 7")
Track shoe width, standard	N		350 (1' 2")
Height of blade	O		380 (1' 3")
Ground clearance of blade up	P		400 (1' 4")
Depth of blade down	Q		480 (1' 7")
Travel speed (low/high)		km/hr (mph)	3.3/4.9 (2.1/3.0)
Swing speed		rpm	9.9
Gradeability		Degree (%)	35 (70)
G0round pressure		kgf/cm^2 (psi)	0.34 (4.82)
Max traction force		kg (lb)	3013 (6640)

2) CANOPY TYPE

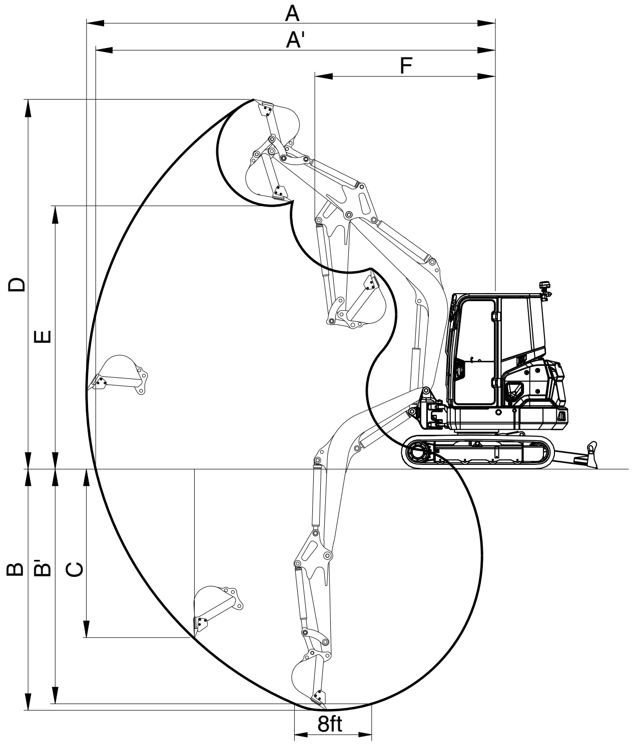
(1) 2.6 m (8' 6") boom, 1.6 m (5' 3") thumb bracket arm, rubber track, quick coupler



Description		Unit	Specification
Operating weight		kg (lb)	4280 (9440)
Bucket capacity (SAE heaped), standard		m3 (yd3)	0.11 (0.14)
Overall length	A	mm (ft-in)	5425 (17' 10")
Overall width, with 350 mm shoe	B		1740 (5' 9")
Overall width, with dozer	-		1740 (5' 9")
Overall height	C		2510 (8' 3")
Overall width of upper structure	D		1700 (5' 7")
Overall height of cab	E		2510 (8' 3")
Ground clearance of counterweight	F		555 (1' 10")
Overall height of engine hood	G		1550 (5' 1")
Minimum ground clearance	H		185 (0' 7")
Rear-end distance	I		1300 (4' 3")
Rear-end swing radius	I'		1300 (4' 3")
Distance between tumblers	J		1720 (5' 8")
Undercarriage length (without grouser)	K		2185 (7' 2")
Undercarriage width	L		1740 (5' 9")
Track gauge	M		1390 (4' 7")
Track shoe width, standard	N		350 (1' 2")
Height of blade	O		380 (1' 3")
Ground clearance of blade up	P		400 (1' 4")
Depth of blade down	Q		480 (1' 7")
Travel speed (low/high)		km/hr (mph)	3.3/4.9 (2.1/3.0)
Swing speed		rpm	9.9
Gradeability		Degree (%)	35 (70)
Ground pressure		kgf/cm^2 (psi)	0.33 (4.69)
Max traction force		kg (lb)	3013 (6640)

3. WORKING RANGE

1) 2.6 m (8' 6") BOOM, WITHOUT QUICK COUPLER

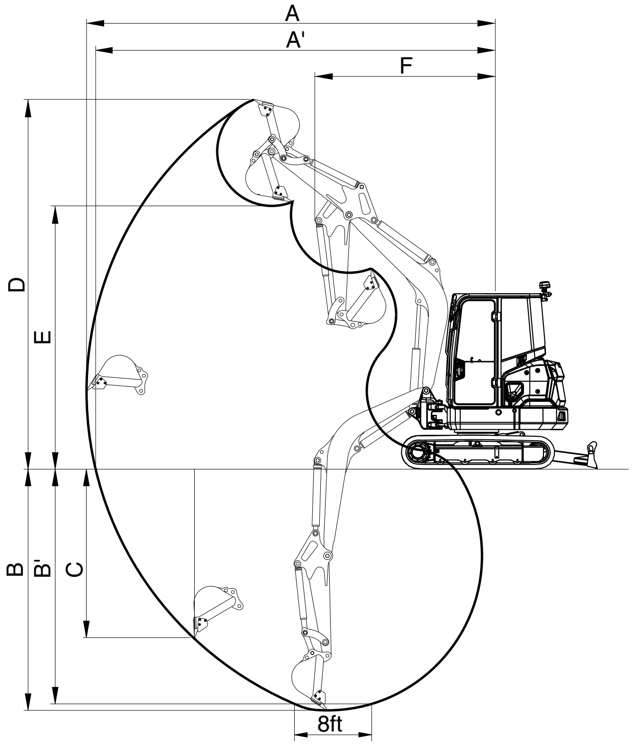


40A2SP10

Description		Unit	1.6 m (5' 3") Arm
Max digging reach	A	mm (ft-in)	5525 (18' 2")
Max digging reach on ground	A'		5390 (17' 8")
Max digging depth	B		3420 (11' 3")
Max digging depth (8ft level)	B'		3010 (9' 11")
Max vertical wall digging depth	C		2620 (8' 7")
Max digging height	D		5360 (17' 7")
Max dumping height	E		3945 (12' 11")
Min swing radius	F		2260 (7' 5")
Boom swing radius (left/right)		degree	75°/55°
Bucket digging force	SAE	kN	39 [42.8]
		kgf	3962 [4360]
		lbf	8735 [9612]
	ISO	kN	44 [48.2]
		kgf	4461 [4910]
		lbf	9835 [10825]
Arm crowd force	SAE	kN	20 [21.7]
		kgf	2005 [2210]
		lbf	4421 [4872]
	ISO	kN	20 [22.3]
		kgf	2060 [2270]
		lbf	4541 [5004]

[ ] : Power boost

2) 2.6 m (8' 6") BOOM, WITH QUICK COUPLER



Description		Unit	1.6 m (5' 3" Arm
Max digging reach	A	mm (ft-in)	5690 (18' 8")
Max digging reach on ground	A'		5560 (18' 3")
Max digging depth	B		3590 (11' 9")
Max digging depth (8ft level)	B'		3200 (10' 6")
Max vertical wall digging depth	C		2450 (8' 0")
Max digging height	D		5530 (18' 2")
Max dumping height	E		3780 (12' 5")
Min swing radius	F		2260 (7' 5")
Boom swing radius (left/right)		degree	75°/55°
Bucket digging force	SAE	kN	33 [36.2]
		kgf	3358 [3690]
		lbf	7403 [8135]
	ISO	kN	35 [39.4]
		kgf	3653 [4020]
		lbf	8053 [8863]
Arm crowd force	SAE	kN	18 [20.1]
		kgf	1862 [2050]
		lbf	4105 [4519]
	ISO	kN	19 [20.6]
		kgf	1908 [2100]
		lbf	4206 [4630]

[   ] : Power boost

4. WEIGHT

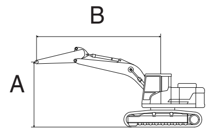
Item	kg	lb
Upperstructure assembly		
· Main frame weld assembly	605	1334
· Engine assembly (including DPF)	209	461
· Main pump assembly	16	35
· Main control valve assembly	54	119
· Swing motor assembly	39	86
· Hydraulic oil tank wa	72	159
· Fuel tank wa	11	24
· Counterweight	300	661
· Cab assembly	455	1003
Lower chassis assembly		
· Track frame weld assembly	470	1036
· Dozer blade assembly	152	335
· Angle dozer blade assembly	243	536
· Swing bearing	47	104
· Travel motor assembly	37	82
· Turning joint	26	57
· Sprocket	24	53
· Track recoil spring	34	74
· Idler	57	126
· Upper roller	5	10
· Lower roller	58	127
· Track-chain assembly-steel	442	974
· Track-chain assembly-rubber	356	785
Front attachment assembly		
· Boom assembly-2.6 m	160	353
· Arm assembly-1.6 m	87	191
· Arm assembly-1.6 m, thumb bracket	90	198
· Bucket assembly (without side cutter-500 mm)	87	191
· Bucket assembly (without side cutter-510 mm)	88	193
· Boom cylinder assembly	52	115
· Arm cylinder assembly	45	99
· Bucket cylinder assembly	24	53
· Boom swing cylinder assembly	32	71
· Dozer cylinder assy	32	71
· Bucket control linkage total	28	63

5. LIFTING CAPACITIES

1) RUBBER TRACK WITH DOZER BLADE

Model	Type	Boom	Arm	Counterweight	Rubber shoe	Wheel	Dozer		Outtriger	
HX40A	Cab	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		2600	1600	300	350	-	Up	-	-	-

· : Rating over-front · : Rating over-side or 360 degree



Load point height (A)		Load radius (B)								At max. reach		
		1.0 m (3.3 ft)		2.0 m (6.6 ft)		3.0 m (9.8 ft)		4.0 m (13.1 ft)		Capacity		Reach
												m (ft)
4.0 m	kg									990	840	3.62
(13.1 ft)	lb									2180	1850	(11.9)
3.0 m	kg							850	720	730	620	4.35
(9.8 ft)	lb							1870	1590	1610	1370	(14.3)
2.0 m	kg					*1220	1080	830	700	640	540	4.72
(6.6 ft)	lb					*2690	2380	1830	1540	1410	1190	(15.5)
1.0 m	kg					1220	1020	800	680	610	510	4.81
(3.3 ft)	lb					2690	2250	1760	1500	1340	1120	(15.8)
Ground	kg			*1480	*1480	1180	970	780	650	630	530	4.66
Line	lb			*3260	*3260	2600	2140	1720	1430	1390	1170	(15.3)
-1.0 m	kg	*1680	*1680	2260	1780	1160	960	770	650	720	610	4.22
(-3.3 ft)	lb	*3700	*3700	4980	3920	2560	2120	1700	1430	1590	1340	(13.8)
-2.0 m	kg	*3070	*3070	*2200	1820	1190	980			1010	840	3.37
(-6.6 ft)	lb	*6770	*6770	*4850	4010	2620	2160			2230	1850	(11.1)

Note 1. Lifting capacity are based on ISO 10567.
2. Lifting capacity of the HX series does not exceed 75% of tipping load with the machine on firm, level ground or 87% of full hydraulic capacity.
3. The lift-point is bucket pivot mounting pin on the arm (without bucket mass).
4. *Indicates load limited by hydraulic capacity.

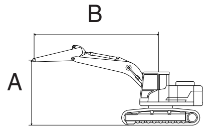
※ Lifting capacities are based upon a standard machine conditions.
Lifting capacities will vary with different work tools, ground conditions and attachments.
The difference between the weight of a work tool attachment must be subtracted.
Consult with your local HD Hyundai Construction Equipment dealer regarding the lifting capacities for specific work tools and attachments.

※ Please be aware of the local regulations and instructions for lifting operations.

⚠ Failure to comply to the rated load can cause serious injury, death, or property damage. Make adjustments to the rated load as necessary for non-standard configurations.

Model	Type	Boom	Arm	Counterweight	Rubber shoe	Wheel	Dozer		Outtriger	
HX40A	Canopy	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		2600	1600	300	350	-	Up	-	-	-

· : Rating over-front · : Rating over-side or 360 degree



Load point height (A)		Load radius (B)								At max. reach		
		1.0 m (3.3 ft)		2.0 m (6.6 ft)		3.0 m (9.8 ft)		4.0 m (13.1 ft)		Capacity		Reach
												m (ft)
4.0 m	kg									930	790	3.62
(13.1 ft)	lb									2050	1740	(11.9)
3.0 m	kg							790	670	680	580	4.35
(9.8 ft)	lb							1740	1480	1500	1280	(14.3)
2.0 m	kg					1220	1020	770	660	590	500	4.72
(6.6 ft)	lb					2690	2250	1700	1460	1300	1100	(15.5)
1.0 m	kg					1140	950	750	630	560	480	4.81
(3.3 ft)	lb					2510	2090	1650	1390	1230	1060	(15.8)
Ground	kg			*1480	*1480	1090	910	720	610	580	490	4.66
Line	lb			*3260	*3260	2400	2010	1590	1340	1280	1080	(15.3)
-1.0 m	kg	*1680	*1680	2110	1660	1080	890	720	600	670	560	4.22
(-3.3 ft)	lb	*3700	*3700	4650	3660	2380	1960	1590	1320	1480	1230	(13.8)
-2.0 m	kg	*3070	*3070	2160	1700	1110	920			940	790	3.37
(-6.6 ft)	lb	*6770	*6770	4760	3750	2450	2030			2070	1740	(11.1)

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3. The lift-point is bucket pivot mounting pin on the arm (without bucket mass).
4. *Indicates load limited by hydraulic capacity.

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Lifting capacities will vary with different work tools, ground conditions and attachments.
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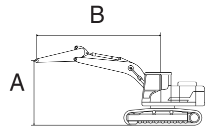
※ Please be aware of the local regulations and instructions for lifting operations.
⚠ Failure to comply to the rated load can cause serious injury, death, or property damage. Make adjustments to the rated load as necessary for non-standard configurations.

Model	Type	Boom	Arm	Counterweight	Rubber shoe	Wheel	Dozer		Outtriger	
HX40A	Cab	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		2600	1600	300	350	-	Down	-	-	-

· : Rating over-front · : Rating over-side or 360 degree



Load point height (A)		Load radius (B)								At max. reach		
		1.0 m (3.3 ft)		2.0 m (6.6 ft)		3.0 m (9.8 ft)		4.0 m (13.1 ft)		Capacity		Reach
												m (ft)
4.0 m	kg									*1000	900	3.62
(13.1 ft)	lb									*2200	1980	(11.9)
3.0 m	kg							*950	780	*930	670	4.35
(9.8 ft)	lb							*2090	1720	*2050	1480	(14.3)
2.0 m	kg					*1220	1180	*1040	760	*910	590	4.72
(6.6 ft)	lb					*2690	2600	*2290	1680	*2010	1300	(15.5)
1.0 m	kg					*1630	1110	*1190	730	*960	560	4.81
(3.3 ft)	lb					*3590	2450	*2620	1610	*2120	1230	(15.8)
Ground	kg			*1480	*1480	*1860	1060	*1280	710	*1050	580	4.66
Line	lb			*3260	*3260	*4100	2340	*2820	1570	*2310	1280	(15.3)
-1.0 m	kg	*1680	*1680	*2800	1970	*1800	1050	*1200	710	*1070	660	4.22
(-3.3 ft)	lb	*3700	*3700	*6170	4340	*3970	2310	*2650	1570	*2360	1460	(13.8)
-2.0 m	kg	*3070	*3070	*2200	2010	*1340	1070			*1050	920	3.37
(-6.6 ft)	lb	*6770	*6770	*4850	4430	*2950	2360			*2310	2030	(11.1)

Note 1. Lifting capacity are based on ISO 10567.
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4. *Indicates load limited by hydraulic capacity.

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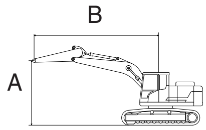
※ Please be aware of the local regulations and instructions for lifting operations.

⚠ Failure to comply to the rated load can cause serious injury, death, or property damage. Make adjustments to the rated load as necessary for non-standard configurations.

Model	Type	Boom	Arm	Counterweight	Rubber shoe	Wheel	Dozer		Outtriger	
HX40A	Canopy	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		2600	1600	300	350	-	Down	-	-	-

· : Rating over-front · : Rating over-side or 360 degree



Load point height (A)		Load radius (B)								At max. reach		
		1.0 m (3.3 ft)		2.0 m (6.6 ft)		3.0 m (9.8 ft)		4.0 m (13.1 ft)		Capacity		Reach
												m (ft)
4.0 m (13.1 ft)	kg lb									*1000 *2200	850 1870	3.62 (11.9)
3.0 m (9.8 ft)	kg lb							*950 *2090	730 1610	*930 *2050	630 1390	4.35 (14.3)
2.0 m (6.6 ft)	kg lb					*1220 *2690	1110 2450	*1040 *2290	710 1570	*910 *2010	550 1210	4.72 (15.5)
1.0 m (3.3 ft)	kg lb					*1630 *3590	1030 2270	*1190 *2620	680 1500	*960 *2120	520 1150	4.81 (15.8)
Ground Line	kg lb			*1480 *3260	*1480 *3260	*1860 *4100	990 2180	*1280 *2820	660 1460	*1050 *2310	540 1190	4.66 (15.3)
-1.0 m (-3.3 ft)	kg lb	*1680 *3700	*1680 *3700	*2800 *6170	1840 4060	*1800 *3970	980 2160	*1200 *2650	660 1460	*1070 *2360	610 1340	4.22 (13.8)
-2.0 m (-6.6 ft)	kg lb	*3070 *6770	*3070 *6770	*2200 *4850	1880 4140	*1340 *2950	1000 2200			*1050 *2310	850 1870	3.37 (11.1)

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4. *Indicates load limited by hydraulic capacity.

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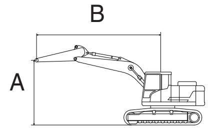
※ **Please be aware of the local regulations and instructions for lifting operations.**

⚠ **Failure to comply to the rated load can cause serious injury, death, or property damage. Make adjustments to the rated load as necessary for non-standard configurations.**

2) RUBBER TRACK WITH ANGLE DOZER BLADE

Model	Type	Boom	Arm	Counterweight	Rubber shoe	Wheel	Dozer		Outtriger	
HX40A	Cab	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		2600	1600	300	350	-	Up	-	-	-

· : Rating over-front · : Rating over-side or 360 degree



Load point height (A)		Load radius (B)								At max. reach		
		1.0 m (3.3 ft)		2.0 m (6.6 ft)		3.0 m (9.8 ft)		4.0 m (13.1 ft)		Capacity		Reach
												m (ft)
4.0 m	kg									970	860	3.62
(13.1 ft)	lb									2140	1900	(11.9)
3.0 m	kg							830	740	720	640	4.35
(9.8 ft)	lb							1830	1630	1590	1410	(14.3)
2.0 m	kg					*1220	1110	810	720	630	560	4.72
(6.6 ft)	lb					*2690	2450	1790	1590	1390	1230	(15.5)
1.0 m	kg					1200	1040	790	690	600	530	4.81
(3.3 ft)	lb					2650	2290	1740	1520	1320	1170	(15.8)
Ground	kg			*1480	*1480	1150	1000	760	670	620	550	4.66
Line	lb			*3260	*3260	2540	2200	1680	1480	1370	1210	(15.3)
-1.0 m	kg	*1680	*1680	2220	1830	1140	990	760	670	710	620	4.22
(-3.3 ft)	lb	*3700	*3700	4890	4030	2510	2180	1680	1480	1570	1370	(13.8)
-2.0 m	kg	*3070	*3070	*2200	1870	1170	1010			990	860	3.37
(-6.6 ft)	lb	*6770	*6770	*4850	4120	2580	2230			2180	1900	(11.1)

Note 1. Lifting capacity are based on ISO 10567.
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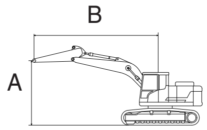
⚠ Failure to comply to the rated load can cause serious injury, death, or property damage. Make adjustments to the rated load as necessary for non-standard configurations.

Model	Type	Boom	Arm	Counterweight	Rubber shoe	Wheel	Dozer		Outtriger	
		Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
HX40A	Canopy	2600	1600	300	350	-	Up	-	-	-

· : Rating over-front · : Rating over-side or 360 degree



Load point height (A)		Load radius (B)								At max. reach		
		1.0 m (3.3 ft)		2.0 m (6.6 ft)		3.0 m (9.8 ft)		4.0 m (13.1 ft)		Capacity		Reach
												m (ft)
4.0 m	kg									910	810	3.62
(13.1 ft)	lb									2010	1790	(11.9)
3.0 m	kg							780	690	670	600	4.35
(9.8 ft)	lb							1720	1520	1480	1320	(14.3)
2.0 m	kg					1190	1050	760	680	580	520	4.72
(6.6 ft)	lb					2620	2310	1680	1500	1280	1150	(15.5)
1.0 m	kg					1120	980	730	650	550	490	4.81
(3.3 ft)	lb					2470	2160	1610	1430	1210	1080	(15.8)
Ground	kg			*1480	*1480	1070	930	710	630	570	510	4.66
Line	lb			*3260	*3260	2360	2050	1570	1390	1260	1120	(15.3)
-1.0 m	kg	*1680	*1680	2070	1710	1060	920	700	620	660	580	4.22
(-3.3 ft)	lb	*3700	*3700	4560	3770	2340	2030	1540	1370	1460	1280	(13.8)
-2.0 m	kg	*3070	*3070	2120	1750	1090	940			920	810	3.37
(-6.6 ft)	lb	*6770	*6770	4670	3860	2400	2070			2030	1790	(11.1)

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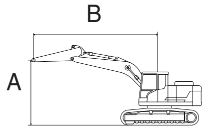
⚠ Failure to comply to the rated load can cause serious injury, death, or property damage. Make adjustments to the rated load as necessary for non-standard configurations.

Model	Type	Boom	Arm	Counterweight	Rubber shoe	Wheel	Dozer		Outtriger	
		Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
HX40A	Cab	2600	1600	300	350	-	Down	-	-	-

· (over-front symbol) : Rating over-front · (over-side symbol) : Rating over-side or 360 degree



Load point height (A)		Load radius (B)								At max. reach		
		1.0 m (3.3 ft)		2.0 m (6.6 ft)		3.0 m (9.8 ft)		4.0 m (13.1 ft)		Capacity		Reach
		Rating over-front	Rating over-side or 360 degree	Rating over-front	Rating over-side or 360 degree	Rating over-front	Rating over-side or 360 degree	Rating over-front	Rating over-side or 360 degree	Rating over-front	Rating over-side or 360 degree	m (ft)
4.0 m	kg									*1000	920	3.62
(13.1 ft)	lb									*2200	2030	(11.9)
3.0 m	kg							*950	790	*930	690	4.35
(9.8 ft)	lb							*2090	1740	*2050	1520	(14.3)
2.0 m	kg					*1220	1200	*1040	780	*910	600	4.72
(6.6 ft)	lb					*2690	2650	*2290	1720	*2010	1320	(15.5)
1.0 m	kg					*1630	1130	*1190	750	*960	570	4.81
(3.3 ft)	lb					*3590	2490	*2620	1650	*2120	1260	(15.8)
Ground	kg			*1480	*1480	*1860	1080	*1280	730	*1050	590	4.66
Line	lb			*3260	*3260	*4100	2380	*2820	1610	*2310	1300	(15.3)
-1.0 m	kg	*1680	*1680	*2800	2010	*1800	1070	*1200	720	*1070	670	4.22
(-3.3 ft)	lb	*3700	*3700	*6170	4430	*3970	2360	*2650	1590	*2360	1480	(13.8)
-2.0 m	kg	*3070	*3070	*2200	2050	*1340	1090			*1050	940	3.37
(-6.6 ft)	lb	*6770	*6770	*4850	4520	*2950	2400			*2310	2070	(11.1)

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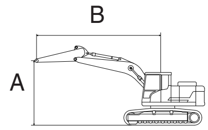
Model	Type	Boom	Arm	Counterweight	Rubber shoe	Wheel	Dozer		Outtriger	
HX40A	Canopy	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		2600	1600	300	350	-	Down	-	-	-

· : Rating over-front · : Rating over-side or 360 degree



Load point height (A)		Load radius (B)								At max. reach		
		1.0 m (3.3 ft)		2.0 m (6.6 ft)		3.0 m (9.8 ft)		4.0 m (13.1 ft)		Capacity		Reach
												m (ft)
4.0 m	kg									*1000	870	3.62
(13.1 ft)	lb									*2200	1920	(11.9)
3.0 m	kg							*950	750	*930	650	4.35
(9.8 ft)	lb							*2090	1650	*2050	1430	(14.3)
2.0 m	kg					*1220	1130	*1040	730	*910	560	4.72
(6.6 ft)	lb					*2690	2490	*2290	1610	*2010	1230	(15.5)
1.0 m	kg					*1630	1060	*1190	700	*960	530	4.81
(3.3 ft)	lb					*3590	2340	*2620	1540	*2120	1170	(15.8)
Ground	kg			*1480	*1480	*1860	1010	*1280	680	*1050	550	4.66
Line	lb			*3260	*3260	*4100	2230	*2820	1500	*2310	1210	(15.3)
-1.0 m	kg	*1680	*1680	*2800	1880	*1800	1000	*1200	670	*1070	630	4.22
(-3.3 ft)	lb	*3700	*3700	*6170	4140	*3970	2200	*2650	1480	*2360	1390	(13.8)
-2.0 m	kg	*3070	*3070	*2200	1920	*1340	1020			*1050	880	3.37
(-6.6 ft)	lb	*6770	*6770	*4850	4230	*2950	2250			*2310	1940	(11.1)

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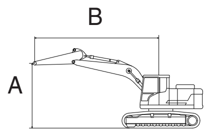
※ Please be aware of the local regulations and instructions for lifting operations.

⚠ Failure to comply to the rated load can cause serious injury, death, or property damage. Make adjustments to the rated load as necessary for non-standard configurations.

3) STEEL TRACK WITH DOZER BLADE

Model	Type	Boom	Arm	Counterweight	Rubber shoe	Wheel	Dozer		Outtriger	
HX40A	Cab	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		2600	1600	300	350	-	Up	-	-	-

· : Rating over-front · : Rating over-side or 360 degree



Load point height (A)		Load radius (B)								At max. reach		
		1.0 m (3.3 ft)		2.0 m (6.6 ft)		3.0 m (9.8 ft)		4.0 m (13.1 ft)		Capacity		Reach
												m (ft)
4.0 m	kg									980	830	3.62
(13.1 ft)	lb									2160	1830	(11.9)
3.0 m	kg							840	720	730	620	4.35
(9.8 ft)	lb							1850	1590	1610	1370	(14.3)
2.0 m	kg					*1220	1080	820	700	630	540	4.72
(6.6 ft)	lb					*2690	2380	1810	1540	1390	1190	(15.5)
1.0 m	kg					1210	1010	790	670	600	510	4.81
(3.3 ft)	lb					2670	2230	1740	1480	1320	1120	(15.8)
Ground	kg			*1480	*1480	1160	960	770	650	620	530	4.66
Line	lb			*3260	*3260	2560	2120	1700	1430	1370	1170	(15.3)
-1.0 m	kg	*1680	*1680	2210	1750	1150	950	760	650	710	600	4.22
(-3.3 ft)	lb	*3700	*3700	4870	3860	2540	2090	1680	1430	1570	1320	(13.8)
-2.0 m	kg	*3070	*3070	*2200	1790	1170	970			1000	840	3.37
(-6.6 ft)	lb	*6770	*6770	*4850	3950	2580	2140			2200	1850	(11.1)

Note 1. Lifting capacity are based on ISO 10567.
2. Lifting capacity of the HX series does not exceed 75% of tipping load with the machine on firm, level ground or 87% of full hydraulic capacity.
3. The lift-point is bucket pivot mounting pin on the arm (without bucket mass).
4. *Indicates load limited by hydraulic capacity.

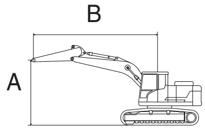
※ Lifting capacities are based upon a standard machine conditions.
Lifting capacities will vary with different work tools, ground conditions and attachments.
The difference between the weight of a work tool attachment must be subtracted.
Consult with your local HD Hyundai Construction Equipment dealer regarding the lifting capacities for specific work tools and attachments.

※ Please be aware of the local regulations and instructions for lifting operations.

⚠ Failure to comply to the rated load can cause serious injury, death, or property damage. Make adjustments to the rated load as necessary for non-standard configurations.

Model	Type	Boom	Arm	Counterweight	Rubber shoe	Wheel	Dozer		Outtriger	
HX40A	Canopy	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		2600	1600	300	350	-	Up	-	-	-

· : Rating over-front · : Rating over-side or 360 degree



Load point height (A)		Load radius (B)								At max. reach		
		1.0 m (3.3 ft)		2.0 m (6.6 ft)		3.0 m (9.8 ft)		4.0 m (13.1 ft)		Capacity		Reach
												m (ft)
4.0 m	kg									920	780	3.62
(13.1 ft)	lb									2030	1720	(11.9)
3.0 m	kg							780	670	680	580	4.35
(9.8 ft)	lb							1720	1480	1500	1280	(14.3)
2.0 m	kg					1200	1010	770	650	590	500	4.72
(6.6 ft)	lb					2650	2230	1700	1430	1300	1100	(15.5)
1.0 m	kg					1130	940	740	630	560	480	4.81
(3.3 ft)	lb					2490	2070	1630	1390	1230	1060	(15.8)
Ground	kg			*1480	*1480	1080	900	720	600	580	490	4.66
Line	lb			*3260	*3260	2380	1980	1590	1320	1280	1080	(15.3)
-1.0 m	kg	*1680	*1680	2070	1640	1070	890	710	600	660	560	4.22
(-3.3 ft)	lb	*3700	*3700	4560	3620	2360	1960	1570	1320	1460	1230	(13.8)
-2.0 m	kg	*3070	*3070	2110	1680	1090	910			930	780	3.37
(-6.6 ft)	lb	*6770	*6770	4650	3700	2400	2010			2050	1720	(11.1)

Note 1. Lifting capacity are based on ISO 10567.
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3. The lift-point is bucket pivot mounting pin on the arm (without bucket mass).
4. *Indicates load limited by hydraulic capacity.

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Lifting capacities will vary with different work tools, ground conditions and attachments.
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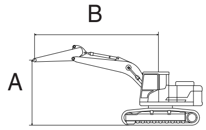
Model	Type	Boom	Arm	Counterweight	Rubber shoe	Wheel	Dozer		Outtriger	
HX40A	Cab	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		2600	1600	300	350	-	Down	-	-	-

· : Rating over-front · : Rating over-side or 360 degree



Load point height (A)		Load radius (B)								At max. reach		
		1.0 m (3.3 ft)		2.0 m (6.6 ft)		3.0 m (9.8 ft)		4.0 m (13.1 ft)		Capacity		Reach
												m (ft)
4.0 m	kg									*1000	910	3.62
(13.1 ft)	lb									*2200	2010	(11.9)
3.0 m	kg							*950	780	*930	680	4.35
(9.8 ft)	lb							*2090	1720	*2050	1500	(14.3)
2.0 m	kg					*1220	1180	*1040	760	*910	590	4.72
(6.6 ft)	lb					*2690	2600	*2290	1680	*2010	1300	(15.5)
1.0 m	kg					*1630	1110	*1190	730	*960	560	4.81
(3.3 ft)	lb					*3590	2450	*2620	1610	*2120	1230	(15.8)
Ground	kg			*1480	*1480	*1860	1060	*1280	710	*1050	580	4.66
Line	lb			*3260	*3260	*4100	2340	*2820	1570	*2310	1280	(15.3)
-1.0 m	kg	*1680	*1680	*2800	1970	*1800	1050	*1200	710	*1070	660	4.22
(-3.3 ft)	lb	*3700	*3700	*6170	4340	*3970	2310	*2650	1570	*2360	1460	(13.8)
-2.0 m	kg	*3070	*3070	*2200	2010	*1340	1070			*1050	920	3.37
(-6.6 ft)	lb	*6770	*6770	*4850	4430	*2950	2360			*2310	2030	(11.1)

Note 1. Lifting capacity are based on ISO 10567.
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3. The lift-point is bucket pivot mounting pin on the arm (without bucket mass).
4. *Indicates load limited by hydraulic capacity.

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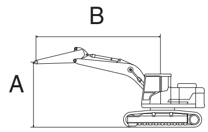
※ Please be aware of the local regulations and instructions for lifting operations.
⚠ Failure to comply to the rated load can cause serious injury, death, or property damage. Make adjustments to the rated load as necessary for non-standard configurations.

Model	Type	Boom	Arm	Counterweight	Rubber shoe	Wheel	Dozer		Outtriger	
HX40A	Canopy	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		2600	1600	300	350	-	Down	-	-	-

· : Rating over-front · : Rating over-side or 360 degree



Load point height (A)		Load radius (B)								At max. reach		
		1.0 m (3.3 ft)		2.0 m (6.6 ft)		3.0 m (9.8 ft)		4.0 m (13.1 ft)		Capacity		Reach
												m (ft)
4.0 m	kg									*1000	870	3.62
(13.1 ft)	lb									*2200	1920	(11.9)
3.0 m	kg							*950	750	*930	650	4.35
(9.8 ft)	lb							*2090	1650	*2050	1430	(14.3)
2.0 m	kg					*1220	1130	*1040	730	*910	560	4.72
(6.6 ft)	lb					*2690	2490	*2290	1610	*2010	1230	(15.5)
1.0 m	kg					*1630	1060	*1190	700	*960	540	4.81
(3.3 ft)	lb					*3590	2340	*2620	1540	*2120	1190	(15.8)
Ground	kg			*1480	*1480	*1860	1020	*1280	680	*1050	550	4.66
Line	lb			*3260	*3260	*4100	2250	*2820	1500	*2310	1210	(15.3)
-1.0 m	kg	*1680	*1680	*2800	1880	*1800	1000	*1200	680	*1070	630	4.22
(-3.3 ft)	lb	*3700	*3700	*6170	4140	*3970	2200	*2650	1500	*2360	1390	(13.8)
-2.0 m	kg	*3070	*3070	*2200	1920	*1340	1030			*1050	880	3.37
(-6.6 ft)	lb	*6770	*6770	*4850	4230	*2950	2270			*2310	1940	(11.1)

Note 1. Lifting capacity are based on ISO 10567.
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4. *Indicates load limited by hydraulic capacity.

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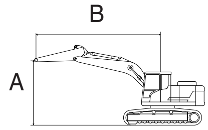
※ Please be aware of the local regulations and instructions for lifting operations.

⚠ Failure to comply to the rated load can cause serious injury, death, or property damage. Make adjustments to the rated load as necessary for non-standard configurations.

4) STEEL TRACK WITH ANGLE DOZER BLADE

Model	Type	Boom	Arm	Counterweight	Rubber shoe	Wheel	Dozer		Outtriger	
HX40A	Cab	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		2600	1600	300	350	-	Up	-	-	-

· : Rating over-front · : Rating over-side or 360 degree



Load point height (A)		Load radius (B)								At max. reach		
		1.0 m (3.3 ft)		2.0 m (6.6 ft)		3.0 m (9.8 ft)		4.0 m (13.1 ft)		Capacity		Reach
												m (ft)
4.0 m	kg									960	850	3.62
(13.1 ft)	lb									2120	1870	(11.9)
3.0 m	kg							820	730	710	640	4.35
(9.8 ft)	lb							1810	1610	1570	1410	(14.3)
2.0 m	kg					*1220	1100	810	720	620	550	4.72
(6.6 ft)	lb					*2690	2430	1790	1590	1370	1210	(15.5)
1.0 m	kg					1180	1030	780	690	590	530	4.81
(3.3 ft)	lb					2600	2270	1720	1520	1300	1170	(15.8)
Ground	kg			*1480	*1480	1140	990	750	670	610	540	4.66
Line	lb			*3260	*3260	2510	2180	1650	1480	1340	1190	(15.3)
-1.0 m	kg	*1680	*1680	2170	1800	1130	980	750	660	700	620	4.22
(-3.3 ft)	lb	*3700	*3700	4780	3970	2490	2160	1650	1460	1540	1370	(13.8)
-2.0 m	kg	*3070	*3070	*2200	1840	1150	1000			980	860	3.37
(-6.6 ft)	lb	*6770	*6770	*4850	4060	2540	2200			2160	1900	(11.1)

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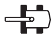
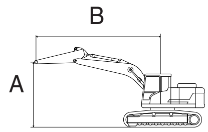
※ Please be aware of the local regulations and instructions for lifting operations.
⚠ Failure to comply to the rated load can cause serious injury, death, or property damage. Make adjustments to the rated load as necessary for non-standard configurations.

Model	Type	Boom	Arm	Counterweight	Rubber shoe	Wheel	Dozer		Outtriger	
		Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
HX40A	Canopy	2600	1600	300	350	-	Up	-	-	-

·  : Rating over-front ·  : Rating over-side or 360 degree



Load point height (A)		Load radius (B)								At max. reach		
		1.0 m (3.3 ft)		2.0 m (6.6 ft)		3.0 m (9.8 ft)		4.0 m (13.1 ft)		Capacity		Reach
												m (ft)
4.0 m	kg									900	800	3.62
(13.1 ft)	lb									1980	1760	(11.9)
3.0 m	kg							770	690	670	600	4.35
(9.8 ft)	lb							1700	1520	1480	1320	(14.3)
2.0 m	kg					1180	1040	750	670	580	520	4.72
(6.6 ft)	lb					2600	2290	1650	1480	1280	1150	(15.5)
1.0 m	kg					1110	970	720	640	550	490	4.81
(3.3 ft)	lb					2450	2140	1590	1410	1210	1080	(15.8)
Ground	kg			*1480	*1480	1060	920	700	620	570	510	4.66
Line	lb			*3260	*3260	2340	2030	1540	1370	1260	1120	(15.3)
-1.0 m	kg	*1680	*1680	2030	1680	1050	910	700	620	650	580	4.22
(-3.3 ft)	lb	*3700	*3700	4480	3700	2310	2010	1540	1370	1430	1280	(13.8)
-2.0 m	kg	*3070	*3070	2070	1720	1070	940			910	800	3.37
(-6.6 ft)	lb	*6770	*6770	4560	3790	2360	2070			2010	1760	(11.1)

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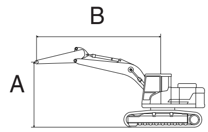
Model	Type	Boom	Arm	Counterweight	Rubber shoe	Wheel	Dozer		Outtriger	
HX40A	Cab	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		2600	1600	300	350	-	Down	-	-	-

· : Rating over-front · : Rating over-side or 360 degree



Load point height (A)		Load radius (B)								At max. reach		
		1.0 m (3.3 ft)		2.0 m (6.6 ft)		3.0 m (9.8 ft)		4.0 m (13.1 ft)		Capacity		Reach
												m (ft)
4.0 m	kg									*1000	920	3.62
(13.1 ft)	lb									*2200	2030	(11.9)
3.0 m	kg							*950	800	*930	690	4.35
(9.8 ft)	lb							*2090	1760	*2050	1520	(14.3)
2.0 m	kg					*1220	1200	*1040	780	*910	600	4.72
(6.6 ft)	lb					*2690	2650	*2290	1720	*2010	1320	(15.5)
1.0 m	kg					*1630	1130	*1190	750	*960	570	4.81
(3.3 ft)	lb					*3590	2490	*2620	1650	*2120	1260	(15.8)
Ground	kg			*1480	*1480	*1860	1080	*1280	730	*1050	590	4.66
Line	lb			*3260	*3260	*4100	2380	*2820	1610	*2310	1300	(15.3)
-1.0 m	kg	*1680	*1680	*2800	2000	*1800	1070	*1200	720	*1070	680	4.22
(-3.3 ft)	lb	*3700	*3700	*6170	4410	*3970	2360	*2650	1590	*2360	1500	(13.8)
-2.0 m	kg	*3070	*3070	*2200	2050	*1340	1100			*1050	940	3.37
(-6.6 ft)	lb	*6770	*6770	*4850	4520	*2950	2430			*2310	2070	(11.1)

Note 1. Lifting capacity are based on ISO 10567.
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Model	Type	Boom	Arm	Counterweight	Rubber shoe	Wheel	Dozer		Outtriger	
HX40A	Canopy	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		2600	1600	300	350	-	Down	-	-	-

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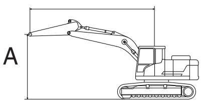

Load point height (A)		Load radius (B)								At max. reach		
		1.0 m (3.3 ft)		2.0 m (6.6 ft)		3.0 m (9.8 ft)		4.0 m (13.1 ft)		Capacity		Reach
												m (ft)
4.0 m	kg									*1000	870	3.62
(13.1 ft)	lb									*2200	1920	(11.9)
3.0 m	kg							*950	750	*930	650	4.35
(9.8 ft)	lb							*2090	1650	*2050	1430	(14.3)
2.0 m	kg					*1220	1130	*1040	730	*910	560	4.72
(6.6 ft)	lb					*2690	2490	*2290	1610	*2010	1230	(15.5)
1.0 m	kg					*1630	1060	*1190	700	*960	540	4.81
(3.3 ft)	lb					*3590	2340	*2620	1540	*2120	1190	(15.8)
Ground	kg			*1480	*1480	*1860	1020	*1280	680	*1050	550	4.66
Line	lb			*3260	*3260	*4100	2250	*2820	1500	*2310	1210	(15.3)
-1.0 m	kg	*1680	*1680	*2800	1880	*1800	1000	*1200	680	*1070	630	4.22
(-3.3 ft)	lb	*3700	*3700	*6170	4140	*3970	2200	*2650	1500	*2360	1390	(13.8)
-2.0 m	kg	*3070	*3070	*2200	1920	*1340	1030			*1050	880	3.37
(-6.6 ft)	lb	*6770	*6770	*4850	4230	*2950	2270			*2310	1940	(11.1)

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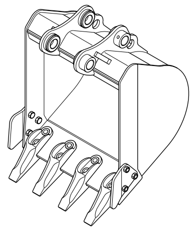
⚠ Failure to comply to the rated load can cause serious injury, death, or property damage. Make adjustments to the rated load as necessary for non-standard configurations.

6. BUCKET SELECTION GUIDE



0.11 m^3
SAE heaped bucket

Capacity		Width		Weight	Recommendation
					2.6 m (8' 6") boom
SAE heaped	CECE heaped	Without side cutter	With side cutter		1.6 m (5' 3") arm
0.11 m^3 (0.14 yd^3)	0.09 m^3 (0.12 yd^3)	500 mm (19.7")	610 mm (24.0")	87 kg (192 lb)	●
0.11 m^3 (0.14 yd^3)	0.09 m^3 (0.12 yd^3)	510 mm (20.1")	610 mm (24.0")	88 kg (194 lb)	●

● Applicable for materials with density of 2100 kg/m^3 (3500 lb/yd^3) or less

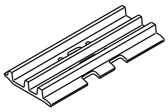
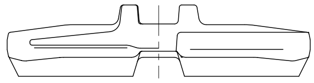
※ These recommendations are for general conditions and average use.
Work tools and ground conditions have effects on machine performance.
Select an optimum combination according to the working conditions and the type of work that is being done.
Consult with your local HD Hyundai Construction Equipment dealer for information on selecting the correct boom-arm-bucket combination.

7. UNDERCARRIAGE

1) TRACKS

X-leg type center frame is integrally welded with reinforced box-section track frames. The design includes dry tracks, lubricated rollers, idlers, sprockets, hydraulic track adjusters with shock absorbing springs and assembled track-type tractor shoes with double grousers.

2) TYPES OF SHOES

Model	Shapes		Steel triple grouser	Rubber track
				
HX40A	Shoe width	mm (in)	350 (14")	350 (14")
	Operating weight	kg (lb)	4480 (9880)	4390 (9680)
	Ground pressure	kgf/cm^2 (psi)	0.35 (4.96)	0.34 (4.82)
	Overall width	mm (ft-in)	1740 (5' 9")	1740 (5' 9")

3) NUMBER OF ROLLERS AND SHOES ON EACH SIDE

Item	Quantity
Carrier rollers	1 EA
Track rollers	4 EA
Track shoes (steel grouser)	45 EA

8. SPECIFICATIONS FOR MAJOR COMPONENTS

1) ENGINE

Item	Specification
Model	Yanmar 4TNV88C-PHYB
Type	Water cooled 4-cycle, diesel engine
Cooling method	Water cooling
Number of cylinders and arrangement	4 cylinders, in-line
Firing order	1-3-4-2
Combustion chamber type	Direct Injection
Cylinder bore × stroke	88 × 90 mm (3.15" × 3.54")
Piston displacement	2190 cc (134 cu in)
Compression ratio	-
Rated gross horse power (SAE J1995)	39.0 hp (29.1 kW)
Rated net horse power (SAE J1995)	37.7 hp (28.1 kW)
Maximum torque	14.8 kgf · m (106.9 lbf · ft)
Engine oil quantity	7.4 ℓ (1.95 U.S. gal)
Dry weight	209 kg (461 lb)
Starting motor	12V-2.3 kW
Alternator	12V-55 A

2) MAIN PUMP

Item	Specification
Type	AL A10V O 45LA7DS (Load Sensing System)
Capacity	45 cc/rev
Maximum pressure	280 kgf/cm^2 (3983 psi)
Rated oil flow	99 ℓ/min (26.1 U.S. gpm / 21.8 U.K. gpm)
Rated speed	2200 rpm

3) MAIN CONTROL VALVE

Item	Specification
Type	Sectional, 10 spools
Operating method	Hydraulic pilot system
Main relief valve pressure	254 kgf/cm^2 (3613 psi)
Overload relief valve pressure	275 kgf/cm^2 (3912 psi)

4) SWING MOTOR

Item	Specification
Type	Fixed displacement axial piston motor
Capacity	23 cc/rev
Relief pressure	210 kgf/cm^2 (2990 psi)
Braking system	Automatic, spring applied hydraulic released
Braking torque	1393 kgf · m (10076 lbf · ft)
Brake release pressure	20~65 kgf/cm^2 (284~925 psi)
Reduction gear type	2 - stage planetary

5) TRAVEL MOTOR

Item	Specification
Type	Two fixed displacement axial piston motor
Capacity	22.9/14.6 cc/rev
Relief pressure	230 kgf/cm^2 (3270 psi)
Reduction gear type	2-stage planetary
Braking system	Automatic, spring applied hydraulic released
Brake release pressure	9.7 kgf/cm^2 (138 psi)
Braking torque	4.9 kgf · m (71.6 lbf · ft)

6) CYLINDER

Item		Specification
Boom cylinder	Bore dia × Rod dia × Stroke	Ø90 × Ø50 × 648 mm
	Cushion	Extend only
Arm cylinder	Bore dia × Rod dia × Stroke	Ø85 × Ø50 × 550 mm
	Cushion	Extend and retract
Bucket cylinder	Bore dia × Rod dia × Stroke	Ø80 × Ø45 × 520 mm
	Cushion	-
Boom swing cylinder	Bore dia × Rod dia × Stroke	Ø80 × Ø50 × 525 mm
	Cushion	-
Dozer cylinder	Bore dia × Rod dia × Stroke	Ø95 × Ø50 × 191 mm
	Cushion	-
Angle dozer cylinder	Bore dia × Rod dia × Stroke	Ø100 × Ø45 × 185 mm
	Cushion	-
Angle swing cylinder	Bore dia × Rod dia × Stroke	Ø55 × Ø30 × 331 mm
	Cushion	-

※ Discoloration of cylinder rod can occur when the friction reduction additive of lubrication oil spreads on the rod surface.

※ Discoloration does not cause any harmful effect on the cylinder performance.

7) BUCKET

Item	Capacity		Tooth quantity	Width	
	SAE heaped	CECE heaped		Without side cutter	With side cutter
STD	0.11 m^3 (0.14 yd^3)	0.09 m^3 (0.12 yd^3)	4	500 mm (19.7")	610 mm (24.0")
STD (europe)	0.11 m^3 (0.14 yd^3)	0.09 m^3 (0.12 yd^3)	4	510 mm (20.1")	610 mm (24.0")

9. RECOMMENDED OILS

HD Hyundai Construction Equipment genuine lubricating oils have been developed to offer the best performance and service life for your equipment. These oils have been tested according to the specifications of HD Hyundai Construction Equipment and, therefore, will meet the highest safety and quality requirements.

We recommend that you use only HD Hyundai Construction Equipment genuine lubricating oils and grease officially approved by HD Hyundai Construction Equipment.

Service point	Kind of fluid	Capacity ℓ (U.S. gal)	Ambient temperature˚C (˚F) -50 (-58), -30 (-22), -20 (-4), -10 (14), 0 (32), 10 (50), 20 (68), 30 (86), 40 (104)
Engine oil pan	Engine oil	7.4 (2.0)	★SAE 5W-40 SAE 30 SAE 10W SAE 10W-30 SAE 15W-40
Final drive	Gear oil	0.6×2 (0.16×2)	★SAE 75W-90 SAE 85W-140
Hydraulic tank	Hydraulic oil	Tank: 42.5 (11.2) System: 78 (20.6)	★ISO VG 15 ISO VG 46 ISO VG 68
Fuel tank	Diesel fuel★1	66.8(17.6)	★ASTM D975 NO.1 ASTM D975 NO.2
Fitting (grease nipple)	Grease	As required	★NLGI NO.1 NLGI NO.2
Radiator (reservoir tank)	Mixture of antifreeze and soft water★2	10.2 (2.7)	Ethylene glycol base permanent type (50 : 50) ★Ethylene glycol base permanent type (60 : 40)

※ Using any lubricating oils other than HD Hyundai Construction Equipment genuine products may lead to a deterioration of performance and cause damage to major components.

※ Do not mix HD Hyundai Construction Equipment genuine oil with any other lubricating oil as it may result in damage to the systems of major components.

※ For HD Hyundai Construction Equipment genuine lubricating oils and grease for use in regions with extremely low temperatures, please contact your local HD Hyundai Construction Equipment dealer.

SAE : Society of Automotive Engineers
API : American Petroleum Institute
ISO : International Organization for Standardization
NLGI : National Lubricating Grease Institute
ASTM : American Society of Testing and Material

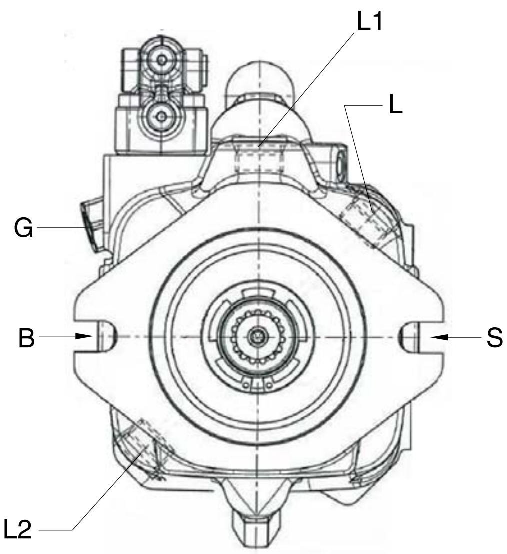
★ : Cold region
Russia, CIS, Mongolia
★1 : Ultra low sulfur diesel
- sulfur content ≤ 10 ppm
★2 : Soft water
City water or distilled water

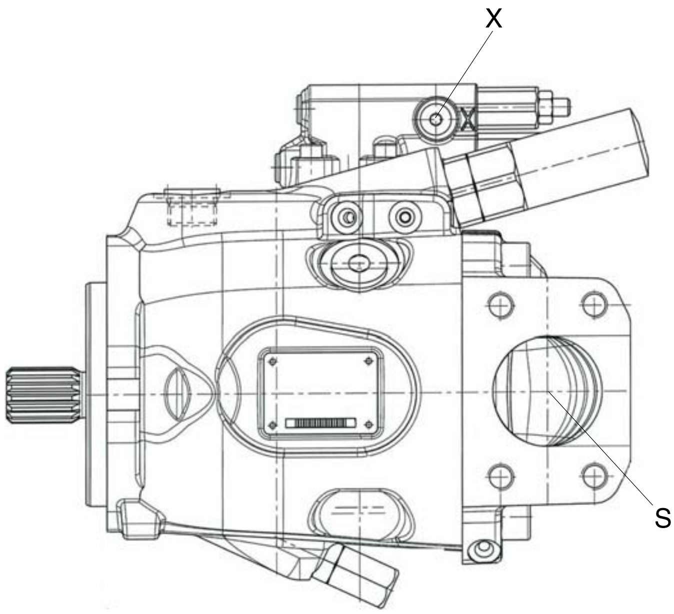
SECTION 2 STRUCTURE AND FUNCTION

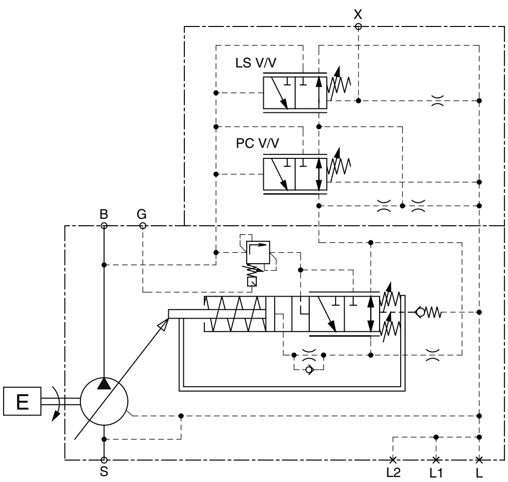
GROUP 1 HYDRAULIC PUMP

1. GENERAL

This main pump is variable displacement piston type with load sensing system.







Hydraulic circuit

48AZ2MP01

Description of the ports

Port	Name	Bore
S	Suction port	SAE 2"
B	Discharge port	SAE 1"
G	High pressure port for dual torque function	M10x1
X	Pilot pressure port	PF7/16-20UNF
L, L1, L2	Case drain port	PF7/8-14UNF

2. START OF POWER CONTROL

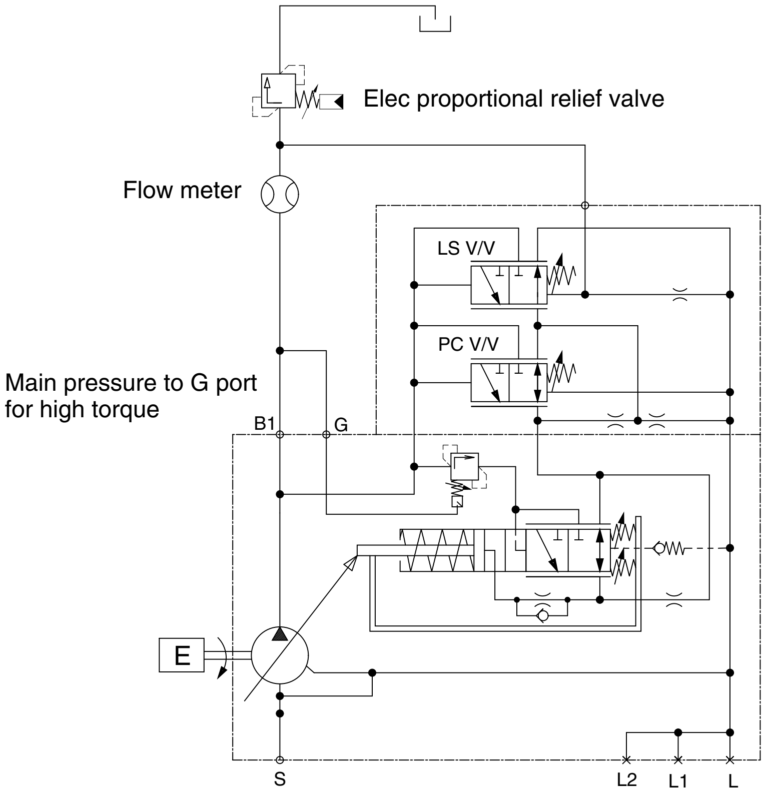
Setting of starting point in P-Q curve shall be carried out as per following conditions and procedures.

1) CONDITIONS

(1) Engine shall be running at 2000 rpm.

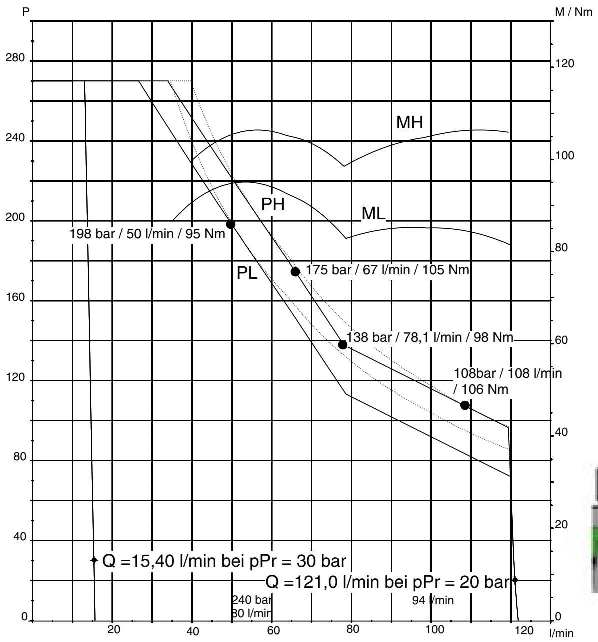
(2) Oil temperature shall be adjusted at 40 ℃.

(3) Pressure gauges and a flow meter shall be installed.

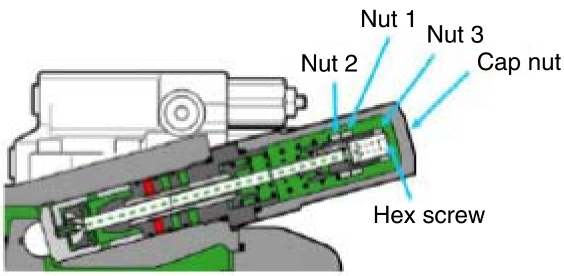


Schematic circuit

85A2MP10



P-Q curve



Pump schematic drawing

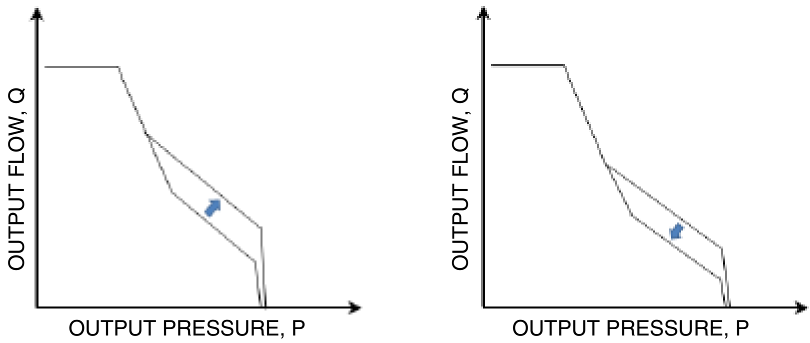
48AZ2MP11

2) PROCEDURES

(1) Loosen nut 1 fixing nut 2.
(2) Adjust outer spring by tightening or loosening nut 2.
 ① Increase pressure up to 170 bar.
 ② Turn Nut 2 clockwise to increase power until pumping flow reaches 123 ℓ/min (±4 ℓ/min).
(3) Secure the setting of nut 2 by tightening nut 1.

3) CHANGE OF P-Q CURVE

(1) If length of outer spring is decreased by tightening nut 2, the P-Q curve is moved to right in general like a graph left under as the spring tension is increased.
(2) If length of outer spring is increased by loosening nut 2, the P-Q curve is moved to left in general like a graph right under as the spring tension is decreased.



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3. END OF POWER CONTROL

Setting of ending point in P-Q curve shall be carried out following procedures and conditions.

1) CONDITIONS

(1) The conditions shall be set same as above.

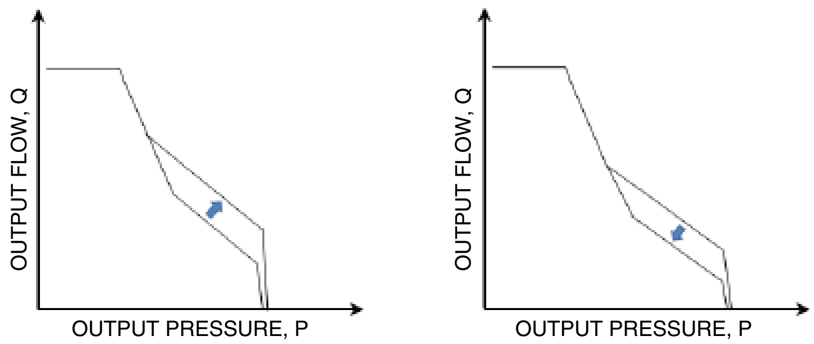
2) PROCEDURES

(1) Loosen the nut 3.
(2) Set end of control by turning Hexagonal screw.
 ① Increase pressure to 220 bar.
 ② Turn Screw clockwise to increase power until 92 ℓ/min (±4 ℓ/min) is reached.
(3) Secure the setting of nut 3.
(4) Tighten Cap nut.

3) CHANGE OF P-Q CURVE

(1) If length of Inner spring is deceased by tightening hexagonal screw, lower part of P-Q curve is moved to right like a graph left under as the tension force of spring is increased.

(2) If length of Inner spring is increased by loosening hexagonal screw, lower part of P-Q curve is moved to left like a graph left under as the tension force of spring is decreased.



85A2MP13

4. APPENDIXES

Required torque for bolt tightening

Part	Name	Required torque	
		kgf·m	lbf·ft
Nut 1	14 mm	5.1	36.9
Nut 2	14 mm	5.1	36.9
Nut 3	10 mm	4.1	29.7
Cap nut	32 mm	7.1	51.4
Hexagon screw	10 mm	-	-

5. DUAL TORQUE MODE

Pump power needs to be decreased in case that engine power is not enough to cover air condition operating at maximum pump operating. This function lets the pump power decrease by operating of dual torque valve.

(1) Normal operating condition (without air conditioner mode)

Solenoid valve (7) maintains the pushed position and allows oil to flow from passage (15) to passage (19). The pressure pushes dual torque valve (5) not to allow the pumping oil to flow toward control valve (6) inside. As a result, pressure in front of dual torque valve (5) does not effect on the angle of swash plate (25).

(2) Excessive operating condition (by air conditioner mode)

If air conditioner operates with maximum pump operating, the increased power will overload engine. Therefore, pump power needs to be decreased to share power consumption with air conditioner without overload to engine.

Connection between passage (15) and passage (19) is blocked by deactivation of solenoid valve (7). Dual torque valve which was pushed by the pressure in passage (19) also returns to initial position by spring force. This return allows the pumping oil to flow toward control valve (6) inside. The angel of swash plate (25) is decreased by the pressure in control valve. As a result, pump flow is decreased and power consumption by pump also is decreased.

6. UPSTROKE

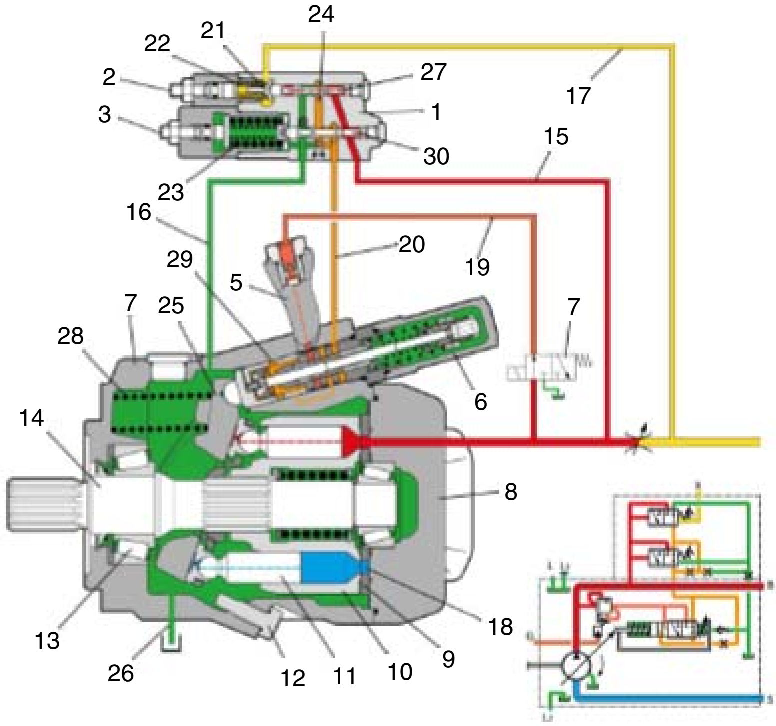
Upstroking of the pump occurs as a demand for flow from attachment.

The increased demand for flow causes a LS pressure in passage (17). The LS pressure in passage (17) combines with the force of spring (22) in cavity (21). The force of spring (22) causes pump pressure to be higher than pressure of passage (17).

If the combination of LS pressure and spring force is greater than the pump discharge pressure in passage (15), this difference pressure causes a spool (27) to move right. As the spool (27) moves right, the spool (27) blocks inflow of pumping oil to control piston (6) through passage (20). Swash plate (25) is controlled by pressure and flow as much as hydraulic system requests.

Pilot oil in passage (20) drains to passage (24). The oil then flows into housing through passage (16) into the housing and finally drains to tank. It also causes pumping flow to increase. As flow requirement is satisfied, pump output pressure increases. The pressure increases until the pressure in passage (24) moves flow compensator spool (27) up to be satisfied with system requirement for pressure and flow.

· Pump discharge pressure = force of spring (22) + LS pressure (17)



85A2MP14

1 Regulator
2 Flow adjustment screw
3 Pressure adjustment screw
4 Pump housing
5 Dual torque valve
6 Control valve
7 Solenoid valve
8 Port plate
9 Distributor plate
10 Cylinder block
11 Piston
12 Minimum flow limitation valve
13 Bearing
14 Drive shaft
15 Passage (high pressure)
16 Passage (leakage pressure)
17 Passage (pilot pressure)
18 Passage (suction pressure)
19 Passage (dual torque valve pilot pressure)
20 Passage (control piston pilot pressure)
21 Cavity
22 Spring
23 Spring
24 Passage
25 Swash plate
26 Casing drain
27 Flow compensator spool
28 Spring
29 Cross drilled hole
30 Pressure compensator spool

7. DESTROKE

The decreased flow demand causes LS pressure in passage (17). LS pressure in passage (17) combines with force of spring (22) in cavity (21).

This combination of LS pressure and spring force is less than the pump pressure in passage (15). It causes flow compensator spool (27) to move left.

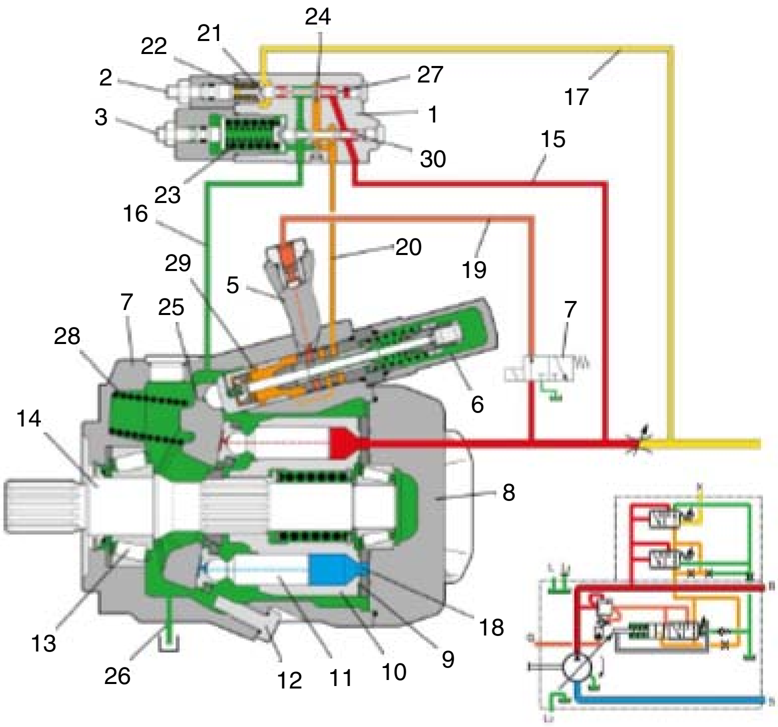
Pumping oil now flows through passage (15). The oil then flows past flow compensator spool (27), and then to control piston (6) through passage (20).

Combined force of pump pressure behind control piston (6) and counter spring (28) is bigger than force of springs inside control piston (6). Angle of swash plate (25) decreases.

This action results in decreasing of pump output and system pressure.

When the flow is decreased enough, flow compensator spool (27) moves right up to the balance position.

Swash plate (25) maintains the angle that is sufficient to provide the lower required pressure. If the operator does not operate RCV lever or pedal, the pump will return to low pressure stand-by.



85A2MP15

8. LOW PRESSURE STAND-BY

Low pressure standby constitutes the following condition: a running engine and inactive attachment. There is no flow demand or pressure demand on the pump. Therefore, there is no LS pressure in passage (17).

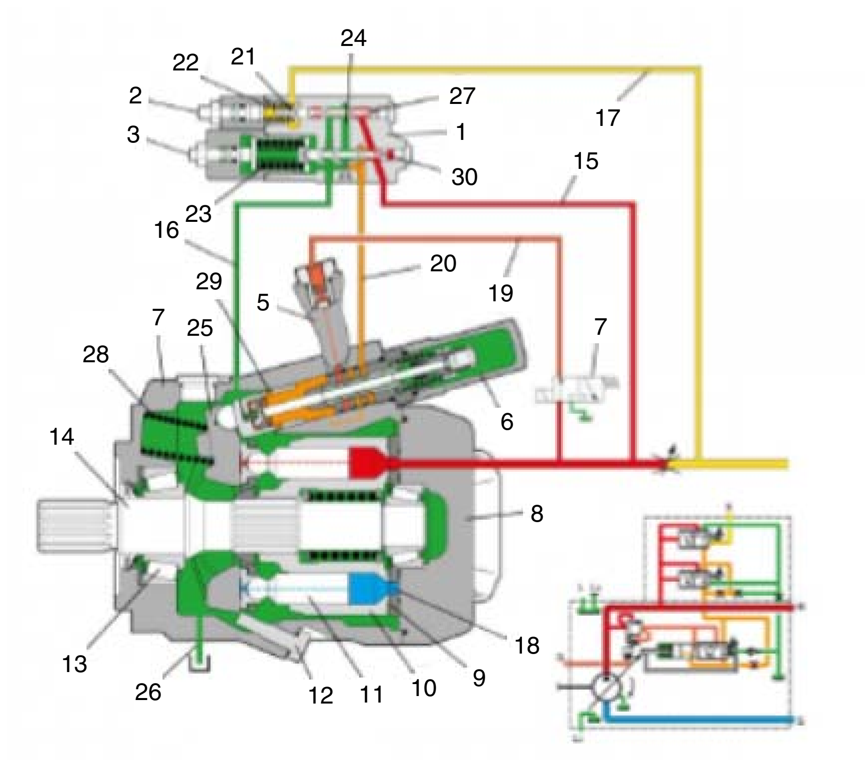
Before you start the engine, counter spring (28) holds swash plate (25) at the maximum angle. As the pump begins to operate, oil begins to flow and pressure increases in the system.

As the pressure increases, the pressure pushes flow compensator spool (27) against spring (22). It causes flow compensator spool (27) to move left. It opens passage (24) in order to allow pumping oil to flow to control piston (6) via passage (20).

The oil acts against control piston (6) in order to overcome the force of counter spring (28). The oil causes control piston (6) to move to the left. When control piston (6) moves to the left, the piston moves swash plate (25) toward the minimum angle. Control piston (6) continues to move to the left until cross-drilled hole (29) allows the oil to drain to pump housing. Cross-drilled hole (29) limits the maximum travel of control piston (6) toward the left.

The pump supplies a sufficient amount of flow that can compensate for the system leakage and the pump leakage. The leakage to the pump housing is flowed from the cross-drilled hole. The pump maintains low pressure stand-by. Low pressure stand-by should not exceed 15 bar.

※ **Low pressure standby will vary in the same pump as the system leakage or the pump leakage increases. The pump will slightly upstroke in order to compensate for the leakage increasing. Control piston (6) will cover much flow control than the flow through the cross-drilled hole.**



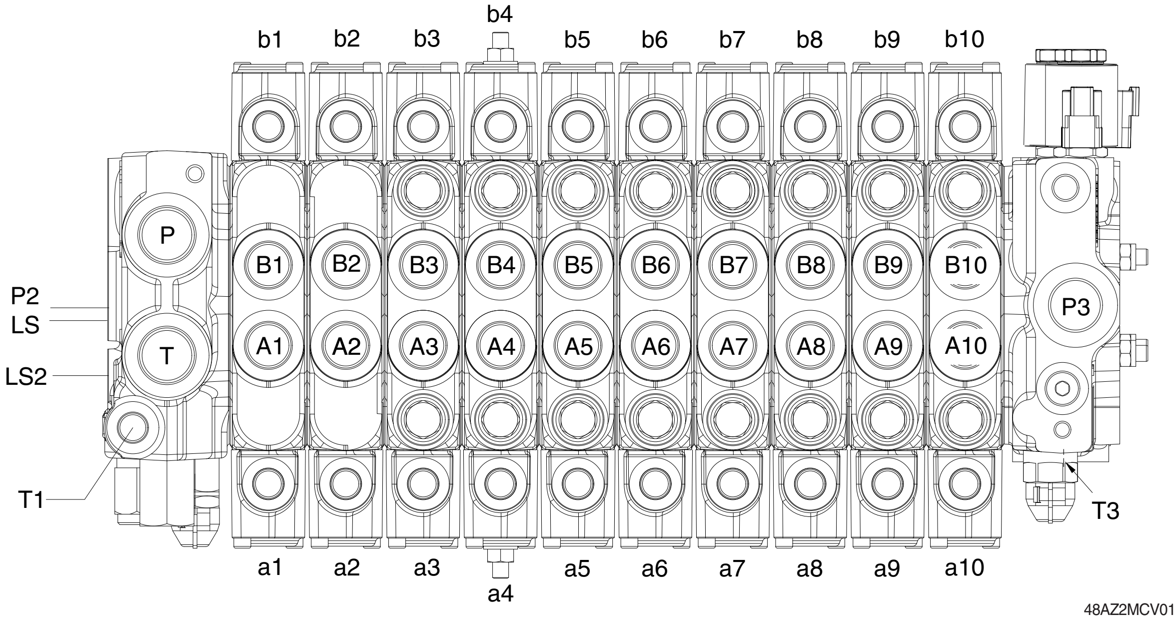
85A2MP16

9. CUT OFF FUNCTION

Once sudden pressure increasing in LS line occurs while attachments work, flow decreasing should be a necessary function to prevent a shock inside the pump. When high pressure in passage (15) flows to regulator (1), spools are likely to move by its force. However, shift of flow compensator spool (27) is restricted by LS pressure pushing spring (22) which is generated from attachments. Therefore, flow compensator spool (27) still blocks a connection from passage (27) to passage (24). The flow blocked by flow compensator spool (27) alternatively shifts pressure compensator spool (30) to right. Passage (15) connects to passage (20) by this shift. High pressure flows to control valve (6), then decreases an angle of swash plate (25). Pumping flow finally will decrease by shift of flow compensator spool (27) although flow compensator spool (27) does not shift.

GROUP 2 MAIN CONTROL VALVE

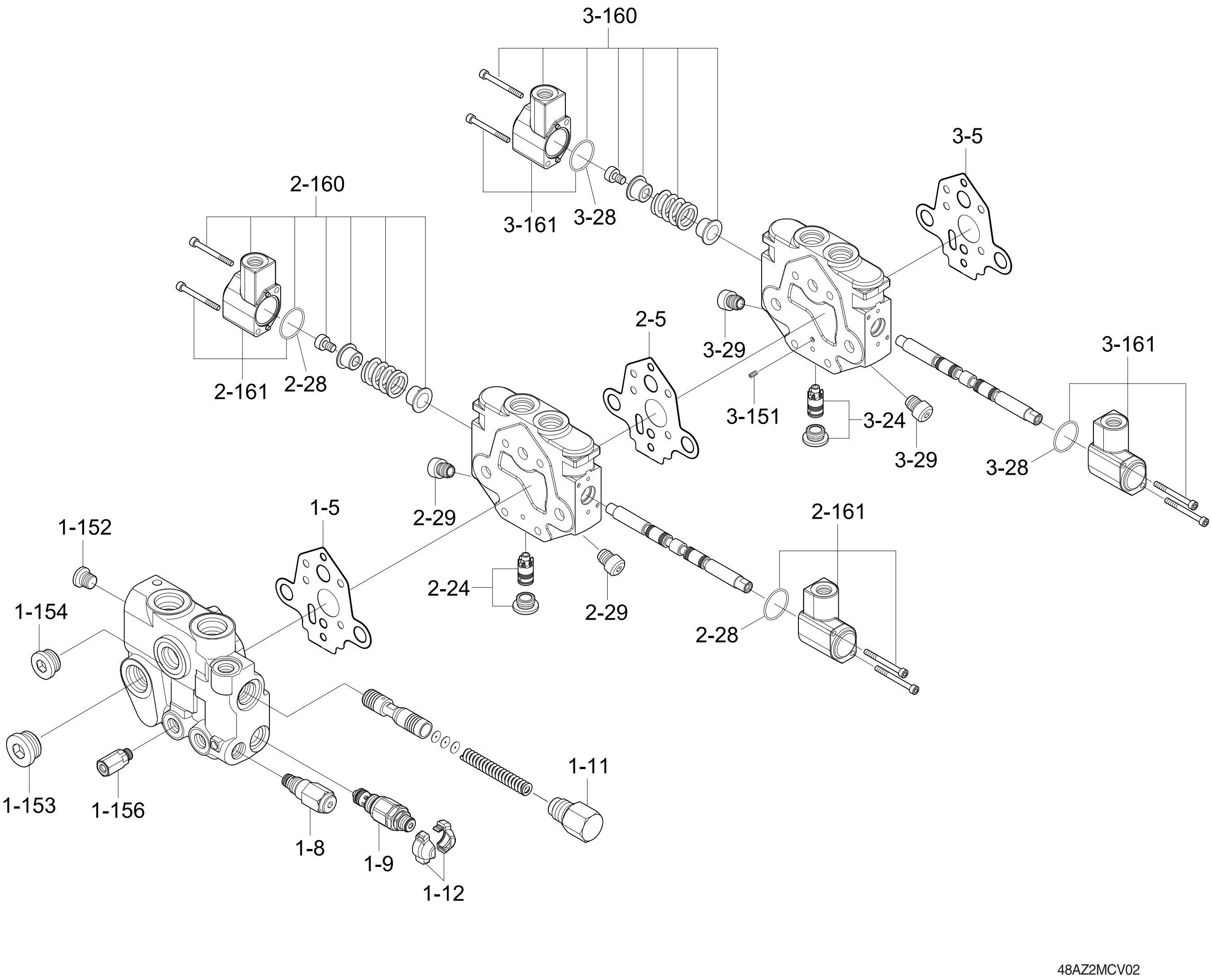
1. OUTLINE



Mark	Port name
P	Pump port
P3	Pump port
A4	Swing port (LH)
B4	Swing port (RH)
A7	Dozer down port
B7	Dozer up port
A8	Boom swing port (LH)
B8	Boom swing port (RH)
A10	Rotating port-CCW
B10	Rotating port-CW
A5	Arm out port
B5	Arm in port
A2	Travel port [LH/FW]
B2	Travel port [LH/RR]
A1	Travel port [RH/FW]
B1	Travel port [RH/RR]
A3	Boom up port
B3	Boom down port
A6	Bucket in port
B6	Bucket out port
A9	Auxiliary 1 port (opt)
B9	Auxiliary 1 port (opt)
T	Tank return port

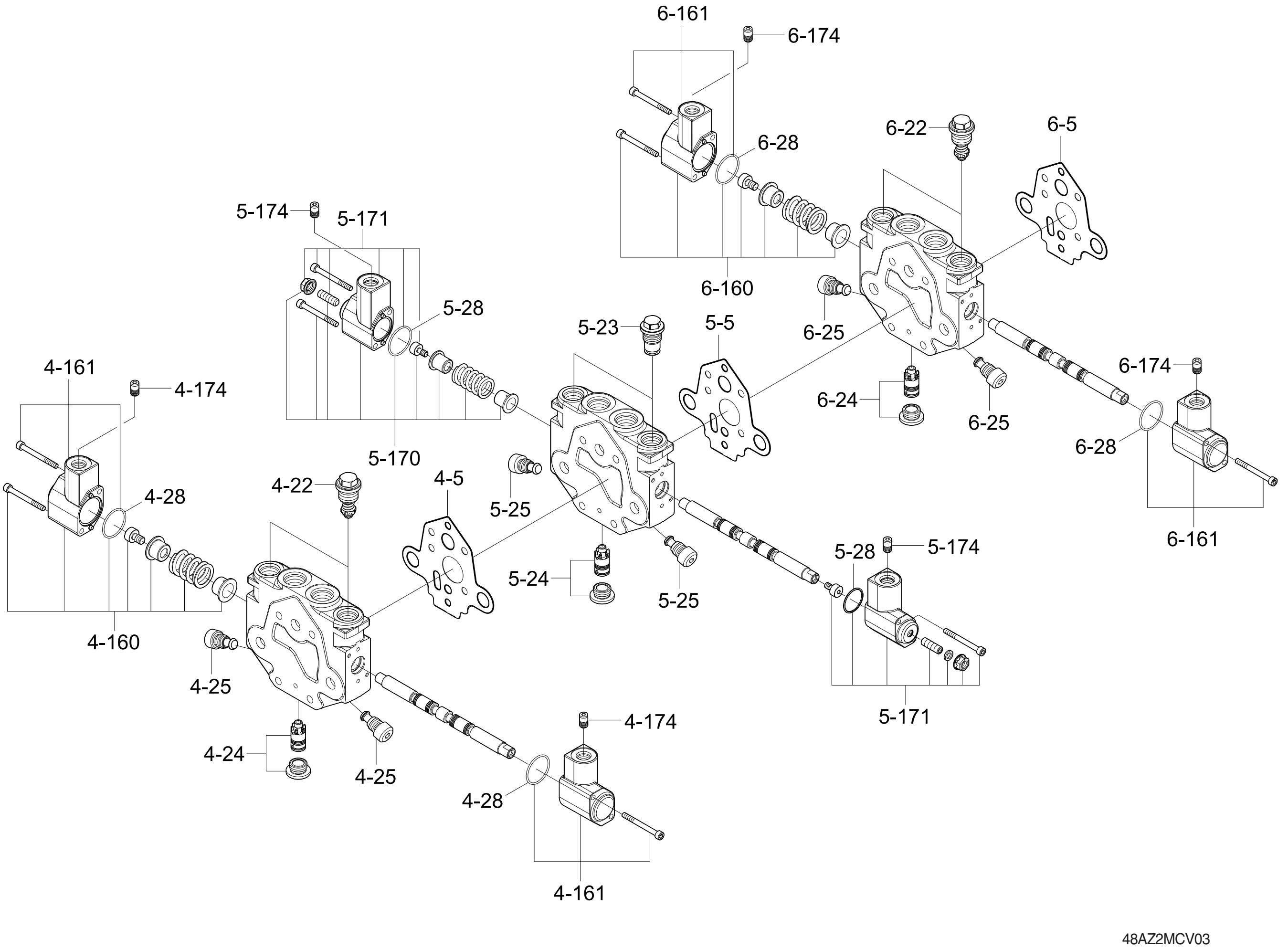
Mark	Port name
T1, T3	Tank return port
a4	Swing pilot port (LH)
b4	Swing pilot port (RH)
a7	Dozer down pilot port
b7	Dozer up pilot port
a8	Boom swing pilot port (LH)
b8	Boom swing pilot port (RH)
a10	Rotating pilot port-CCW
b10	Rotating pilot port-CW
a5	Arm out pilot port
b5	Arm in pilot port
a2	Travel pilot port (LH/FW)
b2	Travel pilot port (LH/RR)
a1	Travel pilot port (RH/FW)
b1	Travel pilot port (RH/RR)
a3	Boom up pilot port
b3	Boom down pilot port
a6	Bucket in pilot port
b6	Bucket out pilot port
a9	Auxiliary 1 pilot port (opt)
b9	Auxiliary 1 pilot port (opt)
LS	Load sensing port
LS2	Load sensing port

2. STRUCTURE (1/4)



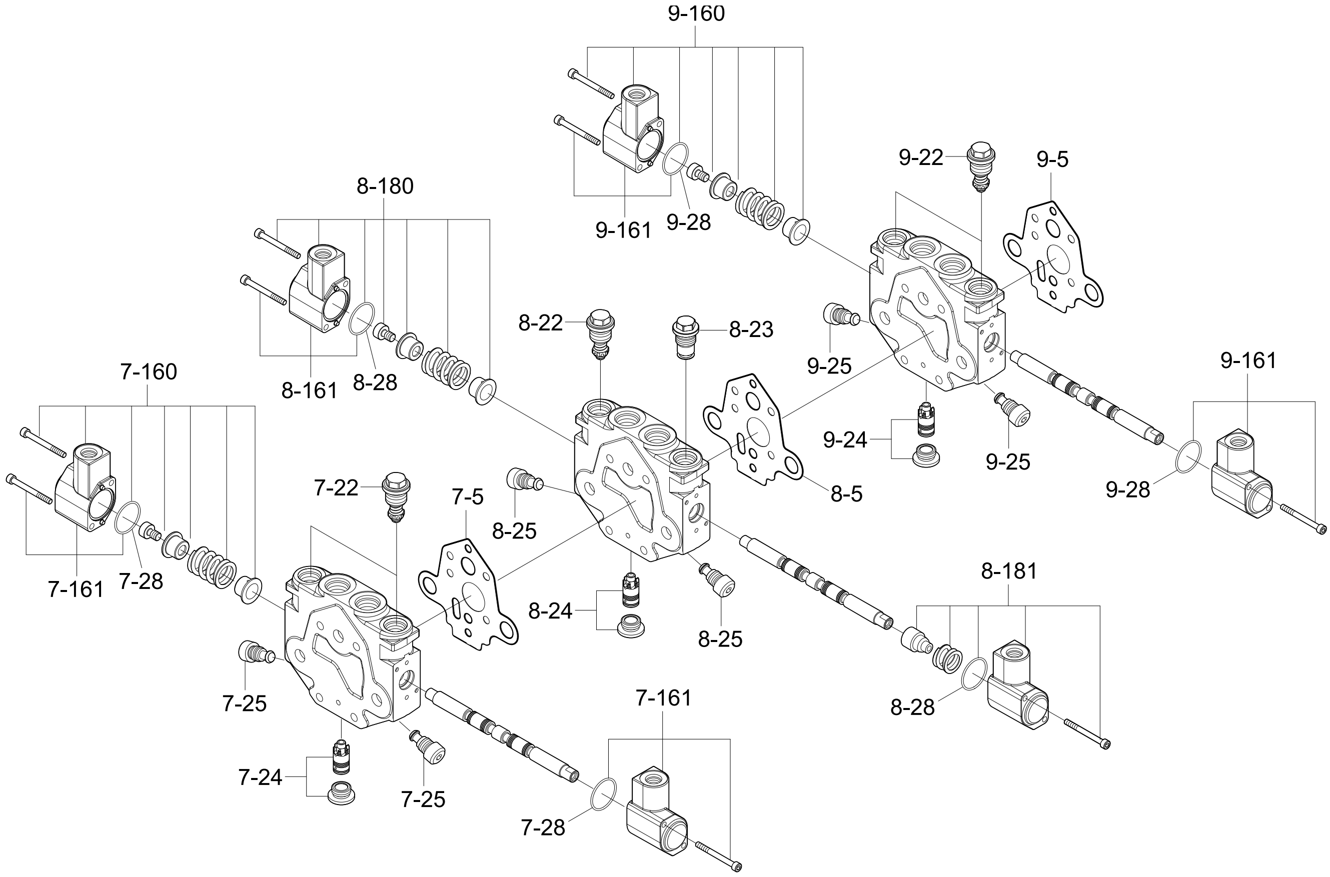
1	Inlet block assy	1-154	Sealing plug	3	Travel block assy
1-5	Plate seal	1-156	Shuttle valve	3-5	Plate seal
1-8	Flow regulator	2	Travel block assy	3-24	Compensator kit
1-9	Relief valve	2-5	Plate seal	3-28	Seal kit
1-11	Plug	2-24	Compensator kit	3-29	Orifice plug
1-12	Locking cover	2-28	Seal kit	3-151	Throttle screw
1-12	Locking cover	2-29	Orifice plug	3-160	W/spool cover kit
1-152	Sealing plug	2-160	W/spool cover kit	3-161	Cover kit
1-153	Sealing plug	2-161	Cover kit		

STRUCTURE (2/4)



4	Boom block assy	5	Swing block assy	6	Arm block assy
4-5	Plate seal	5-5	Plate seal	6-5	Plate seal
4-22	Relief valve	5-23	Plug	6-22	Relief valve
4-24	Compensator kit	5-24	Compensator kit	6-24	Compensator kit
4-25	Check valve	5-25	Check valve	6-25	Check valve
4-28	Seal kit	5-28	Seal kit	6-28	Seal kit
4-160	W/spool cover kit	5-170	W/spool cover kit	6-160	W/spool cover kit
4-161	Cover kit	5-171	Cover kit	6-161	Cover kit
4-174	Snubber	5-174	Snubber	6-174	Snubber

STRUCTURE (3/4)



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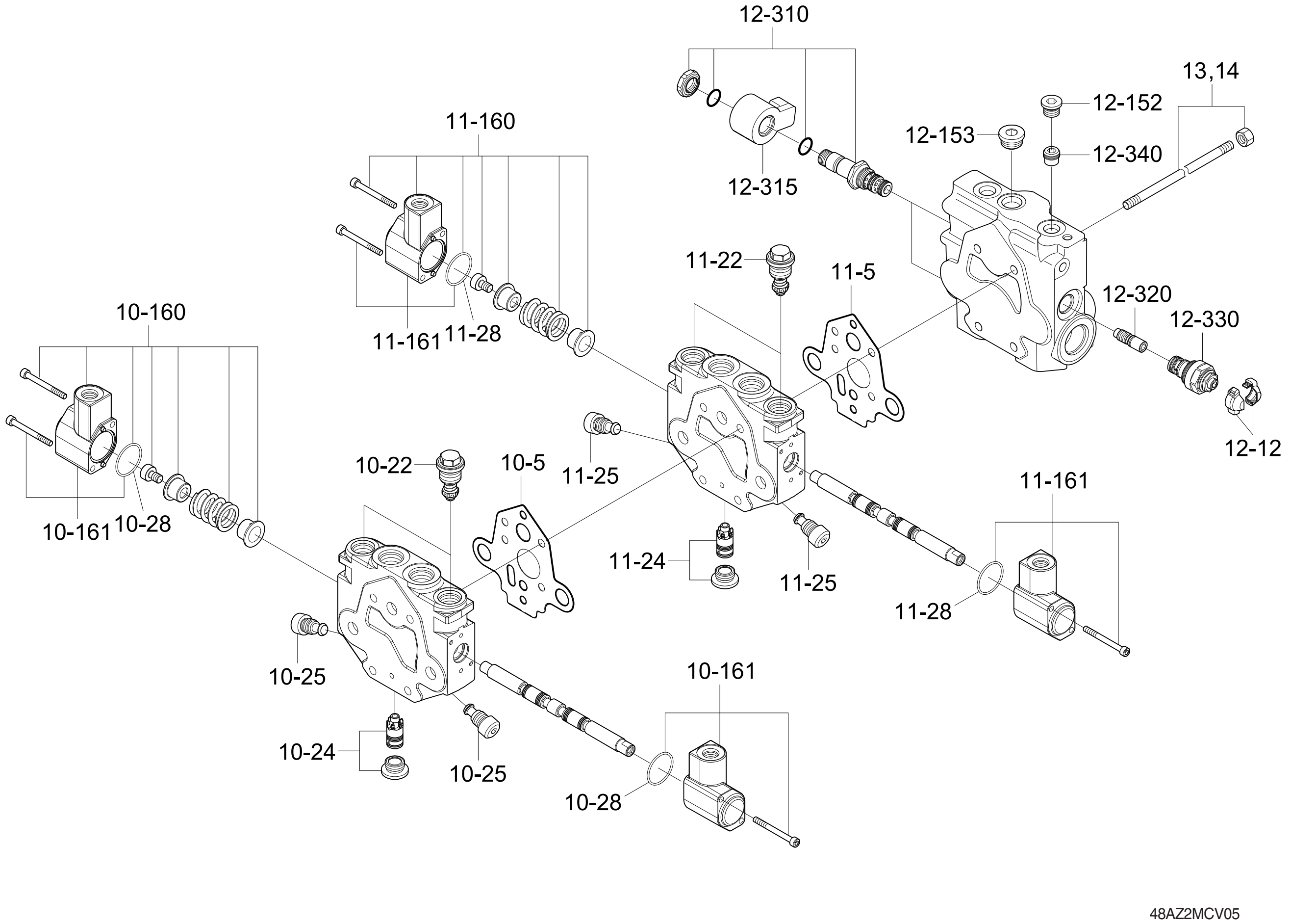
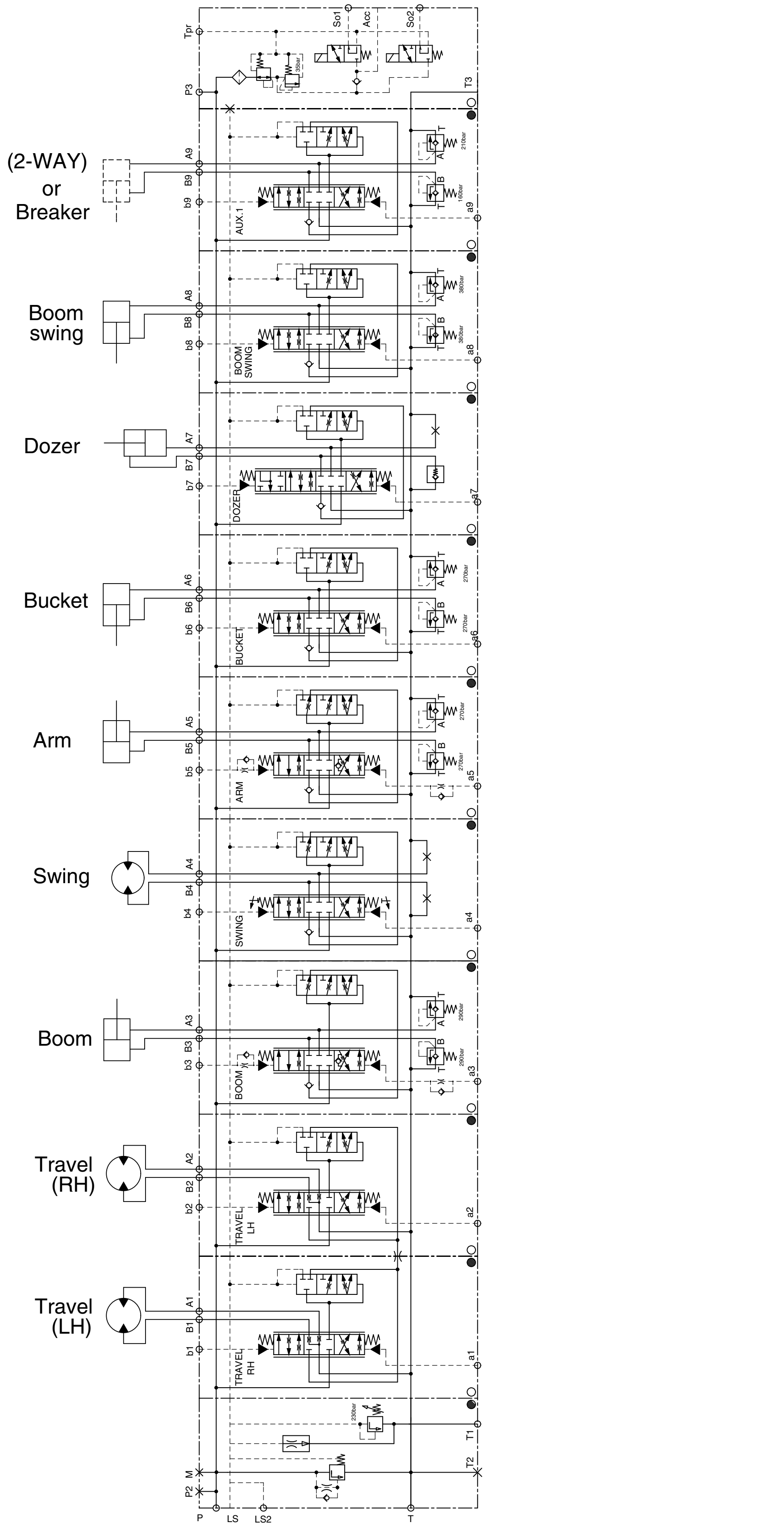
7	Bucket block assy	8-5	Plate seal	9	Boom swing block assy
7-5	Plate seal	8-22	Anticavitation valve	9-5	Plate seal
7-22	Relief valve	8-23	Plug	9-22	Relief valve
7-24	Compensator kit	8-24	Compensator kit	9-24	Compensator kit
7-25	Check valve	8-25	Check valve	9-25	Check valve
7-28	Seal kit	8-28	Seal kit	9-28	Seal kit
7-160	W/spool cover kit	8-161	Cover kit	9-160	W/spool cover kit
7-161	Cover kit	8-180	W/spool cover kit	9-161	Cover kit
8	Dozer block assy	8-181	W/spool cover kit		

STRUCTURE (4/4)



10	Aux 1 block assy	11-5	Plate seal	12-152	Sealing plug
10-5	Plate seal	11-22	Relief valve	12-153	Sealing plug
10-22	Relief valve	11-24	Compensator kit	12-310	Valve kit
10-24	Compensator kit	11-25	Check valve	12-315	Solenoid
10-25	Check valve	11-28	Seal kit	12-320	Shuttle
10-28	Seal kit	11-160	W/spool cover kit	12-330	Pressure relief valve
10-160	W/spool cover kit	11-161	Cover kit	12-340	Filter
10-161	Cover kit	12	Outlet block assy	13	Tie rod
11	Aux 2 block assy	12-12	Locking cover	14	Tie rod

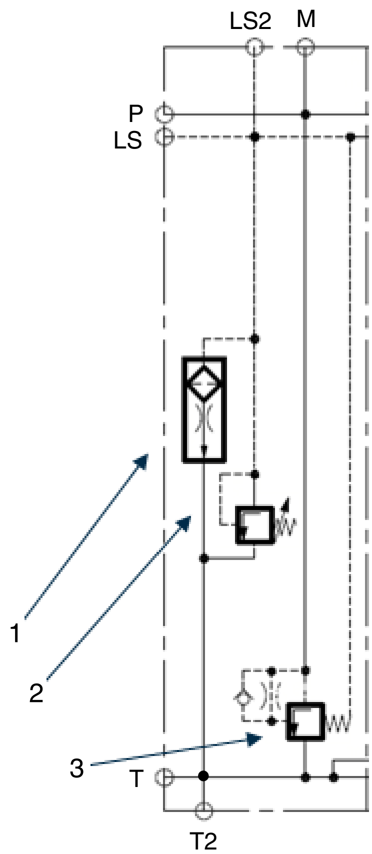
3. HYDRAULIC CIRCUIT (boom swing, 2-way)



4. FUNCTION

1) INLET ELEMENT DESCRIPTION

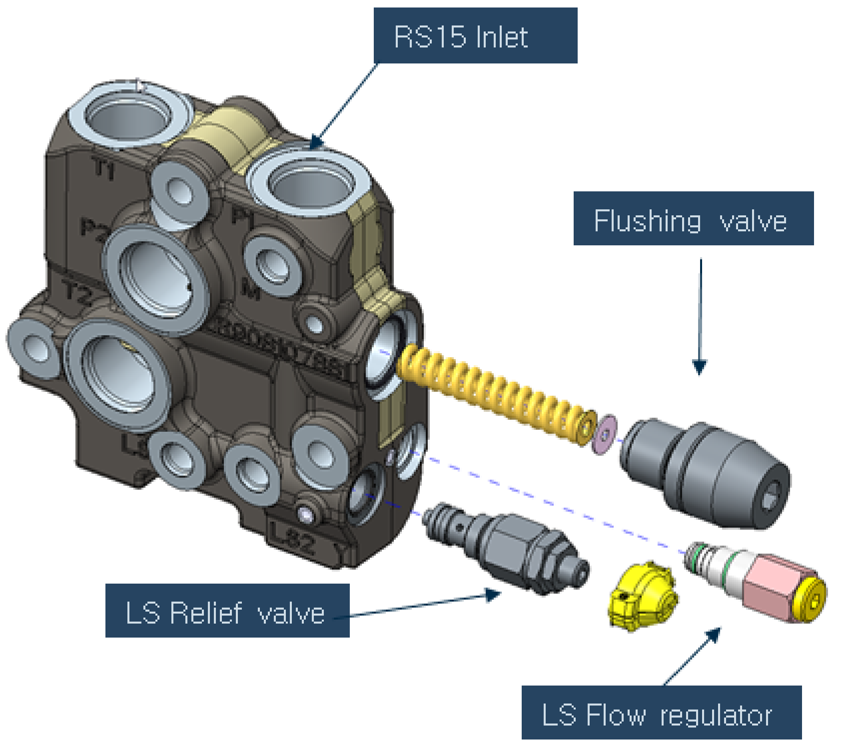
- The inlet plate has the line connections P, T, LS, T2 and M.
- The inlet element moreover comprises all components necessary for the system function: One flow control valve (1) for the controlled unloading of the LS line and one LS pressure relief valve (2) to limit the maximum system pressure.
- Protection of the system by means of LS pressure relief valve (2) combined with flushing valve (3).



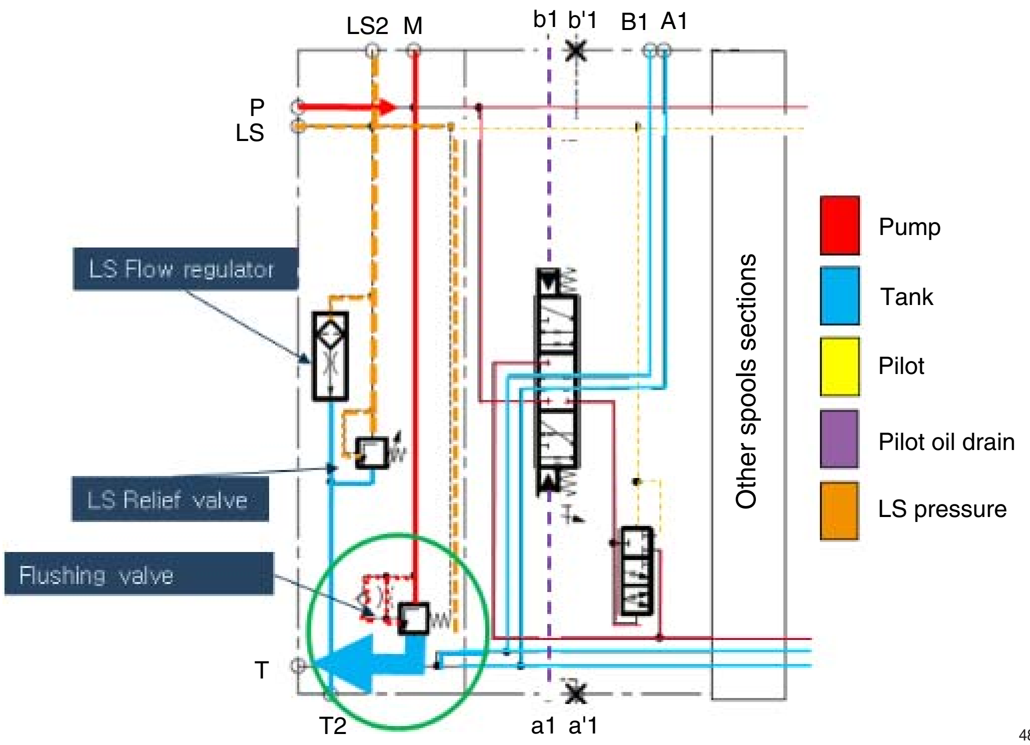
48AZ2MCV10

(1) Inlet description - all spools at neutral position

First section-travel-represented at neutral



85A2MC11



48AZ2MCV12

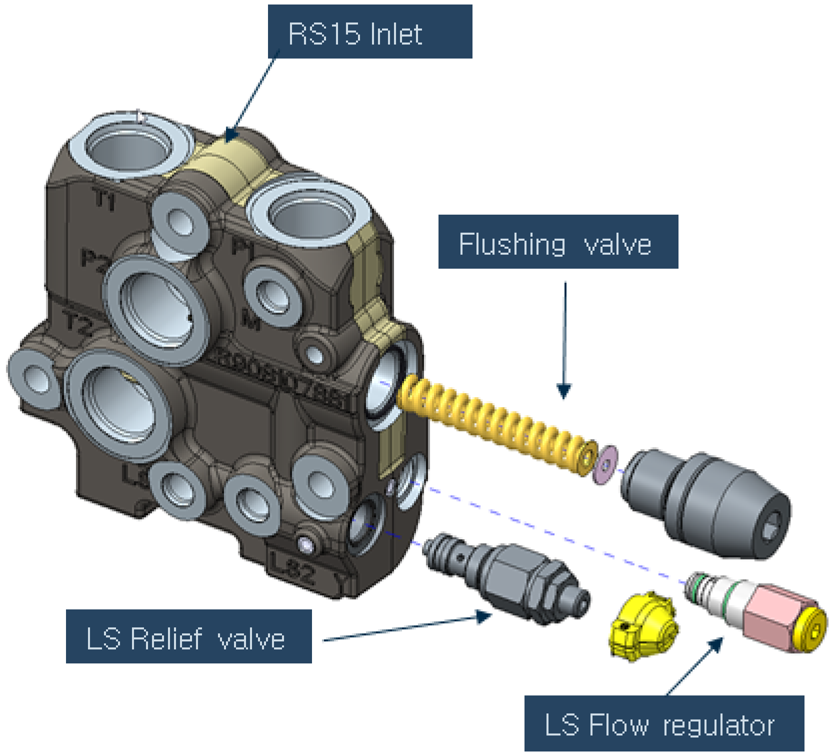
The Inlet element allows the exchange of the in the flow from the pump and the out flow to the tank.

When all sections are in neutral position, the pump is in stand-by and flow is reduced to the minimum pump flow (14 ℓ/min).

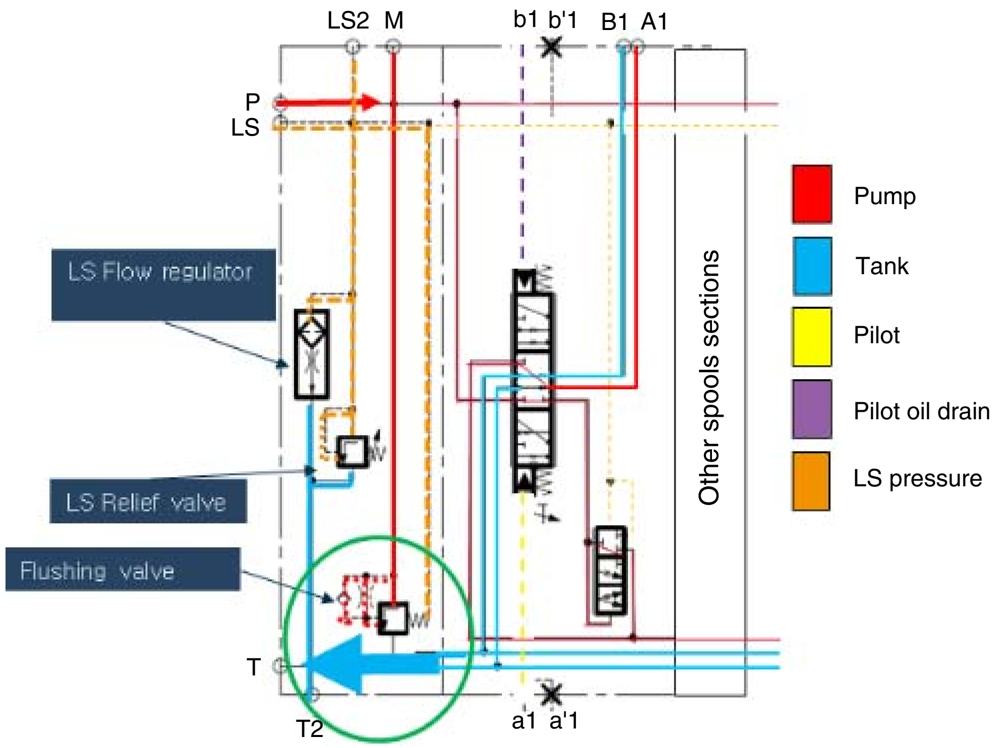
All the minimum pump flow pass through the flushing valve which is open, it means connected to the tank.

(2) Inlet description - spool actuated

First section-travel-PABT spool position represented.



85A2MC13

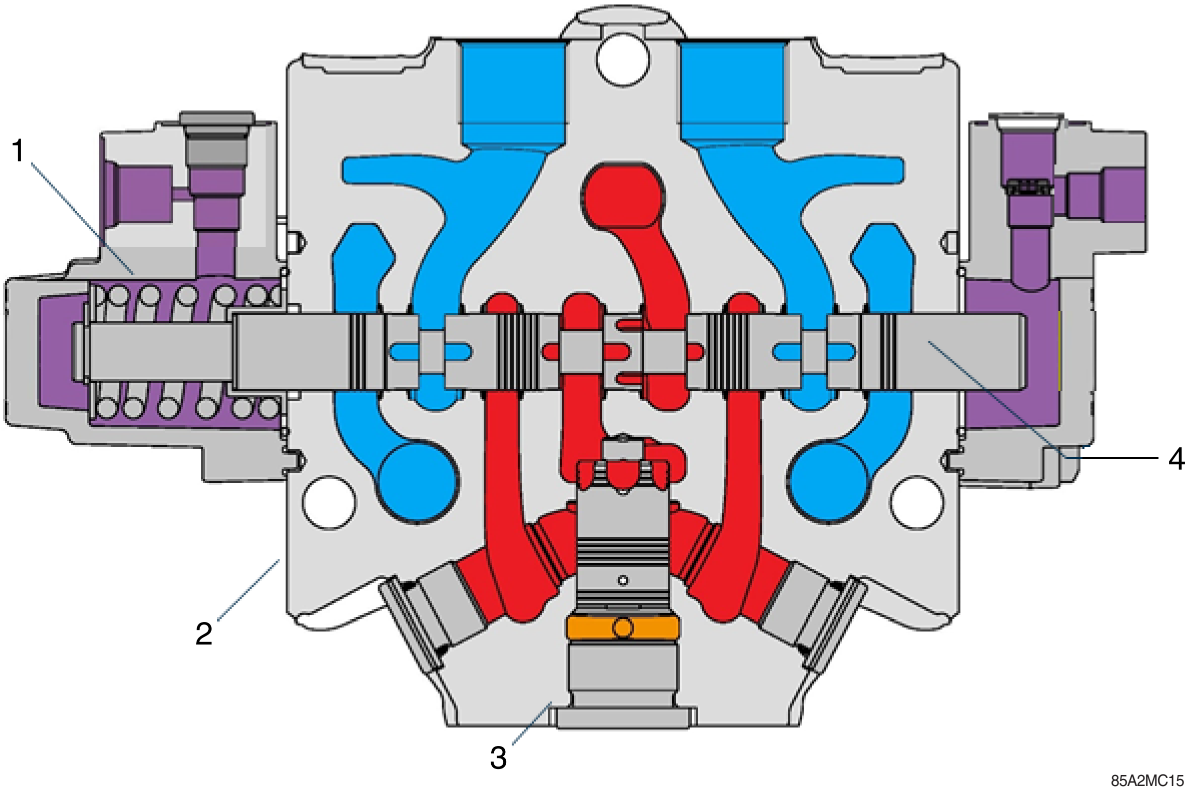


48AZ2MCV14

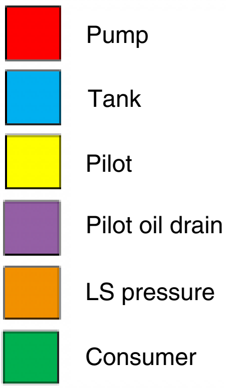
As soon as one or more spool moves, the flow stop to pass trough the flushing valve, which is closed, not anymore connected to the tank. The flow pass trough the spool to reach the movement, and then go to the tank by the T line after the spool.

2) TRAVEL SECTION DESCRIPTION - SECTION 1 AND 2

(1) Component description



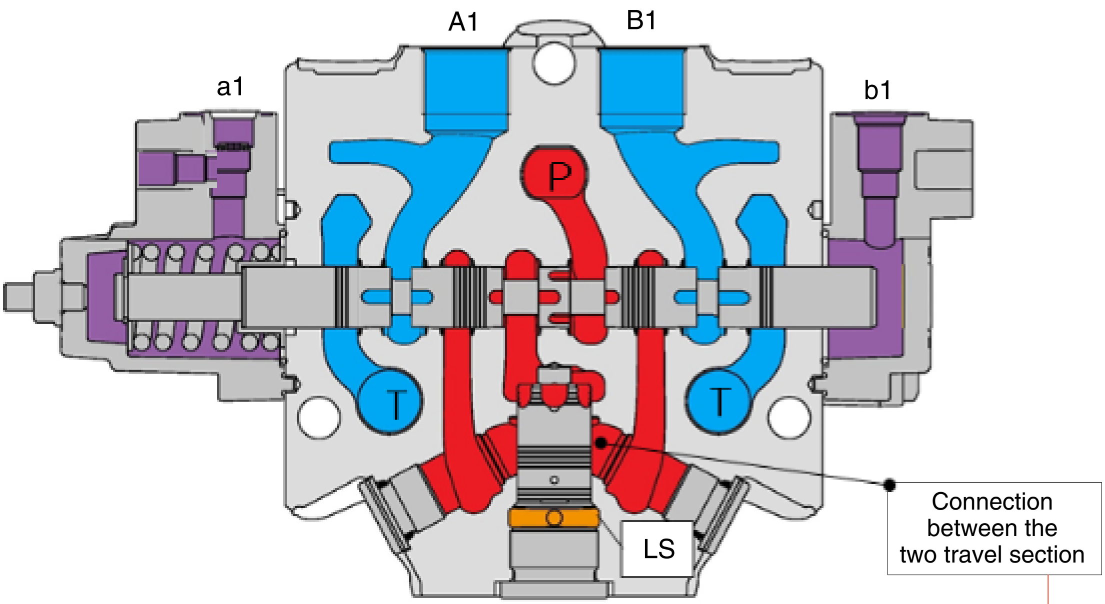
85A2MC15



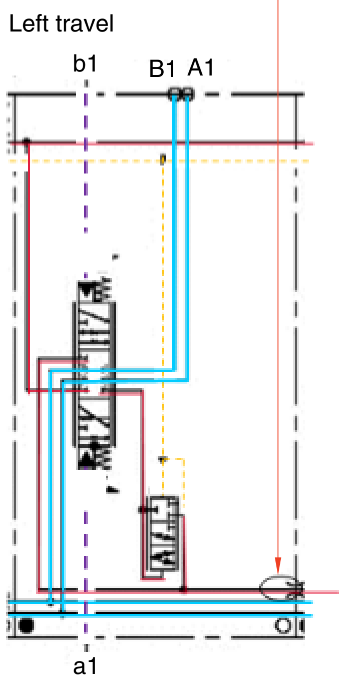
85A2MC16

1 Spring pack
2 Housing
3 Pressure compensator
4 Spool

(2) Neutral position

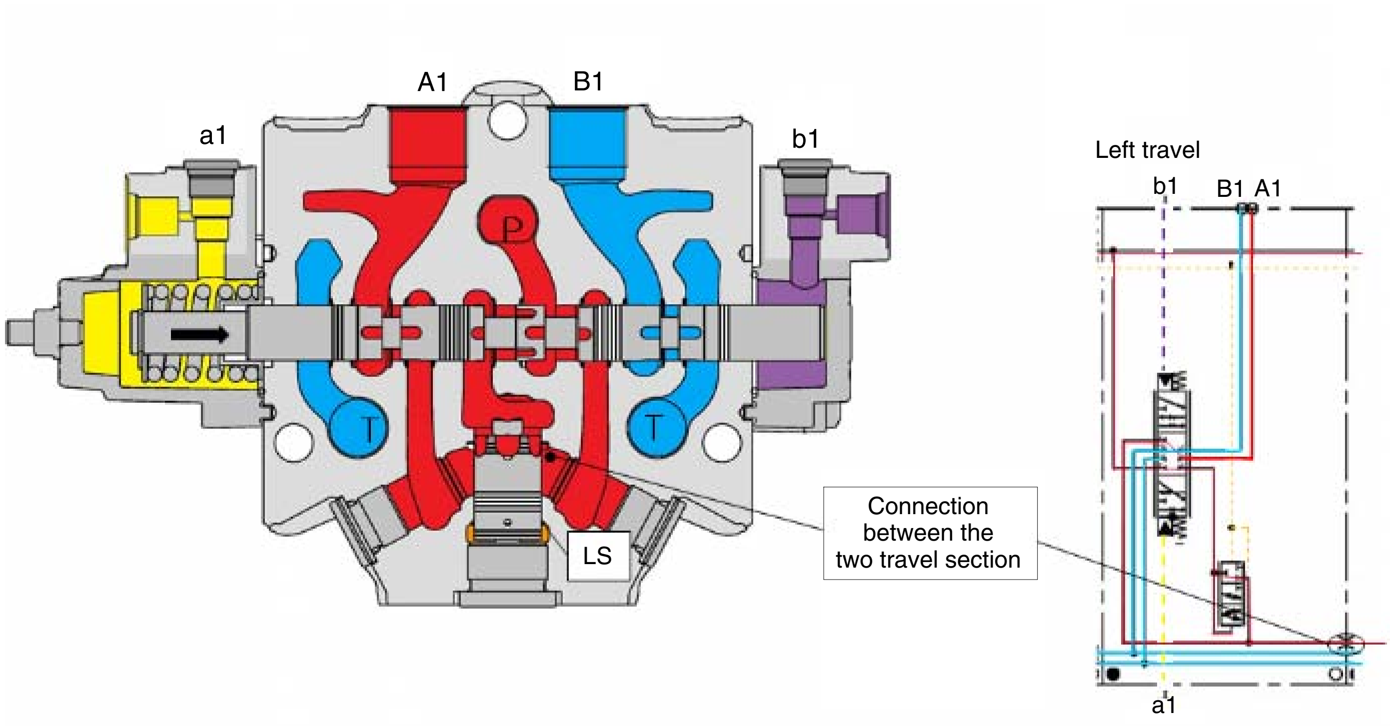


The spool is in neutral position, pump is in low pressure stand-by. The A and B ports are not connected to the pumps but to the tank. This is in order to ensure A and B to be drained to tank. The two translation branches, 1 and 2, are connected in order not to have differences in traction.



85A2MC15

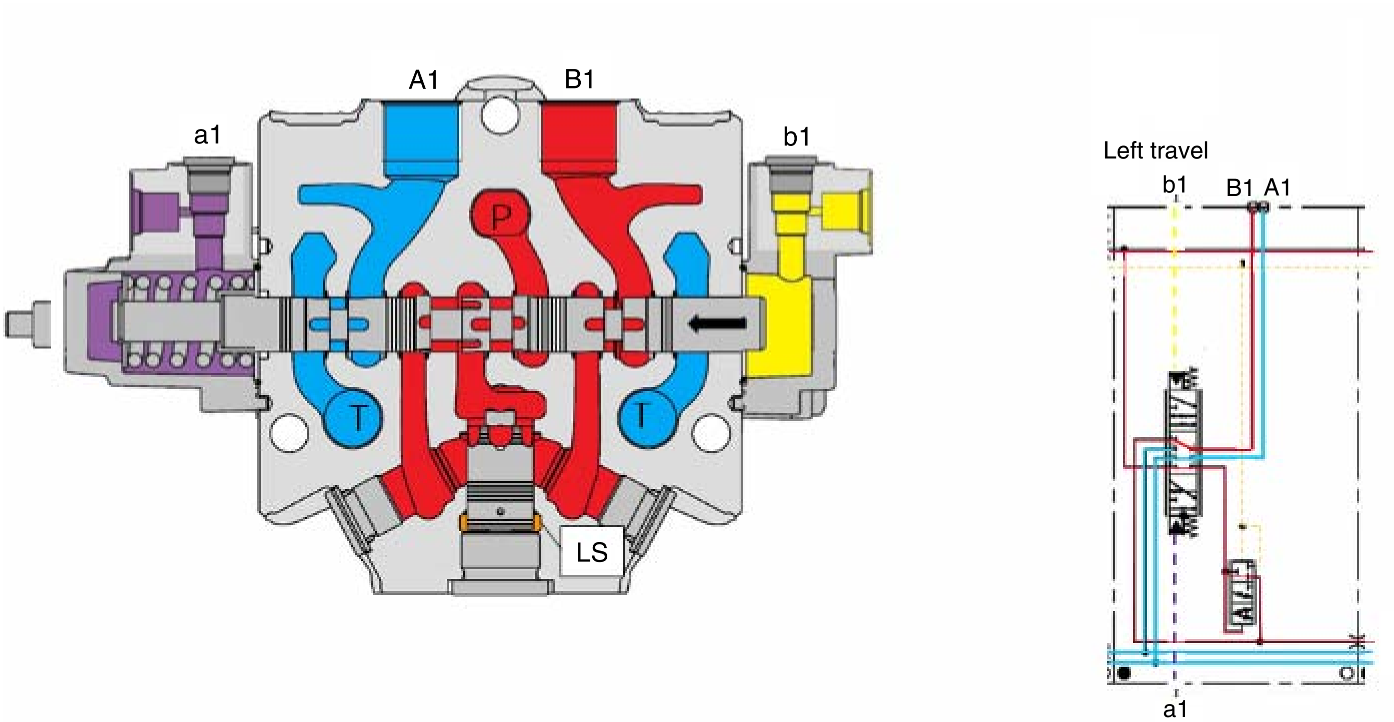
(3) Travel forward position



85A2MC18

When the pilot pressure is led to the port a1, the oil from the pump flows to the cylinder port A1 and oil from the cylinder flows into the tank through the cylinder port B1.

(4) Travel reverse position

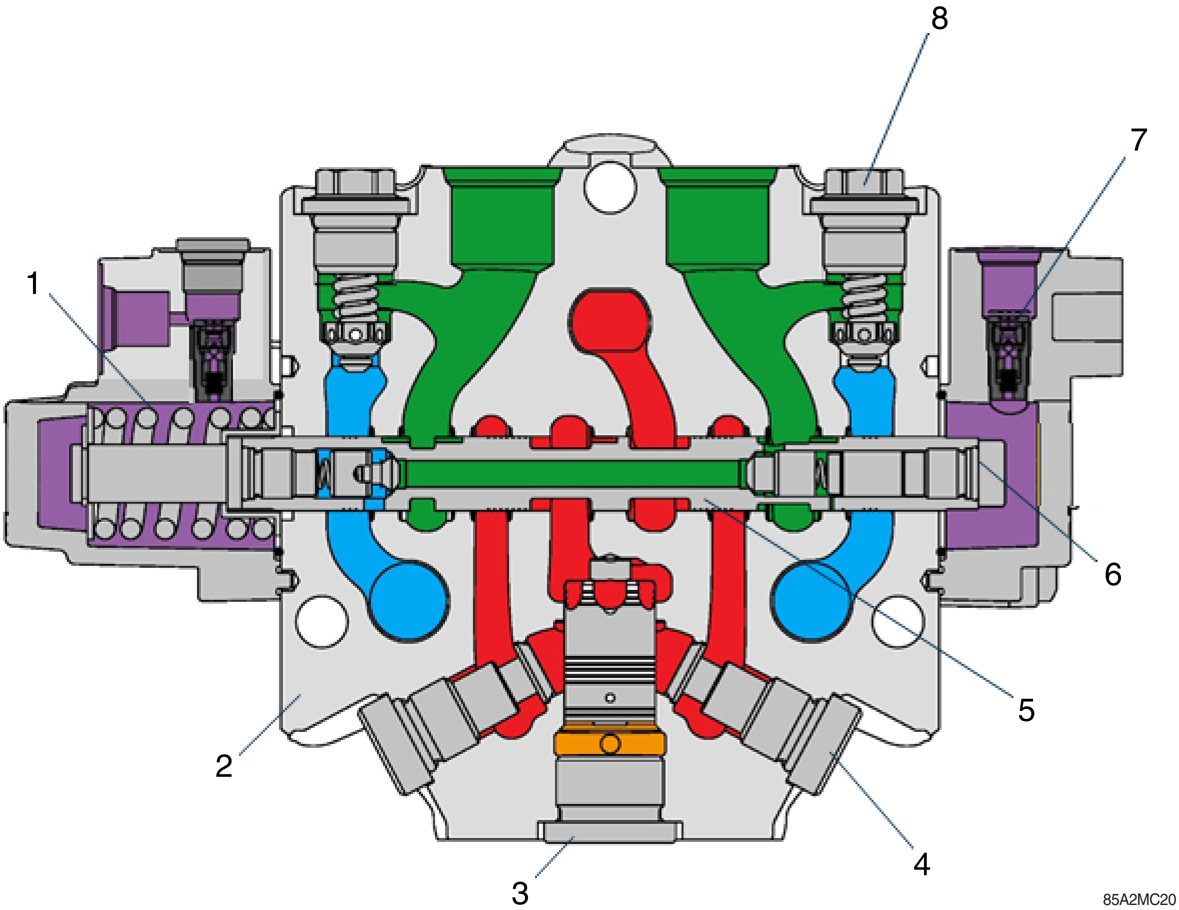


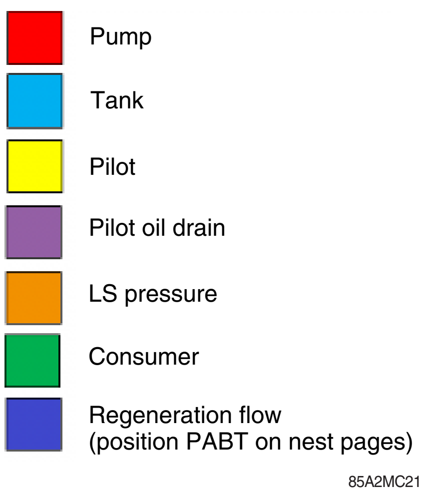
85A2MC19

When the pilot pressure is led to the port b1, the oil from the pump flows to the cylinder port B1 and oil from the cylinder flows into the tank through the cylinder port A1.

3) BOOM AND ARM SECTION 3 AND 5 DESCRIPTION - WITH REGENERATION SPOOLS

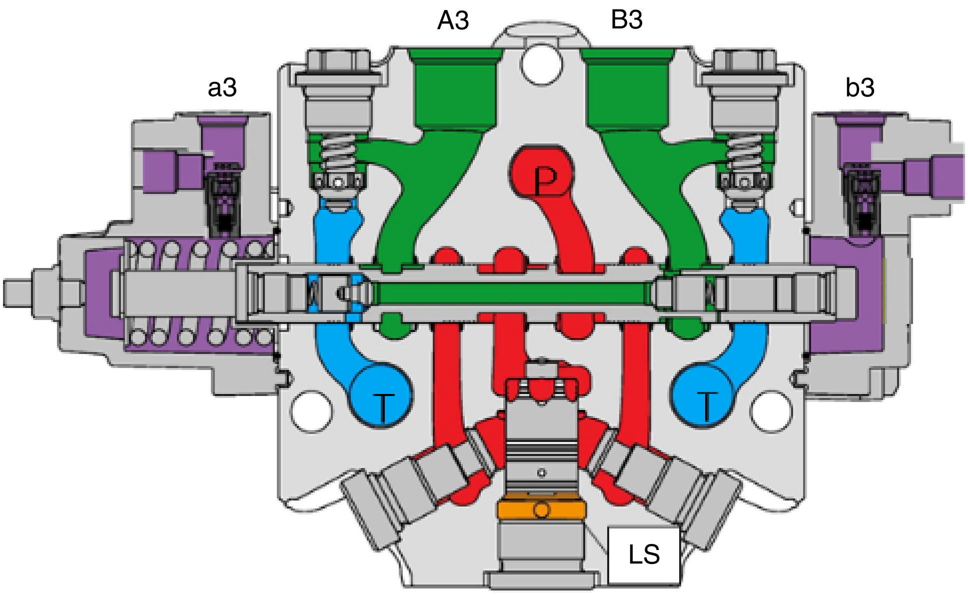
(1) Component description





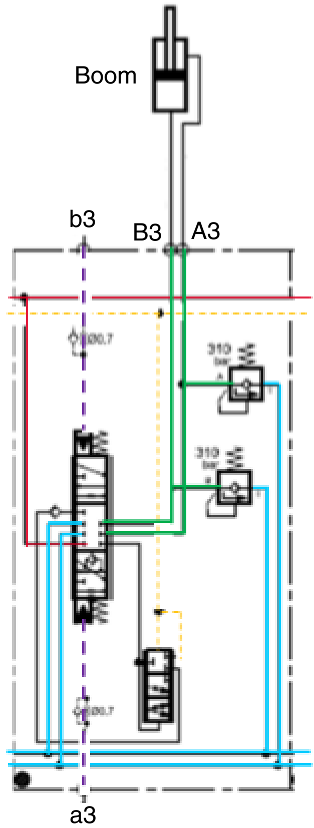
1 Spring pack
2 Housing
3 Pressure compensator
4 Check valves
5 Regeneration spool
6 Spool
7 Shuttle valve
8 Relief valves

(2) Neutral position



85A2MC22

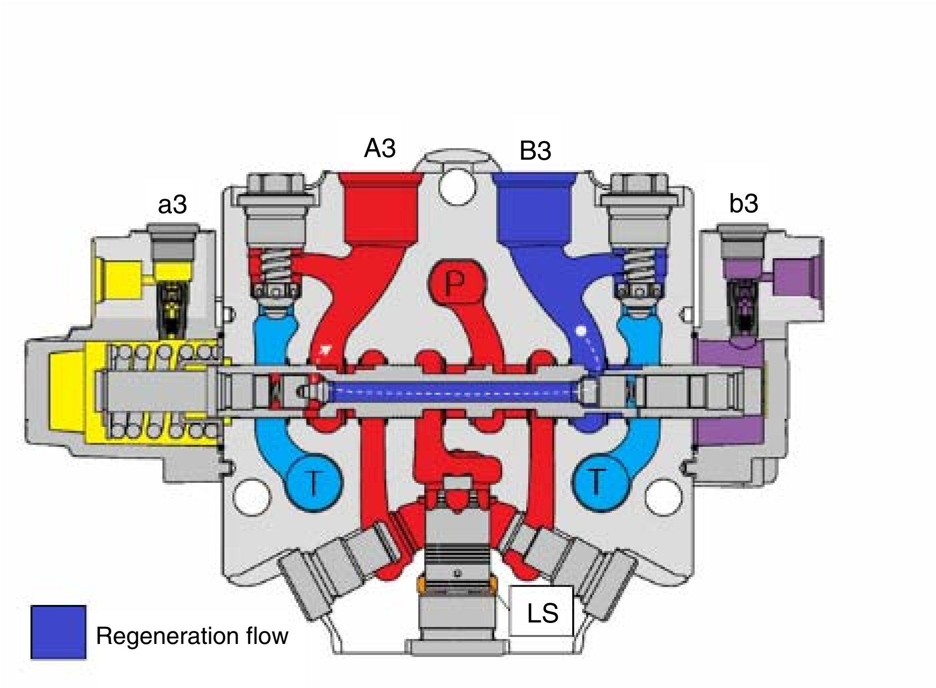
The spool is in neutral position, oil from the pump is blocked, pump is in low pressure stand-by. The A and B ports are not connected to the pump nor the tank.

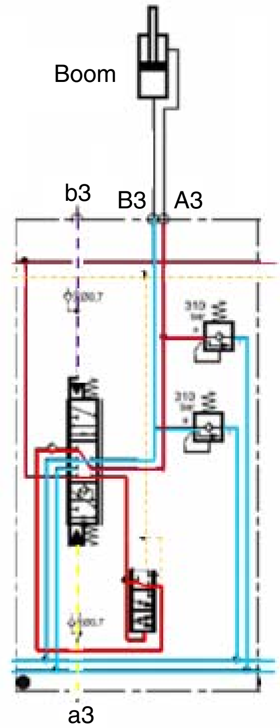


85A2MC23

(3) Boom section description

① Boom down position

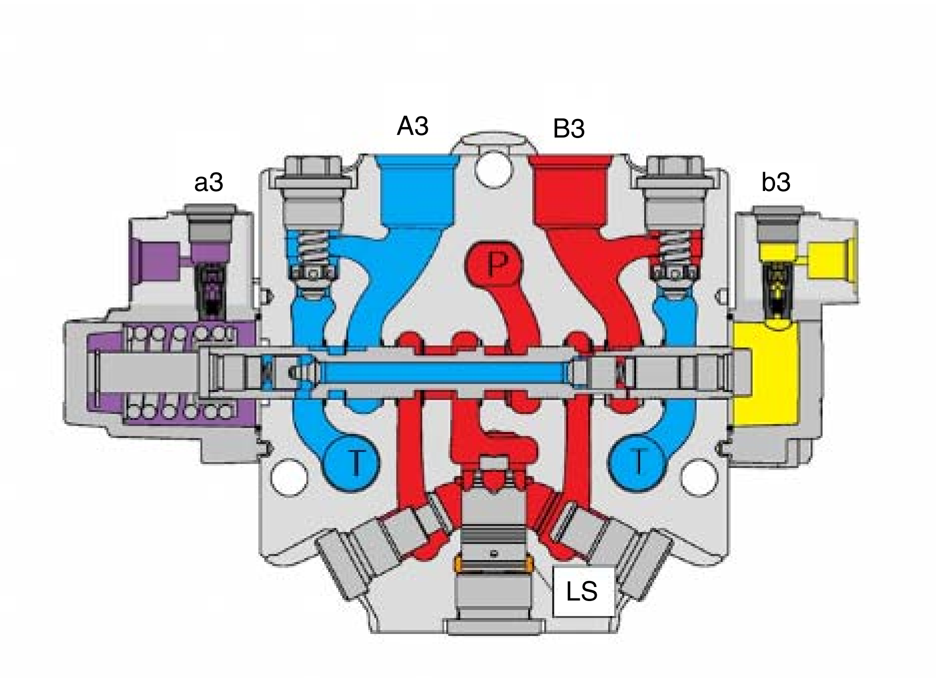


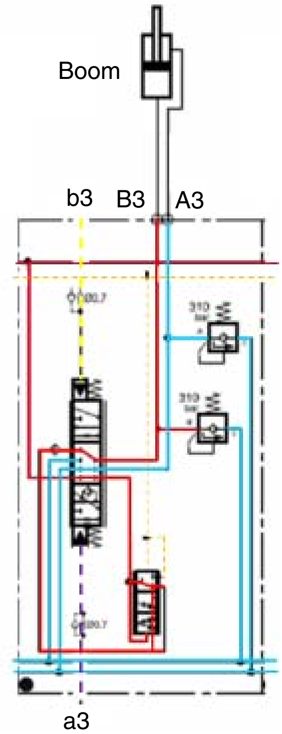


85A2MC24

When the pilot pressure is led to the port a4, the oil from the pump flows to the cylinder port A4 and oil from the cylinder flows partially into the tank and partially trough regeneration path B to A through the cylinder port B4 .

② Boom up position



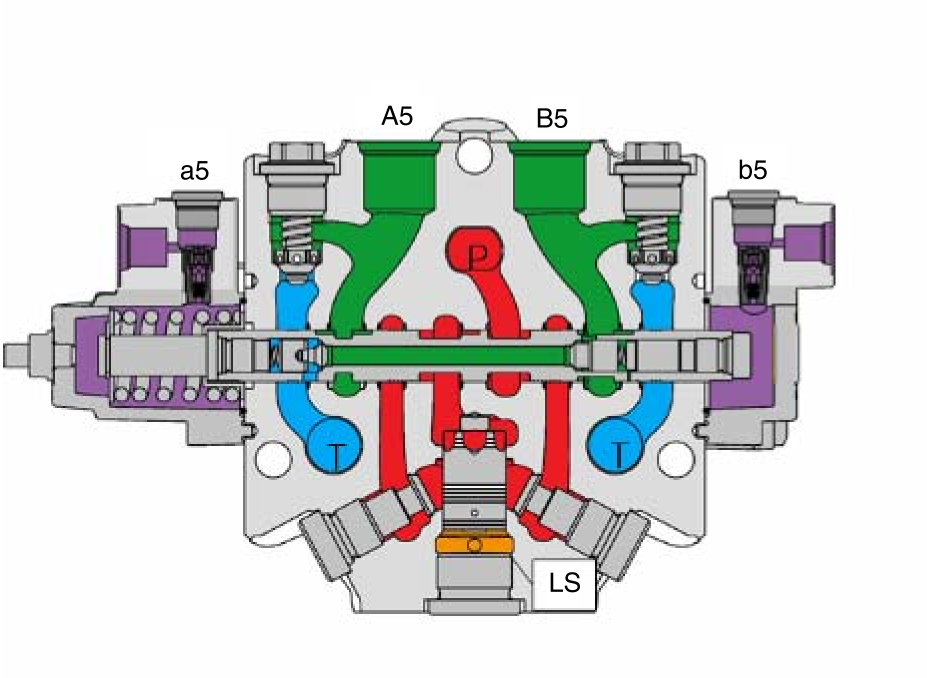


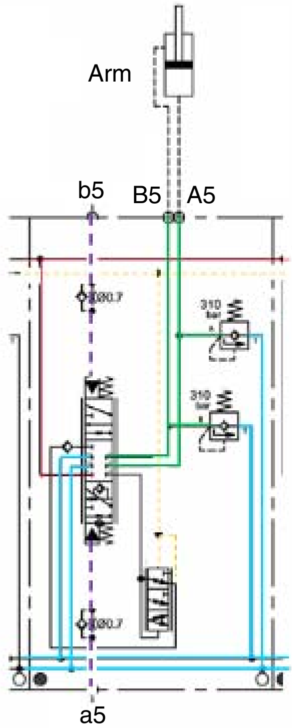
85A2MC25

When the pilot pressure is led to the port b4, the oil from the pump flows to the cylinder port B4 and oil from the cylinder flows into the tank through the cylinder port A4.

(4) Arm section description

① Neutral position

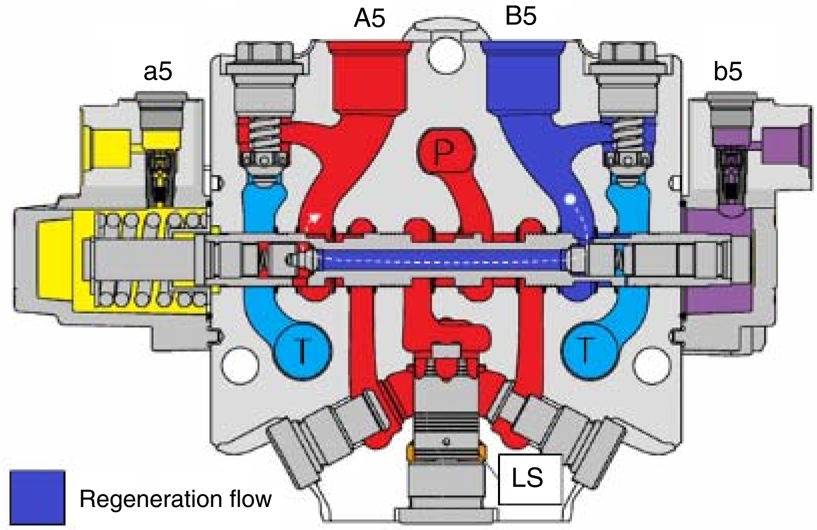


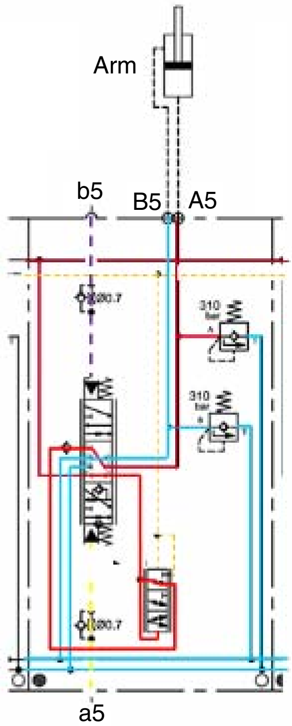


48AZ2MCV26

The spool is in neutral position, oil from the pump is blocked, pump is in low pressure stand-by. The A5 and B4 ports are not connected to the pump nor the tank.

② Arm roll in position

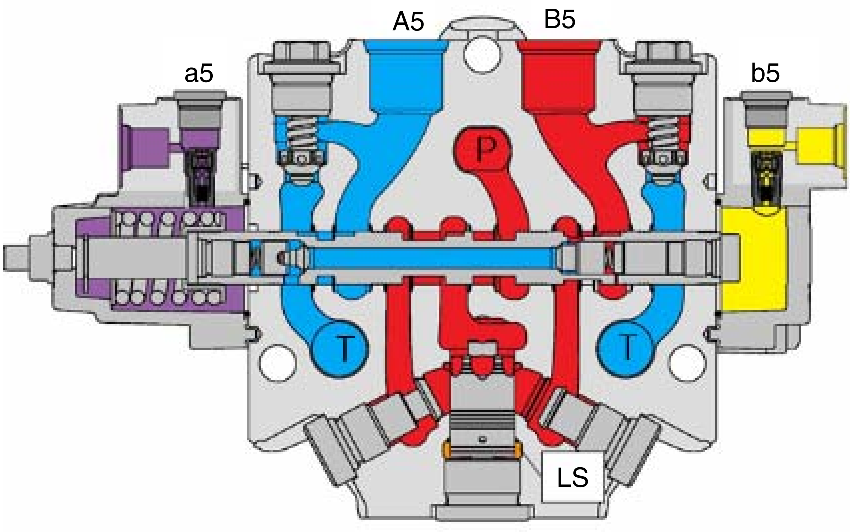


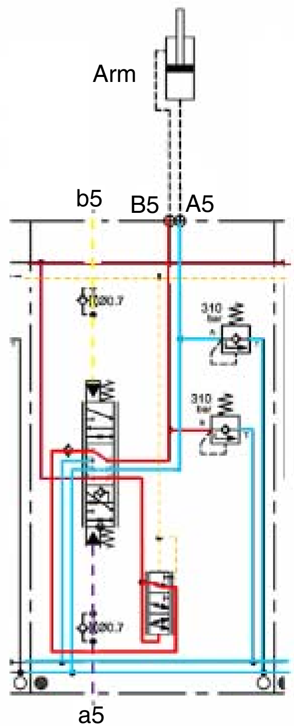


48AZ2MCV27

When the pilot pressure is led to the port a5, the oil from the pump flows to the cylinder port A5 and oil from the cylinder flows partially into the tank and partially trough regeneration path B to A through the cylinder port B5.

③ Arm roll out position



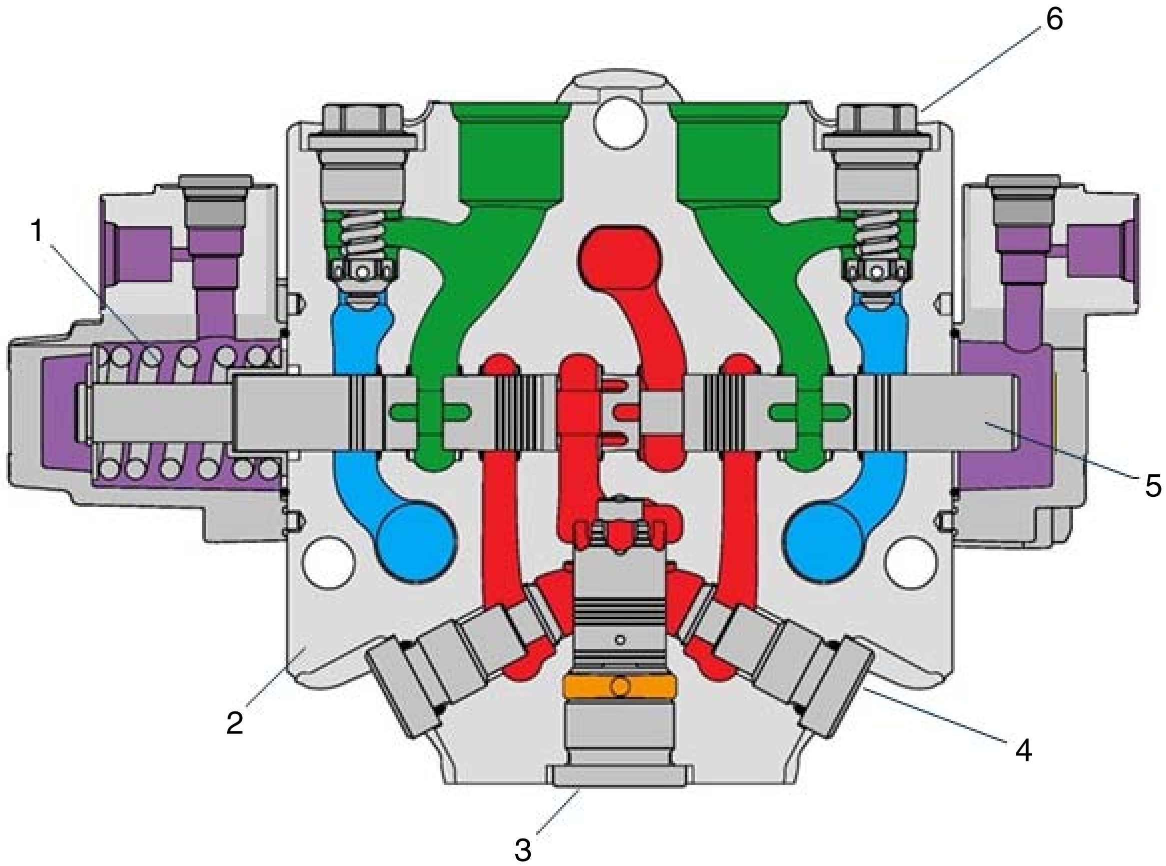


48AZ2MCV28

When the pilot pressure is led to the port b5, the oil from the pump flows to the cylinder port B5 and oil from the cylinder flows into the tank through the cylinder port A5.

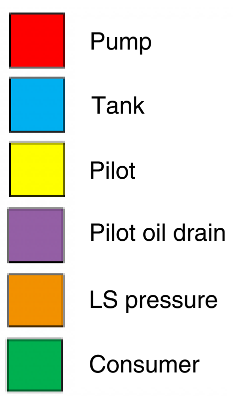
4) BUCKET SECTION DESCRIPTION - SECTION 6

(1) Component description



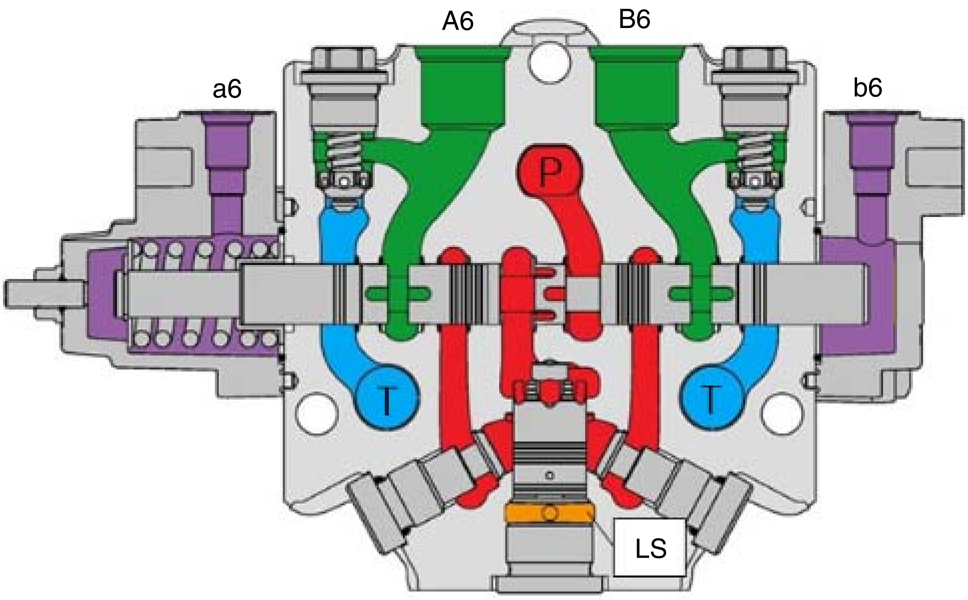
85A2MC29

1 Spring pack
2 Housing
3 Pressure compensator
4 Check valves
5 Spool
7 Overload relief valves



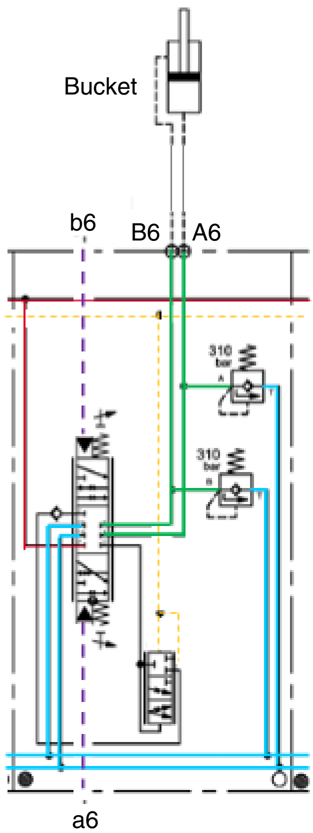
85A2MC30

(2) Neutral position



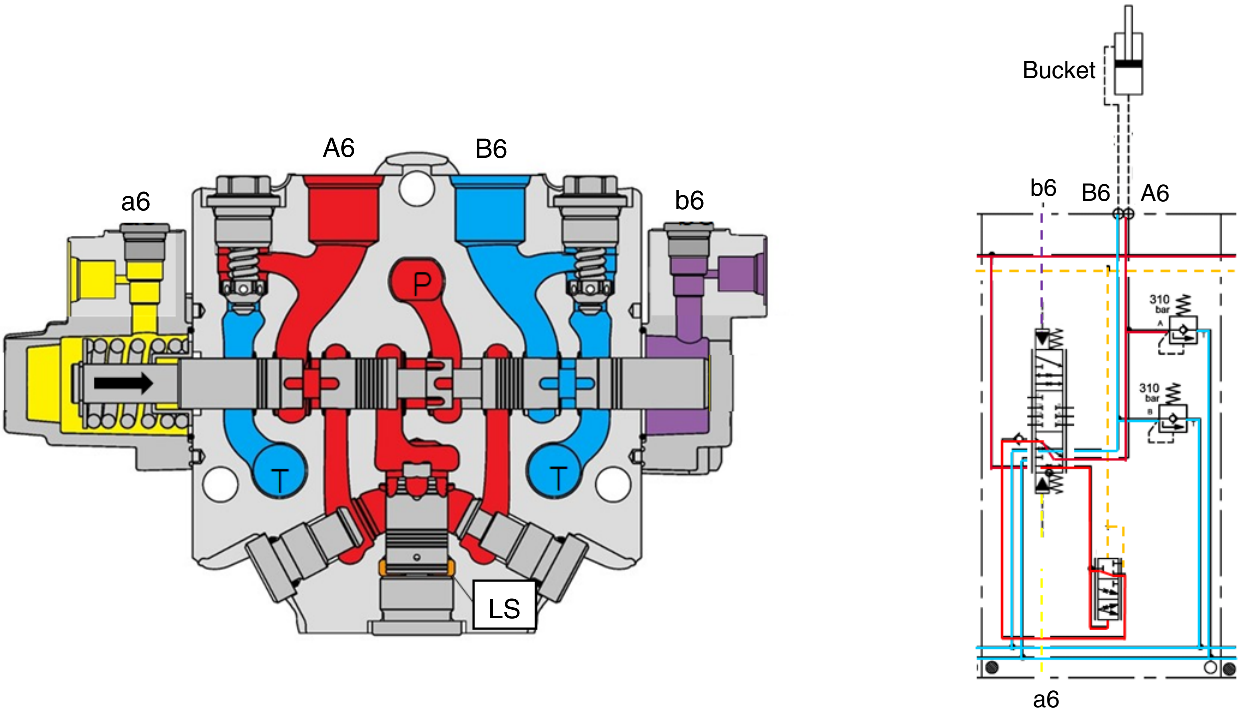
48AZ2MCV31

The spool is in neutral position, pump is in low pressure stand-by. The A6 and B6 ports are not connected to the pumps nor the tank.



48AZ2MCV32

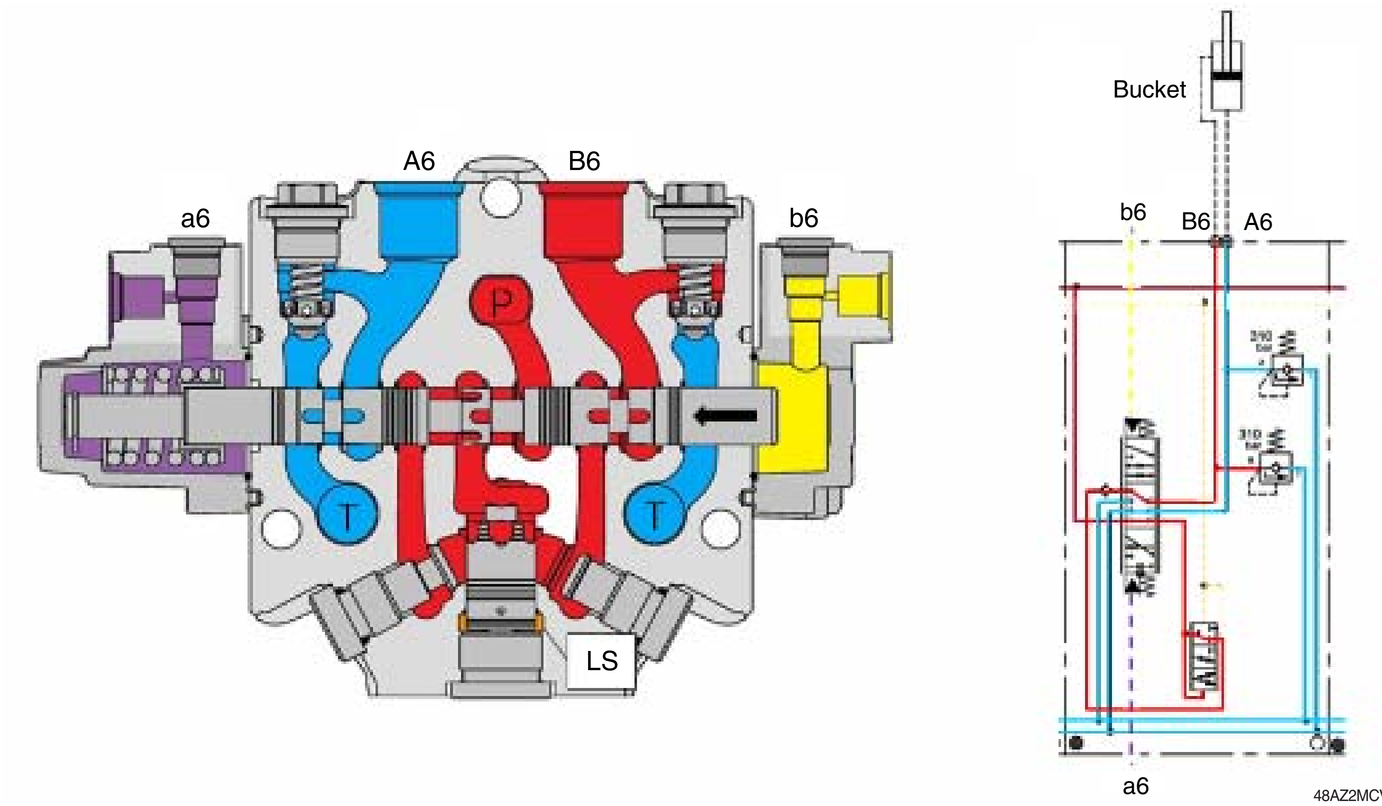
(3) Bucket roll in position



48AZ2MCV33

When the pilot pressure is led to the port a6, the oil from the pump flows to the cylinder port A6 and oil from the cylinder flows into the tank through the cylinder port B6.

(4) Bucket roll out position

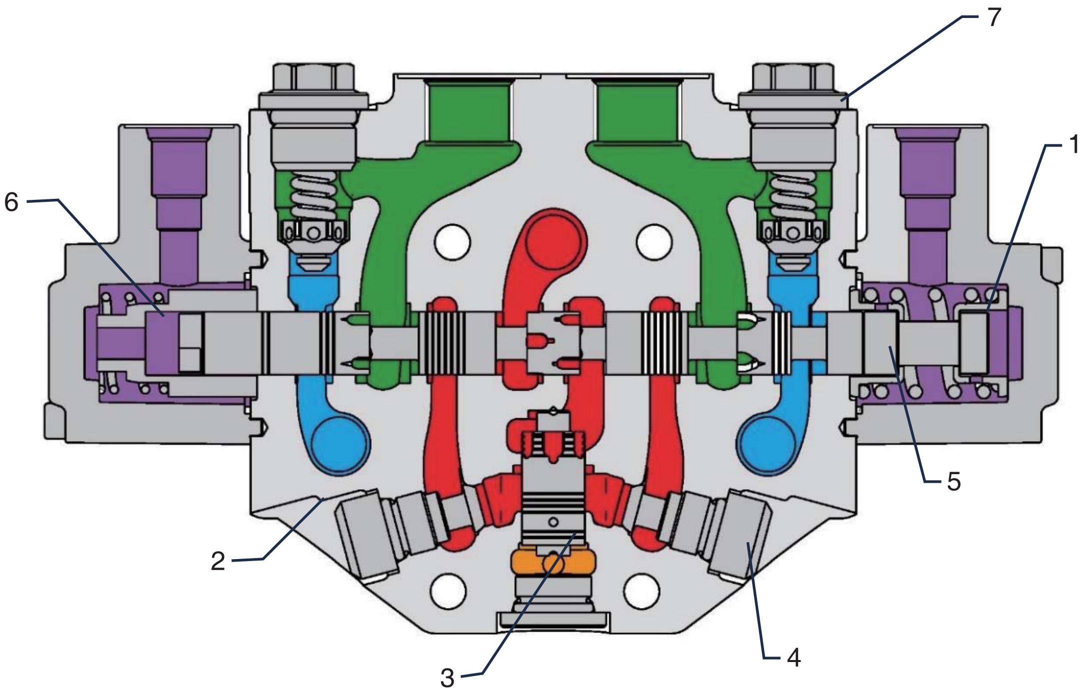


48AZ2MCV34

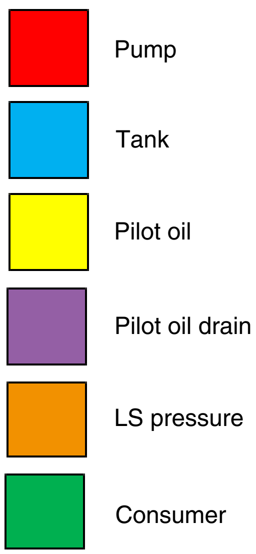
When the pilot pressure is led to the port b6, the oil from the pump flows to the cylinder port B6 and oil from the cylinder flows into the tank through the cylinder port A6.

5) DOZER SECTION DESCRIPTION - SECTION 7

(1) Component description



85A2MC35

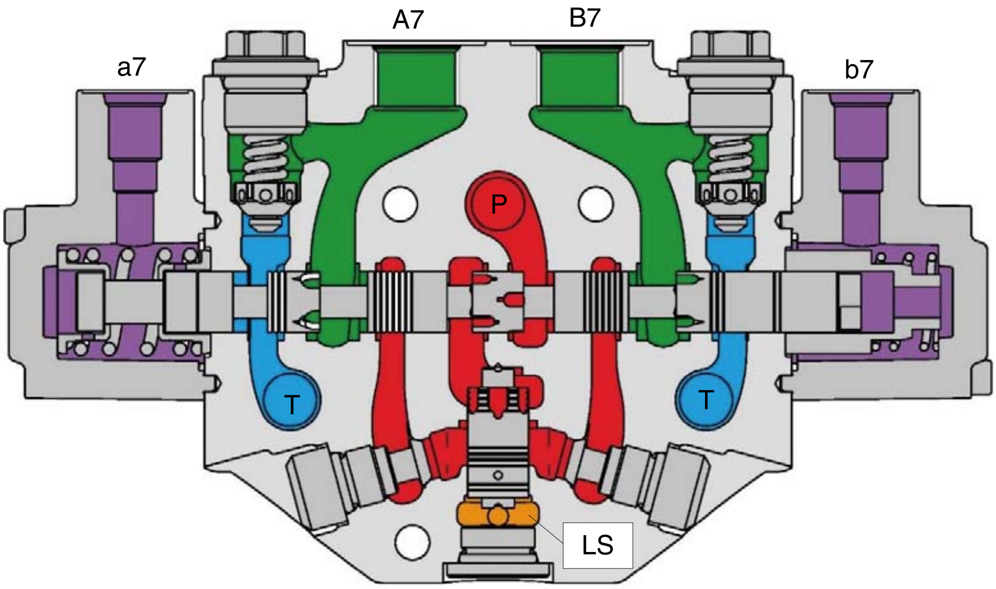


48AA2MC43

1 Spring pack
2 Housing
3 Pressure compensator
4 Check valves
5 Spool
6 Fourth position spring pack
7 Relief valves

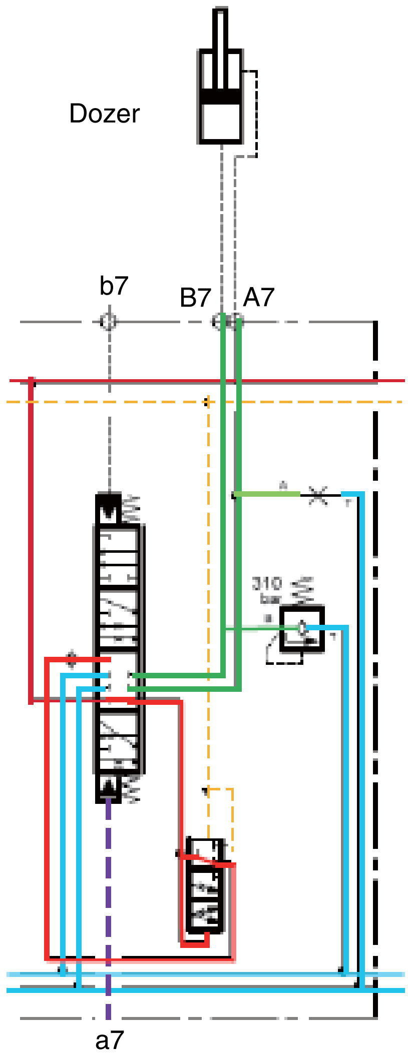
※ This particular slide has a four position spool: neutral, PABT, PBAT and floating position.

(2) Neutral position



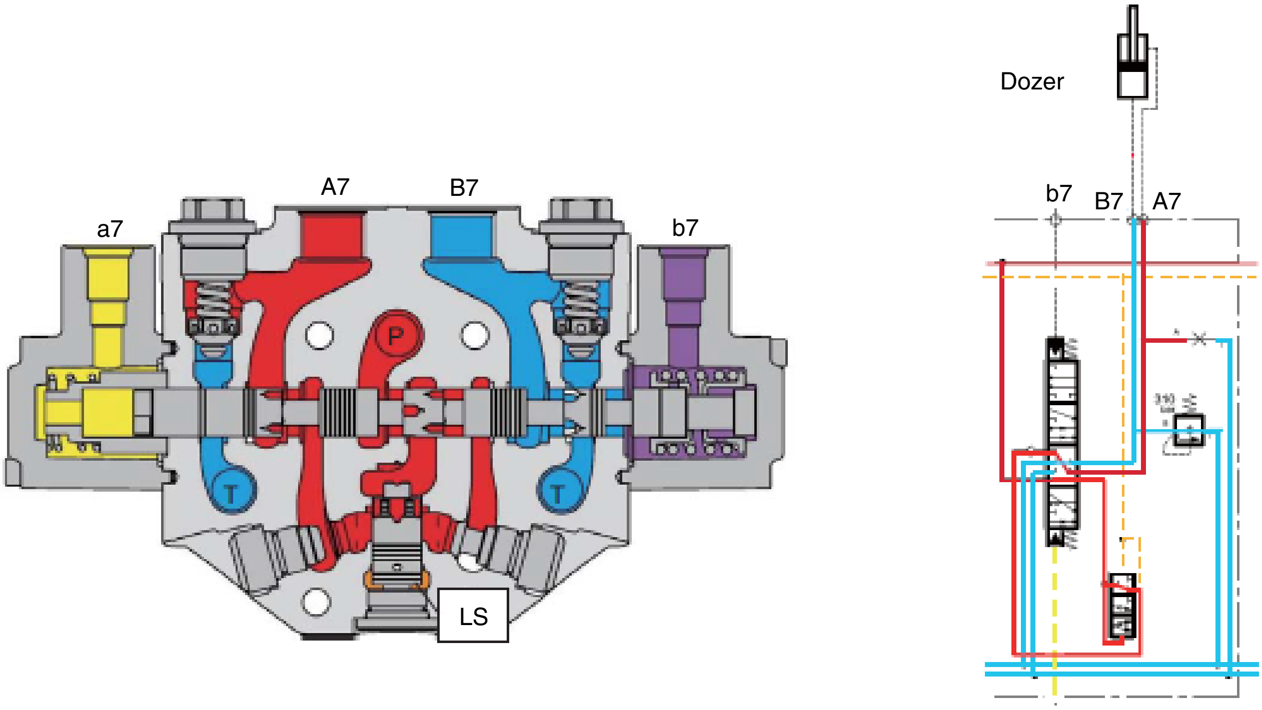
48AZ2MCV37

The spool is in neutral position, oil from the pump is not connected to the A7 or to the B7 ports. Pump is in low pressure stand-by.



48AZ2MCV38

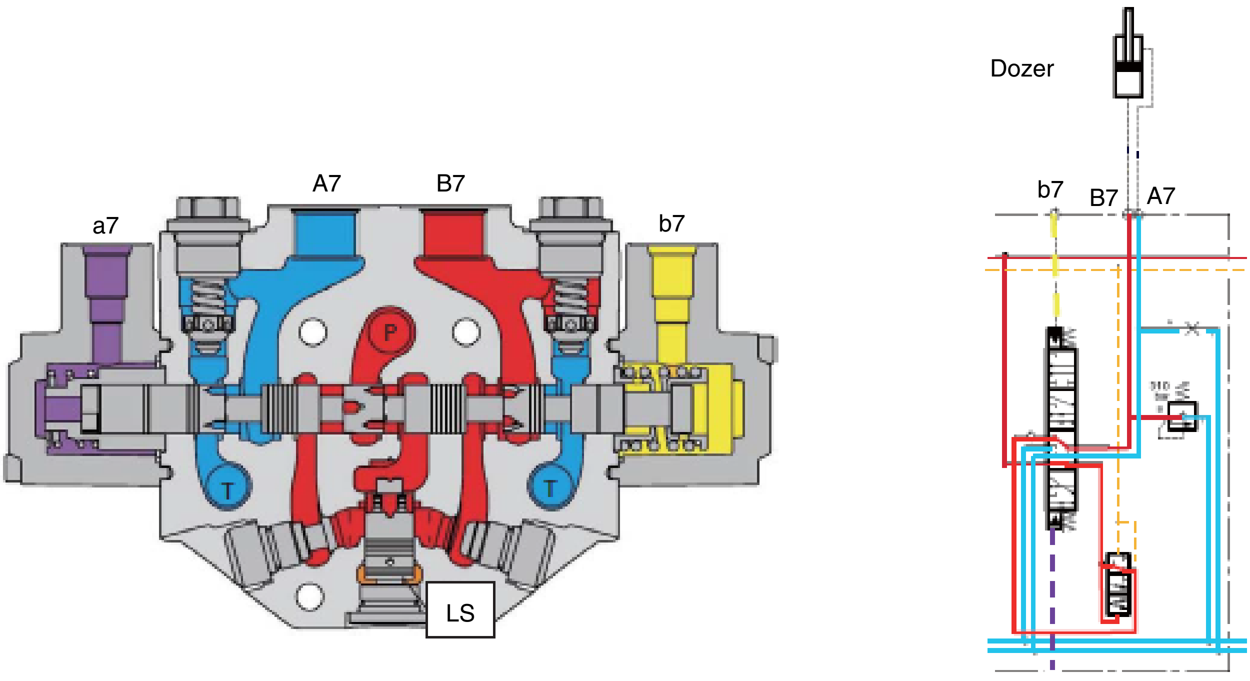
(3) PABT position (dozer up)



48AZ2MCV39

When the pilot pressure is led to the port a7, the oil from the pump flows to the cylinder port A7 and oil from the cylinder flows into the tank through the cylinder port B7.

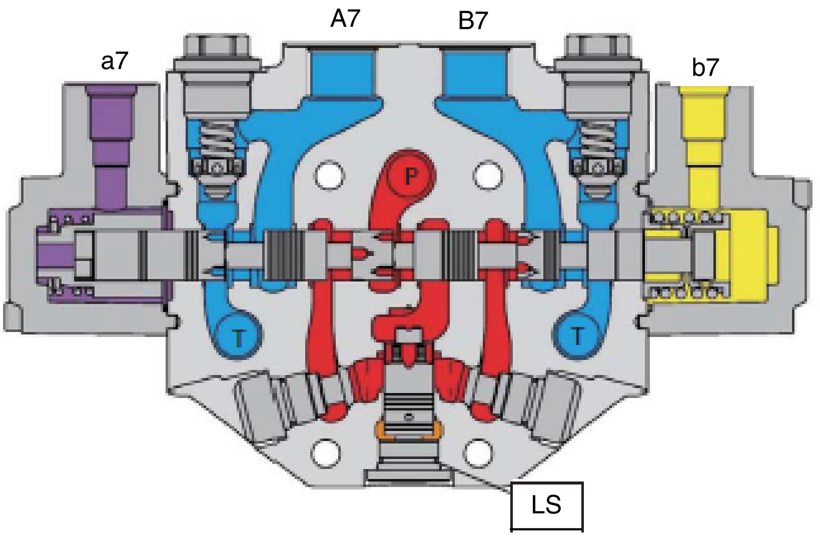
(4) PBAT position (dozer down)

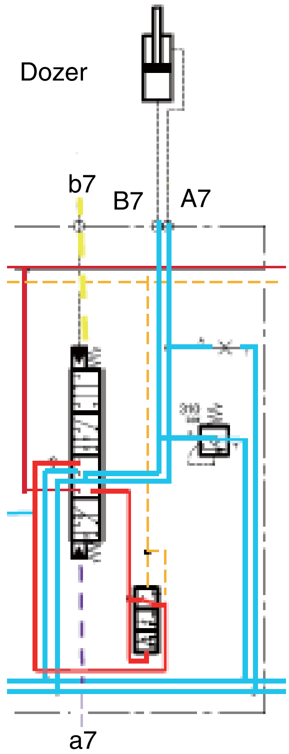


48AZ2MCV40

When the pilot pressure is led to the port b7, the oil from the pump flows to the cylinder port B7 and oil from the cylinder flows into the tank through the cylinder port A7.

(5) Floating position



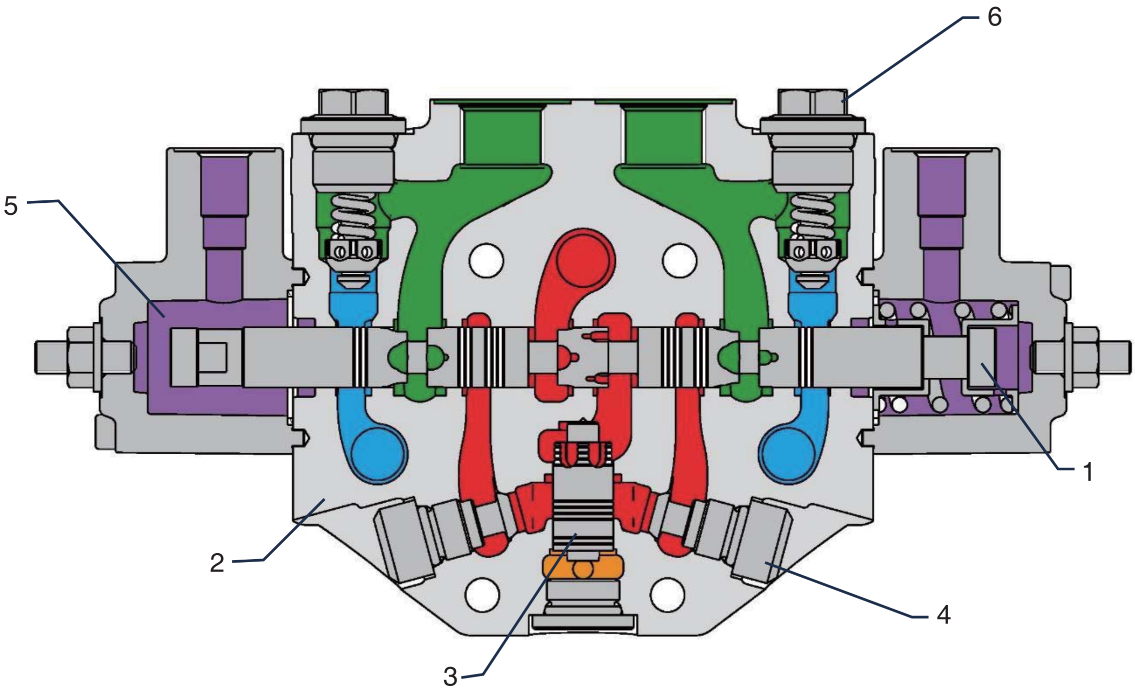


48AZ2MCV41

When the pilot pressure is led to the port b6 to maximal pressure, the spool is in the forth position, floating. The pump is in low pressure stand-by while A7 and B7 are connected to tank.

6) SLICES DESCRIPTION 8 : BOOM SWING

(1) Component description



85A2MC42

Pump

Tank

Pilot oil

Pilot oil drain

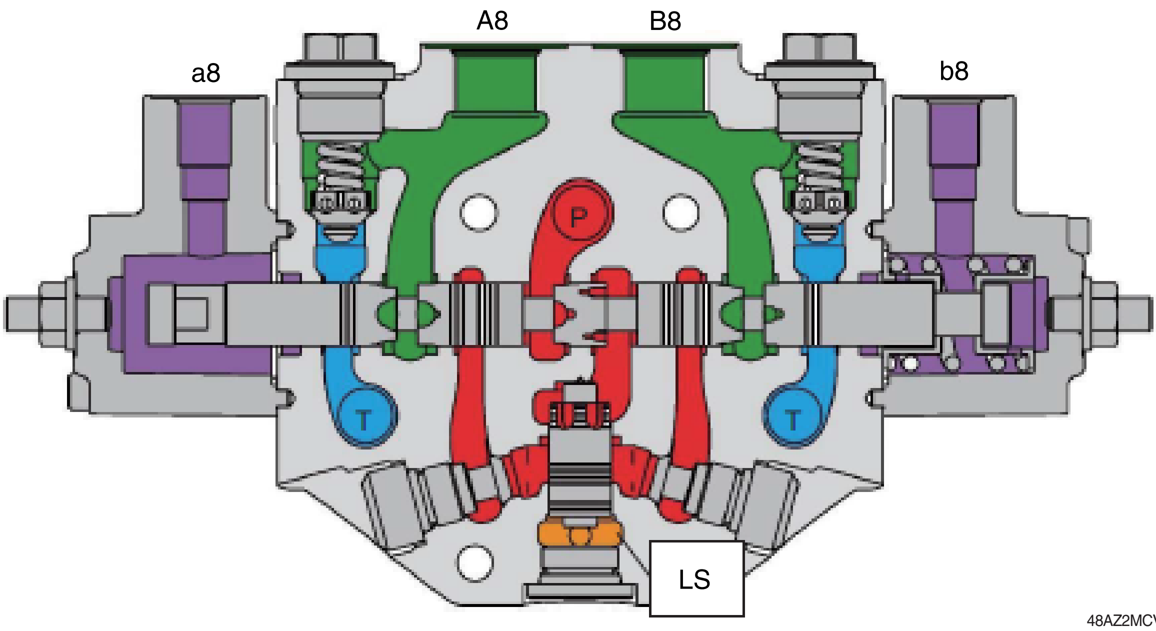
LS pressure

Consumer

48AA2MC43

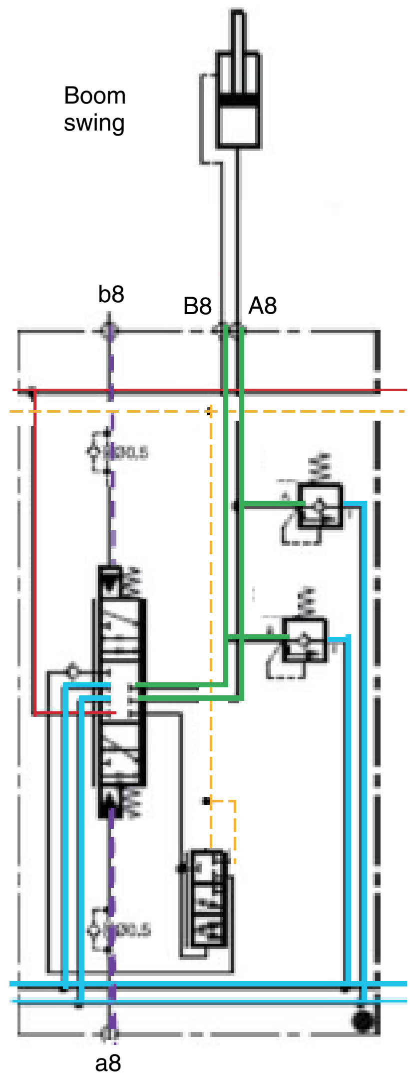
1 Spring pack
2 Housing
3 Pressure compensator
4 Check valves
5 Spool
6 Relief valves

(2) Neutral position



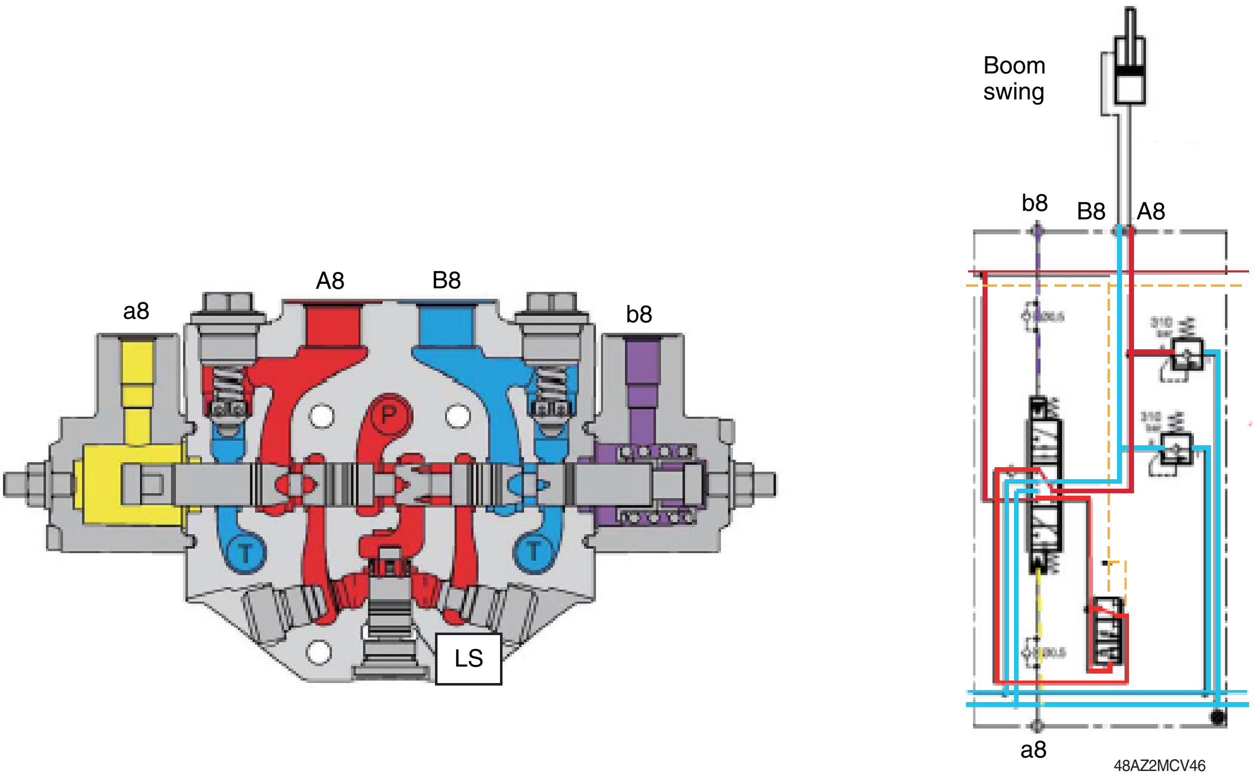
48AZ2MCV44

The spool is in neutral position, pump is in low pressure stand-by. The A8 and B8 ports are not connected to the pumps nor the tank.



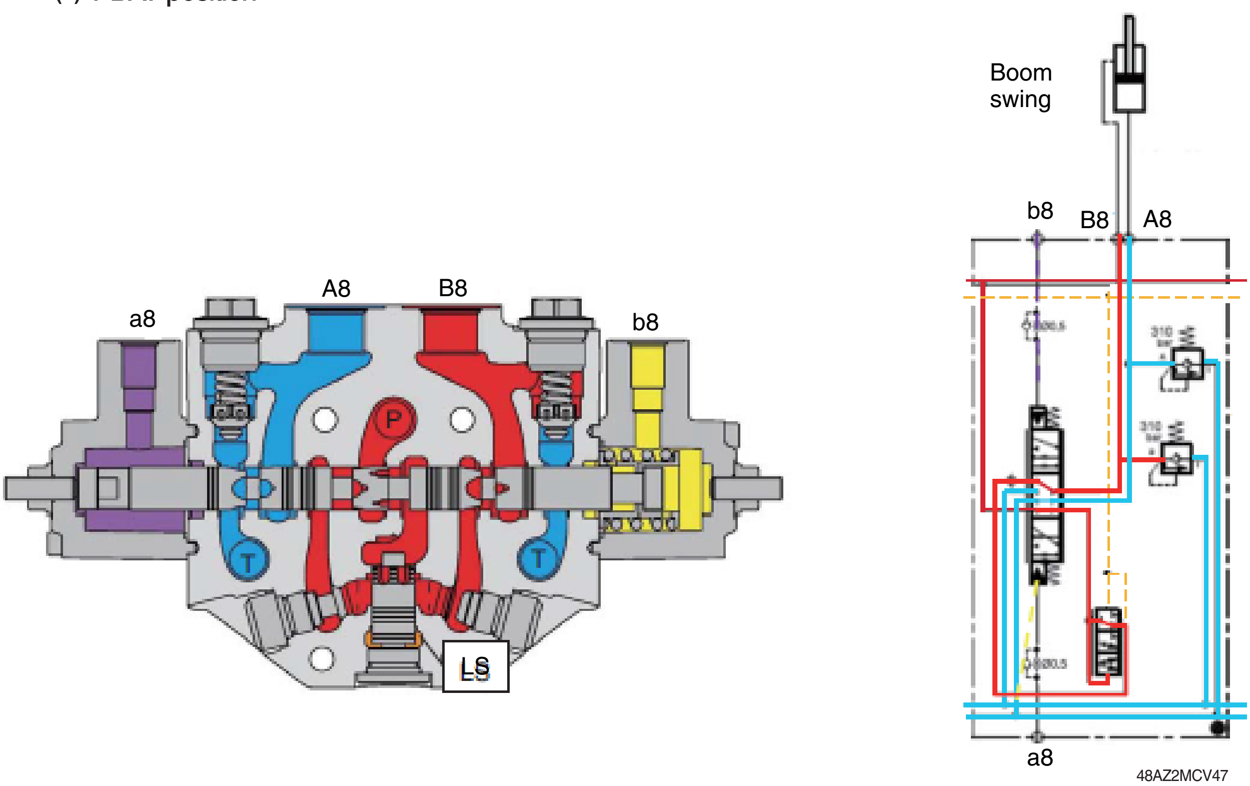
48AZ2MCV45

(3) PABT position



When the pilot pressure is led to the port a7, the oil from the pump flows to the cylinder port A7 and oil from the cylinder flows into the tank through the cylinder port B7.

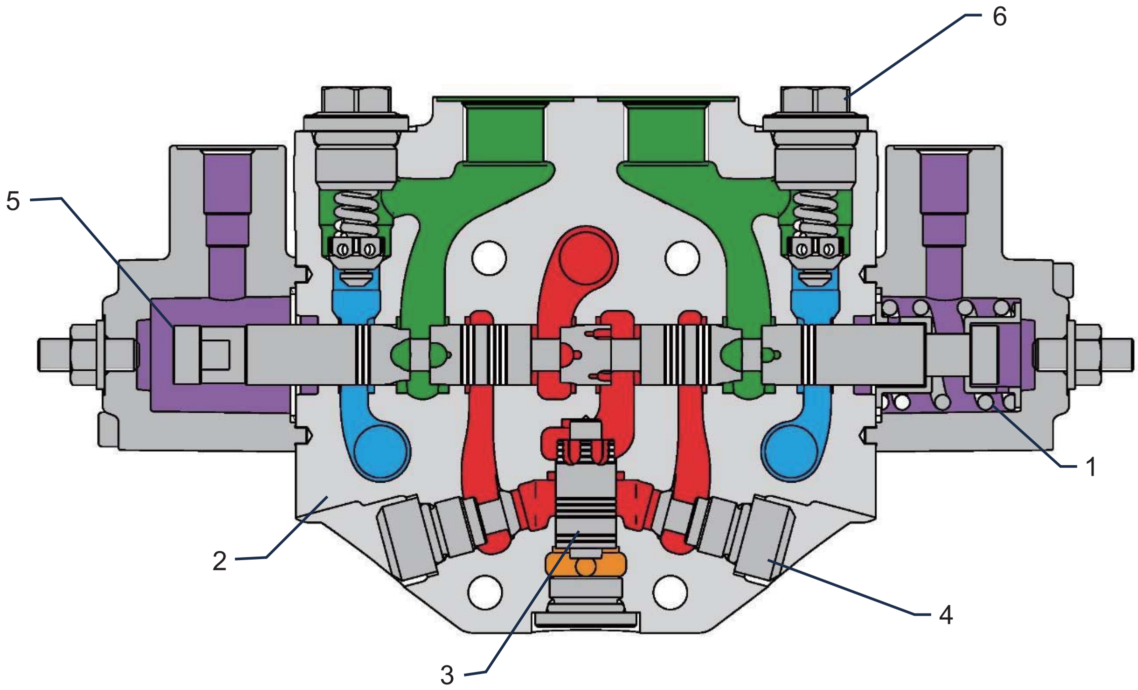
(4) PBAT position



When the pilot pressure is led to the port b7, the oil from the pump flows to the cylinder port B7 and oil from the cylinder flows into the tank through the cylinder port A7.

7) SLICES DESCRIPTION 9 : AUX 1

(1) Component description



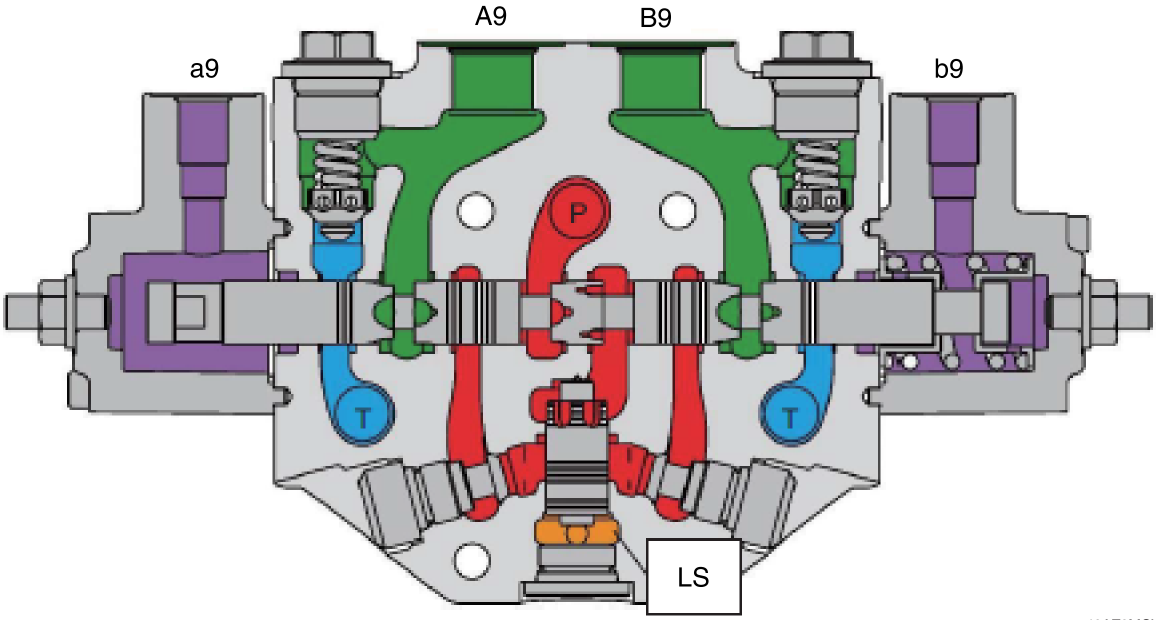
85A2MC48

- Pump
- Tank
- Pilot oil
- Pilot oil drain
- LS pressure
- Consumer

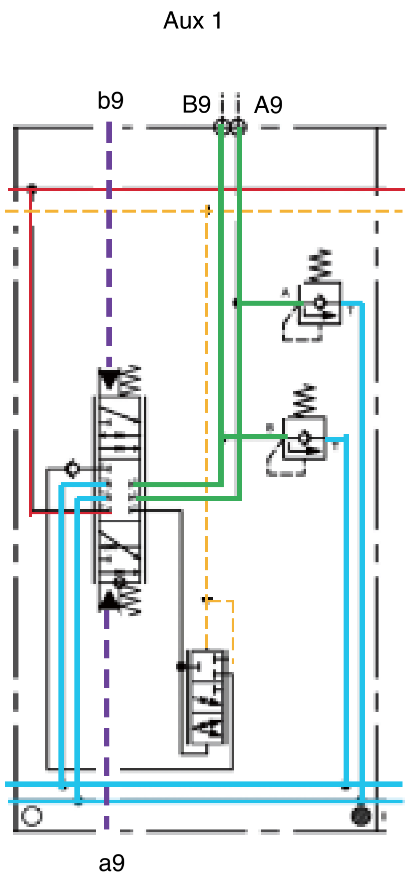
48AA2MC43

1 Spring pack
2 Housing
3 Pressure compensator
4 Check valves
5 Spool
6 Relief valves

(2) Neutral position



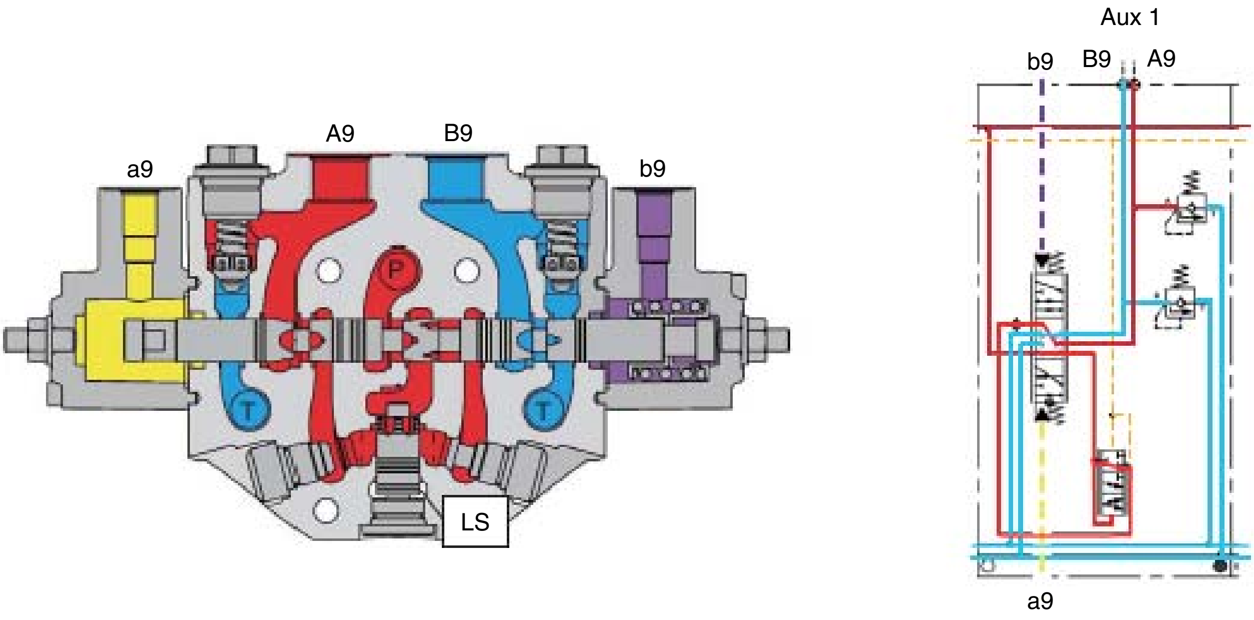
48AZ2MCV49



48AZ2MCV50

The spool is in neutral position, pump is in low pressure stand-by. The A9 and B9 ports are not connected to the pumps nor the tank.

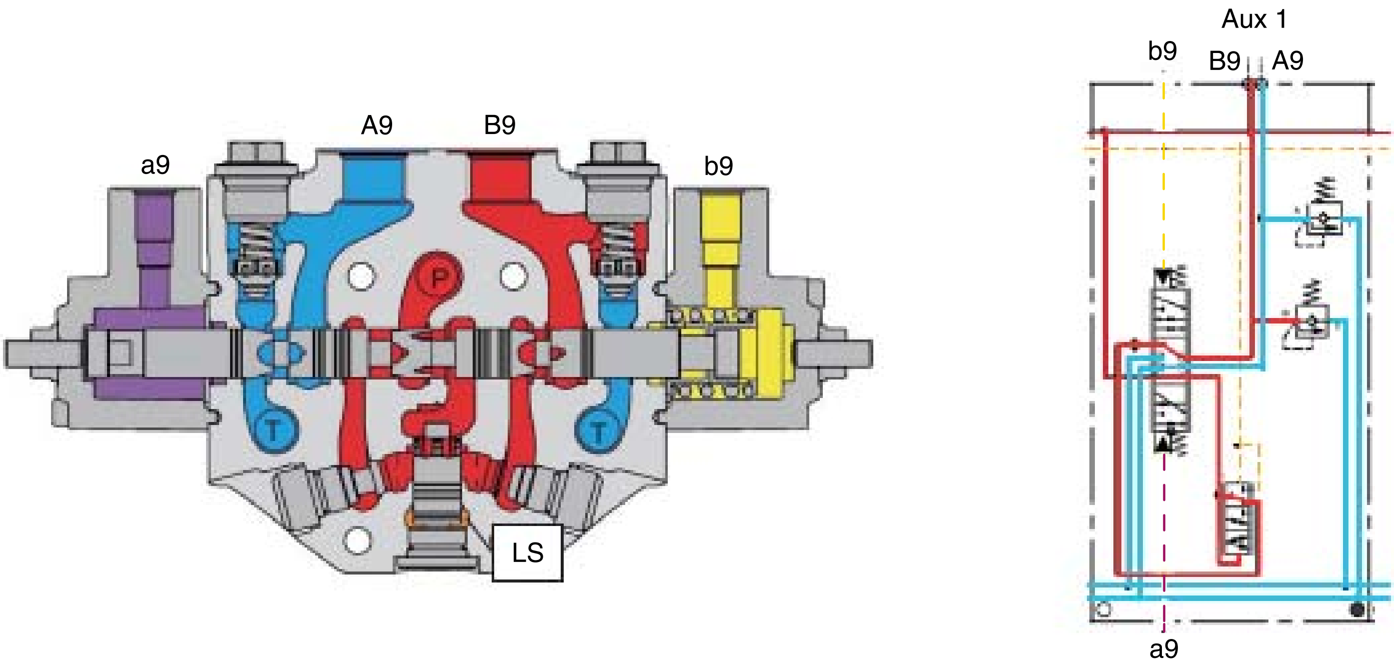
(3) PABT position



48AZ2MCV51

When the pilot pressure is led to the port a9, the oil from the pump flows to the cylinder port A9 and oil from the cylinder flows into the tank through the cylinder port B9.

(4) PBAT position

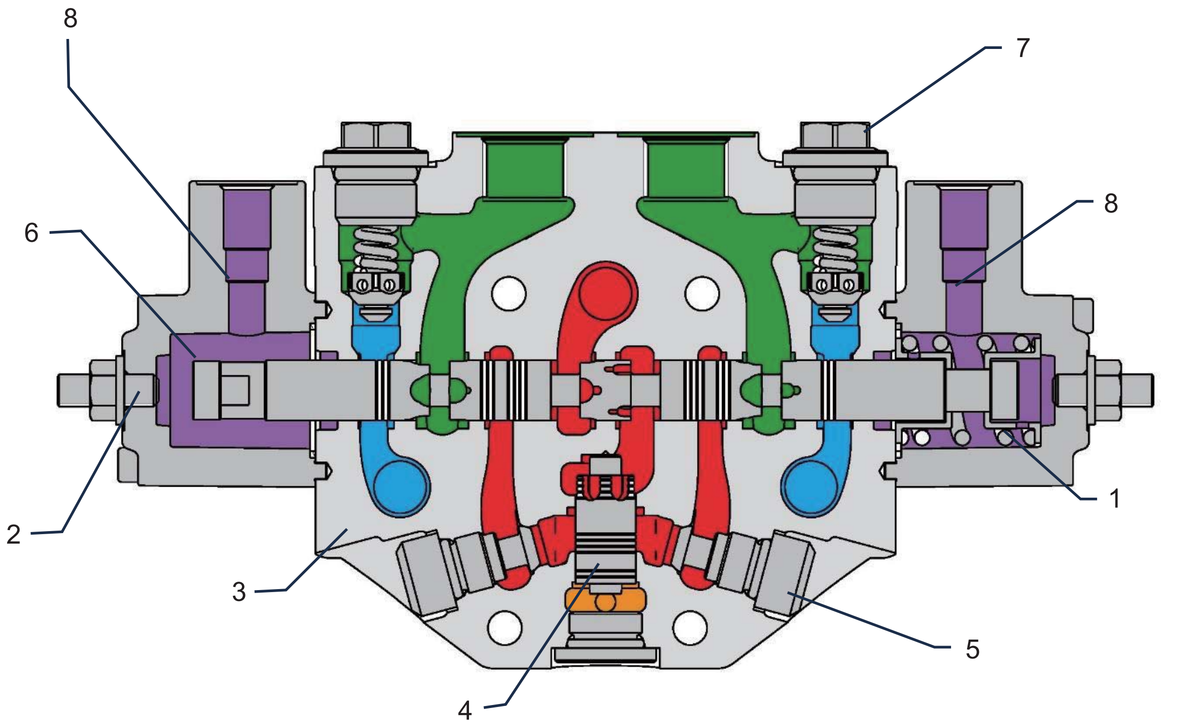


48AZ2MCV52

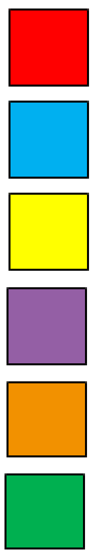
When the pilot pressure is led to the port b9, the oil from the pump flows to the cylinder port B9 and oil from the cylinder flows into the tank through the cylinder port A9.

8) SWING SLICE DESCRIPTION

(1) Component description



85A2MC53



Pump

Tank

Pilot oil

Pilot oil drain

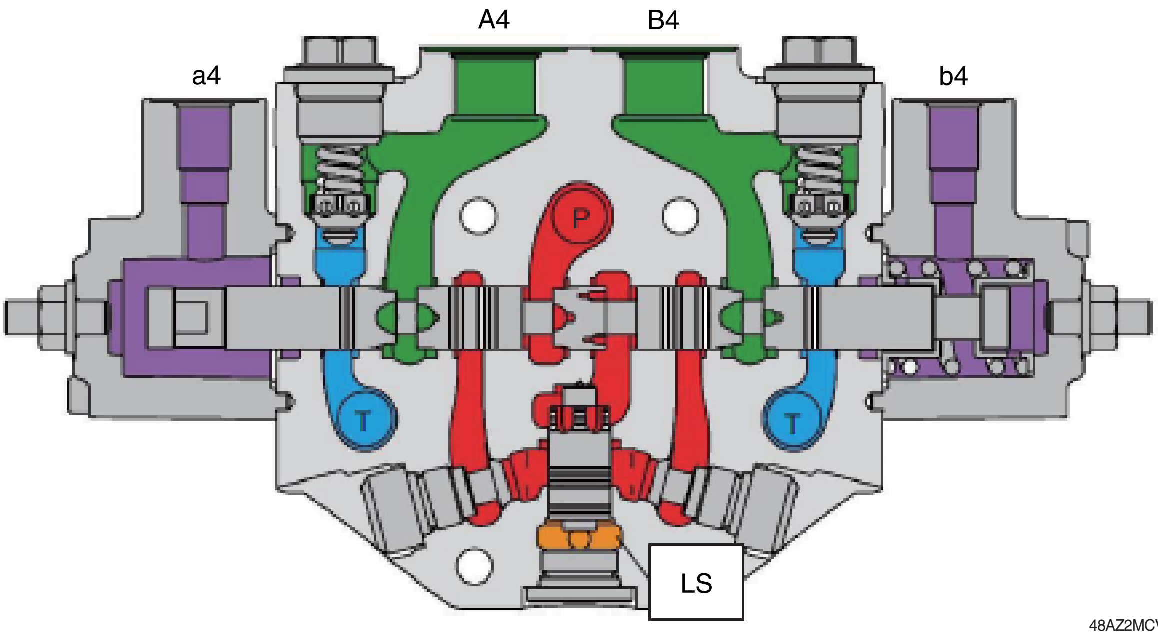
LS pressure

Consumer

1 Spring pack
2 Stroke limitation device
3 Housing
4 Pressure compensator
5 Check valves
6 Spool
7 Plug
8 Snubbers

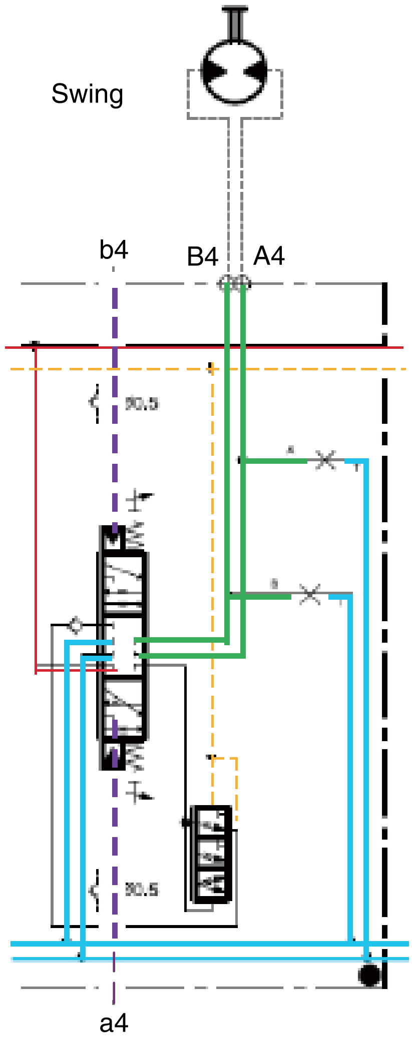
48AA2MC43

(2) Neutral position



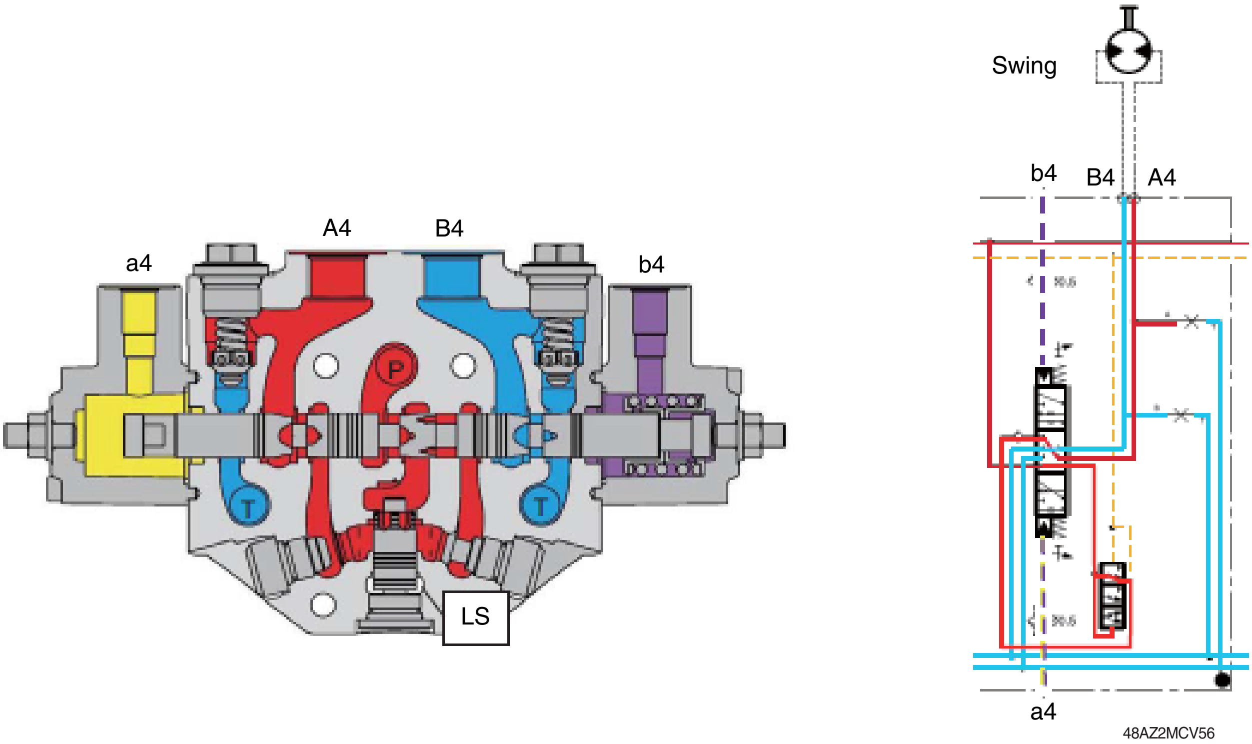
48AZ2MCV54

The spool is in neutral position, pump is in low pressure stand-by. The A4 and B4 ports are not connected to the pumps nor the tank. This slice is equipped with spool stroke limiters



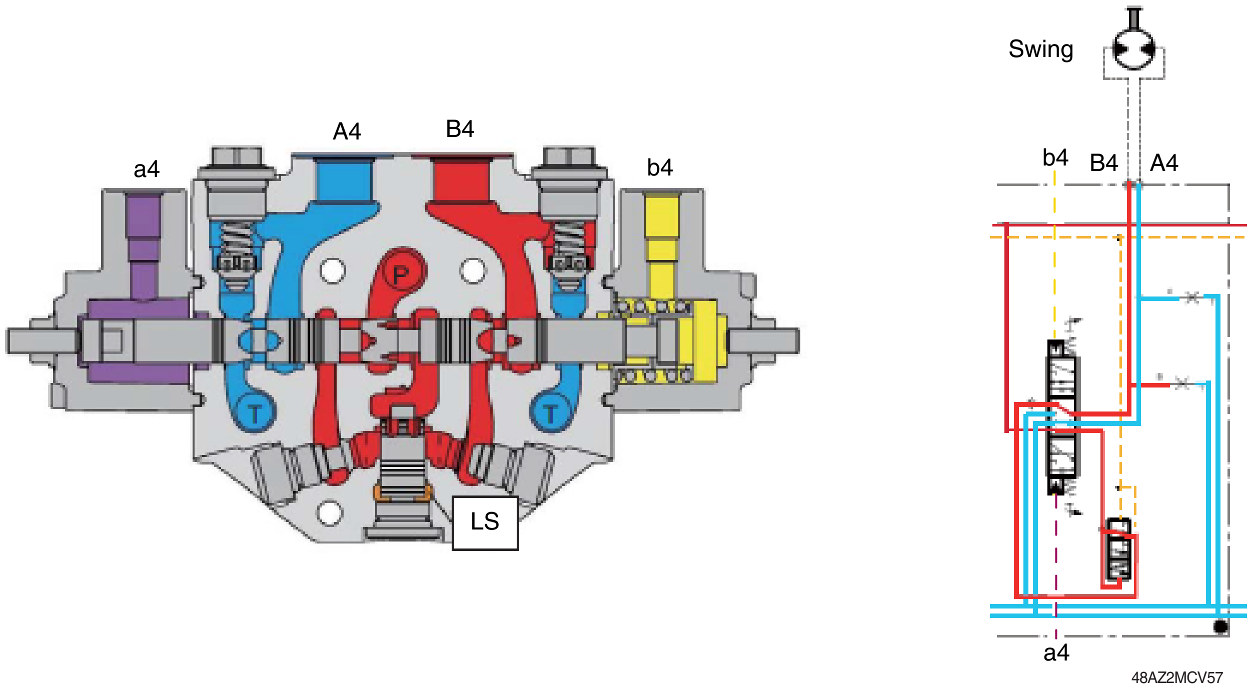
48AZ2MCV55

(3) PABT position



When the pilot pressure is led to the port a4, the oil from the pump flows to the motor port A4 and oil from the cylinder flows into the tank through the motor B4.

(4) PBAT position



When the pilot pressure is led to the port b4, the oil from the pump flows to the motor port B4 and oil from the cylinder flows into the tank through the motor port A4.

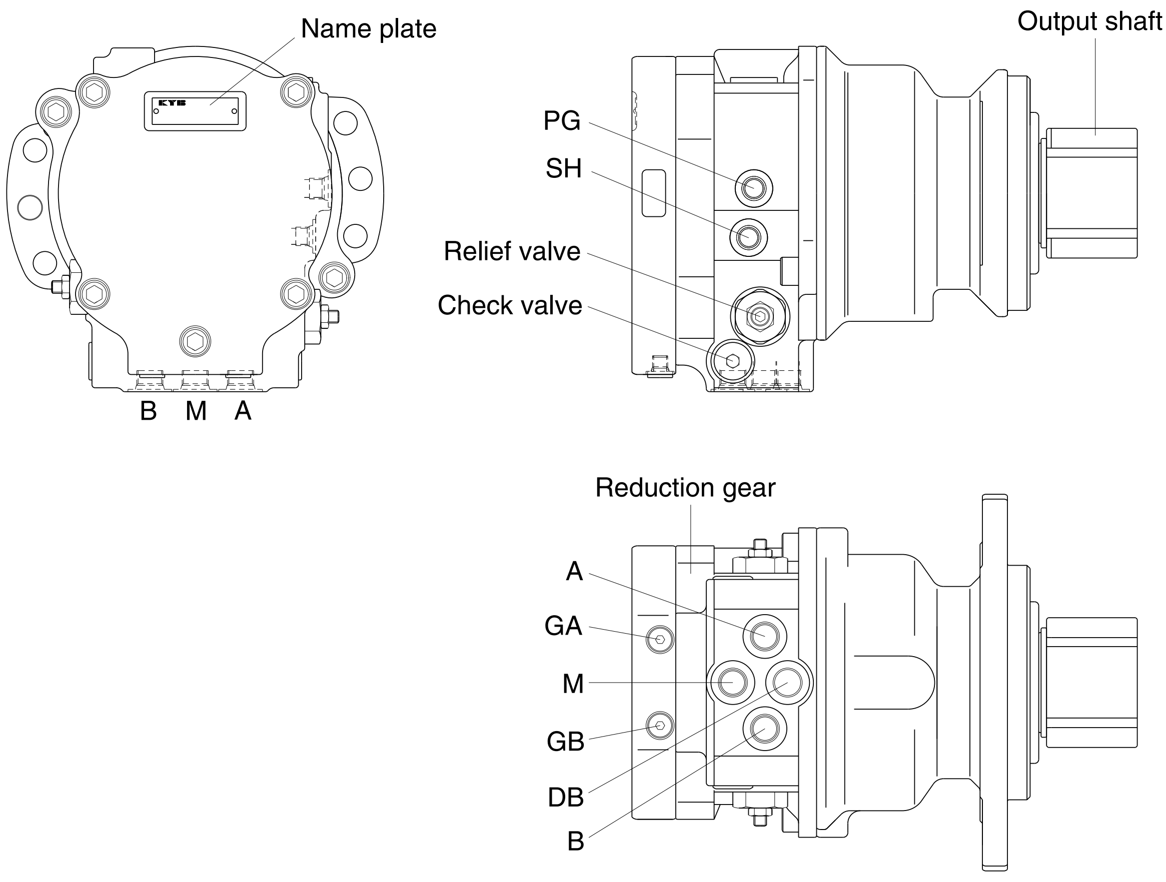
GROUP 3 SWING DEVICE

1. STRUCTURE

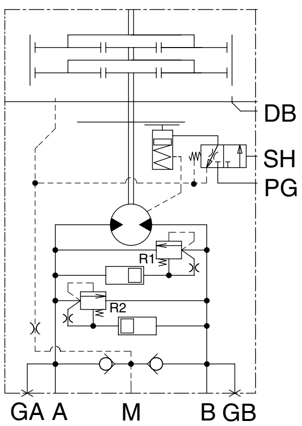
Swing device consists swing motor and swing reduction gear.

1) SWING MOTOR

Swing motor include mechanical parking valve, relief valve, make up valve and time delay valve.



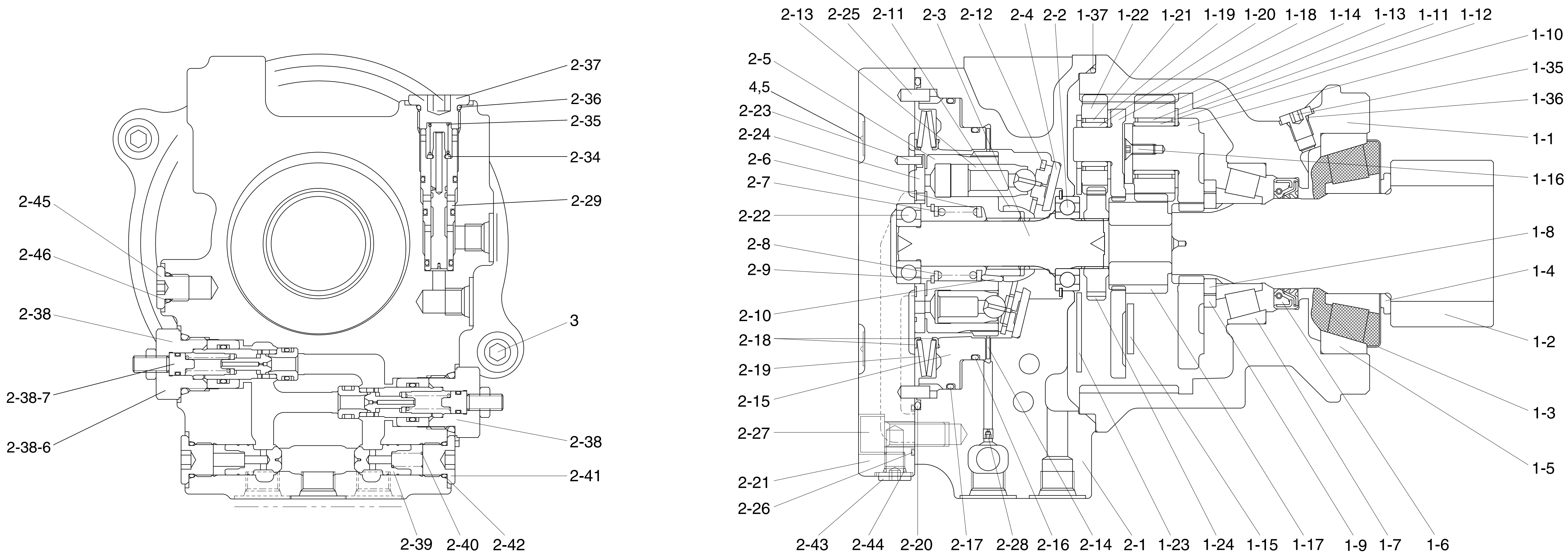
40A2SM01



Hydraulic circuit

Port	Port name	Port size
A	Main port	PF 3/8
B	Main port	PF 3/8
DB	Drain port	PF 3/8
M	Make up port	PF 3/8
PG	Brake release stand by port	PF 1/4
SH	Brake pilot port	PF 1/4
GA,GB	Gage port	PF 1/8

2) COMPONENTS



40A2SM02

1 Gear box
1-1 Housing
1-2 Pinion shaft
1-3 Plate
1-4 Collar
1-5 Tapper roller bearing
1-6 Oil seal
1-7 Tapper roller bearing
1-8 Plate
1-9 Collar
1-10 Holder
1-11 Thrust washer
1-12 Inner race
1-13 Needle bearing
1-14 Planetary gear B
1-15 Thrust plate
1-16 Screw
1-17 Sun gear B
1-18 Holder
1-19 Thrust washer
1-20 Inner race
1-21 Needle bearing
1-22 Planetary gear
1-23 Thrust plate
1-24 Drive gear
1-35 Plug
1-36 O-ring
1-37 O-ring
2 Axial piston motor
2-1 Case
2-2 Ball bearing
2-3 Shaft
2-4 Thrust plate
2-5 Cylinder block
2-6 Collar
2-7 Spring
2-8 Washer
2-9 Ring-snap
2-10 Pin
2-11 Retainer holder
2-12 Retainer plate
2-13 Piston assy
2-14 Disc
2-15 Brake piston
2-16 O-ring
2-17 O-ring
2-18 Spring seat
2-19 Spring
2-20 O-ring
2-21 Cover
2-22 Ball bearing
2-23 Pin
2-24 Valve plate
2-25 Pin
2-26 O-ring
2-27 Socket head bolt
2-28 Orifice
2-29 Valve assy
2-34 Washer
2-35 Spring
2-36 O-ring
2-37 Plug
2-38 Relief valve assy
2-38-6 Plug
2-38-7 Adjust kit
2-39 Check valve
2-40 Spring
2-41 Plug
2-42 O-ring
2-43 Plug
2-44 O-ring
2-45 Plug
2-46 O-ring
3 Socket head bolt
4 Name plate
5 Screw

2. DESCRIPTION OF FUNCTION AND OPERATION

1) SWASH PLATE MOTOR

The cylinder block incorporates nine pistons. The end face of the cylinder block is in contact with the valve plate having two woodruff ports B and C (distributing valve to change over between high and low pressure).

Principle of generation torque

When high pressure oil (pressure P) is introduced to the B port, the inclined surface is pushed by a force of "F = P×A, A : Piston sectional area" per piston and the piston receives a reaction force from the inclined surface. The piston that is restricted in the moving direction by the cylinder block due to the reaction force generates a rotating force. The total of rotating force by the reaction force of the high pressure side pistons works on the cylinder block. The generated rotating force is transmitted as a torque to the shaft via the spline to turn the shaft.

On the other hand, if the high pressure oil is introduced to the C port, the opposite rotation is caused.

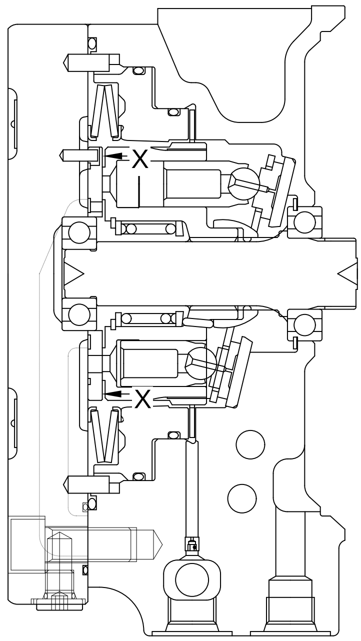
The output torque and the revolution are calculated as follows :

· Output torque (T)

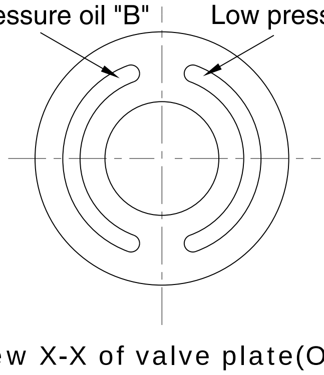
$$T = \frac{P \times D \times i \times \eta m \times \eta G}{2 \times \pi \times 100}$$

· Revolution (N)

$$N = \frac{Q \times 1000 \times \eta v}{D \times i}$$



D : Displacement (cm^3/rev)
P : Effective drive pressure (MPa)
Q : Inflow (L /min)
η m : Mechanical efficiency (motor) (% × 10^{-2})
η v : Volumetric efficiency (motor) (% × 10^{-2})
i : Speed ratio of reduction gear
η G : Efficiency of reduction gear (% × 10^{-2})



View X-X of valve plate(Outline)

R35Z72SM02

2) PARKING BRAKE

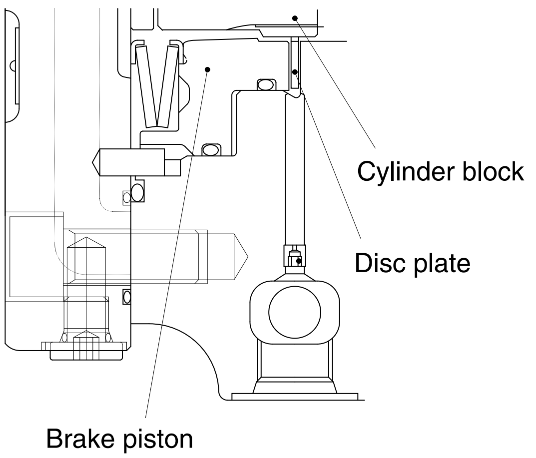
The parking brake is of wet type multi-plate construction of hydraulic release type and has a shaft lock mechanism that changes between ON and OFF of the brake by external signal pressures.

① Parking brake ON

When the hydraulic pressure for brake release is shut, the disc coupled to the periphery of the cylinder block via the spline is pushed by the spring force against the brake piston (pinned to the case so that it will not rotate) and the cylinder block and the case secured by the frictional force. Thus the shaft is locked.

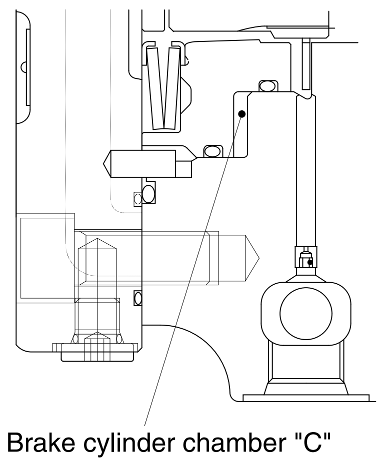
② Parking brake OFF

When the brake release pressure is introduced to the brake cylinder chamber (C) via the "PB" port, the brake piston is operated by the release pressure in opposition to the spring force to eliminate the force of friction with the disc, thus allowing the shaft to rotate freely.



"PB" (Brake releasing pressure) OFF

R35Z72SM03



"PB" (Brake releasing pressure) ON

R35Z72SM04

3) RELIEF VALVE

The relief valves determine the drive force and the brake force for hydraulic shovel swing and are installed in the main port A and B lines. The circuit is configured to return the relief valve return oil to the counterpart main low pressure line.

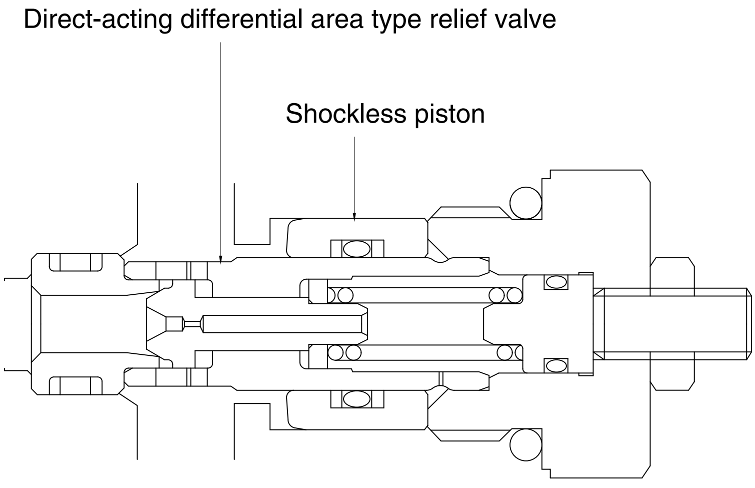
A shockless function is also incorporated to reduce shock produced at the start of both acceleration and deceleration.

(1) Construction of the relief valve

① A direct-acting differential area type relief valve

② A shockless piston

The installation of a shockless type relief valve helps reduce shock and stress produced in the strength members.



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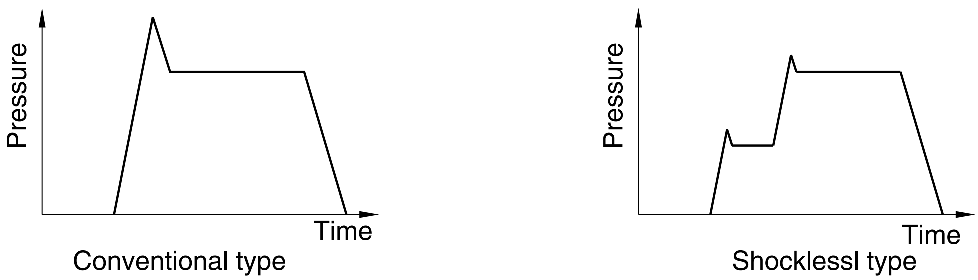


Comparison of pressure wave forms

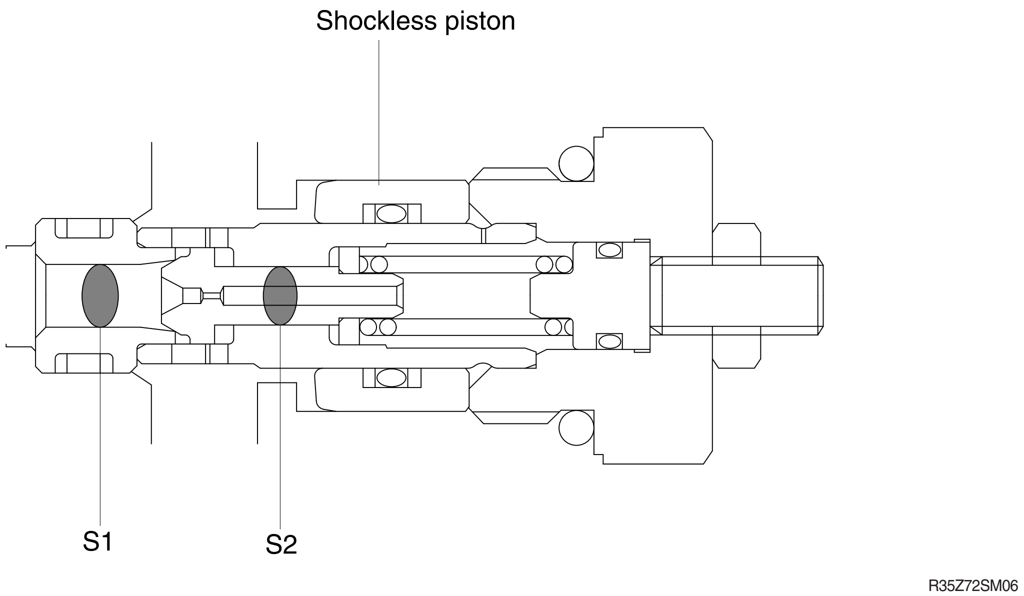
R35Z72SM08

(2) Relief valve operation

First stage

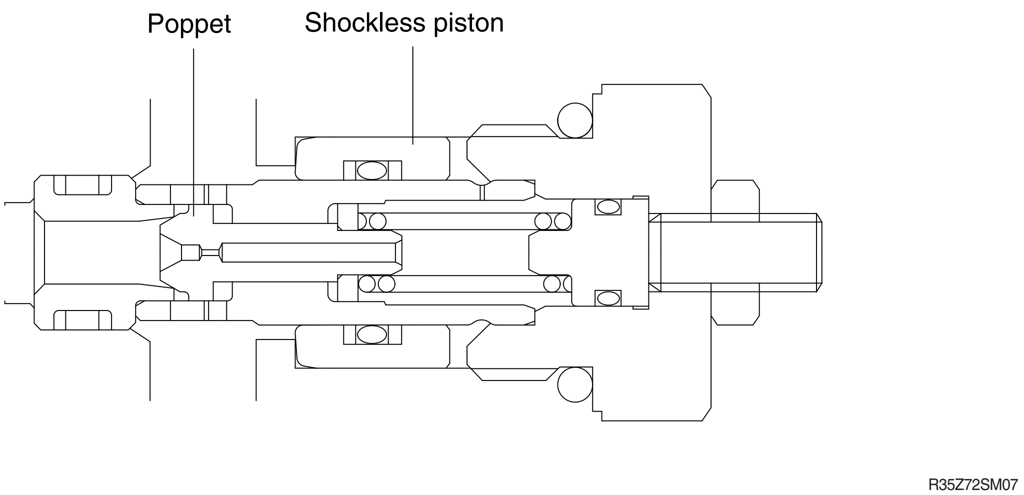
At the start of operation, the shockless piston moves to maintain the spring chamber at a low pressure. Thus, the pressure receiving area of the poppet becomes the poppet seat area (S1), a considerably larger area than the pressure receiving area (S1-S2) at the specified relief setting. For this reason, the relief operating pressure is kept at a low pressure until the shockless piston completes its movement.

The low pressure holding time depends on the poppet orifice diameter, the free piston pressure receiving area and the free piston stroke.



② Second stage

When the shockless piston completes its movement, the pressure inside the spring chamber increases to make the pressures before and after the poppet equal. Then the relief valve operates at the specified set pressure.

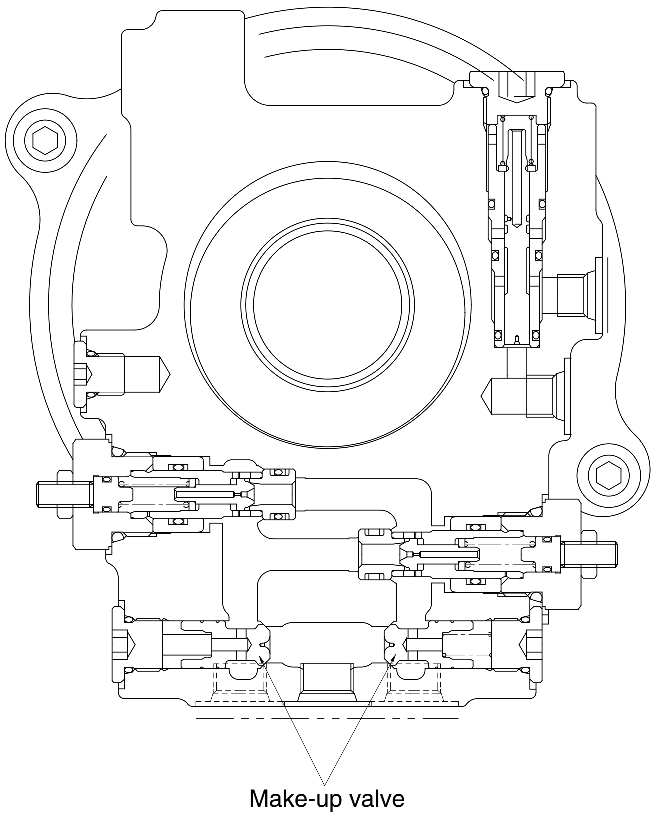


4) MAKE-UP VALVE

The make-up valve has the following two functions.

One is to prevent cavitation produced by overrun of the piston motor in order to prevent the overrun of the upper body. When the motor is turned by the inertia of the upper body to cause the pumping action, which then causes the motor revolution to rise above the revolution equivalent to the amount of oil supplied to the motor, the amount of oil equivalent to the shortage is supplied to the motor main circuit via the make-up valve from outside to prevent occurrence of vacuum inside the circuit.

The other is a function to add the amount of motor drain and valve leak via the make-up valve to prevent vacuum inside the circuit to provide the braking capability in the normal circuit status when a closed circuit is formed between the control valve and the motor as when braking.

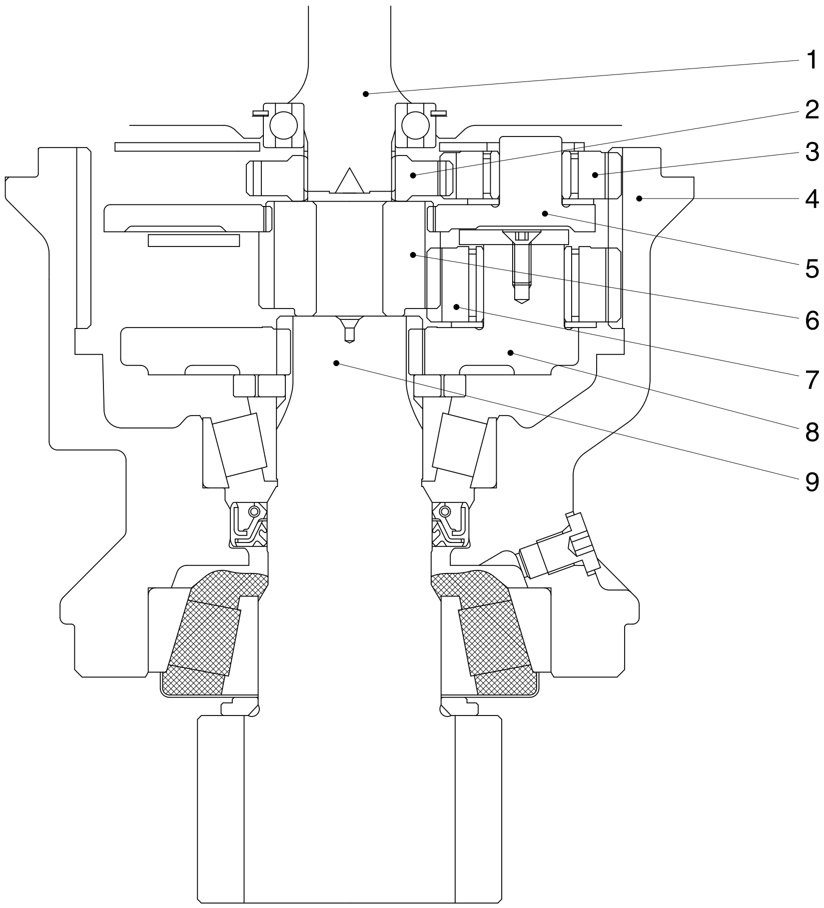


40A2SM09

5) REDUCTION GEAR (planetary two-stage)

Refer to the cross section.

The motor shaft (1) is coupled to the drive gear (2) via a spline. The drive force of the hydraulic motor is transmitted from the drive gear (2) to the engaged planetary gear (3). The planetary gear (3) is meshed with the ring gear of the reduction gear housing (4). Thus, while rotating, it revolves around the ring gear. The planetary gear (3) is held by the holder (5) via the bearing and the holder transmits the revolving motion of the planetary gear (3) to the sun gear (6) coupled via the spline. The sun gear (6) meshes with the planetary gear (7) and as with the first stage, transmits the rotary motion to the planetary gear (7). Since the planetary gear (7) is meshed with the ring gear of the housing (4), it revolves while rotating. Since the planetary gear (7) is held by the holder (8) via the bearing, the holder (8) transmits the revolving motion of the planetary gear (7) to the pinion shaft (9) coupled via the spline.



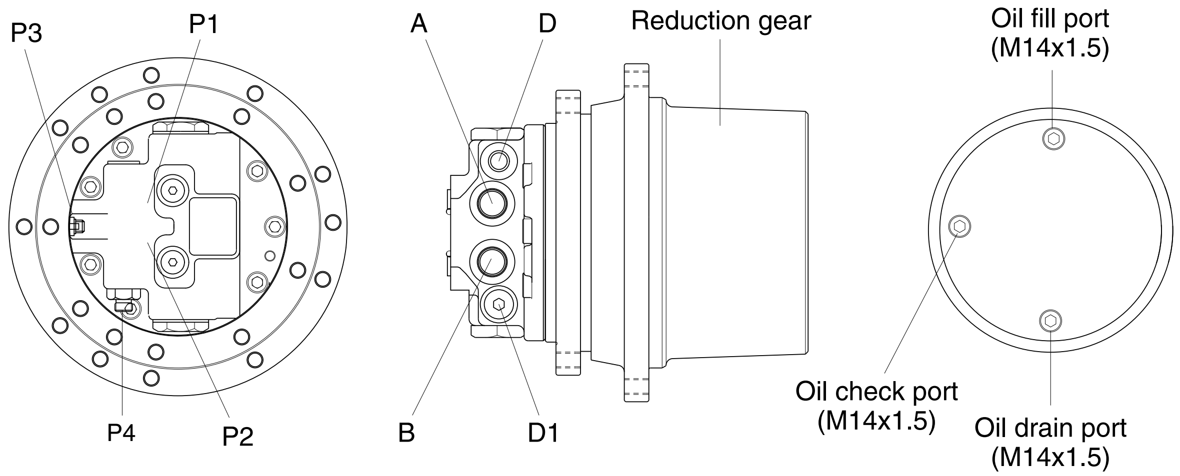
R35Z72SM10

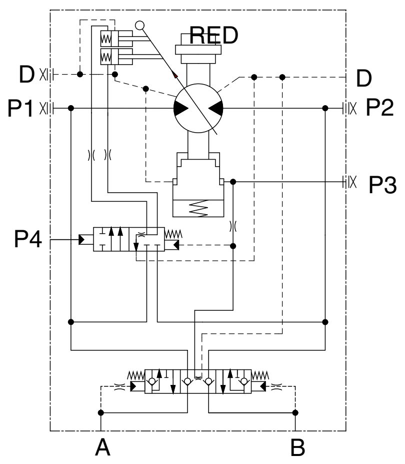
GROUP 4 TRAVEL DEVICE

1. CONSTRUCTION

Travel device consists travel motor and reduction gear box.

Travel motor includes counterbalance valve, parking brake and high/low speed changeover mechanism.



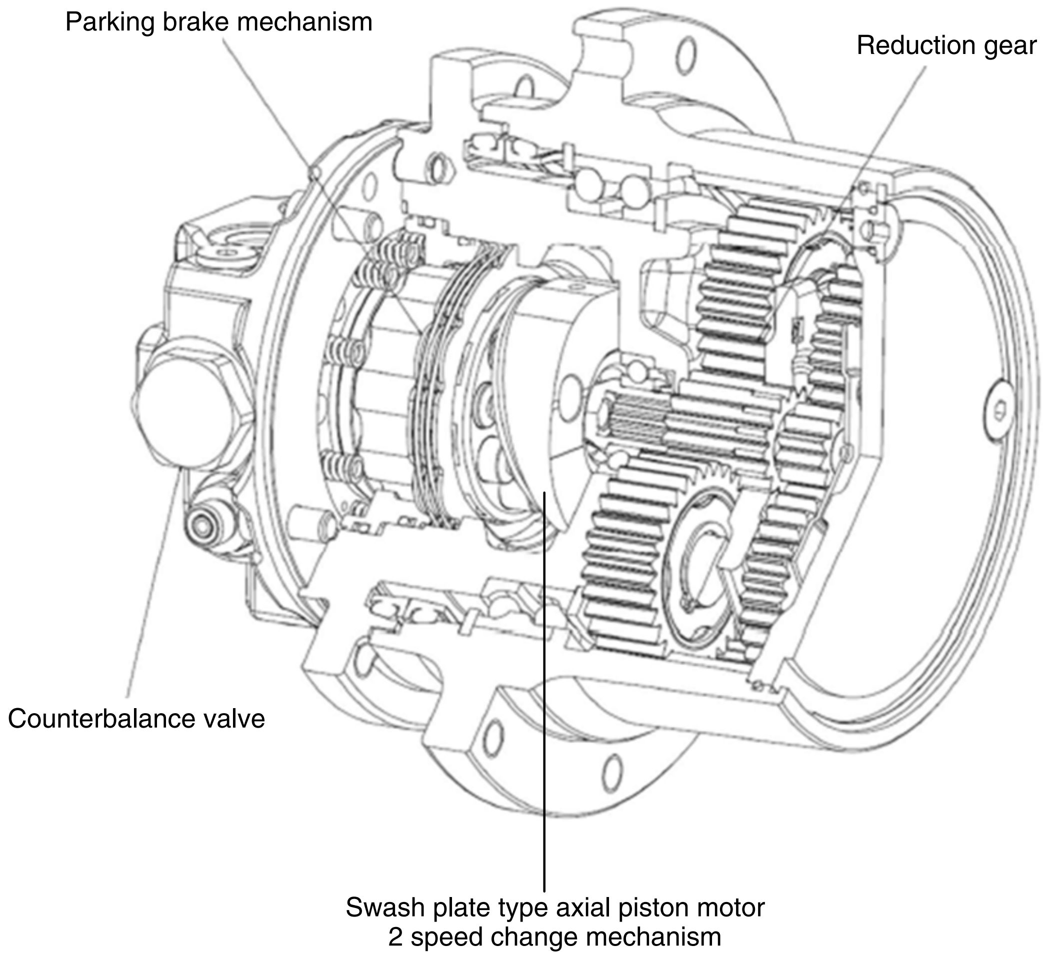


Hydraulic circuit

40A2TM01

Port	Port name	Port size
A	Main port	PF 1/2
B	Main port	PF 1/2
P1, P2	Gauge port	PF 1/4
D, D1	Drain port	PF 1/4
P4	2 speed control port	9/16-18 UNF
P3	Brake release port	PF 1/8

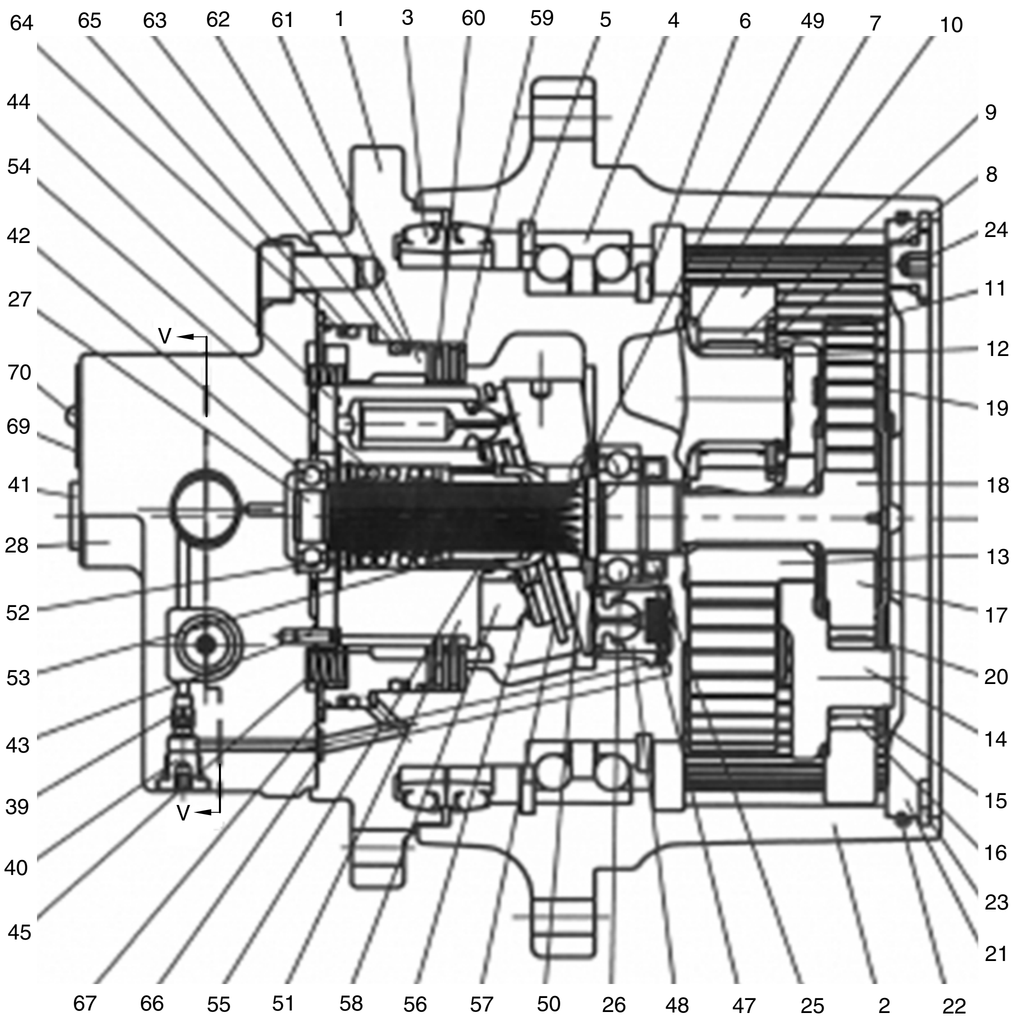
1) STRUCTURE (1/3)



35AZ2TM04

The travel motor is constituted with swash plate type axial piston motor, counterbalance valve, 2 speed change mechanism, parking brake, anti-cavitation valve and reduction gear unit.

STRUCTURE (2/3)

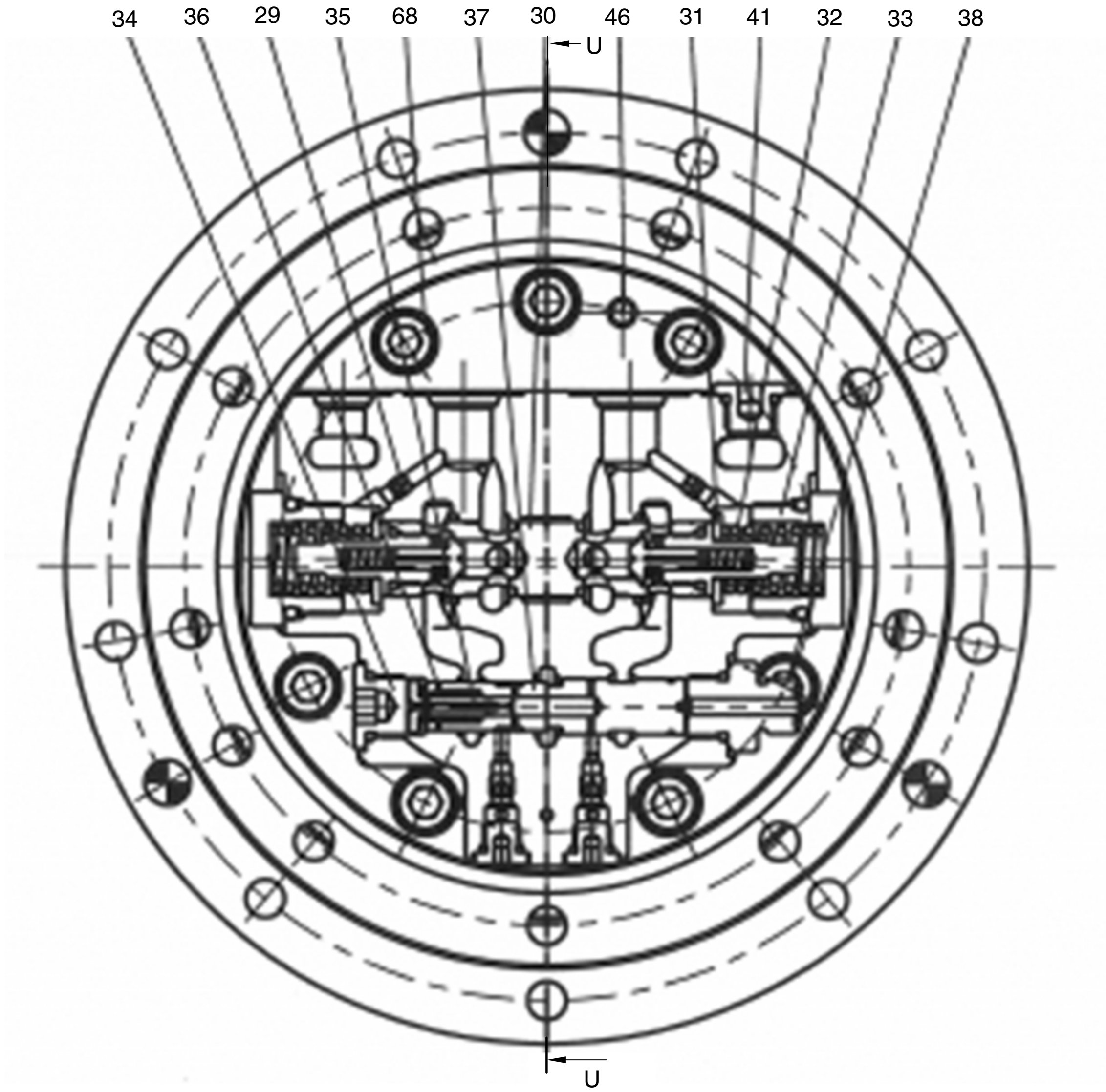


SECTION U-U

35AZ2TM02

1	Spindle	21	Cover	52	Snap ring
2	Hub	22	O-Ring	53	Washer
3	Floating seal	23	Clip	54	Spring
4	Angular ball bearing	24	Plug	55	Roller
5	Snap ring	25	Oil seal	56	Thrust ball
6	Shim plate	26	Ball bearing	57	Retainer plate
7	Washer	27	Drive shaft	58	Piston assembly
8	Inner race	28	Valve casing	59	Separation plate
9	Needle bearing	39	Orifice	60	Friction plate
10	Planet gear No.2	40	Plug assy	61	Parking piston
11	Thrust washer	41	Plug assy	62	Back up ring
12	Snap ring	42	Ball bearing	63	O-ring
13	Sun sear No.2	43	Parallel pin	64	Back up ring
14	Carrier No.1	44	Valve plate	65	O-ring
15	Inner race	45	Parking spring	66	O-ring
16	Needle bearing	47	Spring	67	O-ring
17	Planet gear No.1	48	2 speed piston assy	69	Name plate
18	Sun gear No.1	49	Steel ball	70	Screw
19	Thrust plate No.1	50	Swash plate		
20	Snap ring	51	Cylinder block		

STRUCTURE (3/3)



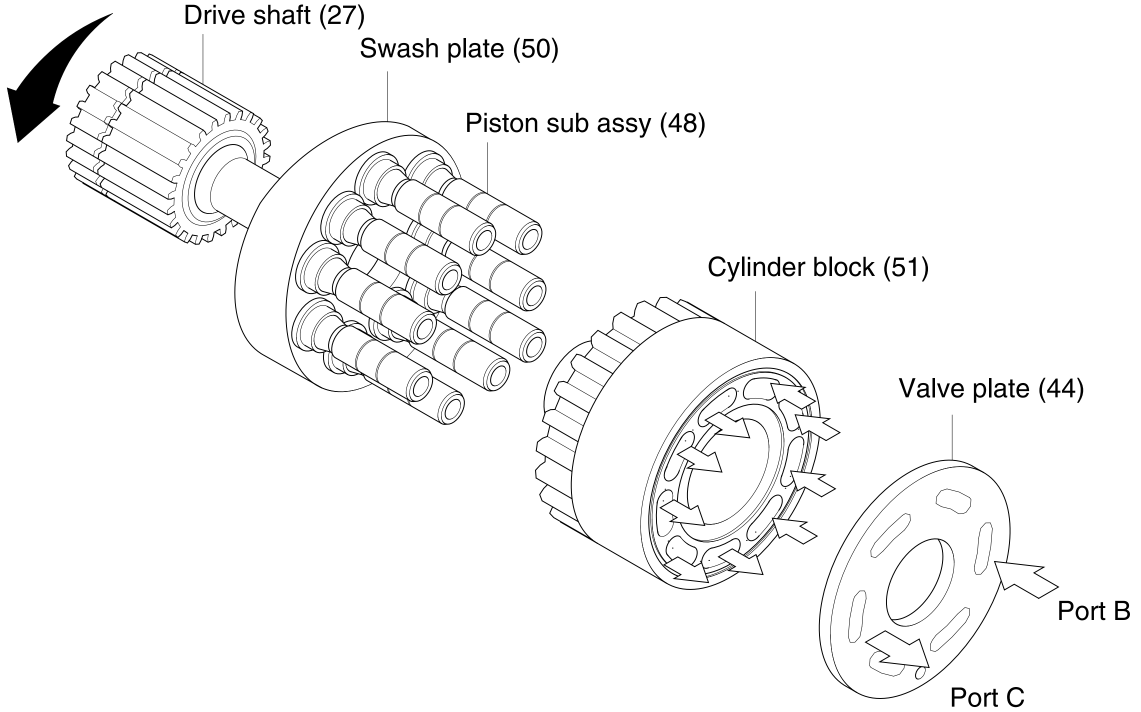
SECTION V-V

35AZ2TM03

29 Orifice
30 CB spool assy
31 Washer
32 Spring
33 Main plug assy
34 Plug assy
35 Speed shift guide spool
36 Spring
37 2-speed spool
38 Plug assy
41 Plug assy
46 Parallel pin
68 Socket bolt

2. FUNCTION

1) HYDRAULIC MOTOR



35AZ2TM05

Nine piston sub assemblies (48) are assembled in cylinder block (51). The end face of cylinder block (51) is in contact with valve plate (44) having two crescent shaped ports, B and C (high and low pressure ports).

When supplying pressure fluid (pressure P) to B port, a swash plate (50) is pushed by the force of piston sub assemblies having F = P · A (A : piston pressure area). Piston sub assemblies receive the reaction force against it, and produce the reaction force (Ft) in rotating direction. The total force of high pressure side piston sub assemblies in rotating direction produces a rotating force in the cylinder block, and the torque is transmitted to drive shaft (27) through the spline resulting in the rotation of the shaft.

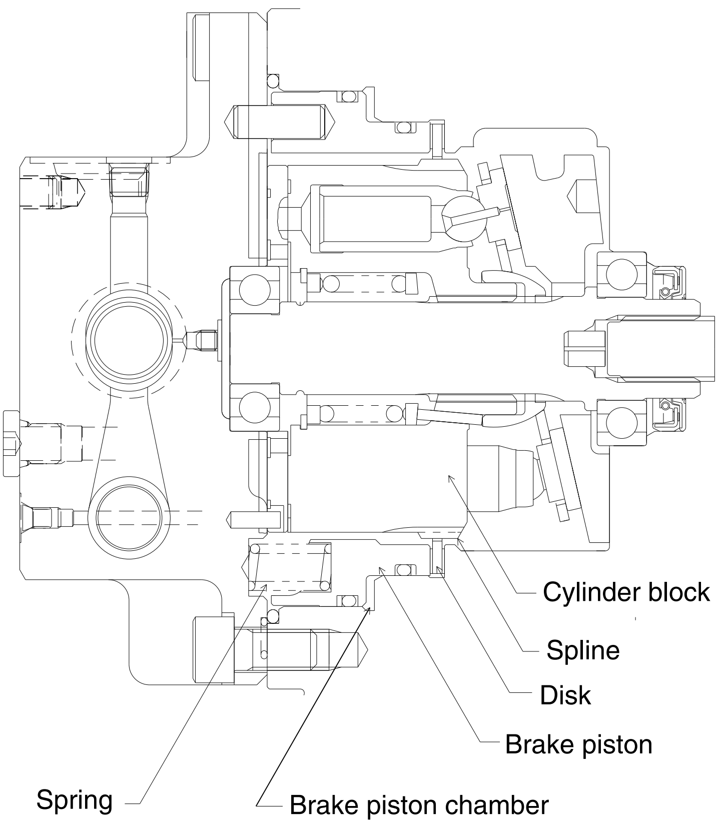
According to the above working principle, the output torque and rotating speed of the piston motor are determined by supply pressure (P) and flow rate (Q), and are calculated by the following equation.

$$T = \frac{P \times D \times \eta m}{2 * \pi}$$

$$N = \frac{Q \times 10^3 \times \eta v}{D}$$

T : Output torque [N · m]
N : Speed of rotation [rpm]
P : Working pressure [MPa]
Q : Flow rate [L/min]
D : Theoretical displacement [cm^3/rev]
η m : Mechanical efficiency
η v : Volumetric efficiency

2) PARKING BRAKE



The parking brake is a negative brake consisting of disk, brake piston and spring.

The cylinder block and the disk are combined with a spline, and friction material is bonded on both sides of disk. The disk generates frictional force between the flange holder and the brake piston by the force of spring and restricts the rotating force of the motor, achieving the best performance of the parking brake.

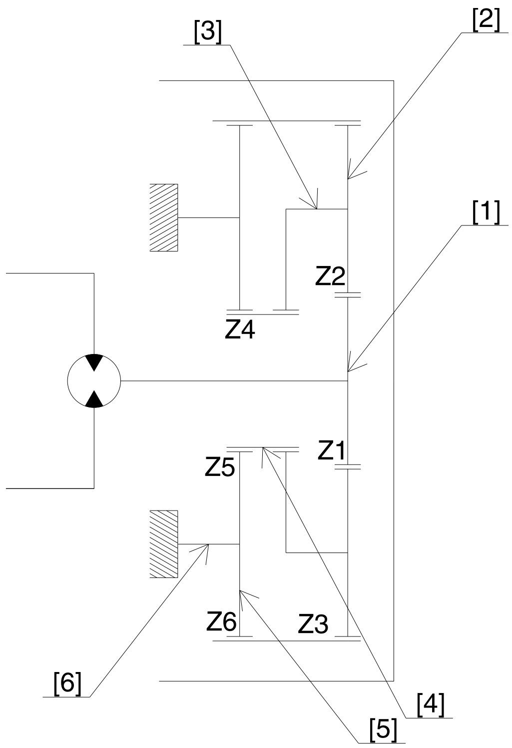
When the pressurized oil flows into the motor, the plunger moves and the parking brake release port is opened. After the oil flows into brake piston chamber, the thrust F is generated, corresponding to the pressure receiving area of brake piston and the thrust F becomes larger than the force of spring f, consequently the brake piston moves toward right.

Then, the disk rotates freely between the flange holder and brake piston, and parking brake is released.

When the motor is stopped, the plunger returns to the neutral position and the parking brake release port is closed. Consequently the pressurized oil in brake piston chamber flows into motor case, the parking brake acts by the force of spring.

3) REDUCTION UNIT

The reduction unit consists of double stage planetary gear mechanism.



R35Z72TM19

Drive gear[1] is engaged with the 1st planetary gear [2], 2nd stage sun gear [4] is engaged with the 2nd planetary gear [5]. The 2nd stage planetary carrier [6] is fixed machine body. Planetary gears [2], [5] are engaged with ring gear (housing).

The driving force form the piston motor is transmitted to drive gear [1], and the speed is reduced by each gear.

The reduced driving force is transmitted to ring gear through planetary gear [5] of planetary carrier [6] fixed on the machine body. (The driving force is also transferred from 1st stage planetary gear [2]). The direction of output rotation are reversed against that of input rotation.

The reduction gear ratio " i " is shown as follows.

※ Reduction gear ratio (i)

$$I = (i1 \times i2-1) = \left(\frac{Z1+Z3}{Z1} \times \frac{Z4+Z6}{Z4} -1 \right)$$

※ Output torque of reduction unit (T)

$$T = TM \times i \times \eta M$$

Z1 : Drive gear teeth number
Z2 : Ring gear teeth number
Z4 : Sun gear teeth number
Z6 : Ring gear teeth number

※ Reduction gear output rotating speed (N)

$$N = \frac{NM}{i}$$

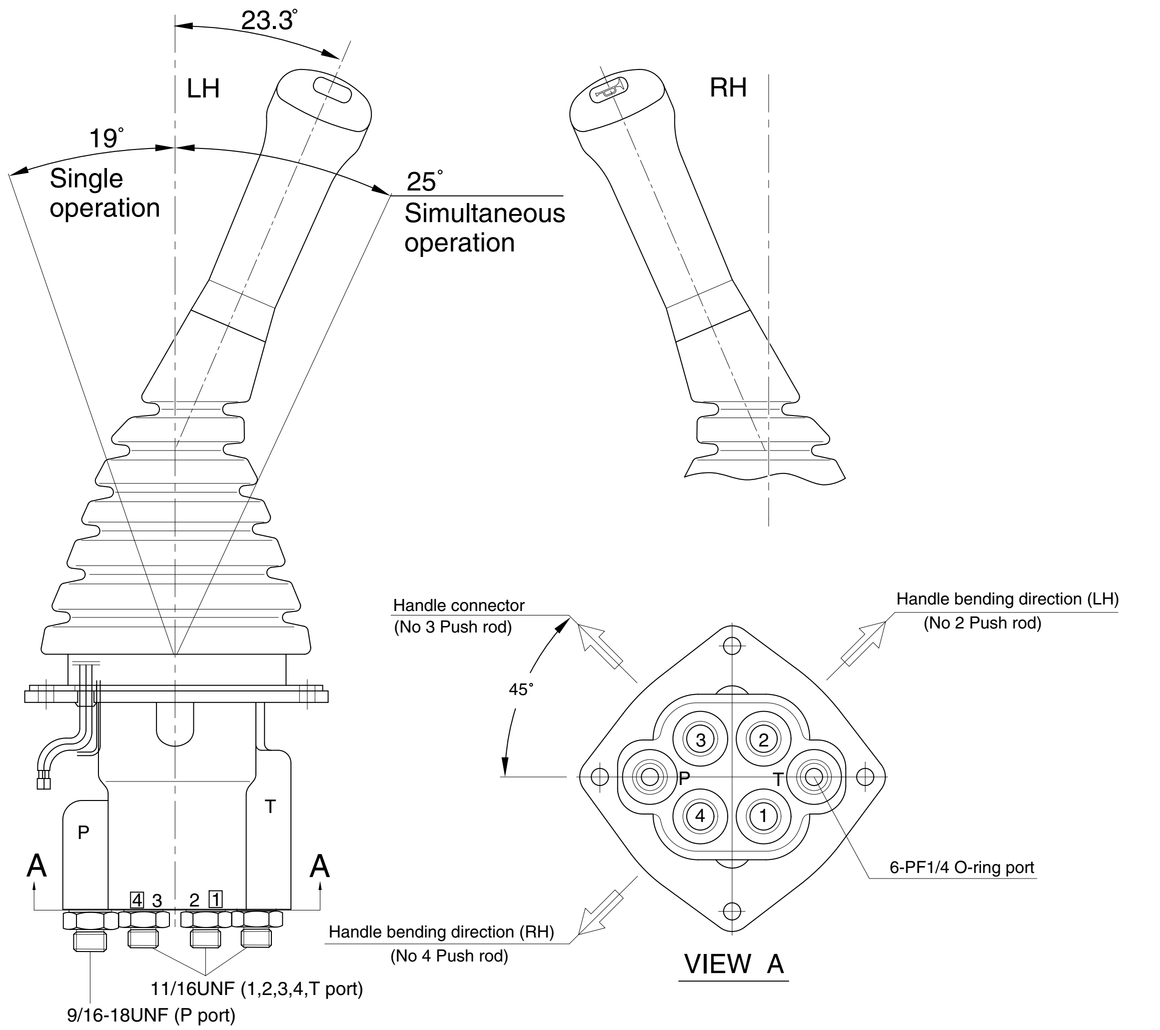
TM : Input torque (motor output torque)
i : Reduction gear ratio
η M : Mechanical efficiency
NM : Input speed of rotation (output motor speed)

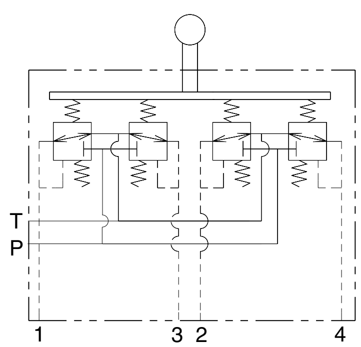
GROUP 5 RCV LEVER

■ TYPE 1 (STD)

1. STRUCTURE

The casing has the oil inlet port P (primary pressure) and the oil outlet port T (tank). In addition the secondary pressure is taken out through ports 1,2,3 and 4 provided at the bottom face.





Hydraulic circuit

Port	LH	RH	Port size
P	Pilot oil inlet port	Pilot oil inlet port	PF 1/4
T	Pilot oil return port	Pilot oil return port	
1	Left swing port	Bucket out port	
2	Arm out port	Boom up port	
3	Right swing port	Bucket in port	
4	Arm in port	Boom down port	

CROSS SECTION

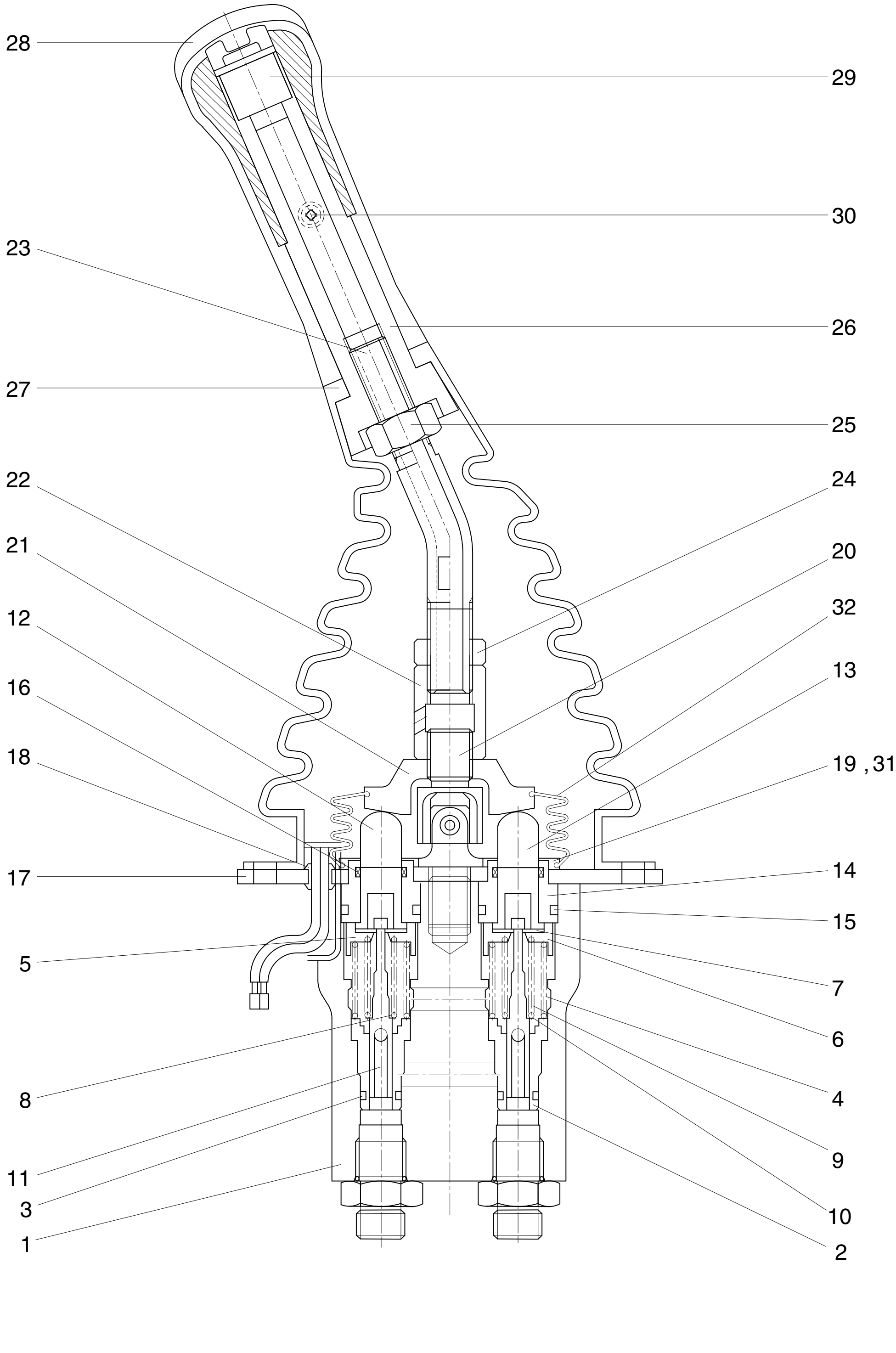
The construction of the pilot valve is shown in the attached cross section drawing. The casing has vertical holes in which reducing valves are assembled.

The pressure reducing section is composed of the spool (11), spring (8, 9) for setting secondary pressure, return spring (4), stopper (7), spring seat (5, 6) and spring seat (10). The spring for setting the secondary pressure has been generally so preset that the secondary pressure is 5 to 20.5 kgf/cm^2 (depending on the type). The spool is pushed against the push rod (12, 13) by the return spring.

When the push rod is pushed down by tilting the handle, the spring seat comes down simultaneously and changes setting of the secondary pressure spring.

1	Case	12	Push rod (1, 3)	23	Connector
2	Plug	13	Push rod (2, 4)	24	Nut
3	O-ring	14	Plug	25	Nut
4	Spring	15	O-ring	26	Insert
5	Spring seat (1, 3)	16	Rod seal	27	Boot
6	Spring seat (2, 4)	17	Plate (A)	28	Handle
7	Stopper	18	Bushing	29	Switch assembly
8	Spring (1, 3)	19	Machine screw	30	Screw
9	Spring (2, 4)	20	Joint assembly	31	Plate
10	Spring seat	21	Swash plate	32	Boot
11	Spool	22	Hex nut		

CROSS SECTION



R25Z9A2RL02

2. FUNCTIONS

1) FUNDAMENTAL FUNCTIONS

The pilot valve is a valve that controls the spool stroke, direction, etc of a main control valve. This function is carried out by providing the spring at one end of the main control valve spool and applying the output pressure (secondary pressure) of the pilot valve to the other end.
For this function to be carried out satisfactorily, the pilot valve is composed of the following elements.

(1) Inlet port (P) where oil is supplied from hydraulic pump.

(2) Output ports (1, 2, 3 & 4) to apply pressure supplied from inlet port to ends of control valve spools.

(3) Tank port (T) necessary to control the above output pressure.

(4) Spool to connect output port to inlet port or tank port.

(5) Mechanical means to control output pressure, including springs that work on the above spools.

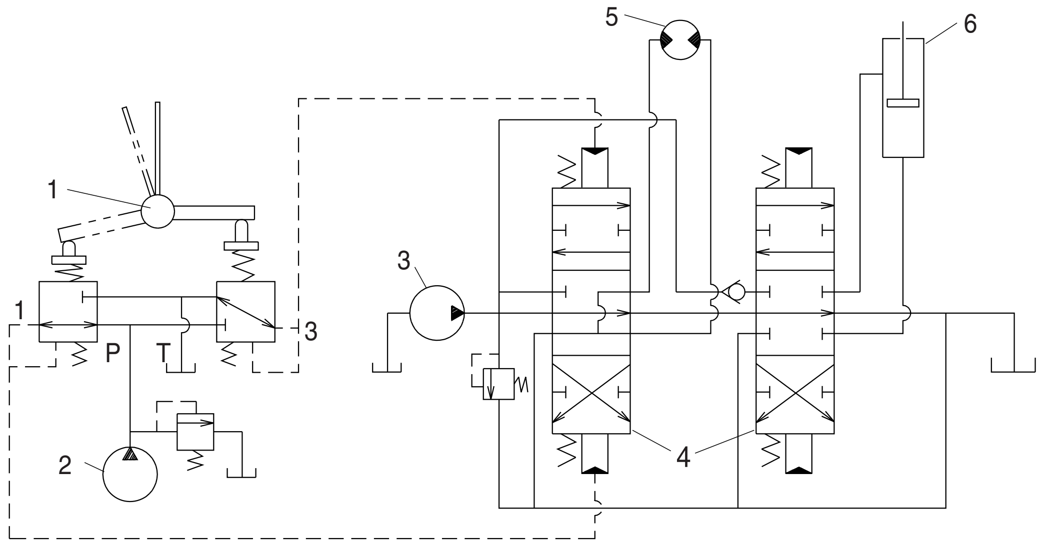
2) FUNCTIONS OF MAJOR SECTIONS

The functions of the spool (11) are to receive the supply oil pressure from the hydraulic pump at its port P, and to change over oil paths to determine whether the pressure oil of port P is led to output ports 1, 2, 3 & 4 or the output port pressure oil to tank port T.
The spring (8, 9) works on this spool to determine the output pressure.
The change the deflection of this spring, the push rod (12, 13) is inserted and can slide in the plug (14).
For the purpose of changing the displacement of the push rod through the switch plate (21) and adjusting nut (22) are provided the handle (28) that can be tilted in any direction around the fulcrum of the universal joint (20) center.
The spring (4) works on the case (1) and spring seat (5, 6) and tries to return the push rod (12, 13) to the zero-displacement position irrespective of the output pressure, securing its resetting to the center position.
This also has the effect of a reaction spring to give appropriate control feeling to the operator.

3) OPERATION

The operation of the pilot valve will be described on the basis of the hydraulic circuit diagram shown below and the attached operation explanation drawing.

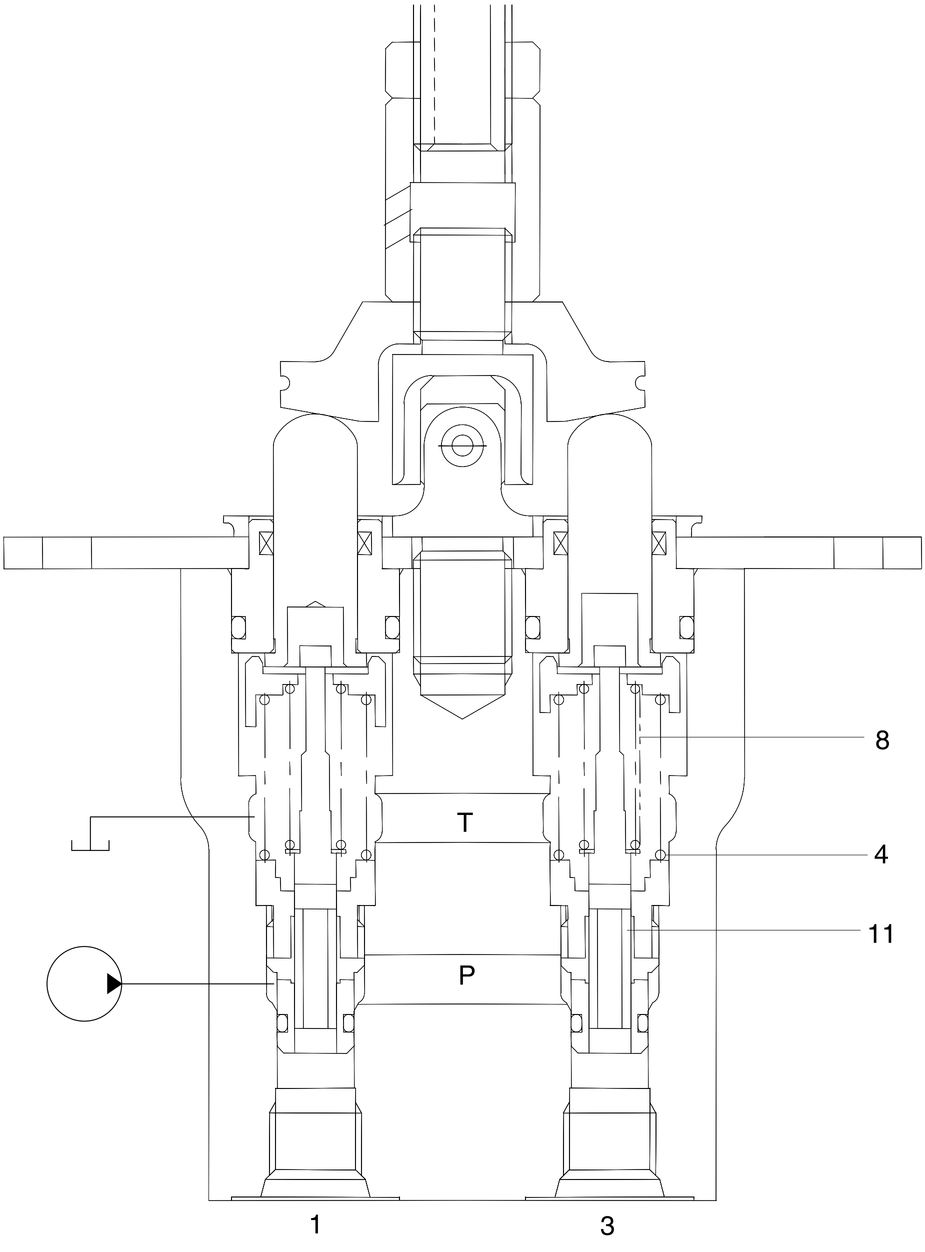
The diagram shown below is the typical application example of the pilot valve.



2-70 (140-7TIER)

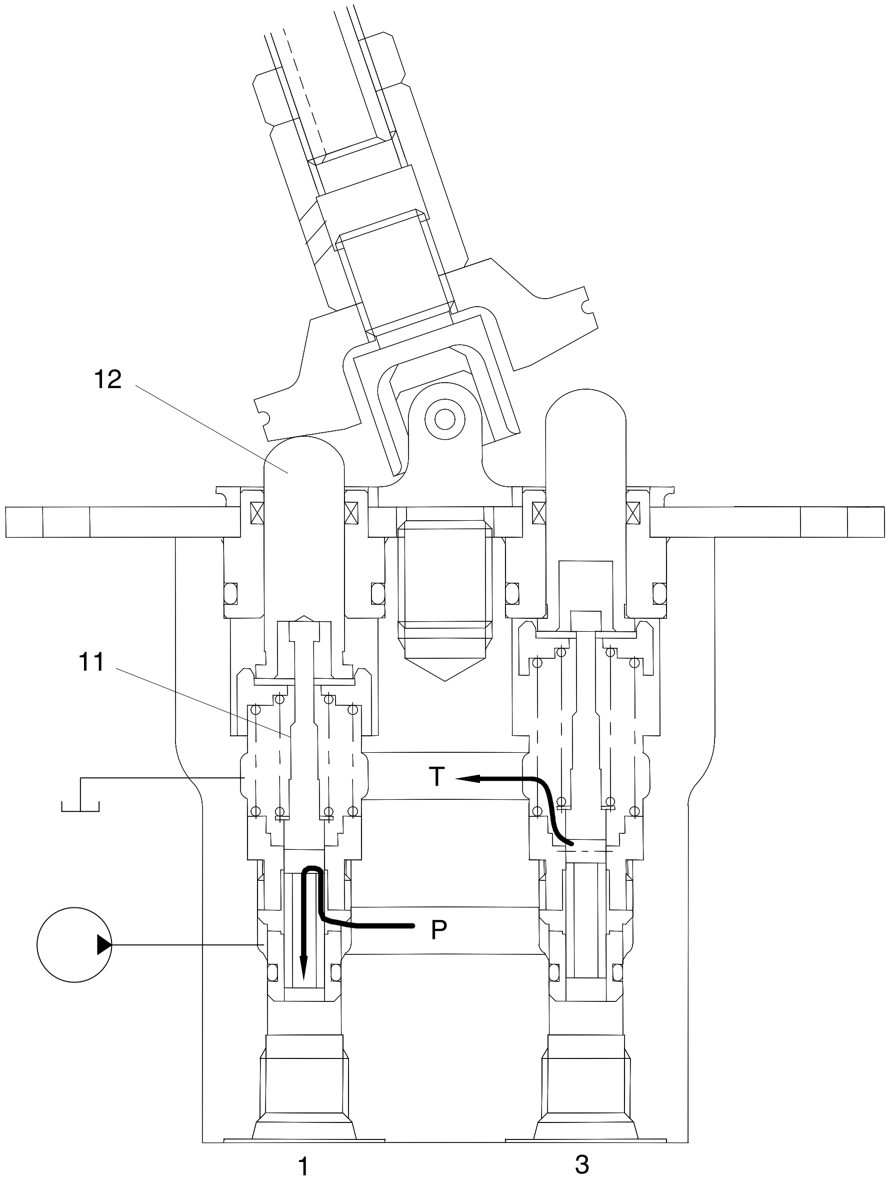
1	Pilot valve	3	Main pump	5	Hydraulic motor
2	Pilot pump	4	Main control valve	6	Hydraulic cylinder

(1) Case where handle is in neutral position



The force of the spring (8) that determines the output pressure of the pilot valve is not applied to the spool (11). Therefore, the spool is pushed up by the spring (4) to the position of port (1, 3) in the operation explanation drawing. Then, since the output port is connected to tank port T only, the output port pressure becomes equal to tank pressure.

(2) Case where handle is tilted



When the push rod (12) is stroked, the spool (11) moves downwards.

Then port P is connected with port (1) and the oil supplied from the pilot pump flows through port (1) to generate the pressure.

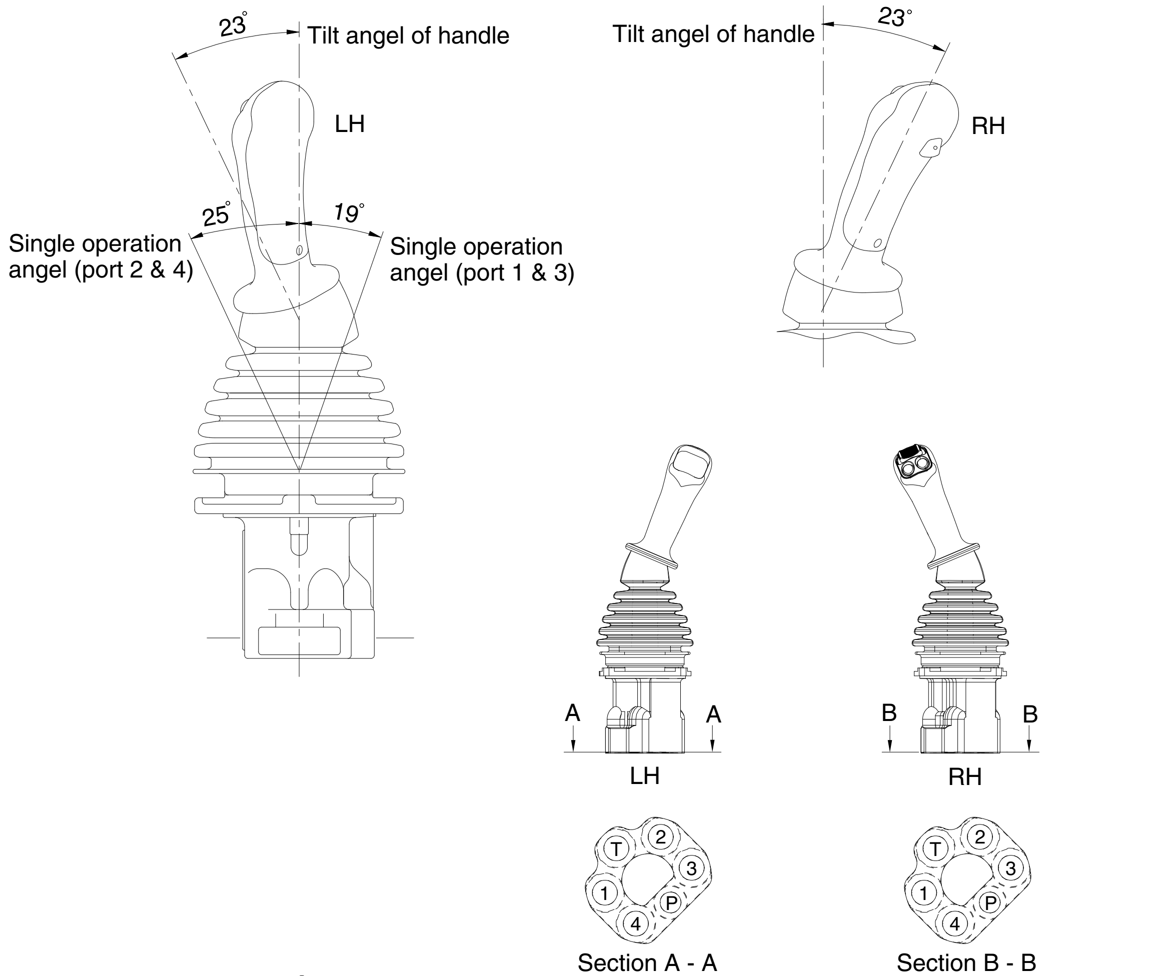
When the pressure at port (1) increases to the value corresponding to the spring force set by tilting the handle, the hydraulic pressure force balances with the spring force. If the pressure at port (1) increases higher than the set pressure, port P is disconnected from port (1) and port T is connected with port (1). If it decreases lower than the set pressure, port P is connected with port (1) and port T is disconnected from port 1.

In this manner the secondary pressure is kept at the constant value.

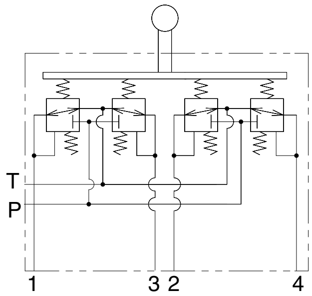
■ TYPE 2 (OPT)

1. STRUCTURE

The casing has the oil inlet port P (primary pressure) and the oil outlet port T (tank). In addition the secondary pressure is taken out through ports 1,2,3 and 4 provided at the bottom face.



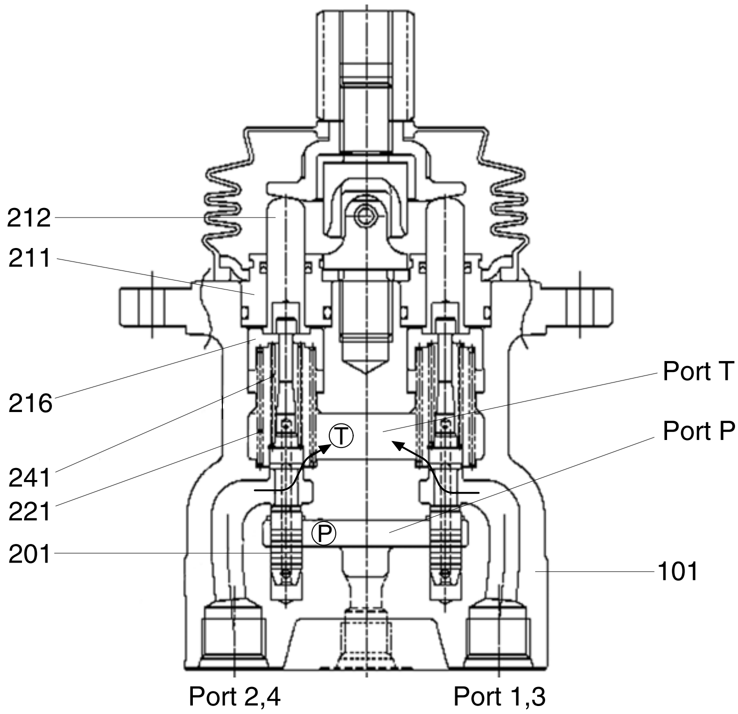
17Z9A2RL01



Hydraulic circuit

Port	LH	RH (with proportional)	Port size
P	Pilot oil inlet port	Pilot oil inlet port	PF 1/4
T	Pilot oil return port	Pilot oil return port	PF 3/8
1	Left swing port	Bucket out port	
2	Arm out port	Boom down port	
3	Right swing port	Bucket in port	
4	Arm in port	Boom up port	

CROSS SECTION



17Z9A2RL02

101	Casing	216	Spring seat
201	Spool	221	Return spring
211	Plug	241	Secondary pressure setting spring
212	Push rod		

The structure of the remote control valve is as shown in the assembly. There is a vertical axial hole in the casing and the reduction valves are inserted into this.

The secondary pressure setting spring (241) is set such that the secondary pressure is calculated as 5.1~10.2 kgf/cm^2. Spool (201) is pushed onto the push rod (212) by return spring (221).
Tilting the control handle pushes down push rod (212), the spring seat (216) also moves down and the setting of the secondary pressure setting spring (241) is changed.
Port P, oil inlet (primary pressure) and port T outlet (tank) are in the casing (101).

2. PERFORMANCE

1) BASIC PERFORMANCE

The remote control valve controls the stroke and direction of the control valve spools. This is achieved by the output pressure of the remote control valve acting on the tip of the control valve spool.

To achieve satisfactory performance, the remote control valve comprises the following elements :

(1) An inlet port (P) for oil fed from the hydraulic pump.

(2) Multiple output ports (1, 2, 3 and 4) to allow pressure from the inlet port to act on the spool tips of the control valve.

(3) A tank port (T) to control the output pressure.

(4) A spool to connect the output port to the inlet port or tank port.

(5) A mechanical assembly, which contains a spring which acts on the spool and controls the output pressure.

2) PERFORMANCE OF THE MAIN PARTS

The spool (201) operates to take the supply oil pressure from the hydraulic pump. This switches the oil channel so that the port P oil pressure is directed to the output ports 1, 2, 3, 4 or to port T.

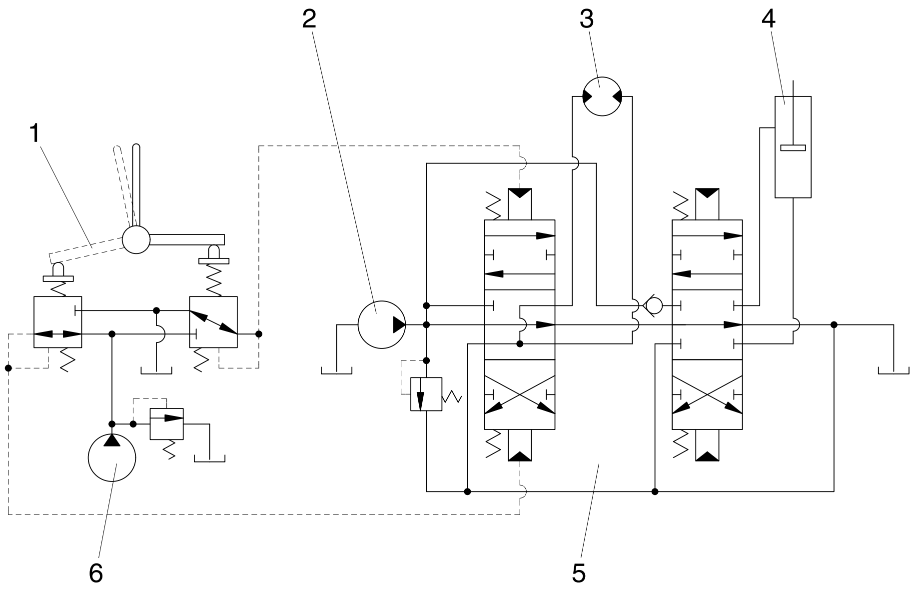
The secondary pressure setting spring (241) determines the output pressure that acts on the spool (201).

The push-rod (212), which changes the strain of the secondary pressure setting spring (241), is inserted so that it can move smoothly into the plug (211).

The return spring (221) acts to return the push-rod (212) towards zero displacement without reference to the output pressure acting on the spring seat (216) and casing (101). This acts to ensure the return to neutral of the spool (201) and also acts as a resistance spring to provide the operator with an appropriate operating "feel".

3) OPERATION

The operation of the remote control valve is described in the hydraulic circuit plan and operation explanatory figures (see figures RL04, 05 and 06). The below figure shows a typical example of the use of the remote control valve.



17Z9A2RL03

1	Remote control valve	3	Hydraulic motor	5	Control valve
2	Main pump	4	Hydraulic cylinder	6	Pilot pump

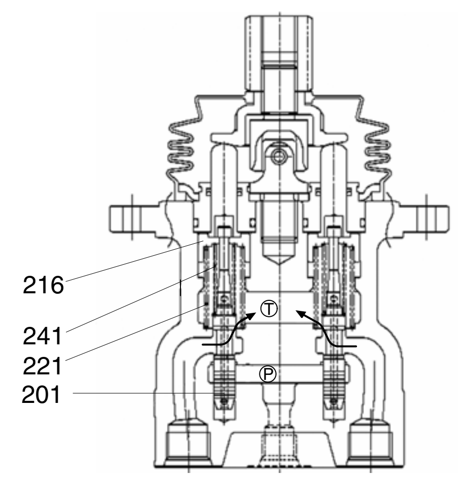
(1) Control handle neutral

The force of the secondary pressure setting spring (241) (which determines the output pressure of the pilot valve) does not act on the spool (201).

Spool (201) is pressed upward by the return spring (221) and spring seat (216) .

Output ports (2, 4) and port T are open.

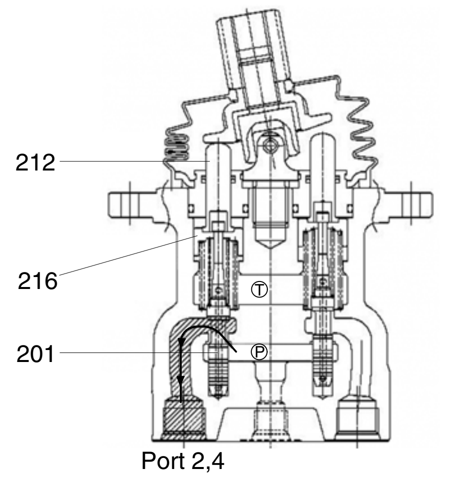
The output pressure is the same as the tank pressure.



17Z9A2RL04

(2) Control handle tilted

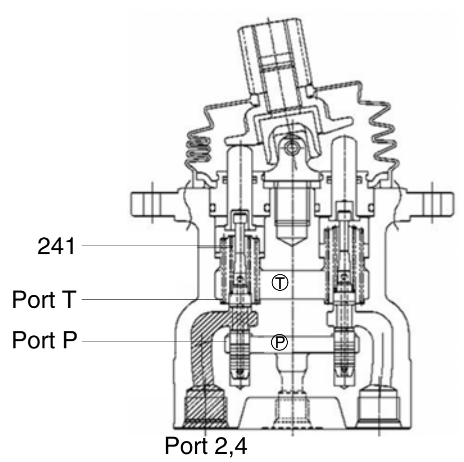
The push-rod moves, (spring seat (216)), spool (201) moves downward, port P and ports (2, 4) are open and the oil fed from the pilot pump flows to ports (2, 4) and generates pressure.



17Z9A2RL05

(3) Control handle held

The pressure of ports (2, 4) rises to become equal to the spring (241) force; the oil pressure and spring pressures become balanced. If the pressure of ports (2, 4) exceeds the set pressure, ports (2, 4) and port P close, ports (2, 4) and port T open. If the pressure of ports (2, 4) falls below the set pressure, ports (2, 4) and port P open and ports (2, 4) and port T close. The secondary pressure is kept constant.

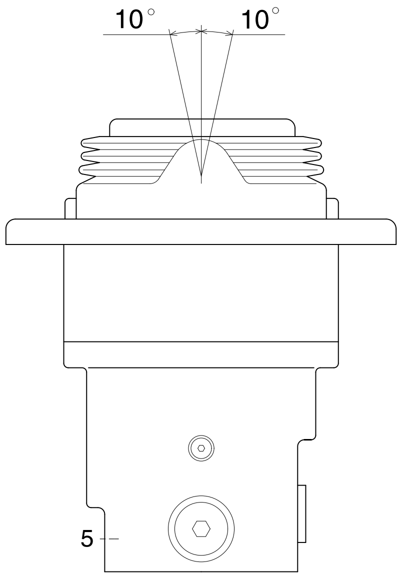


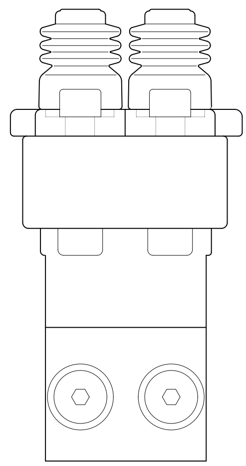
17Z9A2RL06

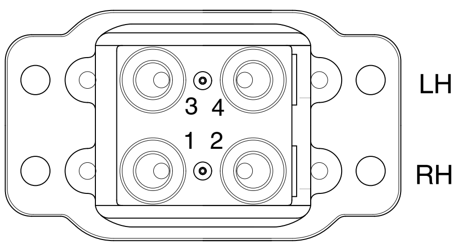
GROUP 6 RCV PEDAL

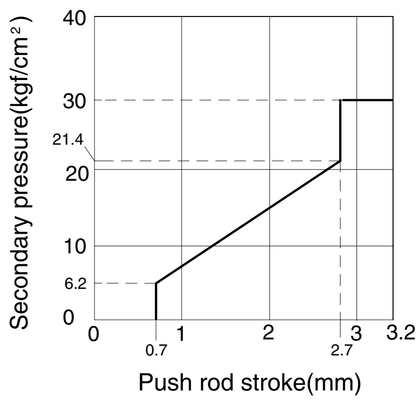
1. STRUCTURE

The casing has the oil inlet port P (primary pressure), and the oil outlet port T (tank). In addition the secondary pressure is taken out through ports 1, 2, 3 and 4 provided at the bottom face.

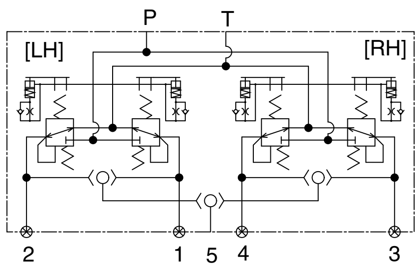








35AZ2RCP01



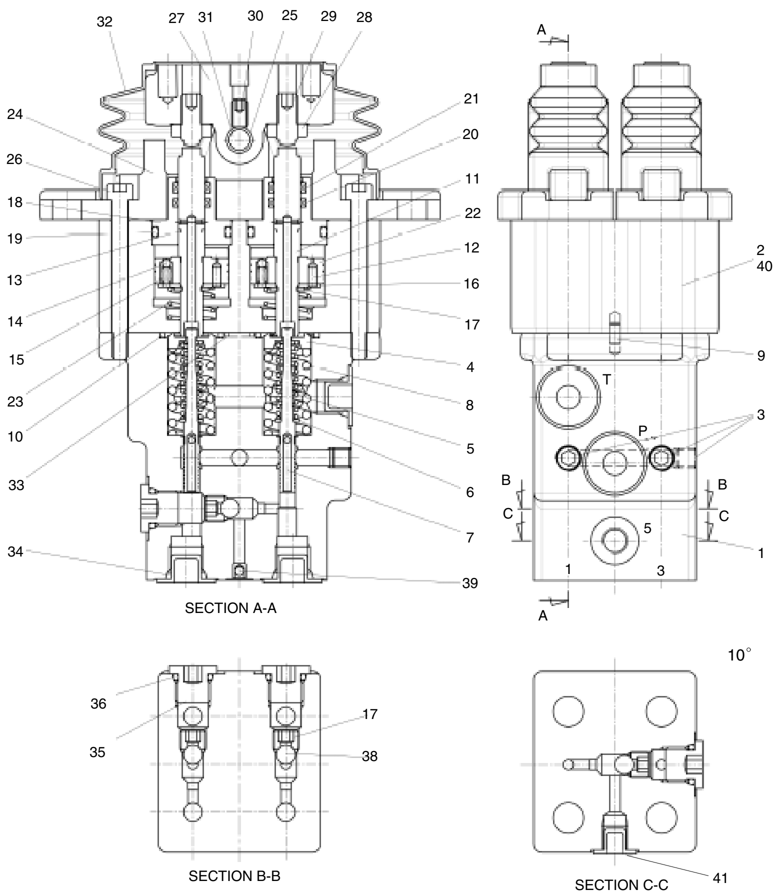
Port	Port name	Port size
P	Pilot oil inlet port	PF 1/4
T	Pilot oil return port	
1	Travel (LH, backward)	
2	Travel (LH, forward)	
3	Travel (RH, backward)	
4	Travel (RH, forward)	
5	Travel alarm	PT 1/8

CROSS SECTION

The construction of the RCV pedal is shown in the below drawing. The casing has vertical holes in which reducing valves are assembled.

The pressure reducing section is composed of the spool (7), spring (5) for setting secondary pressure, return spring (8), spring seat (4) and washer (6). The spring for setting the secondary pressure has been generally so preset that the secondary pressure is 6.2 to 21.4 kgf/cm^2 (depending on the type). The spool is pushed against the push rod (11) by the return spring.

When the push rod is pushed down by tilting pedal, the spring seat comes down simultaneously and changes setting of the secondary pressure spring.



35AZ2RCP02

1	Body 1	15	Spring	29	Set screw
2	Body 2	16	Plate	30	Set screw
3	Plug	17	Snap ring	31	Cam shaft
4	Spring seat	18	Plug	32	Bellows
5	Spring	19	O-ring	33	O-ring
6	Washer	20	Rod seal	34	Cap
7	Spool	21	Dust seal	35	Plug
8	Spring	22	Piston	36	O-ring
9	Spring pin	23	Spring	37	Check seat
10	O-ring	24	Cover	38	Steel ball
11	Push rod	25	Bushing	39	Expander
12	Spring pin	26	Wrench bolt	40	Name plate
13	Seal	27	Cam assy	41	Cap
14	Steel ball	28	Hex nut		

2. FUNCTION

1) FUNDAMENTAL FUNCTIONS

The pilot valve is a valve controls the spool stroke, direction, etc of a main control valve. This function is carried out by providing the spring at one end of the main control valve spool and applying the output pressure (secondary pressure) of the pilot valve to the other end.
For this function to be carried out satisfactorily, the pilot valve is composed of the following elements.

(1) Inlet port (P) where oil is supplied from hydraulic pump.

(2) Output port (1, 2, 3 & 4) to apply pressure supplied from inlet port to ends of control valve spools.

(3) Tank port (T) necessary to control the above output pressure.

(4) Spool to connect output port to inlet port tank port.

(5) Mechanical means to control output pressure, including springs that work on the above spools.

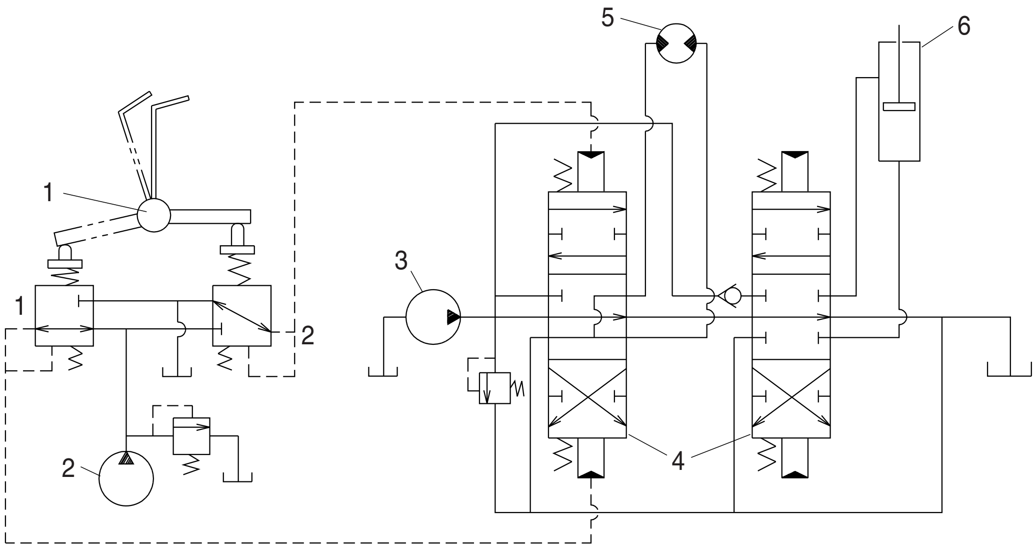
2) FUNCTIONS OF MAJOR SECTIONS

The functions of the spool (7) are to receive the supply oil pressure from the hydraulic pump at its port P, and to change over oil paths to determine whether the pressure oil of port P is led to output ports 1, 2, 3 & 4 or the output spool to determine the output pressure.
The spring (5) works on this spool to determine the output pressure.
The change the deflection of this spring, the push rod (11) is inserted and can slide in the plug (18).
For the purpose of changing th displacement of the push rod through the cam (27) and steel ball (28) are provided the pedal that can be tilted in any direction around the fulcrum of the cam (27) center.
The spring (8) works on the casing (1) and washer (6) and tries to return the push rod (11) to the zero-displacement position irrespective of the output pressure, securing its resetting to the center position.
This also has the effect of a reaction spring to give appropriate control feeling to the operator.

3) OPERATION

The operation of the pilot valve will be described on the basis of the hydraulic circuit diagram shown below ant the attached operation explanation drawing.

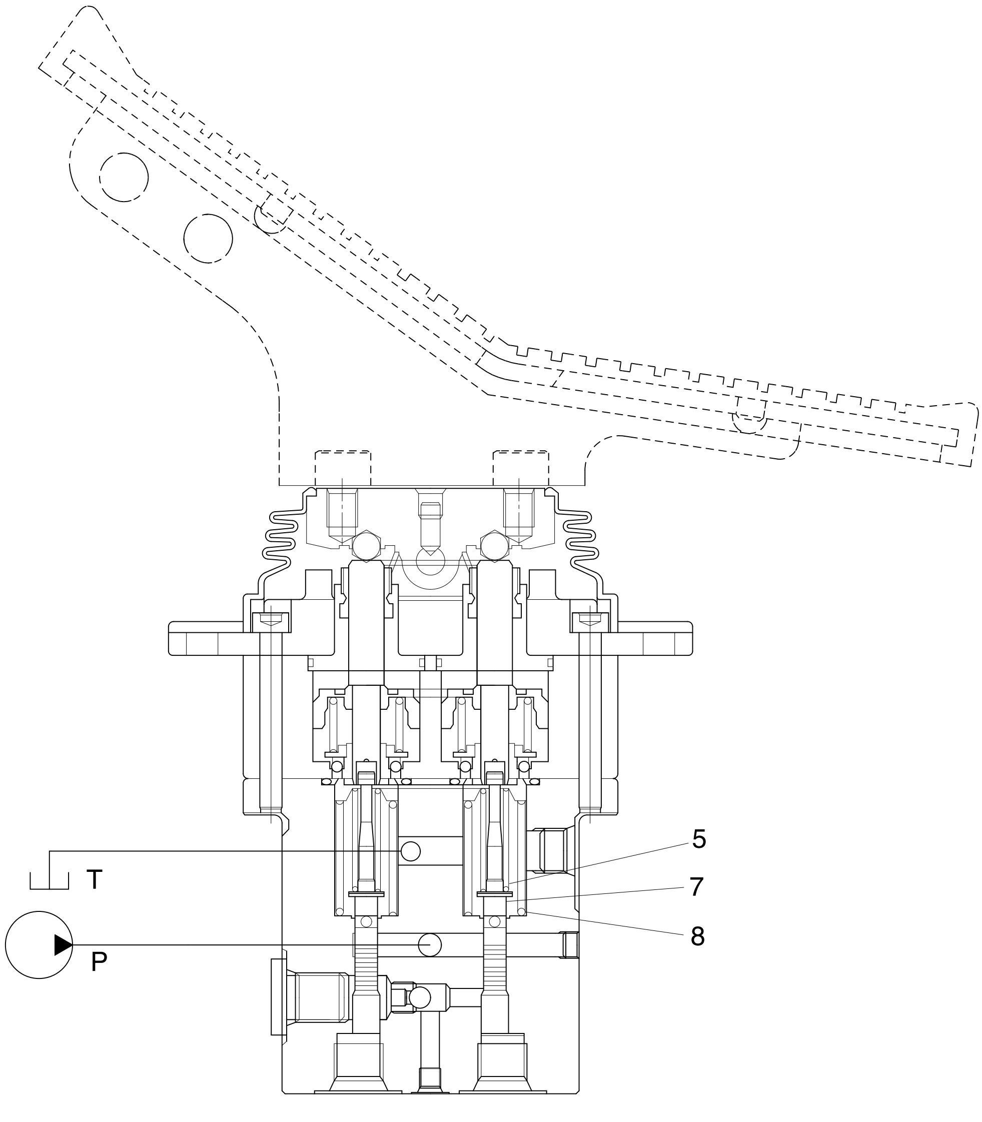
The diagram shown below is the typical application example of the pilot valve.



140LC-7 기타2-76

1	Pilot valve	3	Main pump	5	Hydraulic motor
2	Pilot pump	4	Main control valve	6	Hydraulic cylinder

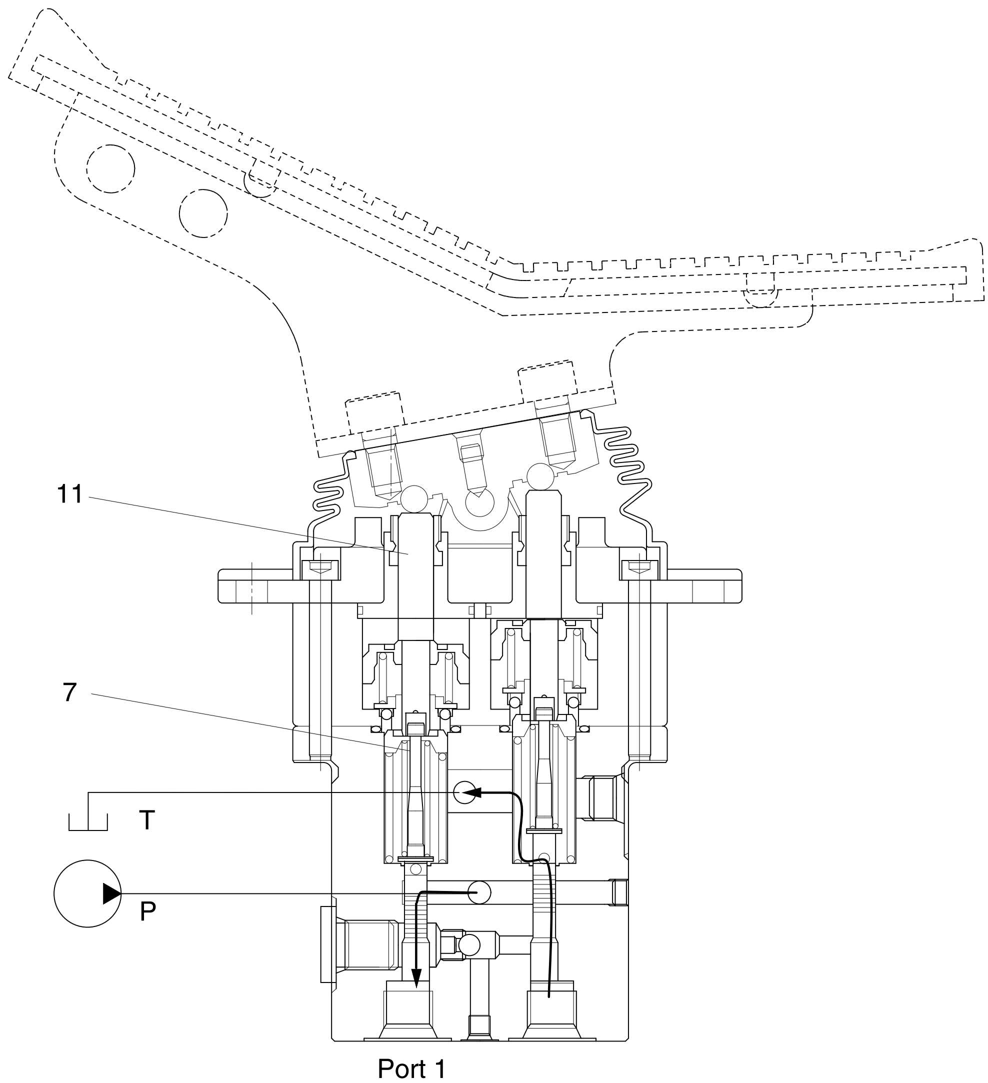
(1) Case where pedal is in neutral position



35AZ2RCP04

The force of the spring (5) that determines the output pressure of the pilot valve is not applied to the spool (7). Therefore, the spool is pushed up by the spring (8) to the position of port 2 in the operation explanation drawing. Then, since the output port is connected to tank port T only, the output port pressure becomes equal to tank pressure.

(2) Case where pedal is tilted



35AZ2RCP05

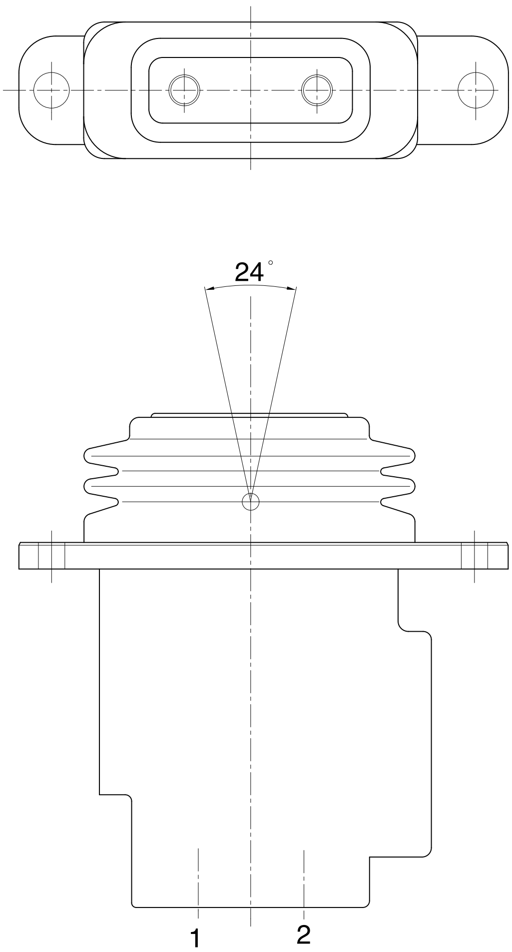
When the push rod (11) is stroked, the spool (7) moves downwards.
Then port P is connected with port 1, and the oil supplied from the pilot pump flows through port 1 to generate the pressure.
When the pressure at port 1 increases to the value corresponding to the spring force set by tilting the handle, the hydraulic pressure force balances with the spring force. If the pressure at port 1 increases higher than the set pressure, port P is disconnected from port 1 and port T is connected with port 1. If it decreases lower than the set pressure, port P is connected with port 1 and port T is disconnected from port 1.
In this manner the secondary pressure is kept at the constant value.

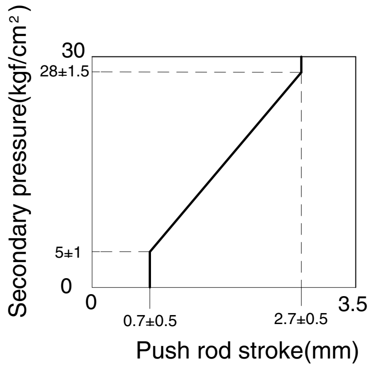
3. BOOM SWING PEDAL

1) STRUCTURE

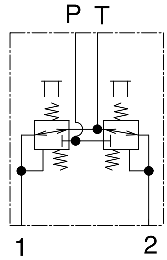
The casing has the oil inlet P (primary pressure) and the oil return port (tank).

In addition the secondary pressure is taken out through port 1 and port 2 provided at the housing bottom face.





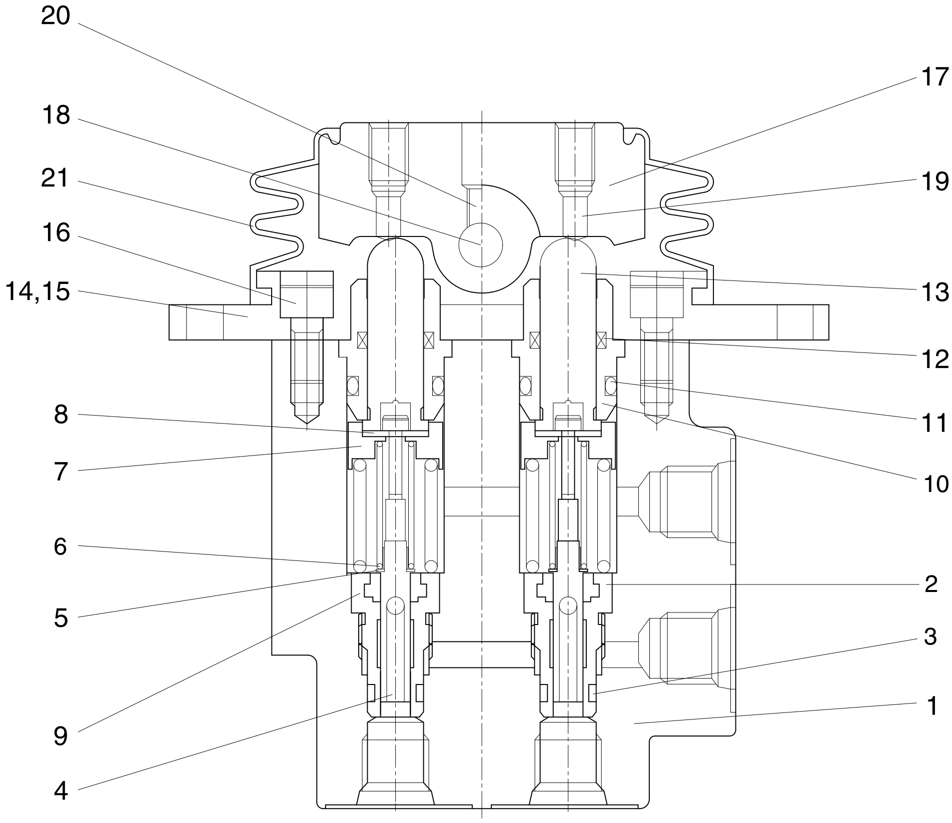
48AZ2BS01



Hydraulic circuit

Port	Port name	Port size
P	Pilot oil inlet port	PF 1/4
T	Pilot oil return port	
1	Boom swing (LH)	
2	Boom swing (RH)	

2) COMPONENT



31MT-20050

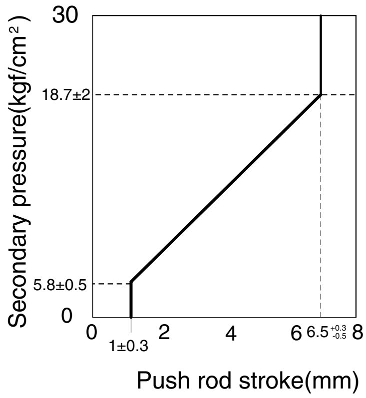
1	Body	8	Stopper	15	DU bush
2	Plug	9	Spring	16	Wrench bolt
3	O-ring	10	Plug	17	Cam
4	Spool	11	O-ring	18	Pin
5	Spring seat	12	Rod seal	19	Adjust screw
6	Spring	13	Push rod	20	Socket bolt
7	Spring seat	14	Cover	21	Bellows

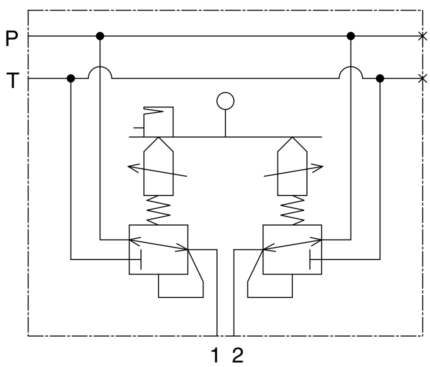
4. DOZER LEVER

1) STRUCTURE

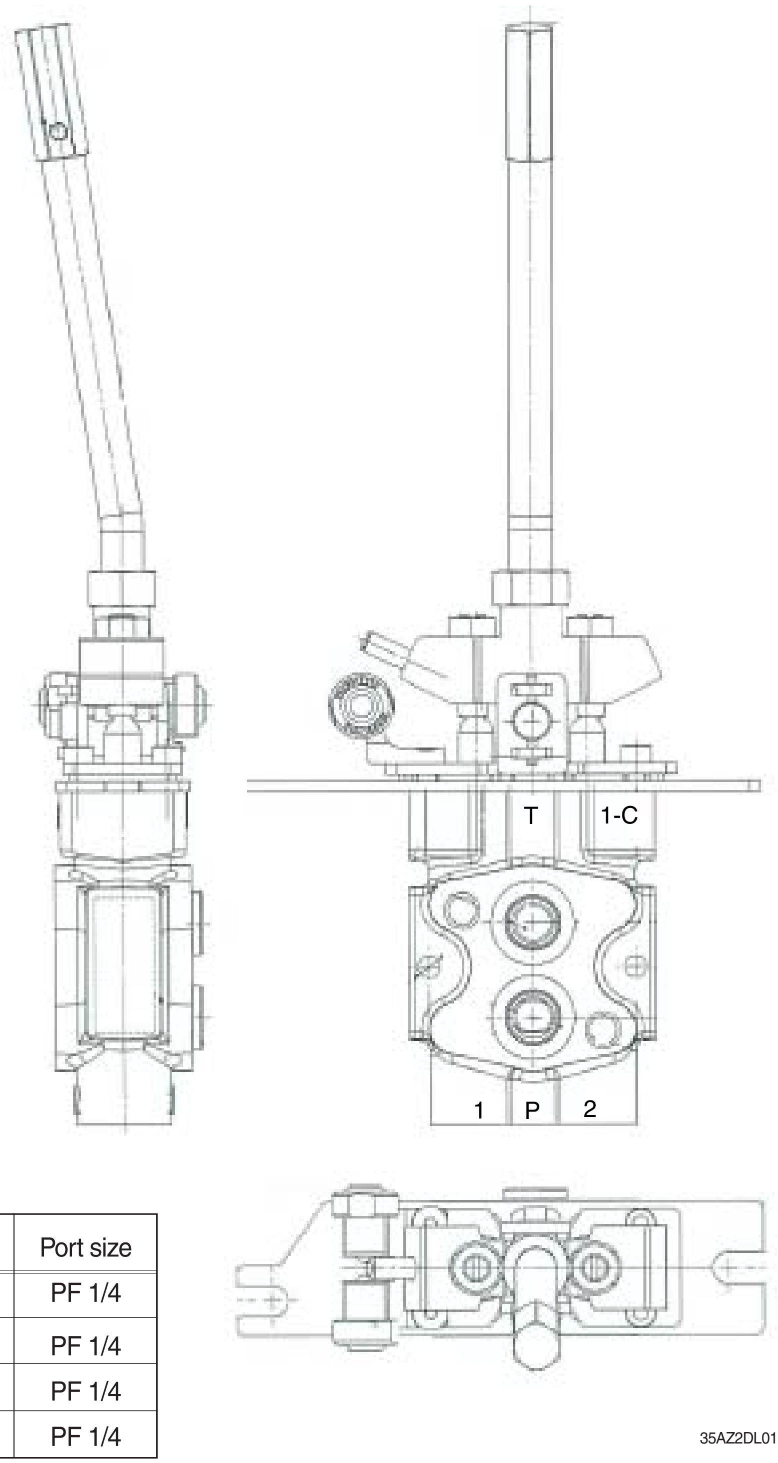
The casing has the oil inlet P (primary pressure) and the oil return port (tank).

In addition the secondary pressure is taken out through port 1 and port 2 provided at the housing bottom face.



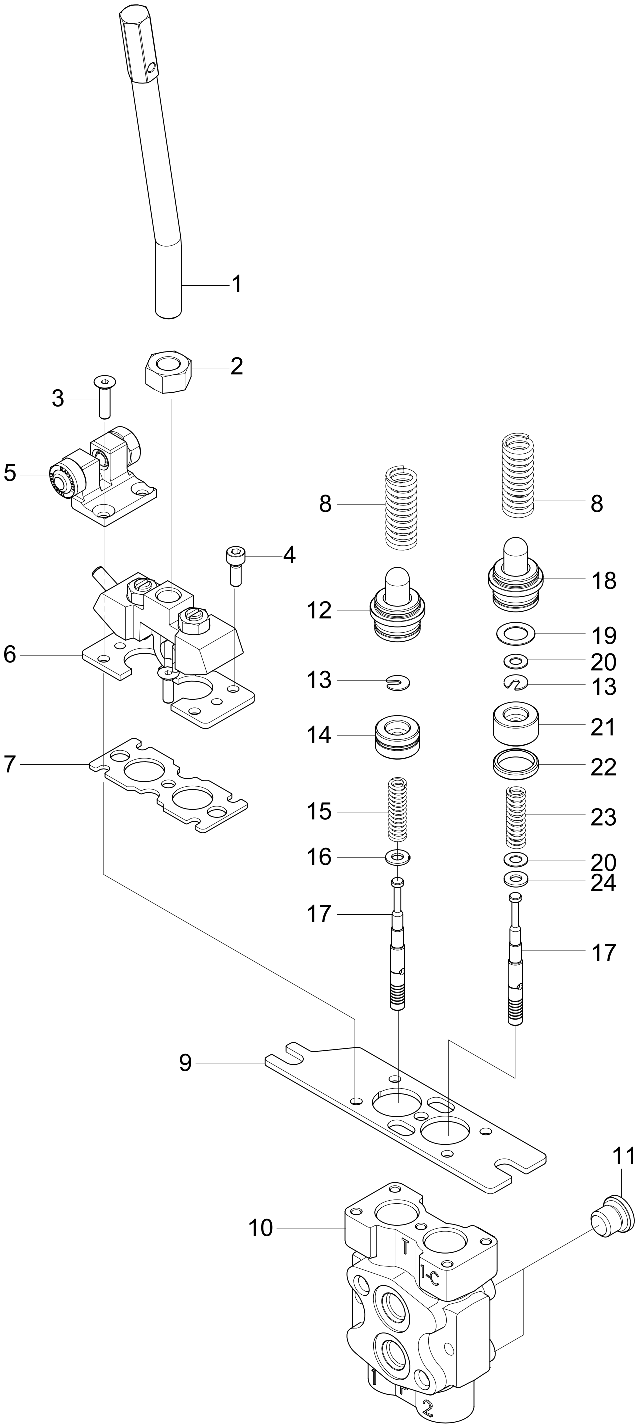


Hydraulic circuit



Port	Port	Port size
P	Pilot oil inlet port	PF 1/4
T	Pilot oil return port	PF 1/4
1	Dozer blade up port	PF 1/4
2	Dozer blade down port	PF 1/4

2) COMPONENT



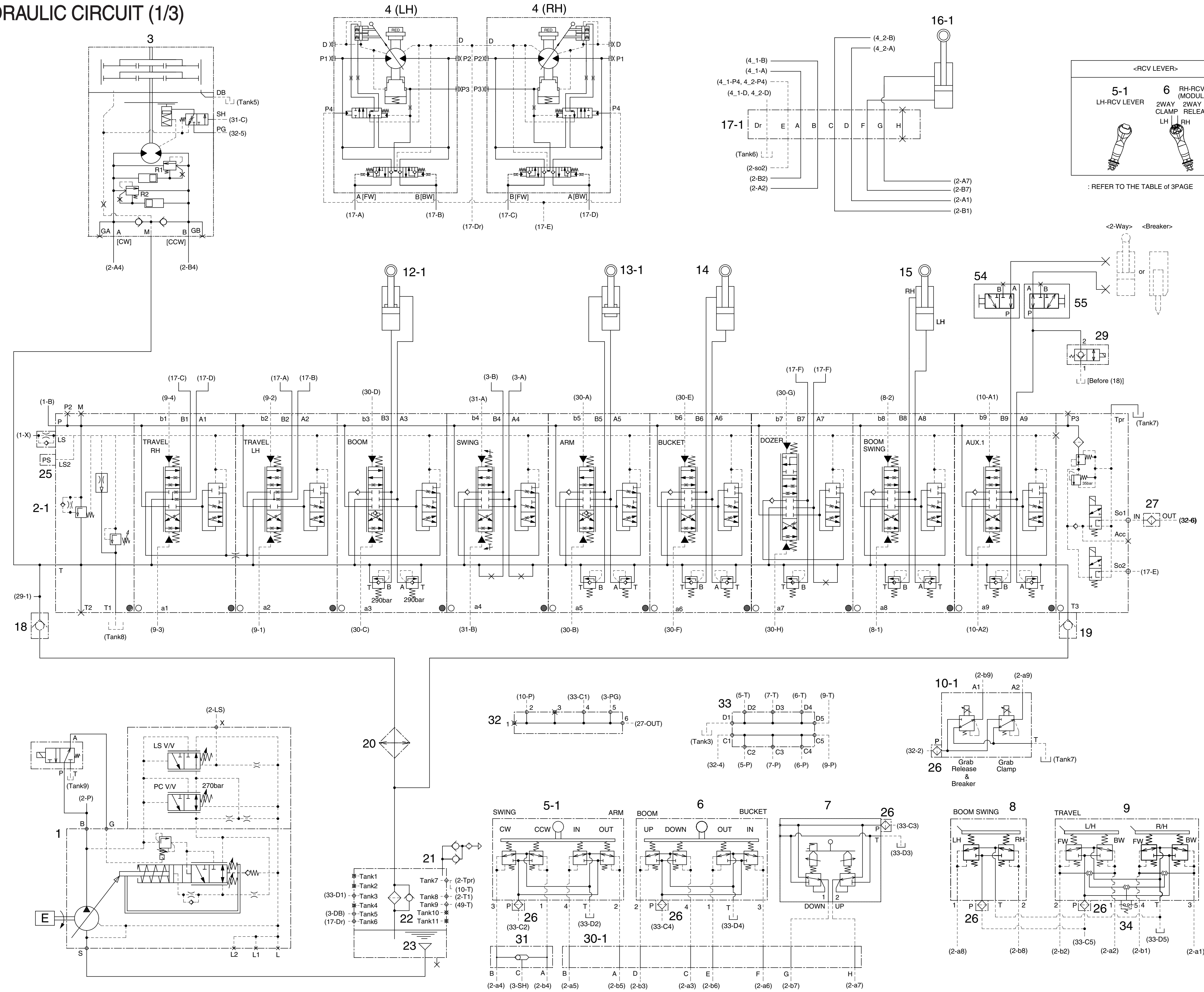
35AZ2DL02

1	RCV lever	9	Lower plate	17	Rod
2	Lever nut	10	Lower body	18	Plunger
3	Screw	11	Plug	19	Spacer
4	Screw	12	Plunger	20	Spacer
5	Bracket	13	Retainer	21	Bushing
6	Upper body	14	Bushing	22	Spacer
7	Upper plate	15	Spring	23	Spring
8	Spring	16	Seal washer	24	Gasket

SECTION 3 HYDRAULIC SYSTEM

GROUP 1 HYDRAULIC CIRCUIT

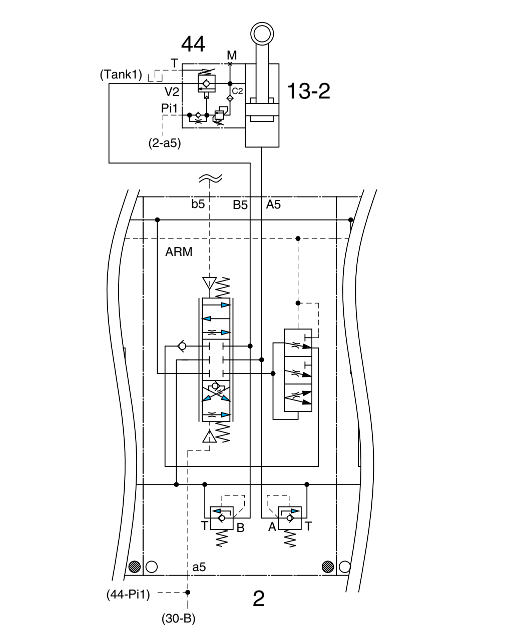
1. HYDRAULIC CIRCUIT (1/3)



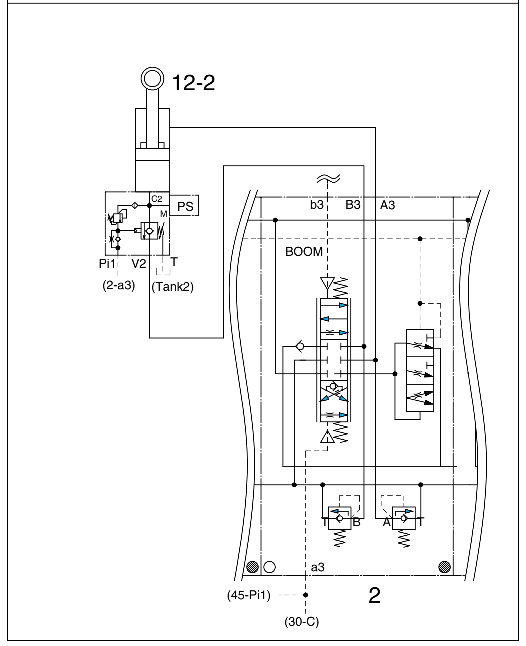
1 Main pump
2-1 Main control valve
3 Swing motor
4 Travel motor
5-1 RCV lever (LH)
6-1 RCV lever (RH)
7 RCV lever-dozer
8 OPT pedal
9 Travel pedal
10-1 EPPR valve
12-1 Boom cylinder
13-1 Arm cylinder
14 Bucket cylinder
15 Boom swing cylinder
16-1 Dozer cylinder
17-1 Turning joint
18 Return check valve
19 Return check valve
20 Radiator total
21 Air breather
22 Return filter
23 Suction strainer
25 Pressure sensor
26 Last guard filter
27 Pilot filter
29 Pilot selector valve
30-1 Terminal
31 Shuttle valve
32 Block (P)
33 Block (B)
34-1 Dozer handle
35 Solenoid valve
36 Block (T)
37 Pressure switch
49 Solenoid valve
54 Diverter valve (LH)
55 Diverter valve (RH)

2. HYDRAULIC CIRCUIT (2/3)

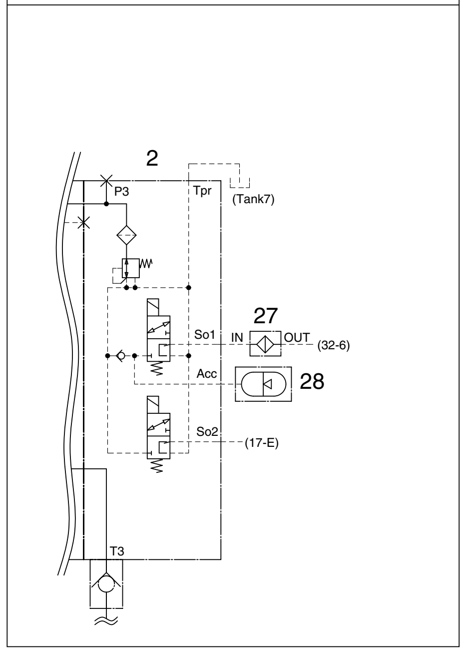
Arm Safety Lock Valve(AS01)



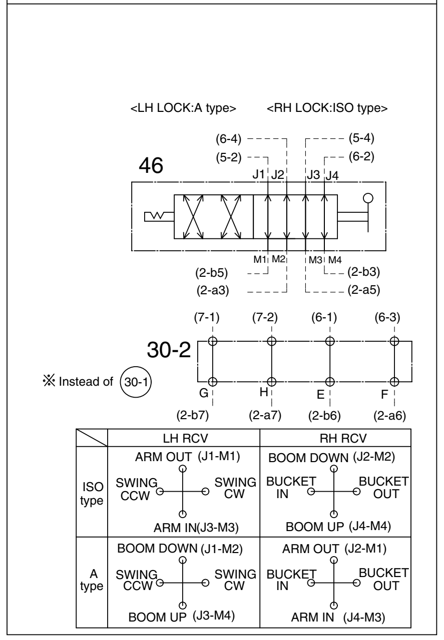
Safety Lock Valve (BS01)



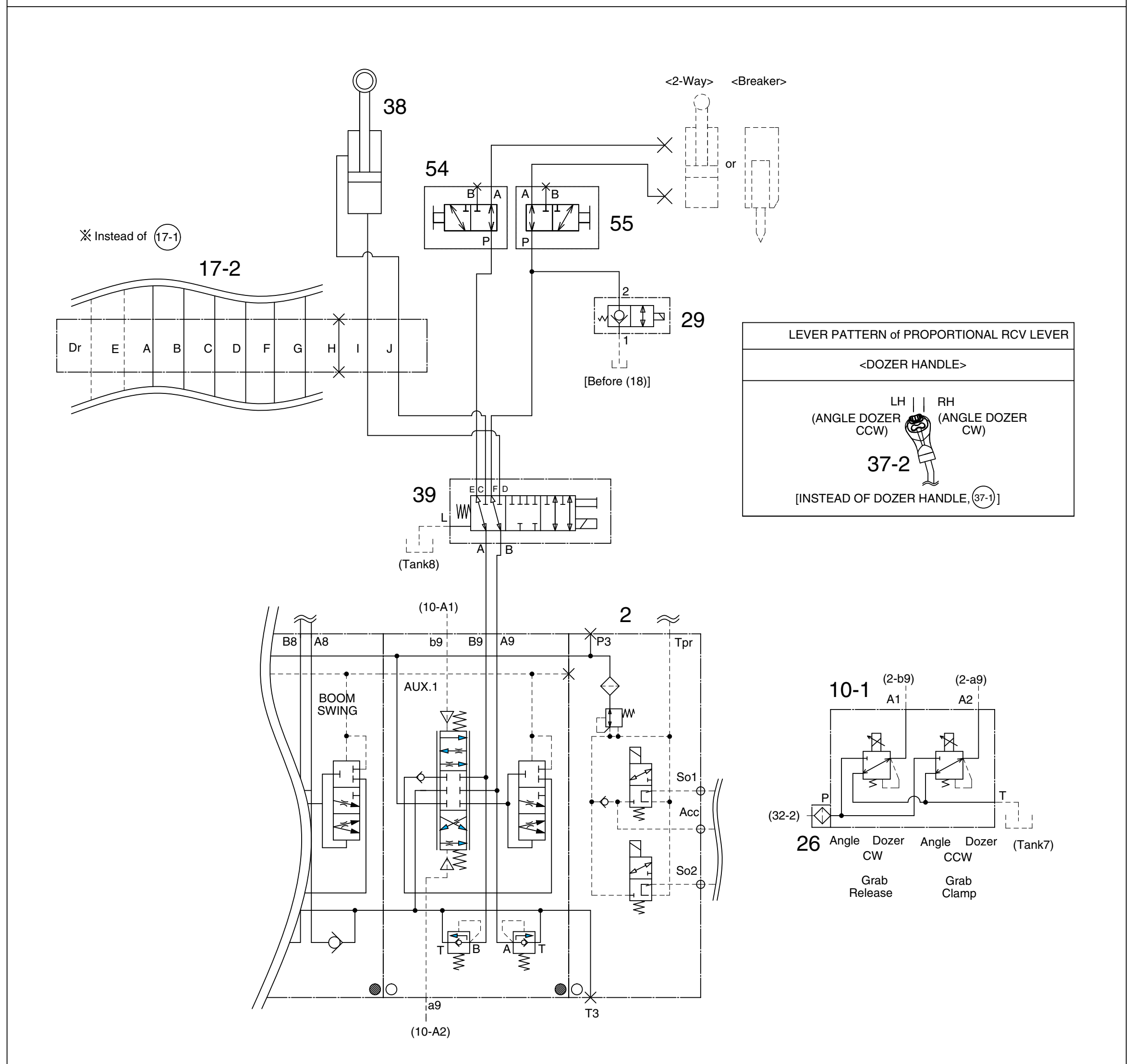
Accumulator (HA01)



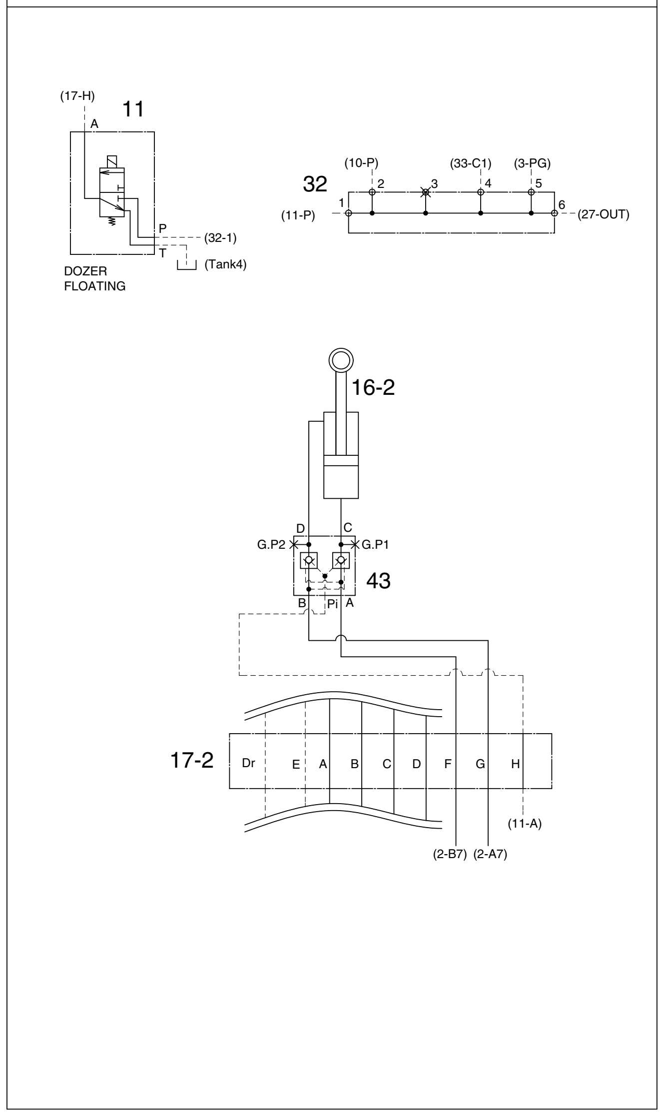
Pattern Change (PV01)



Angle Dozer (BR12)



Dozer D.P.C. V/V (DV01, BR11)

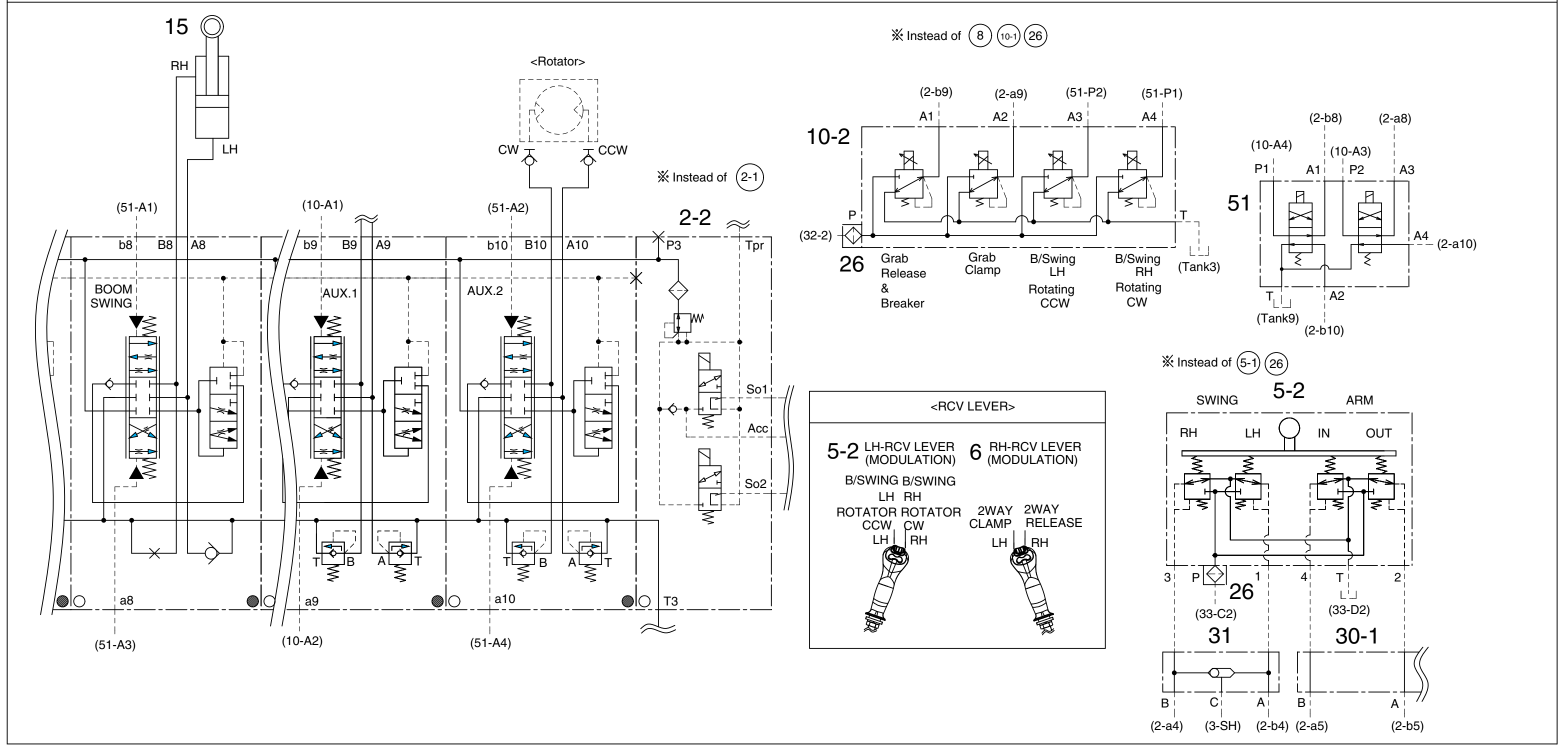


11 Solenoid valve
12-2 Boom cylinder
13-2 Arm cylinder
16-2 Dozer cylinder
17-2 Turning joint
25 Pressure sensor
28 Accumulator
30-2 Terminal assy
37-2 Dozer handle
38 Angle dozer cylinder
39 Selector valve
43 Double pilot check
44 Safety lock valve
45 Safety lock valve
46 Pattern change valve

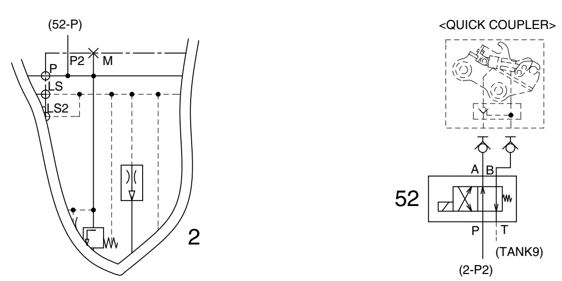
30MT-00060-04 2OF3

3. HYDRAULIC CIRCUIT (3/3)

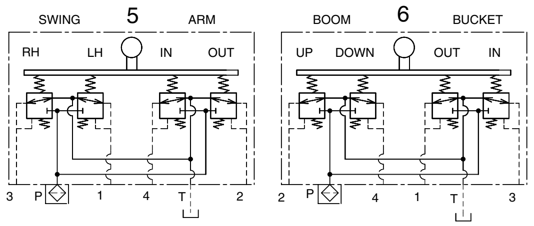
Swing Modulation with Rotating (BO02, HR02)



Quick Coupler (HQ01)

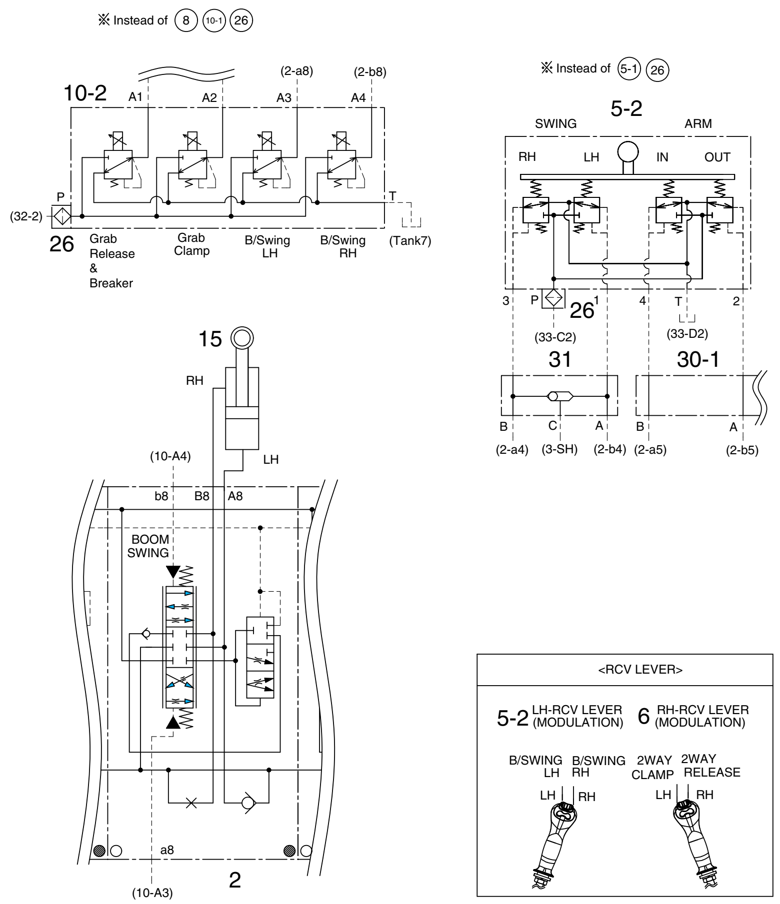


RCV LEVER(LH/RH) OPTION



PART NO (5 :LH / 6 : RH)				OPTION CODE	PRODUCER
5-1	31MQ-21130	6-1	31MQ-21120	RR00 JA01	EATON
5-2	31MQ-21110			RR01 JA01	
5-3	31MQ-21410	6-2	31MQ-21440	RR00 JA21	KPM
5-4	31MQ-21430			RR01 JA21	

B/Swing Modulation (BO02)



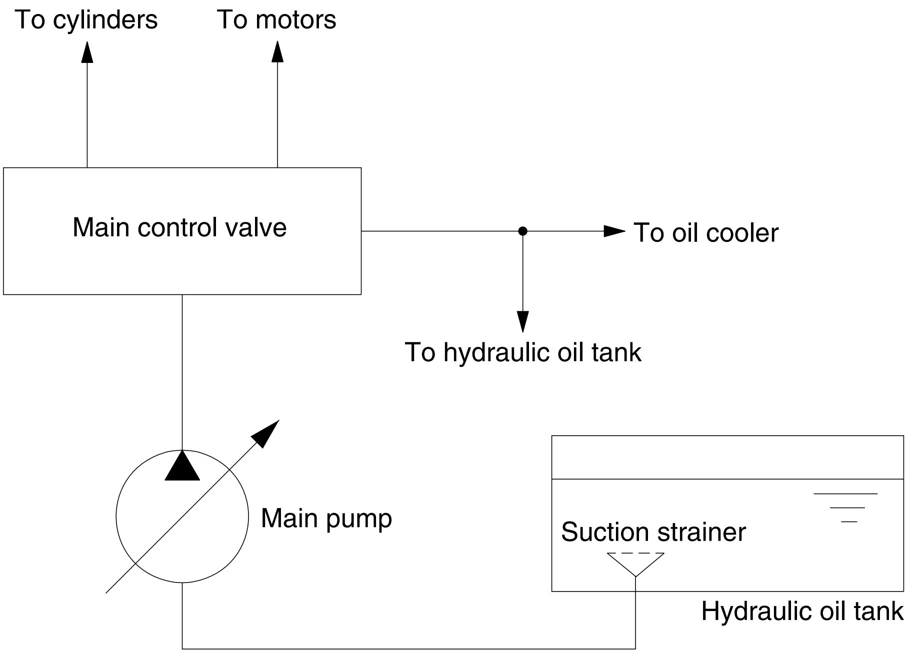
- 2-2 Main control valve
- 5-2 RCV lever-LH
- 10-2 4-EPPR valve
- 15 Boom swing cylinder
- 26 Last guard filter
- 30-1 Terminal
- 31 Shuttle valve
- 51 Solenoid valve
- 52 Solenoid valve

30MT-00060-04 3OF3

GROUP 2 MAIN CIRCUIT

The main hydraulic circuit consists of suction circuit, delivery circuit, return circuit and drain circuit.
The hydraulic system consists of one main pump, one control valve, one swing motor, four cylinders and two travel motors.
The swash plate type variable displacement axial piston pump is used as the main pump and is driven by the engine at ratio 1.0 of engine speed.

1. SUCTION AND DELIVERY CIRCUIT

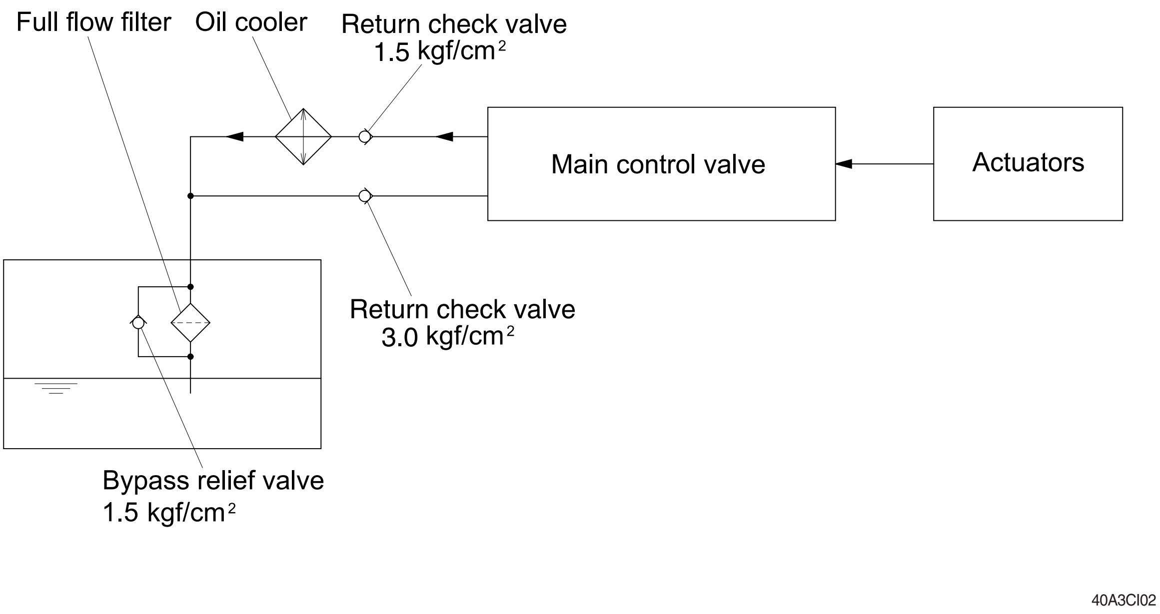


140L3CI01

The pumps receive oil from the hydraulic tank through a suction strainer. The discharged oil from the pump flows into the main control valve and goes out the tank ports.
The oil discharged from the main pump flows to the actuators through the main control valve.
The main control valve controls the hydraulic functions.
The return oil from the actuators flows to the hydraulic tank through the main control valve and the oil cooler.

※ The circuit diagram may differ from the equipment, so please check before a repair.

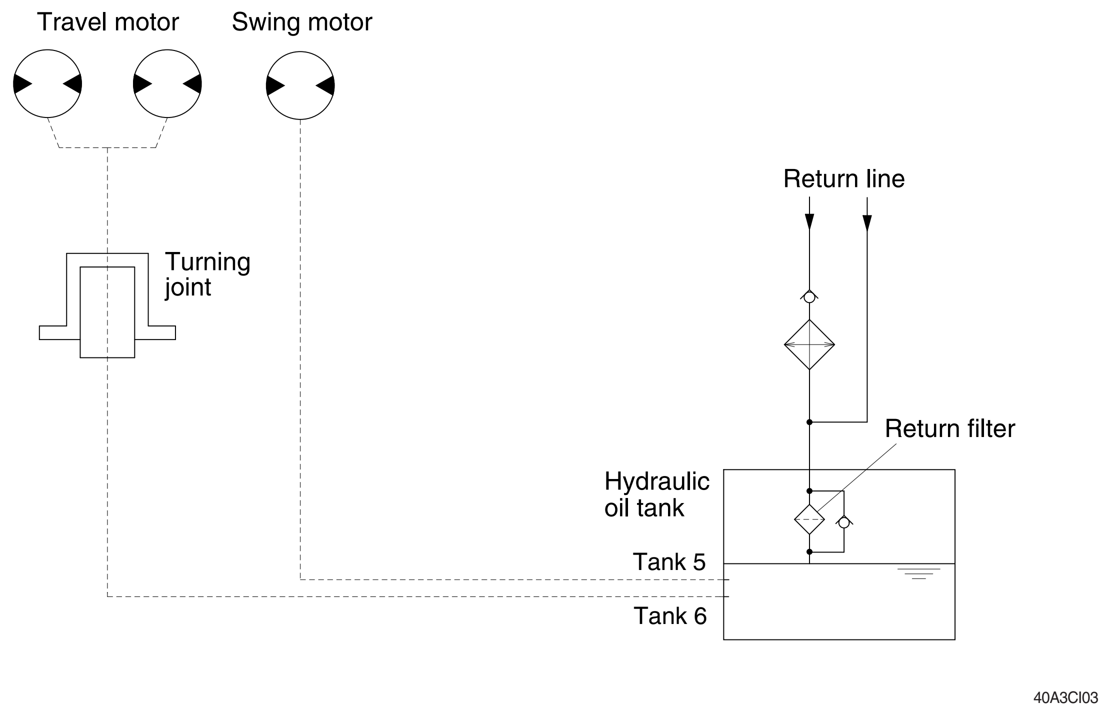
2. RETURN CIRCUIT



All oil returned from each actuator returns to the hydraulic tank through the control valve.
The bypass check valves are provided in the return circuit.
The setting pressure of bypass check valves are 1.5 kgf/cm^2 (21 psi) and 3.0 kgf/cm^2 (43 psi). Usually, oil returns to the hydraulic tank from the left side of control valve through oil cooler.
When oil temperature is low, viscosity becomes higher and flow resistance increases when passing through the oil cooler. When the oil pressure exceeds 3.0 kgf/cm^2 (43 psi), the oil returns directly to the hydraulic tank, resulting in the oil temperature being raised quickly at an appropriate level.
When the oil cooler is clogged, the oil returns directly to the hydraulic tank through bypass check valve (1).
The full-flow filter and bypass relief valve are provided in the hydraulic tank.
The oil returned from right and left side of control valve is combined and filtered by the full-flow filter. A bypass relief valve is provided in the full-flow filter.
When the filter element is clogged, the bypass relief valve opens at 1.5 kgf/cm^2 (21 psi) differential pressure.

※ The circuit diagram may differ from the equipment, so please check before a repair.

3. DRAIN CIRCUIT



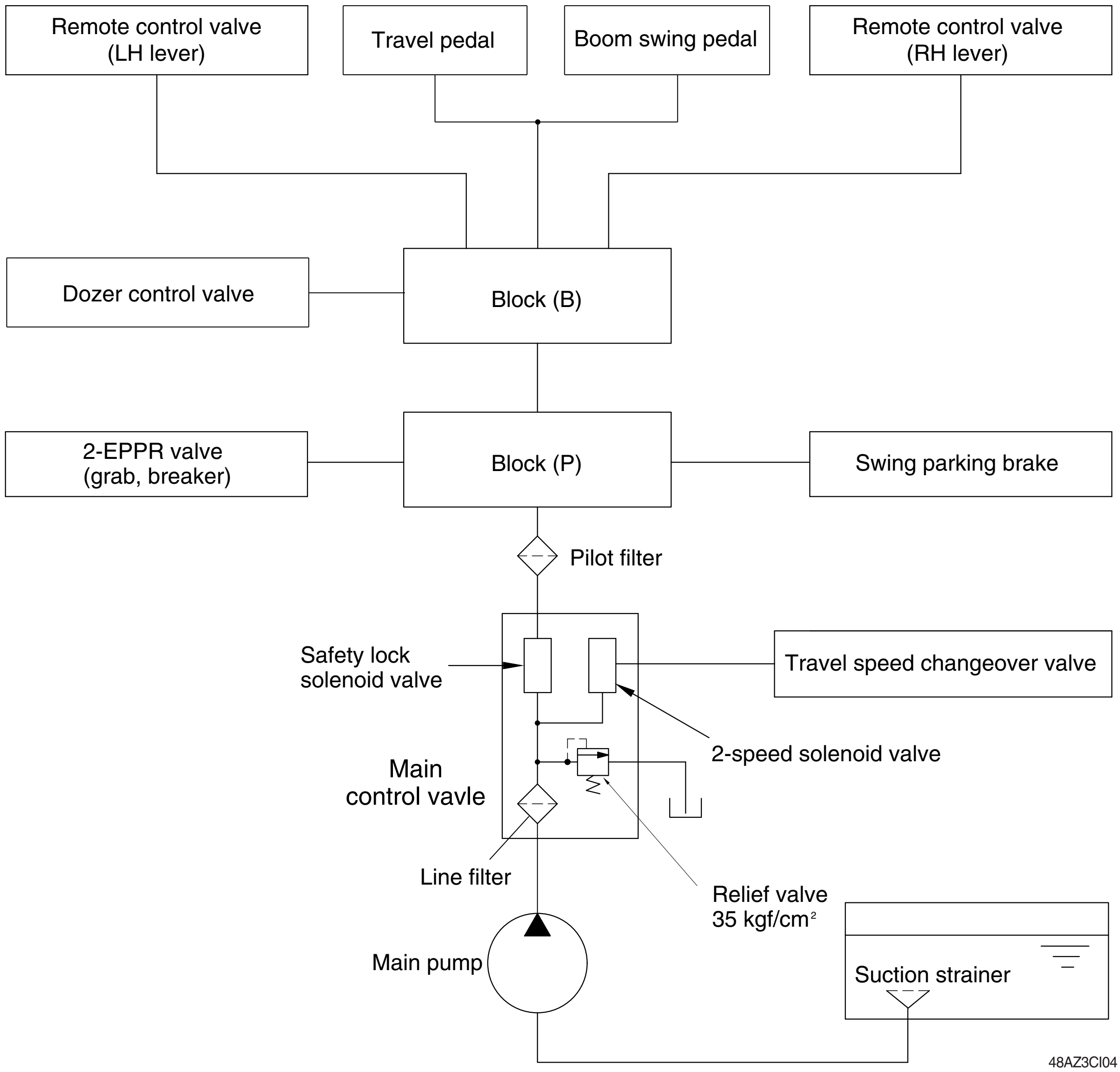
Besides internal leaks from the motors and main pump, the oil for lubrication circulates.

1) TRAVEL MOTOR DRAIN CIRCUIT
   Oil leaked from the right and left travel motors comes out of the drain ports provided in the respective motor casing and join with each other. These oils pass through the turning joint and return to the hydraulic oil tank.

2) SWING MOTOR DRAIN CIRCUIT
   Oil leaked from the swing motor returns to the hydraulic tank passing through return filter.

※ The circuit diagram may differ from the equipment, so please check before a repair.

GROUP 3 PILOT CIRCUIT



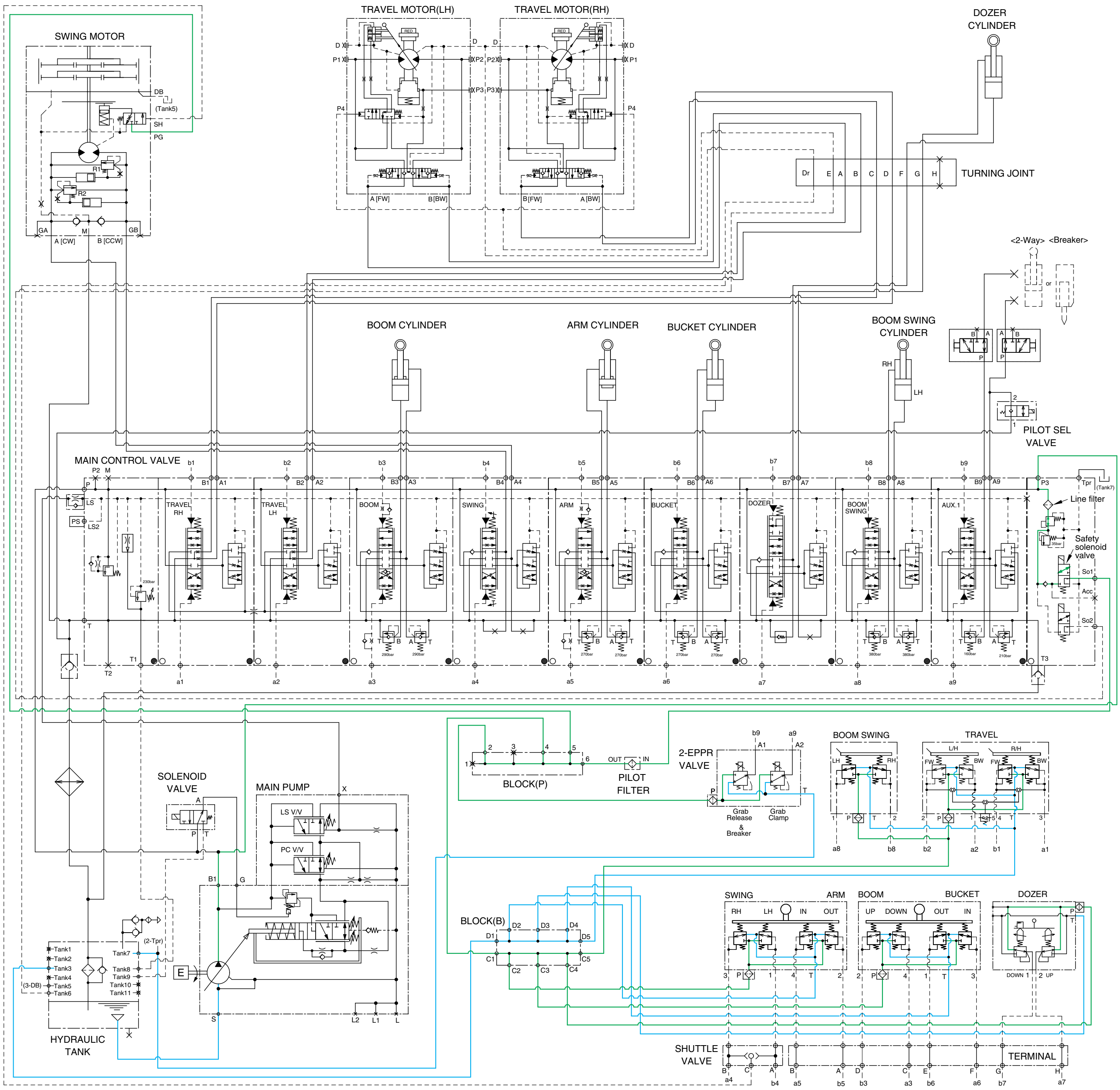
The pilot circuit consists of suction circuit, delivery circuit and return circuit.
Some of the main pump discharged oil is used the pilot line oil and the pilot line is provided with the relief valve.
The pilot oil is supplied each control valve and pedal through the line filter and safety lock solenoid valve in the main control valve as below.

- The pilot oil flows to the remote control valve (LH, RH), travel pedal, boom swing pedal and dozer lever through the pilot filter, block (P) and block (B).
- The pilot oil flows to the swing parking brake and 2-EPPR valve (grab, breaker) through the pilot filter and block (P).

Also, the pilot oil flows to the travel speed solenoid valve through the line filter in the main control valve.

※ The circuit diagram may differ from the equipment, so please check before a repair.

1. SUCTION, DELIVERY AND RETURN CIRCUIT



40A3HC02

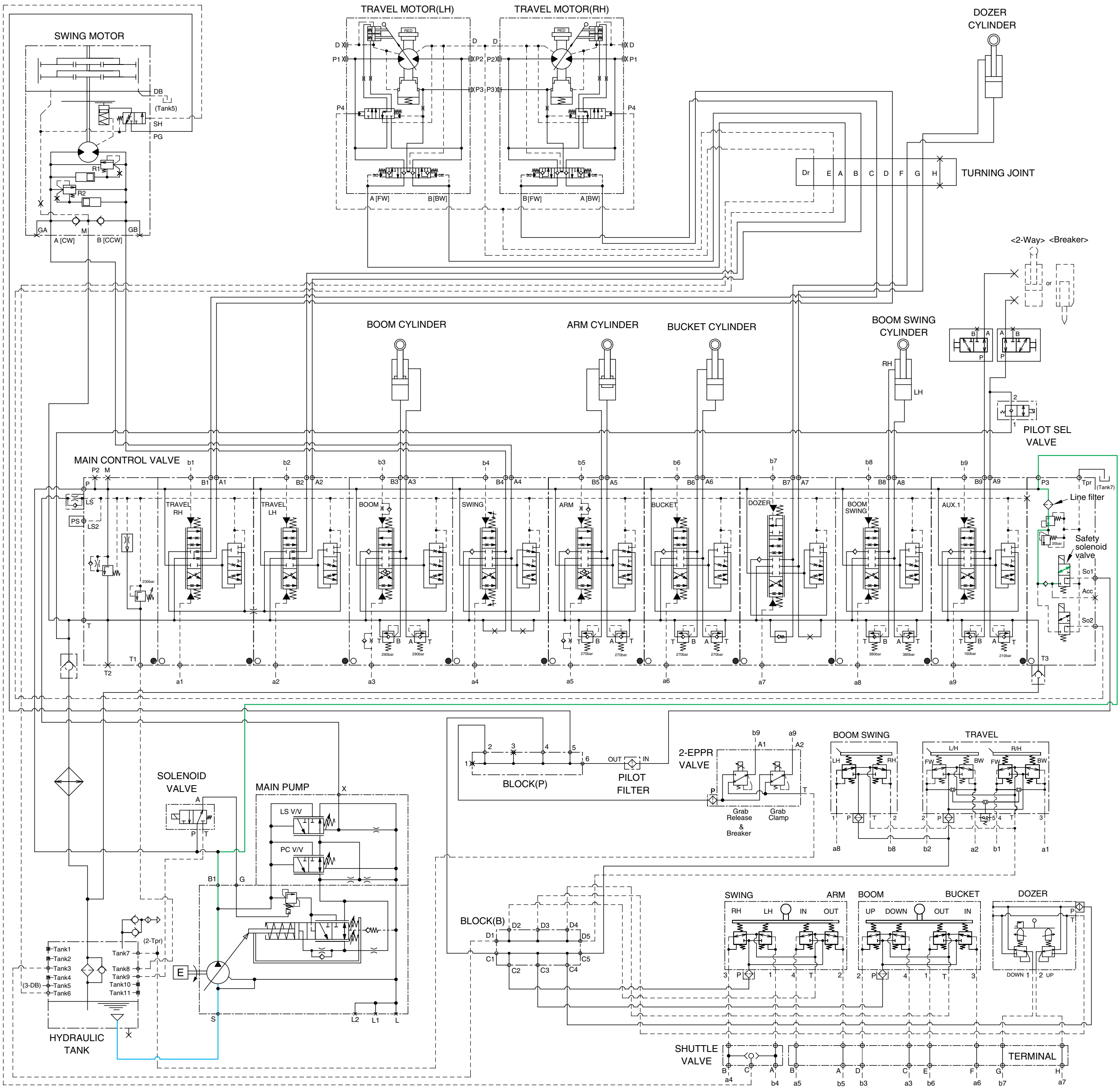
The main pump receive oil from the hydraulic tank. The discharged oil from the main pump flows to the safety solenoid valve through the line filter. The oil is filtered by the line filter. The pilot relief valve is provided in the main control valve for limiting the pilot circuit pressure.

The oil filtered by pilot filter flows remote control valve through safety solenoid valve.

The return oil flow into the hydraulic tank through block (B).

※ The circuit diagram may differ from the equipment, so please check before a repair.

2. SAFETY VALVE (SAFETY LEVER)

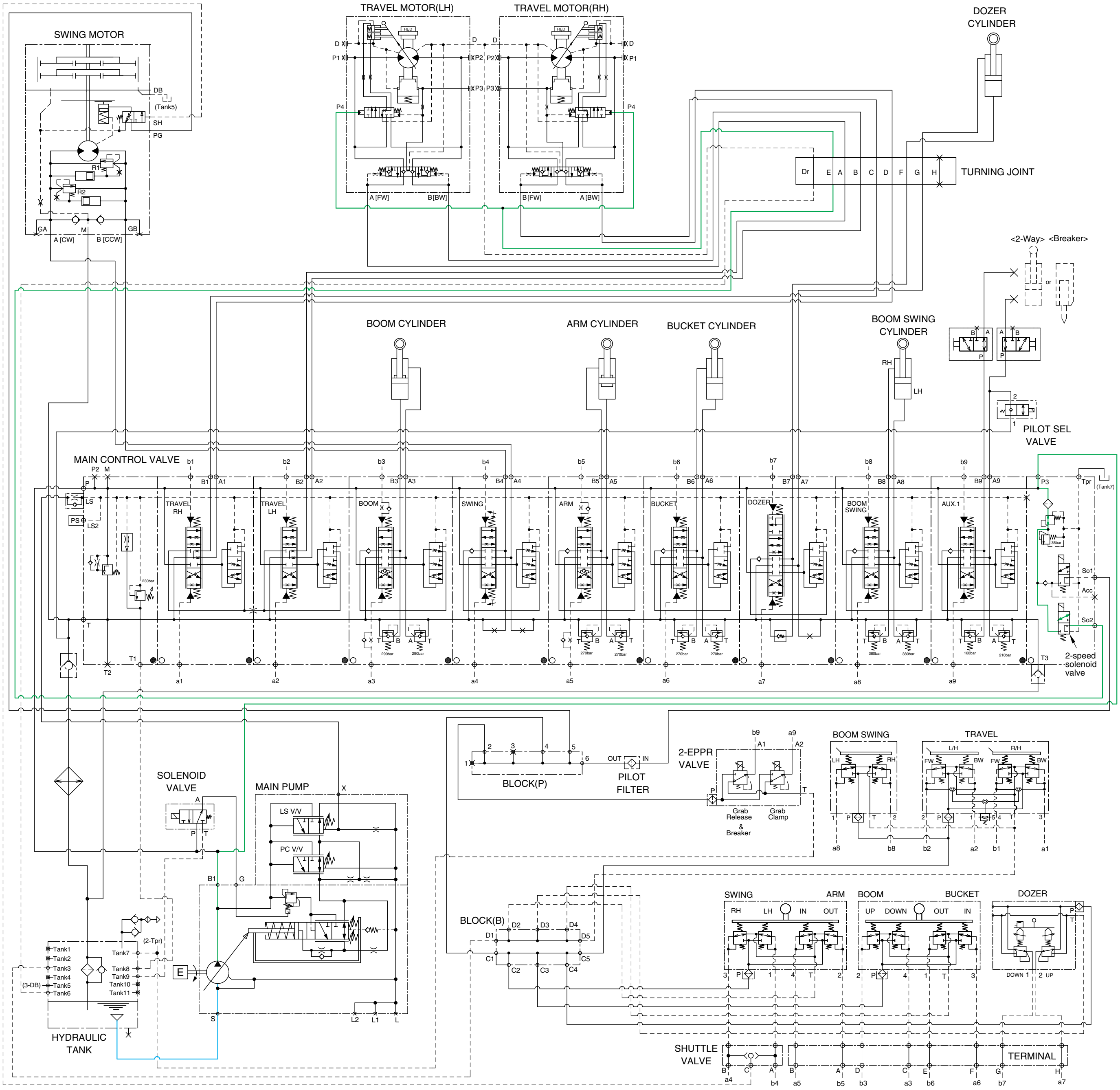


When the lever of the safety solenoid valve is moved downward, oil flows into the remote control valve through solenoid valve and line filter in the main control valve.

When the lever of the safety solenoid valve is moved upward, oil does not flow into the remote control valve, because of the blocked port.

※ The circuit diagram may differ from the equipment, so please check before a repair.

3. TRAVEL SPEED CONTROL SYSTEM



40A3HC04

When the travel speed switch is pushed, the travel speed solenoid valve is actuated and the discharged oil from the pilot pump flows to the P4 port of pilot valve in the travel motors.

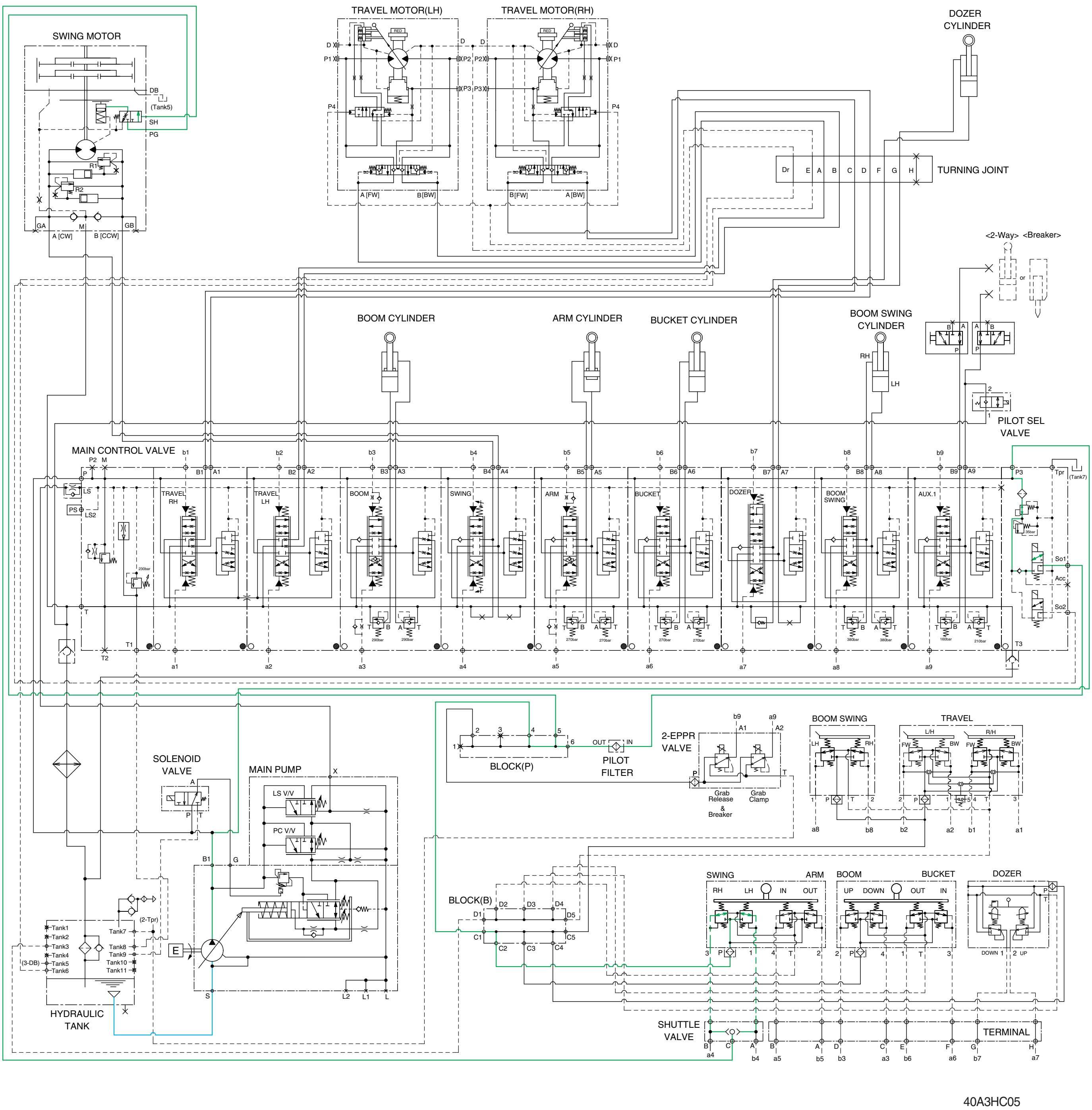
As a result, the control piston is pushed by the main oil flow, thus the displacement is minimized.

When the travel speed switch is pushed once more, the travel speed solenoid valve is return to original position by the force of spring, the hydraulic oil of P4 port returns to the hydraulic tank.

As a result, the control piston is returned by the main oil flow, thus the displacement is maximized.

※ The circuit diagram may differ from the equipment, so please check before a repair.

4. SWING PARKING BRAKE RELEASE



When the swing control lever is tilted, the pilot oil flow into SH port of shuttle valve, this pressure move spool so, discharged oil from pilot valve flow into PG port.

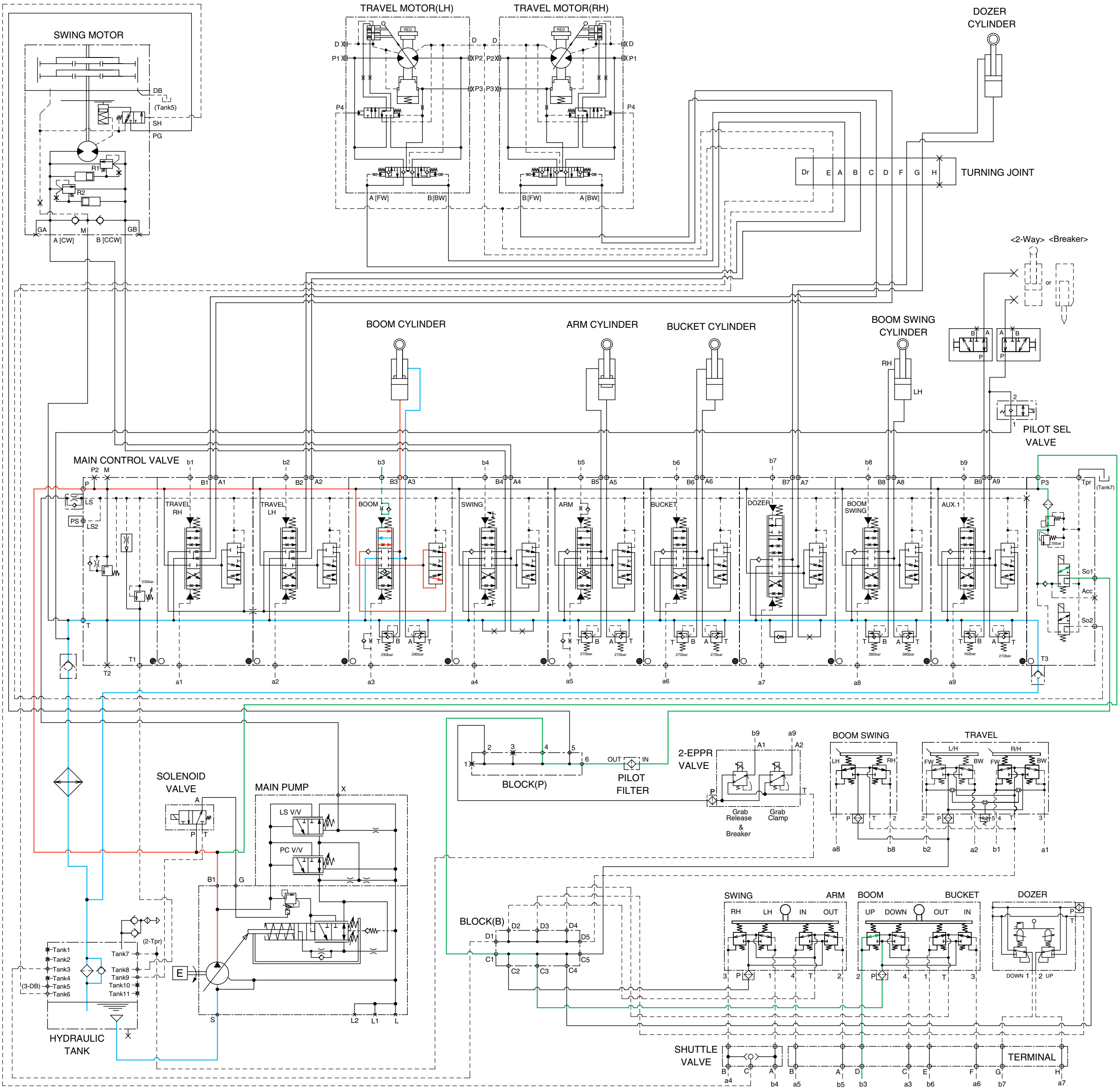
This pressure is applied to swing motor disc, thus the brake is released.

When the swing control lever is set in the neutral position, oil in the swing motor disc cylinder is drained, thus the brake is applied.

※ The circuit diagram may differ from the equipment, so please check before a repair.

GROUP 4 SINGLE OPERATION

1. BOOM UP OPERATION



40A3HC10

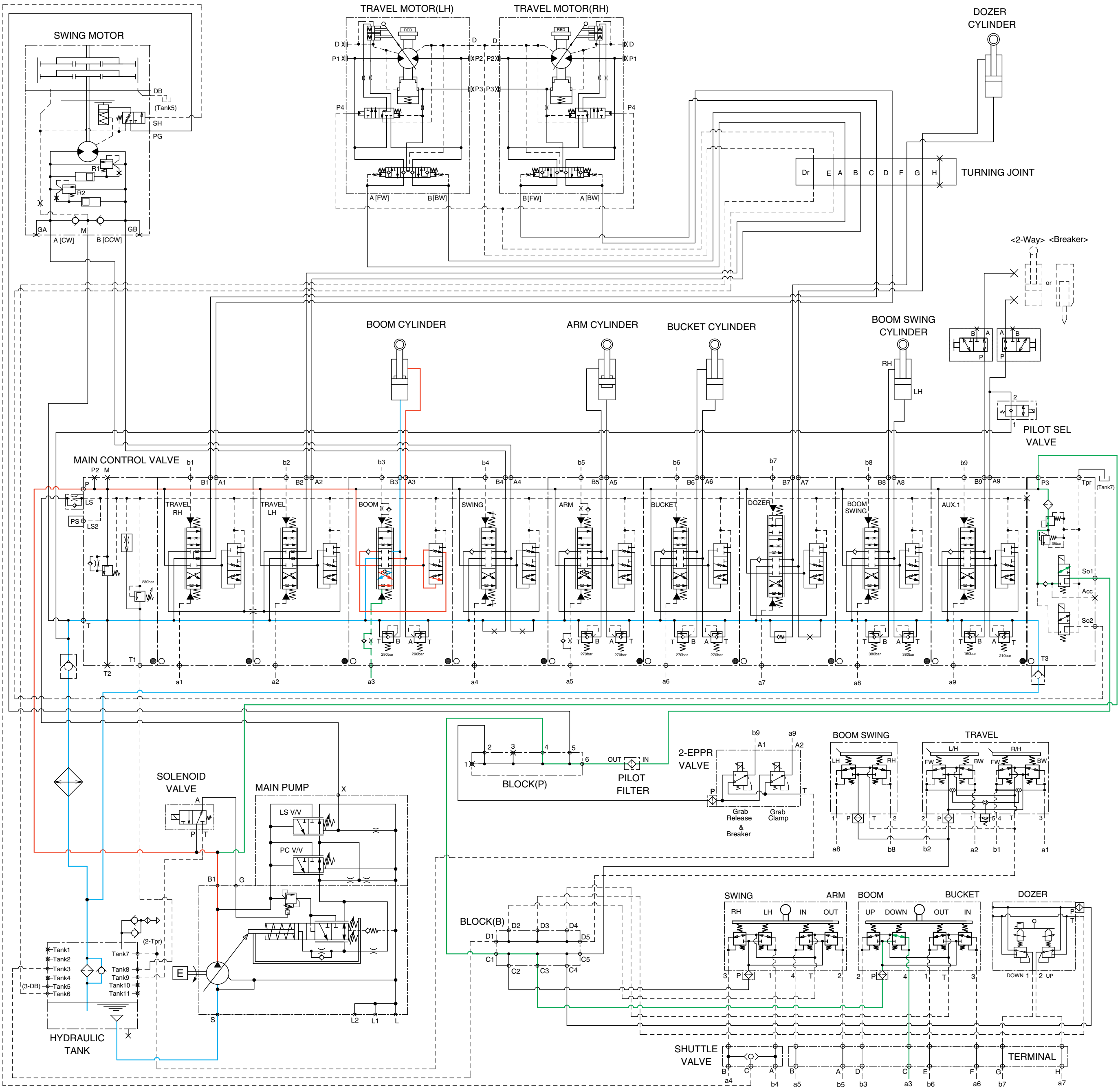
When the right control lever is pulled back, the boom spool in the main control valve is moved to the up position by the pilot oil pressure (b3) from the remote control valve.

The oil from the main pump flows into the main control valve and then goes to the large chamber of boom cylinder. At the same time, the oil from the small chamber of boom cylinder returns to the hydraulic oil tank through the boom spool in the main control valve. When this happens, the boom goes up. The excessive pressure in the boom cylinder bottom end circuit is prevented by relief valve.

When the boom is up and the control lever is returned to neutral position, the circuit for the holding pressure at the bottom end of the boom cylinder is closed by the boom holding valve. This prevents the hydraulic drift of boom cylinder.

※ The circuit diagram may differ from the equipment, so please check before a repair.

2. BOOM DOWN OPERATION



40A3HC11

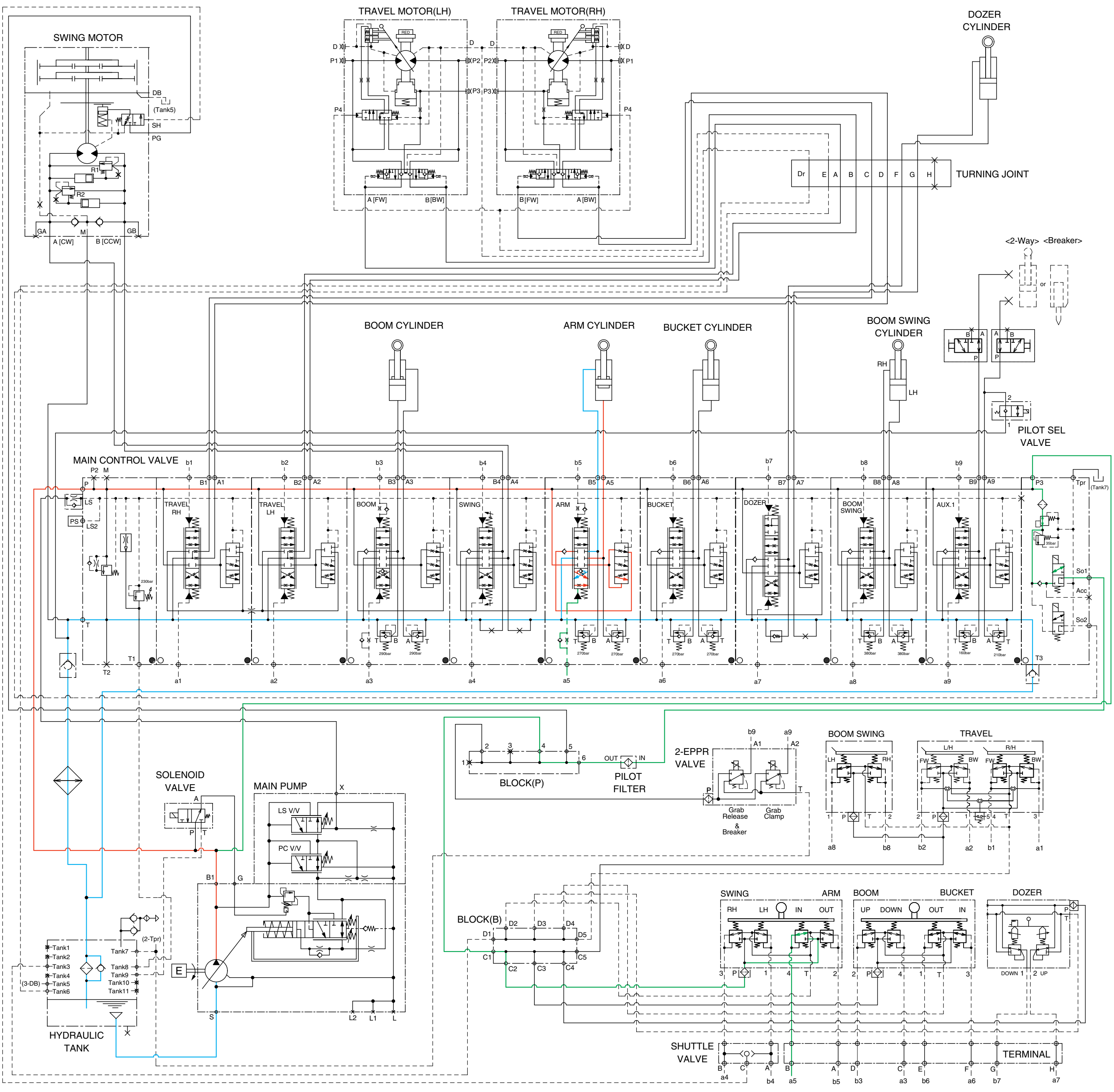
When the right control lever is pushed forward, the boom spool in the main control valve is moved to the down position by the pilot oil pressure (a3) from the remote control valve.

The oil from the main pump flows into the main control valve and then goes to the small chamber of boom cylinder. At the same time, the oil from the large chamber of boom cylinder returns to the hydraulic tank through the boom spool in the main control valve.

The excessive pressure in the boom cylinder rod end circuit is prevented by the relief valve.

※ The circuit diagram may differ from the equipment, so please check before a repair.

3. ARM ROLL IN OPERATION

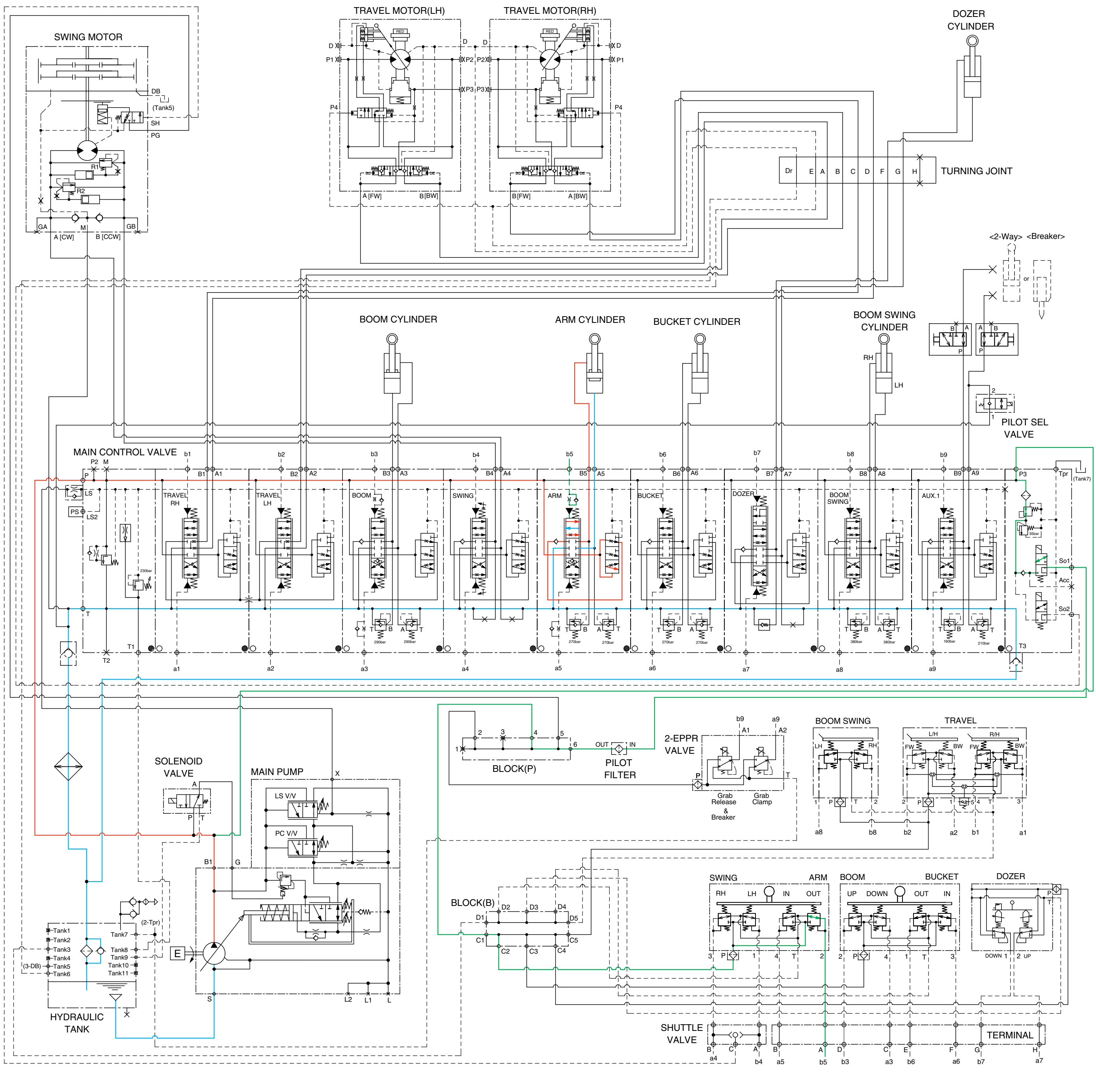


40A3HC12

When the left control lever is pulled back, the arm spool in the main control valve is moved the to roll in position by the pilot oil pressure (a5) from the remote control valve.
The oil from the main pump flows into the main control valve and then goes to the large chamber of arm cylinder.
At the same time, the oil from small chamber of arm cylinder returns to the hydraulic oil tank through the arm spool in the main control valve. When this happens, the arm rolls in.
The cavitation which will happen to the bottom of the arm cylinder is also prevented by the make-up valve in the main control valve.

※ The circuit diagram may differ from the equipment, so please check before a repair.

4. ARM ROLL OUT OPERATION



40A3HC13

When the left control lever is pushed forward, the arm spool in the main control valve is moved to the roll out position by the pilot oil pressure (b5) from the remote control valve.

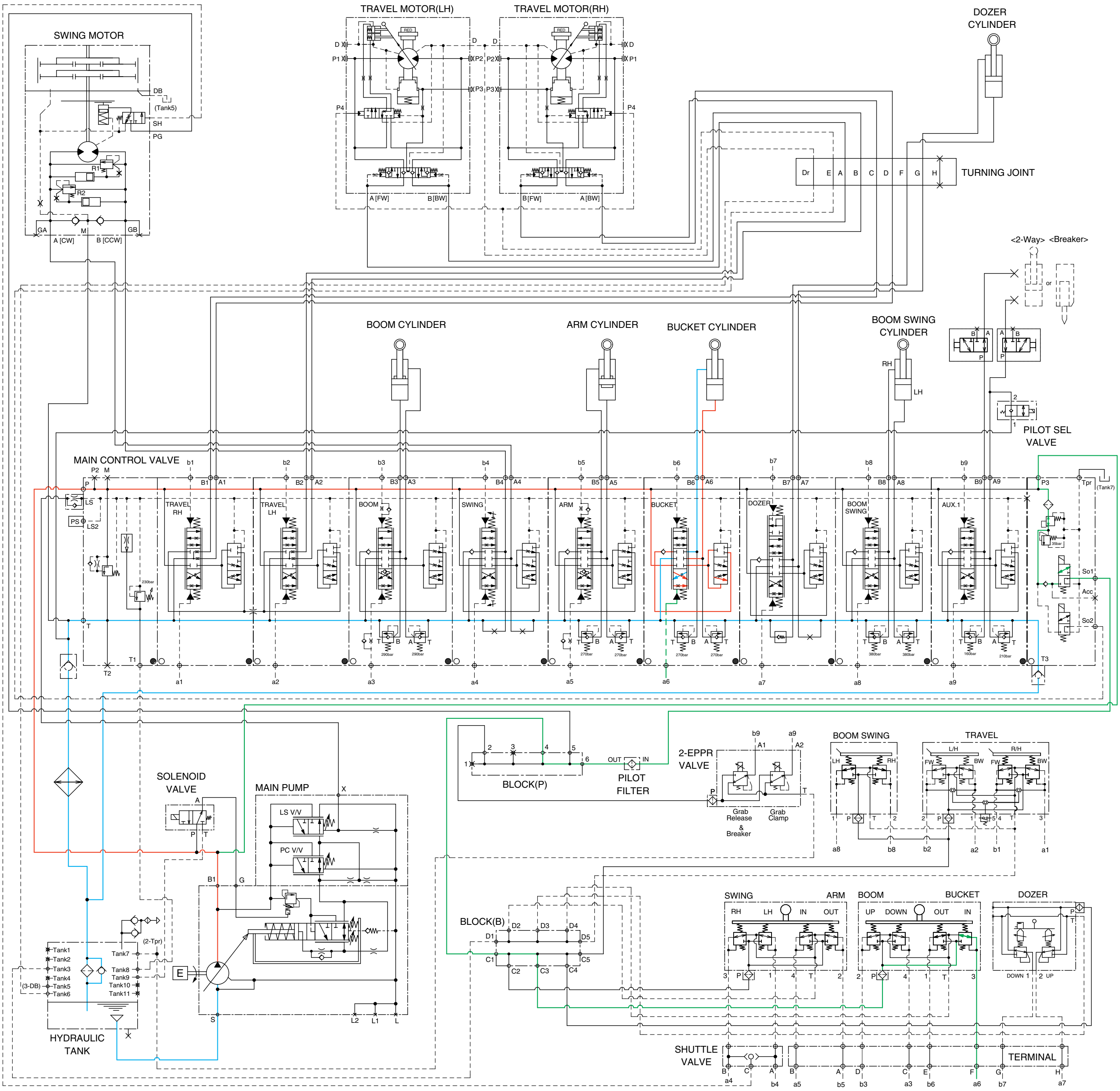
The oil from the main pump flows into the main control valve and then goes to the small chamber of arm cylinder.

At the same time, the oil from the large chamber of arm cylinder returns to the hydraulic oil tank through the arm spool in the main control valve. When this happens, the arm rolls out.

The cavitation which will happen to the rod of the arm cylinder is also prevented by the make-up valve in the main control valve.

※ The circuit diagram may differ from the equipment, so please check before a repair.

5. BUCKET ROLL IN OPERATION



40A3HC14

When the right control lever is pulled left, the bucket spool in the main control valve is moved to the roll in position by the pilot oil pressure (a6) from the remote control valve.

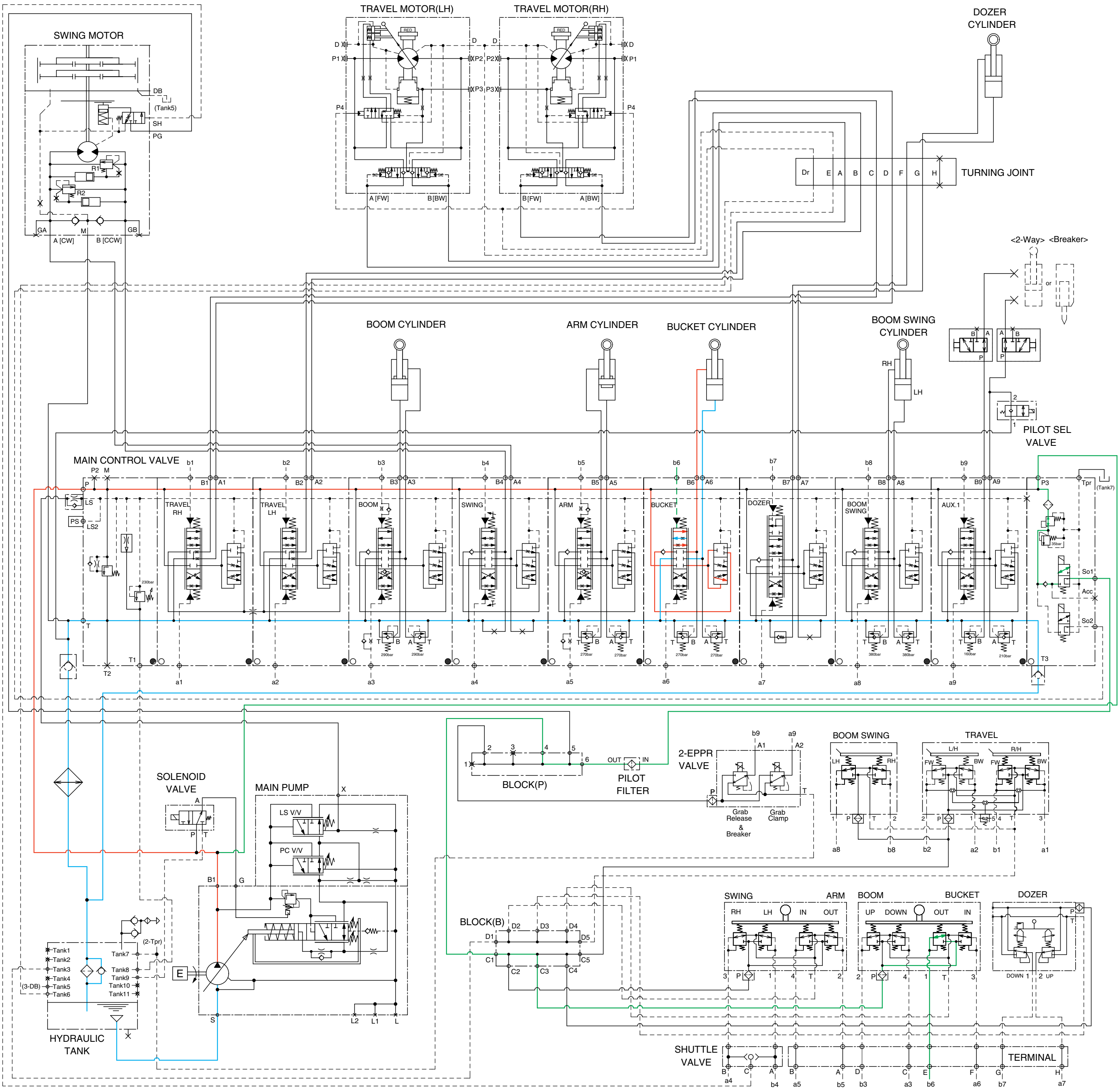
The oil from the main pump flows into the main control valve and then goes to the large chamber of bucket cylinder.

At the same time, the oil from the small chamber of bucket cylinder returns to the hydraulic oil tank through the bucket spool in the main control valve. When this happens, the bucket rolls in.

The cavitation which will happen to the bottom of the bucket cylinder is also prevented by the make-up valve in the main control valve.

※ The circuit diagram may differ from the equipment, so please check before a repair.

6. BUCKET ROLL OUT OPERATION

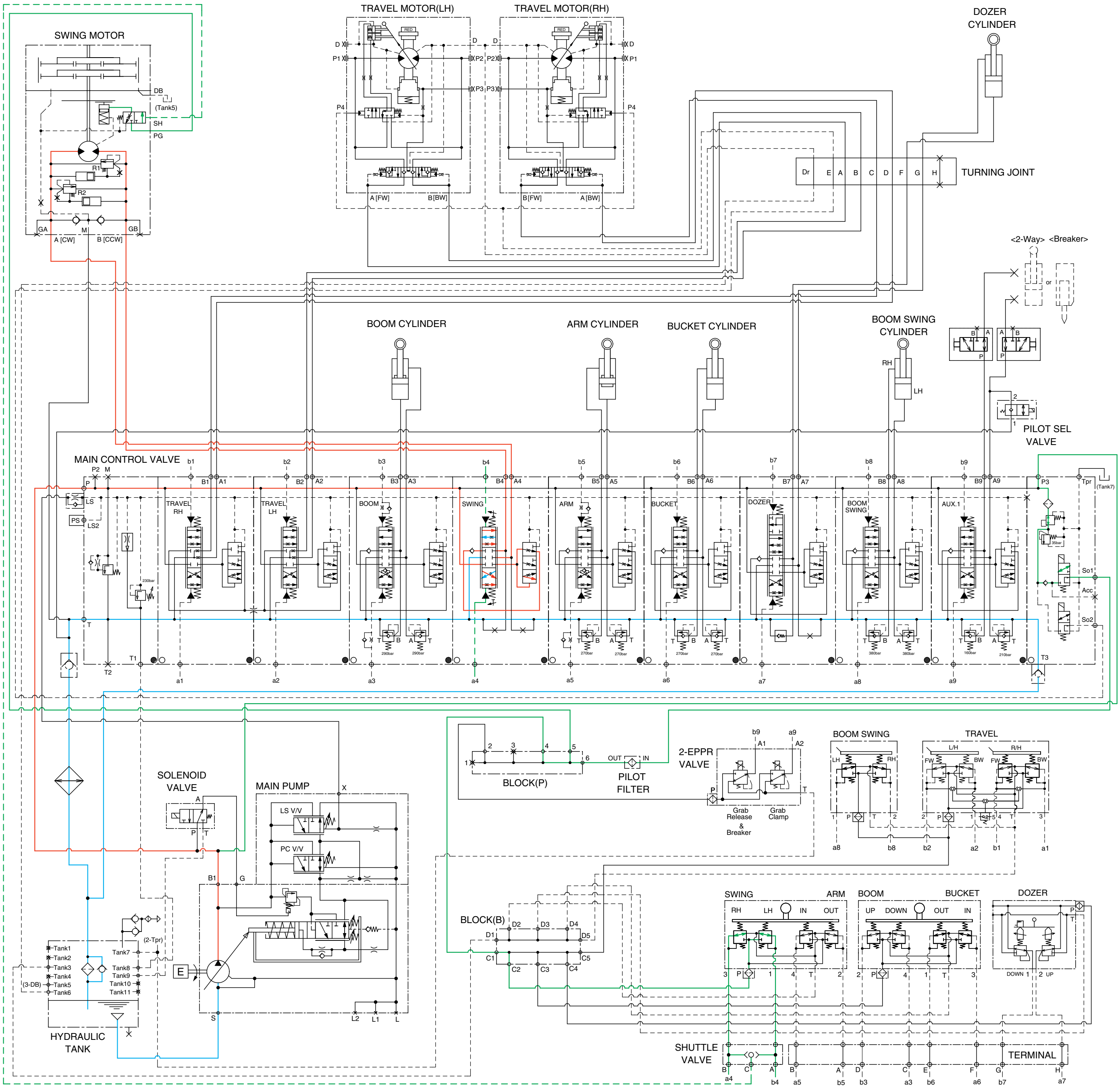


40A3HC15

When the right control lever is pushed right, the bucket spool in the main control valve is moved to the roll out position by the pilot oil pressure (b6) from the remote control valve.
The oil from the main pump flows into the main control valve and then goes to the small chamber of bucket cylinder.
At the same time, the oil from the large chamber of bucket cylinder returns to the hydraulic oil tank through the bucket spool in the main control valve. When this happens, the bucket rolls out.
The cavitation which will happen to the rod of the bucket cylinder is also prevented by the make-up valve in the main control valve.

※ The circuit diagram may differ from the equipment, so please check before a repair.

7. SWING OPERATION



40A3HC16

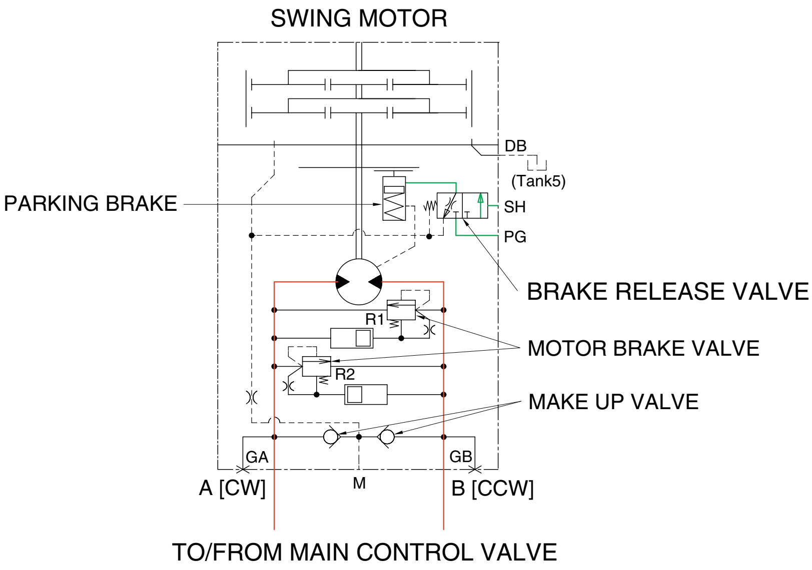
When the left control lever is pushed left or right, the swing spool in the main control valve is moved to the left or right swing position by the pilot oil pressure (a4, b4) from the remote control valve.

The oil from the main pump flows into the main control valve and then goes to the swing motor.

At the same time, the return oil from the swing motor returns to the hydraulic oil tank through the swing spool in the main control valve. When this happens, the superstructure swings to the left or right. The swing parking brake, make up valve and the overload relief valve are provided in the swing motors. The cavitation which will happen to the swing motor is also prevented by the make up valve in the swing motor itself.

※ The circuit diagram may differ from the equipment, so please check before a repair.

SWING CIRCUIT OPERATION



40A3HC17

1) MOTOR BRAKE VALVE

Motor brake valve for the swing motor limits to cushion the starting and stopping pressure of swing operation.

2) MAKE UP VALVE

The make up valves prevent cavitation by supplying return oil to the vacuum side of the motor.

3) PARKING BRAKE

In case that the parking, of the machine at slope is required during operation, there is the danger of involuntary swing caused by the self weight of the machine. The brake is connected to prevent this involuntary swing.

PARKING BRAKE "OFF" OPERATION

The parking brake is released by the pilot pressure oil from the main pump.

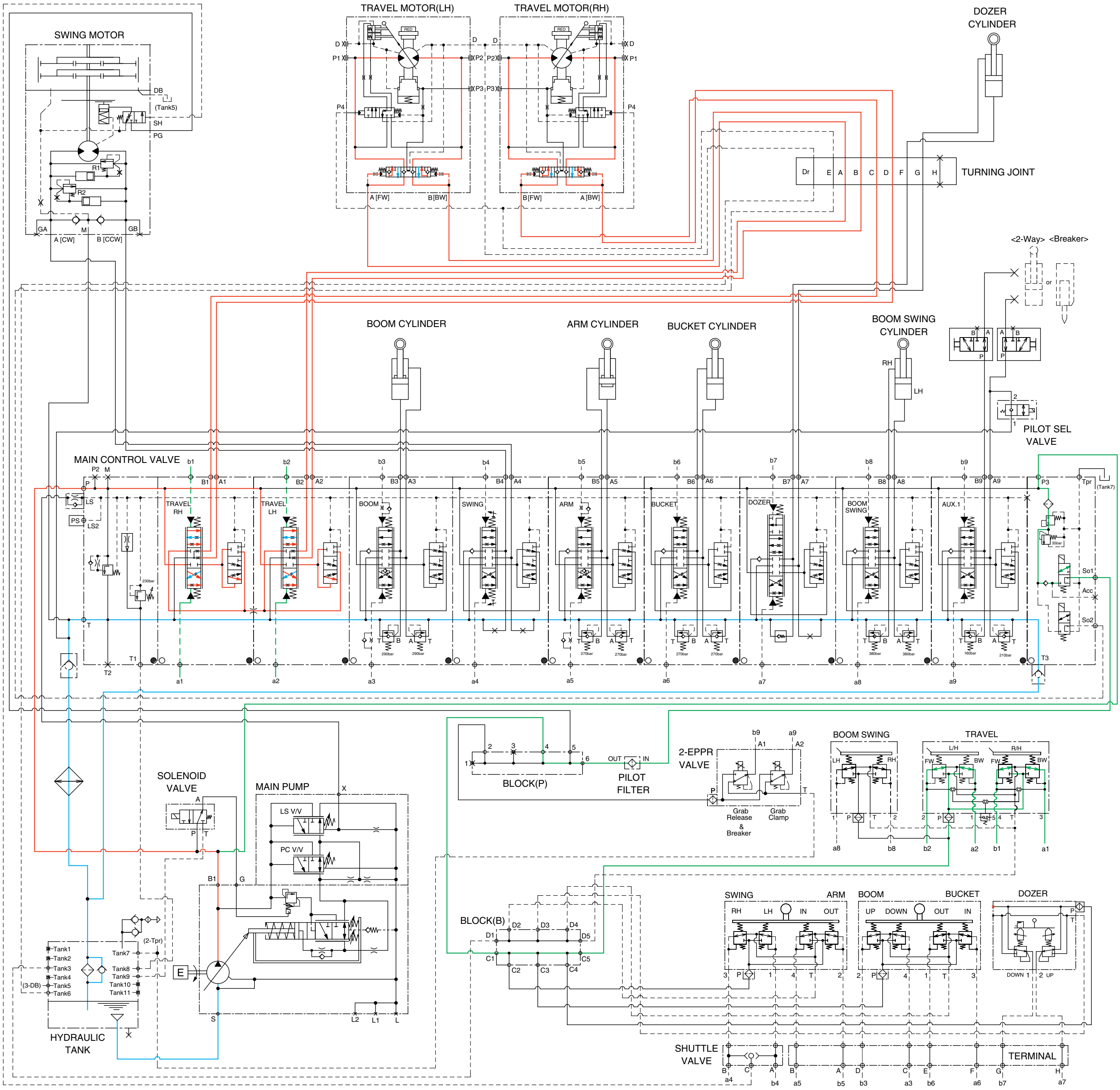
When the left control lever placed in the swing position, the pilot pressure (SH) at the shuttle valve is transferred to the brake release valve and the brake release valve is change over. Then the pilot pressure (PG) lift the brake piston and release the parking brake.

PARKING BRAKE "ON" OPERATION

When the control lever placed in the neutral position, the pressure of the pilot oil passage down. Then the brake release valve returned to the neutral position and the oil is returned from the brake piston to the tank. And the brake is set to 'ON".

※ The circuit diagram may differ from the equipment, so please check before a repair.

8. TRAVEL FORWARD AND REVERSE OPERATION

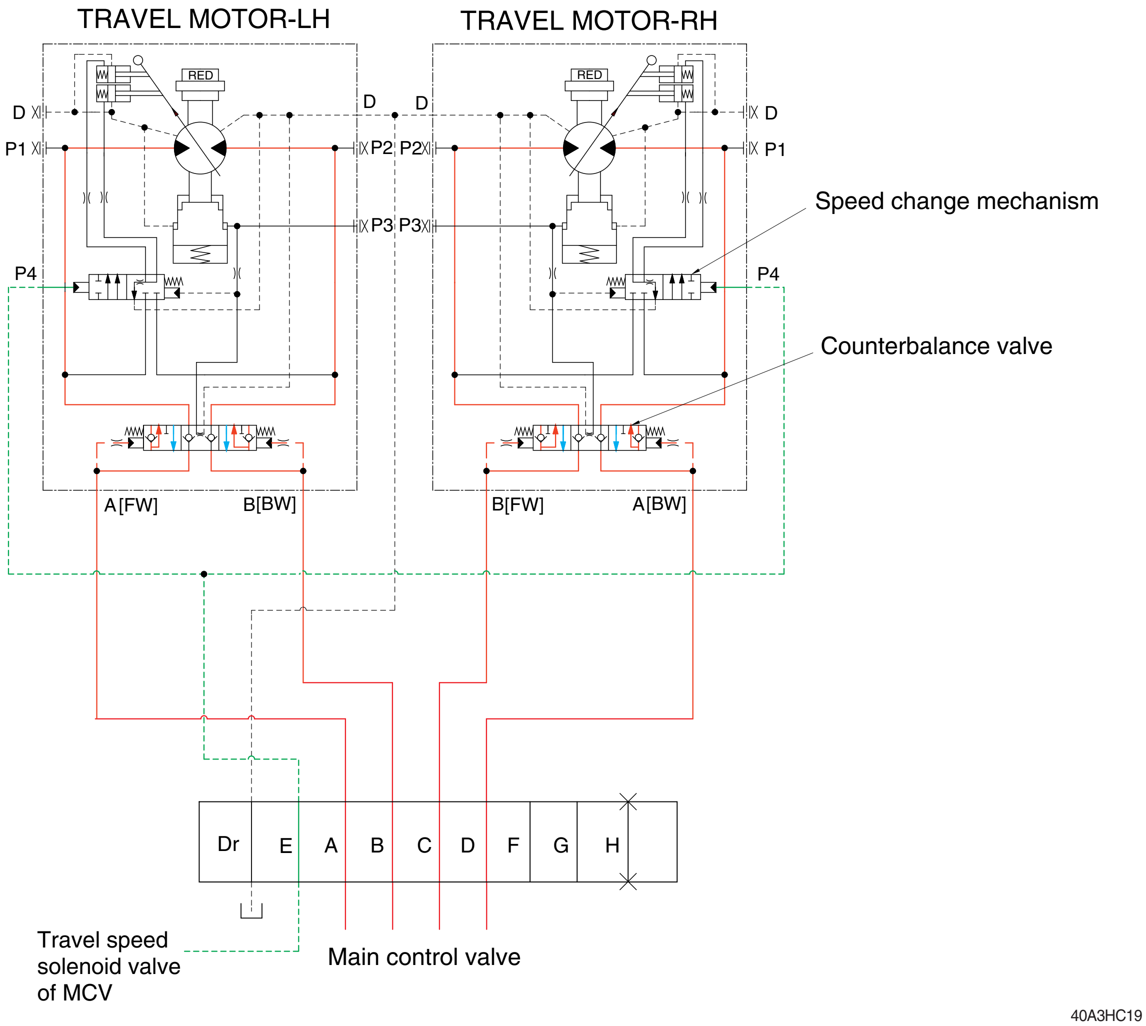


40A3HC18

When the travel levers are pushed forward or reverse position, the travel spools in the main control valve are moved to the forward or reverse travel position by the pilot oil pressure (a1,b1, a2, b2) from the travel control valve. The oil from the main pump flows into the main control valve and then goes to the both travel motors through the turning joint. The return oil from both travel motors returns to the hydraulic oil tank through the turning joint and the travel spools in the main control valve. When this happens, the machine moves to the forward or reverse.

※ The circuit diagram may differ from the equipment, so please check before a repair.

TRAVEL CIRCUIT OPERATION



Valves are provided on travel motors to offer the following functions.

1) COUNTER BALANCE VALVE

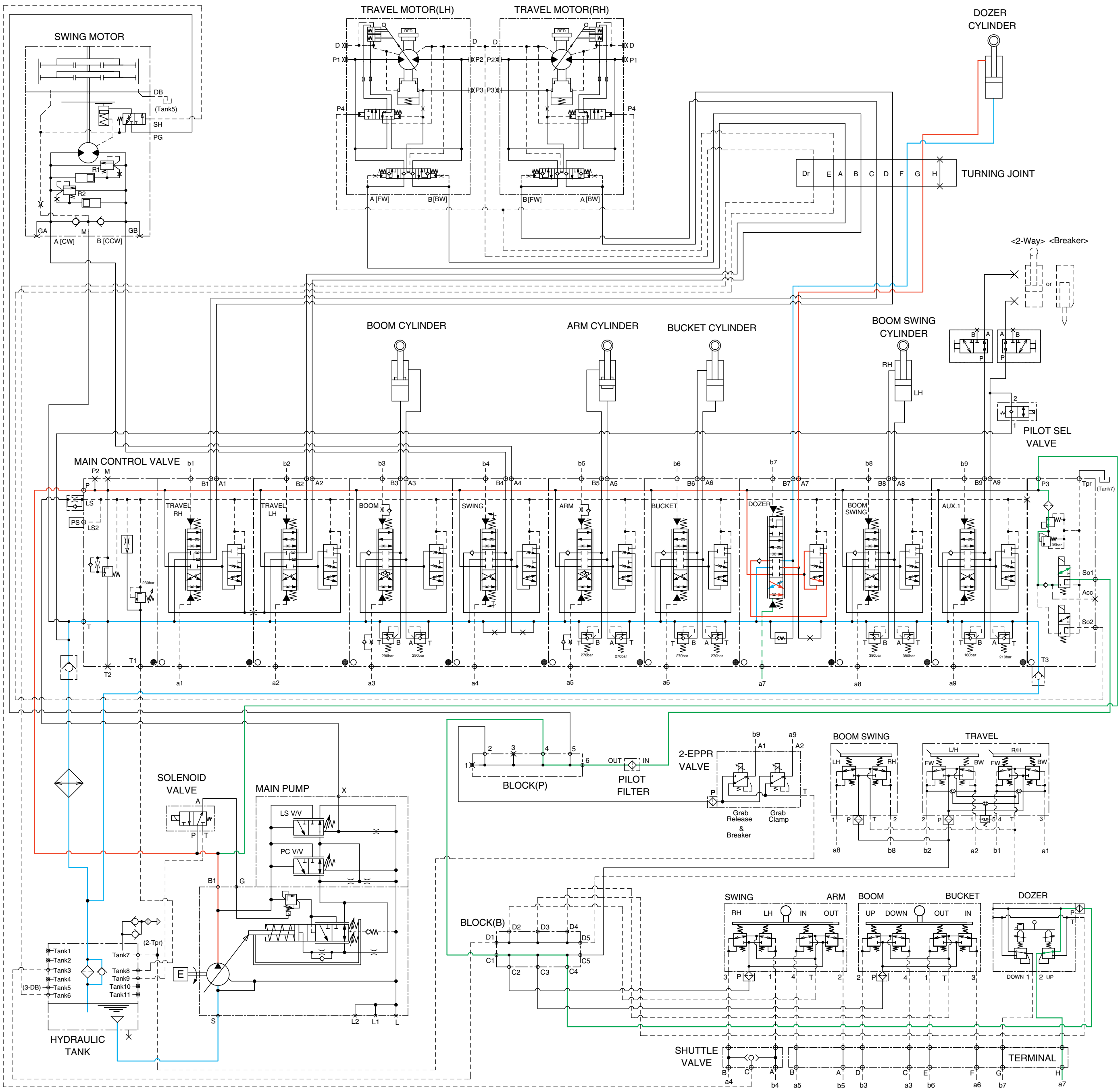
When stopping the motor of slope descending, this valve to prevent the motor over run.

2) SPEED CHANGE MECHANISM (auto)

Auto two speed control mechanism consists of two spools and spring. This valve automatically changes motor displacement in portion to motor pressure.

※ The circuit diagram may differ from the equipment, so please check before a repair.

9. DOZER UP OPERATION



40A3HC20

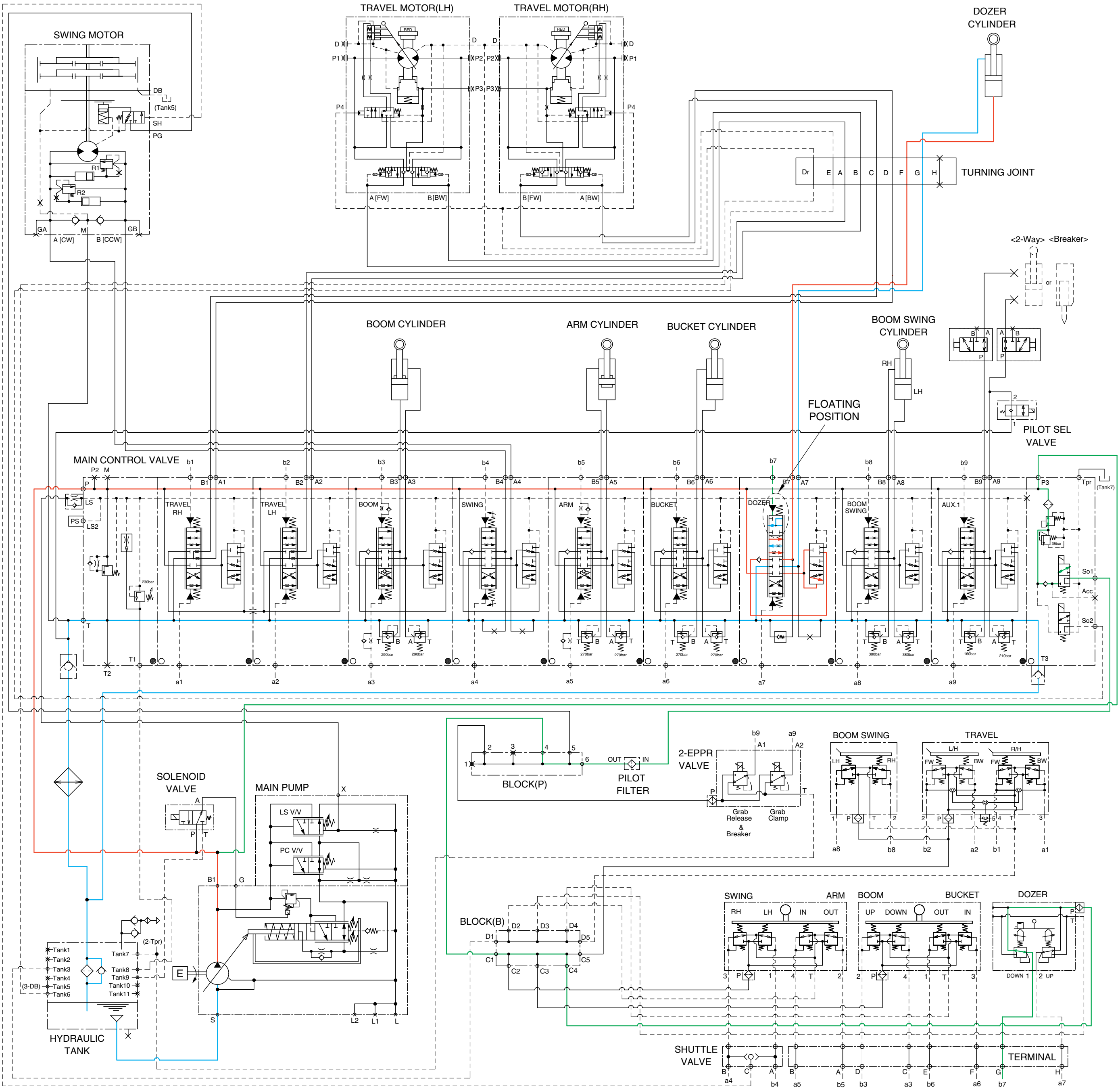
When the dozer control lever is pulled back, the dozer spool in the main control valve is moved to the dozer up position by the pilot oil pressure (a7) from the remote control valve.

The oil from the main pump flows into the main control valve and then goes to the small chamber of dozer cylinders through the turning joint.

At the same time, the oil from the large chamber of dozer cylinders returns to the hydraulic oil tank through the turning joint and dozer spool in the main control valve. When this happens, the dozer goes up.

※ The circuit diagram may differ from the equipment, so please check before a repair.

10. DOZER DOWN OPERATION



40A3HC21

When the dozer control lever is pushed forward, the dozer spool in the main control valve is moved to the dozer down position by the pilot oil pressure (b7) from the remote control valve.

The oil from the main pump flows into the main control valve and then goes to the large chamber of dozer cylinders through the turning joint.

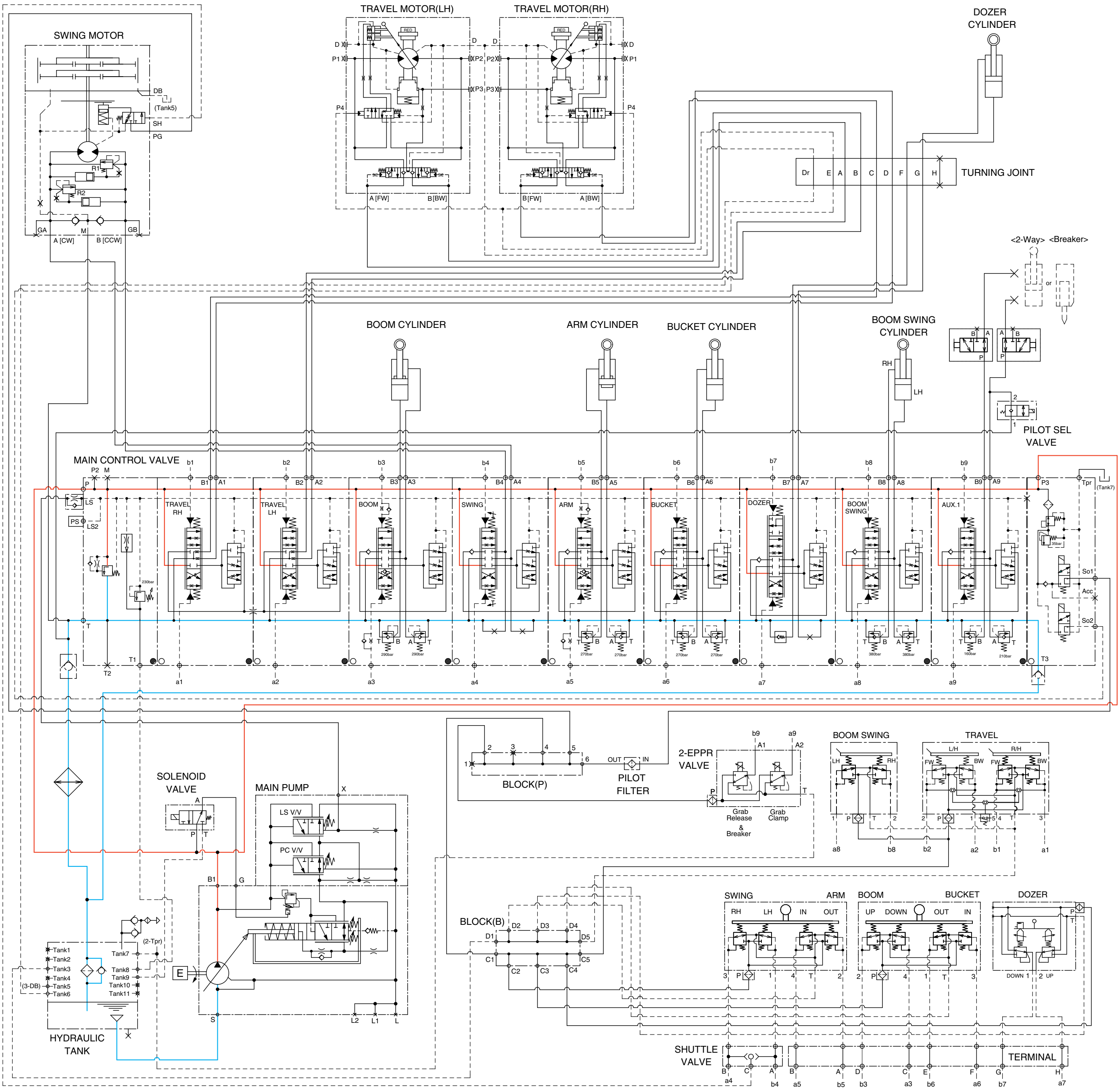
At the same time, the oil from the small chamber of dozer cylinders returns to the hydraulic oil tank through the turning joint and dozer spool in the main control valve. When this happens, the dozer blade is down.

Press the dozer floating button and push the dozer control lever until the end, the dozer spool is moved to the floating position. Then the hydraulic oil of the rod and head goes to tank, and floating is accomplished. Refer to the operator's manual page 3-33.

※ The circuit diagram may differ from the equipment, so please check before a repair.

GROUP 5 COMBINED OPERATION

1. OUTLINE

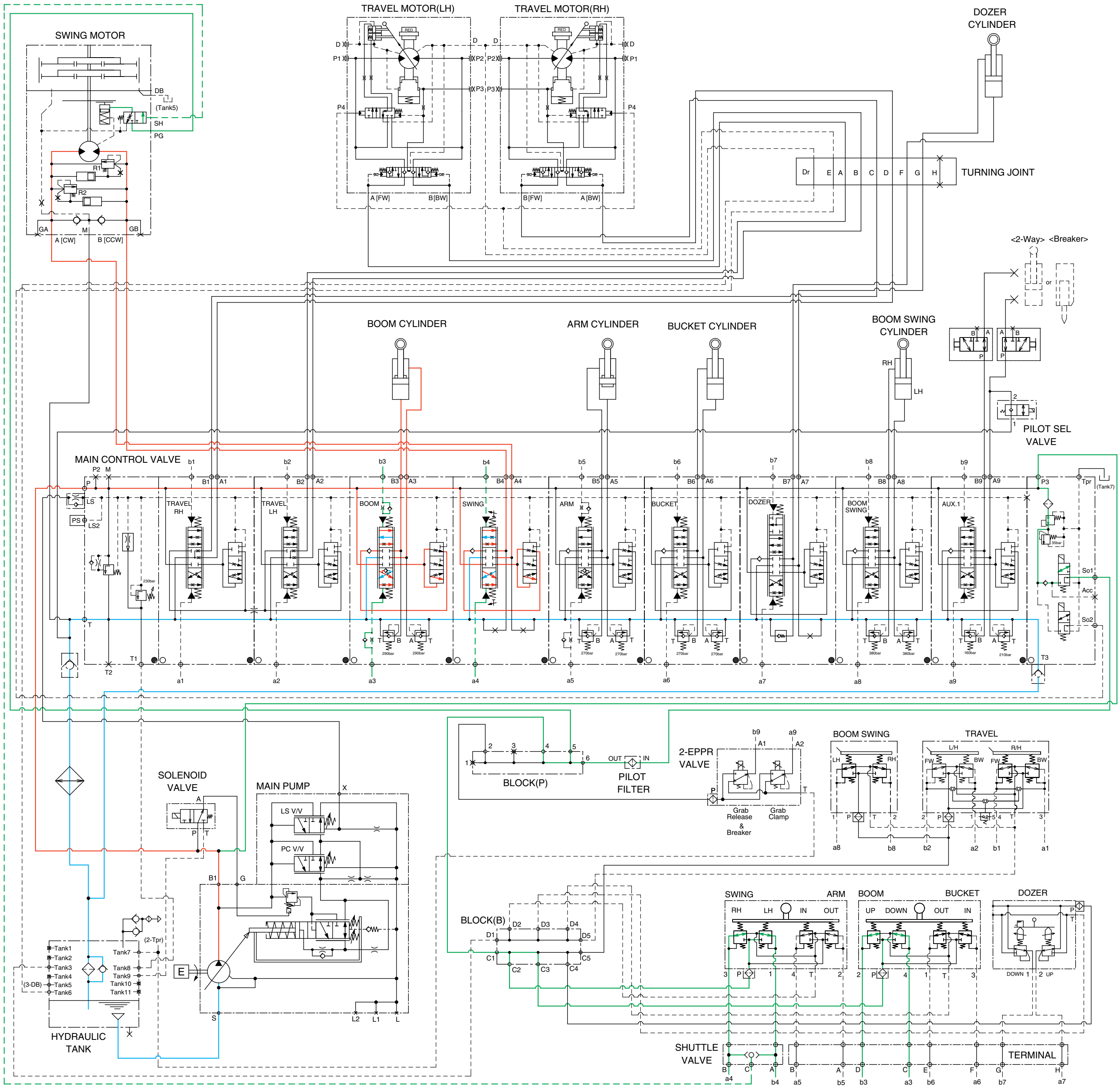


40A3HC30

The oil from the main pump flows through the parallel oil passage in the main control valve. Then the oil goes to each actuator and operates them. Check valves and orifices are located on these oil passage in the main control valve. These control the oil from the main pumps so as to correspond to the operation of each actuator and smooth the combined operation.

※ The circuit diagram may differ from the equipment, so please check before a repair.

2. COMBINED SWING AND BOOM OPERATION



40A3HC31

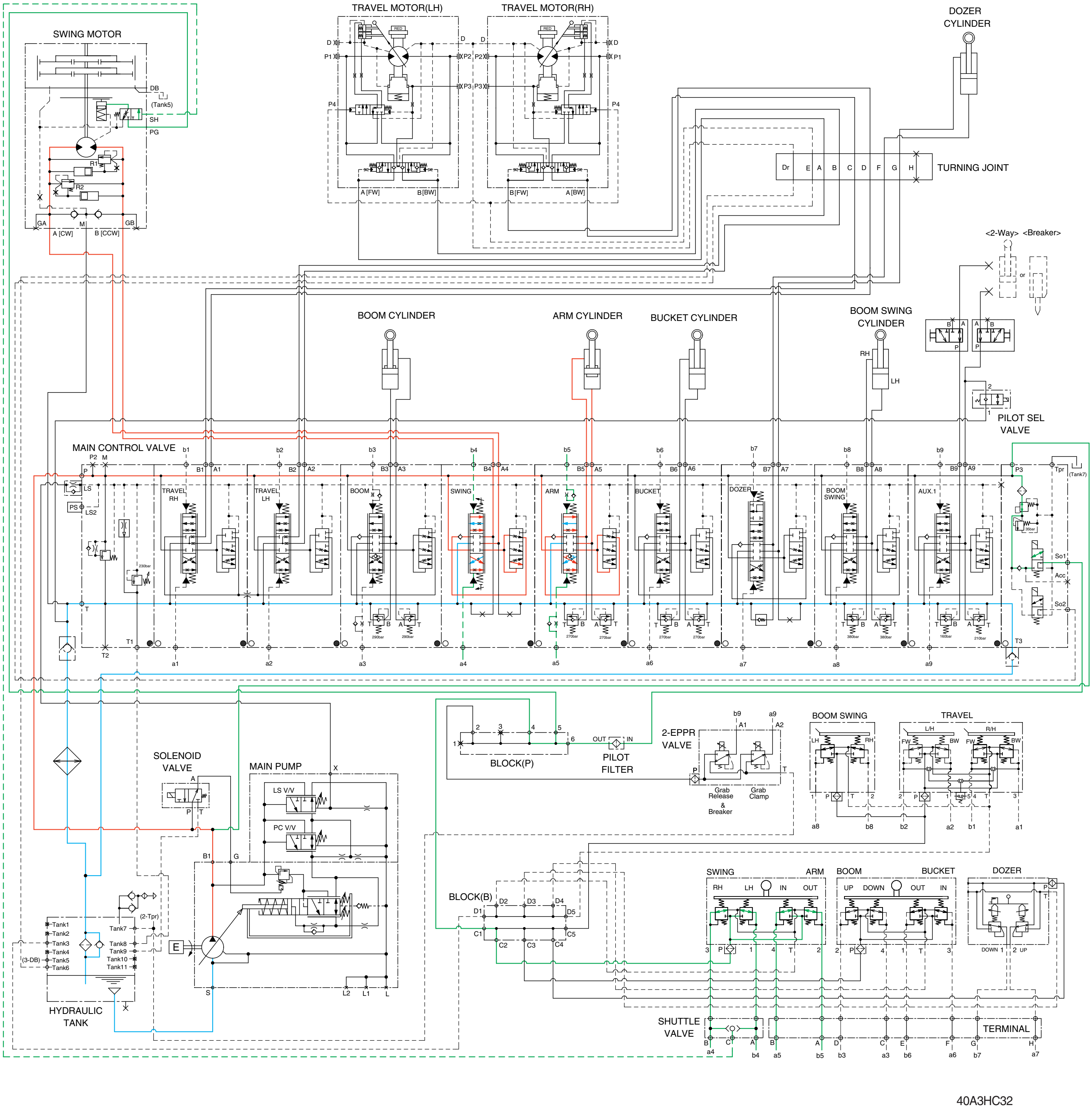
When the swing and boom functions are operated, simultaneously the swing spool and boom spool in the main control valve are moved to the functional position by the pilot oil pressure (a4, b4, a3, b3) from the remote control valve.

The oil from the main pump flows into the boom cylinder through boom spool and flows into the swing motor through the swing spool via the parallel passage.

The superstructure swings and the boom is operated.

※ The circuit diagram may differ from the equipment, so please check before a repair.

3. COMBINED SWING AND ARM OPERATION



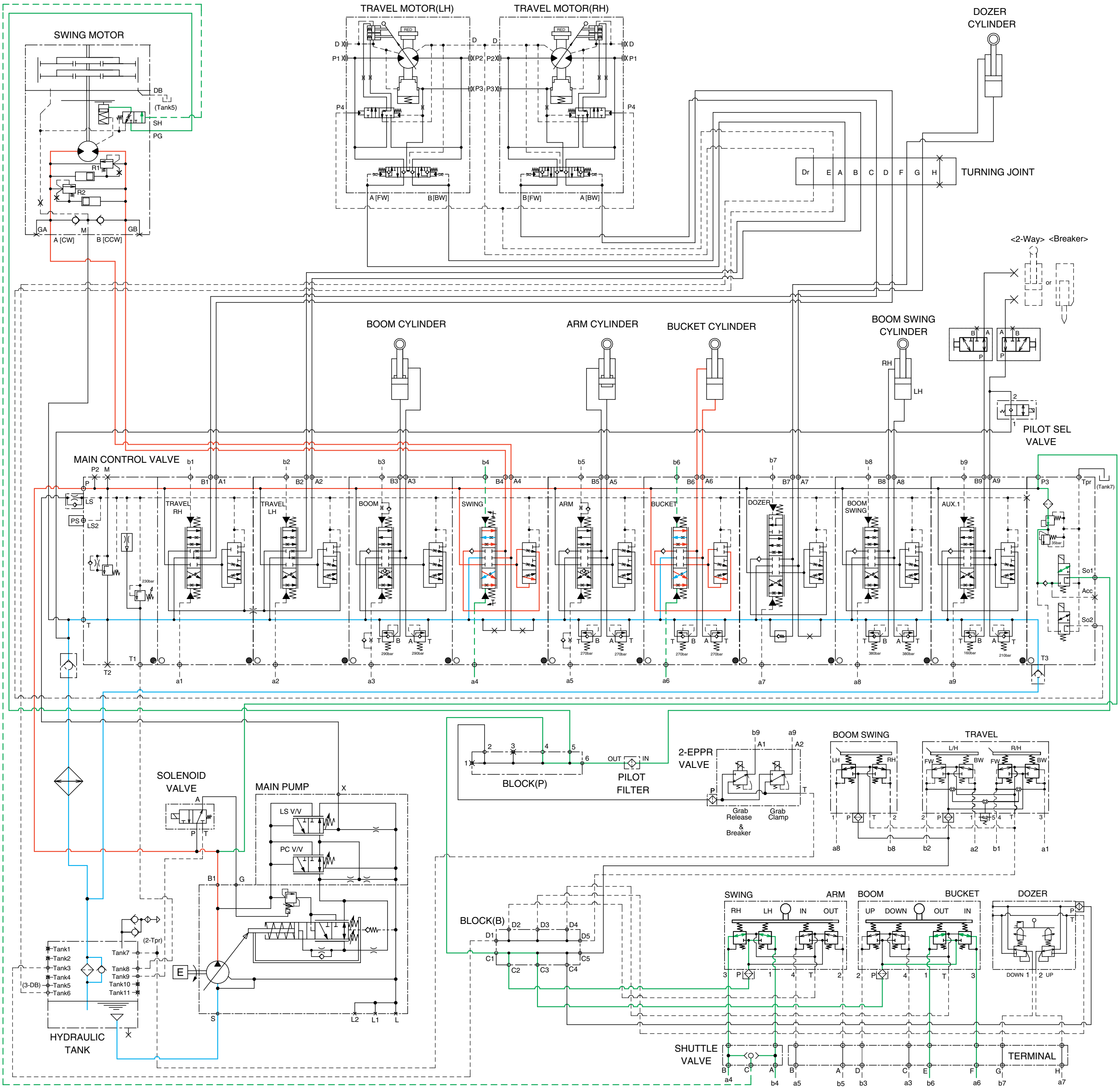
When the swing and arm functions are operated, simultaneously the swing spool and arm spool in the main control valve are moved to the functional position by the pilot oil pressure (a4, b4, a5, b5) from the remote control valve.

The oil from the main pump flows into the swing motor through swing spool via the parallel passage and flows into the arm cylinder through the arm spool.

The superstructure swings and the arm is operated.

※ The circuit diagram may differ from the equipment, so please check before a repair.

4. COMBINED SWING AND BUCKET OPERATION



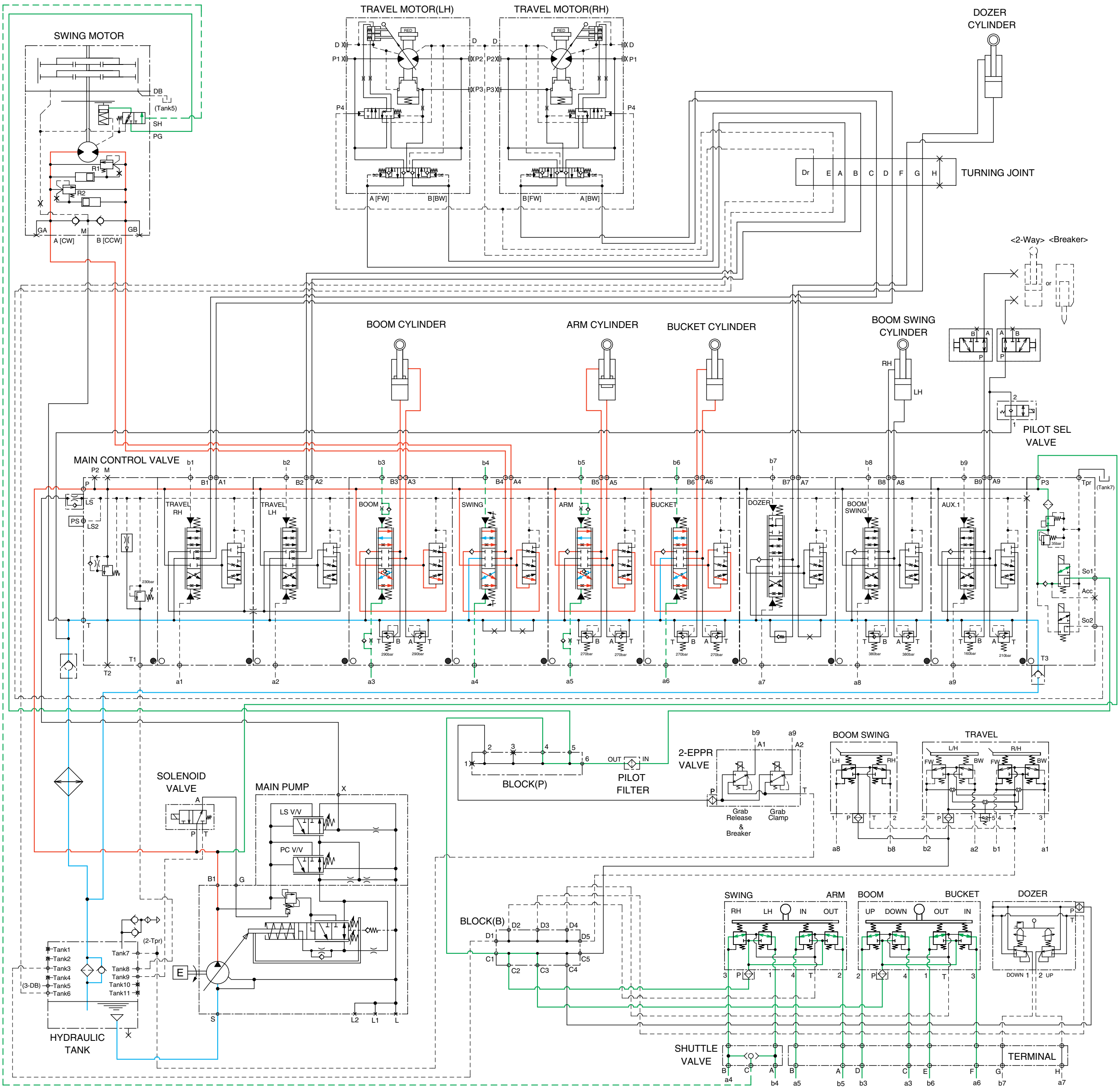
When the swing and bucket functions are operated, simultaneously the swing spool and bucket spool in the main control valve are moved to the functional position by the pilot oil pressure (a4, b4, a6, b6) from the remote control valve.

The oil from the main pump flows into the swing motor through the swing spool via the parallel passage and flows into the bucket cylinder through the bucket spool.

The superstructure swings and the bucket is operated.

※ The circuit diagram may differ from the equipment, so please check before a repair.

5. COMBINED SWING, BOOM, ARM AND BUCKET OPERATION



40A3HC34

When the swing, boom, arm and bucket functions are operated, simultaneously each spool in the main control valve is moved to the functional position by the pilot oil pressure (a4, b4, a3, b3, a5, b5. a6, b6) from the remote control valve.

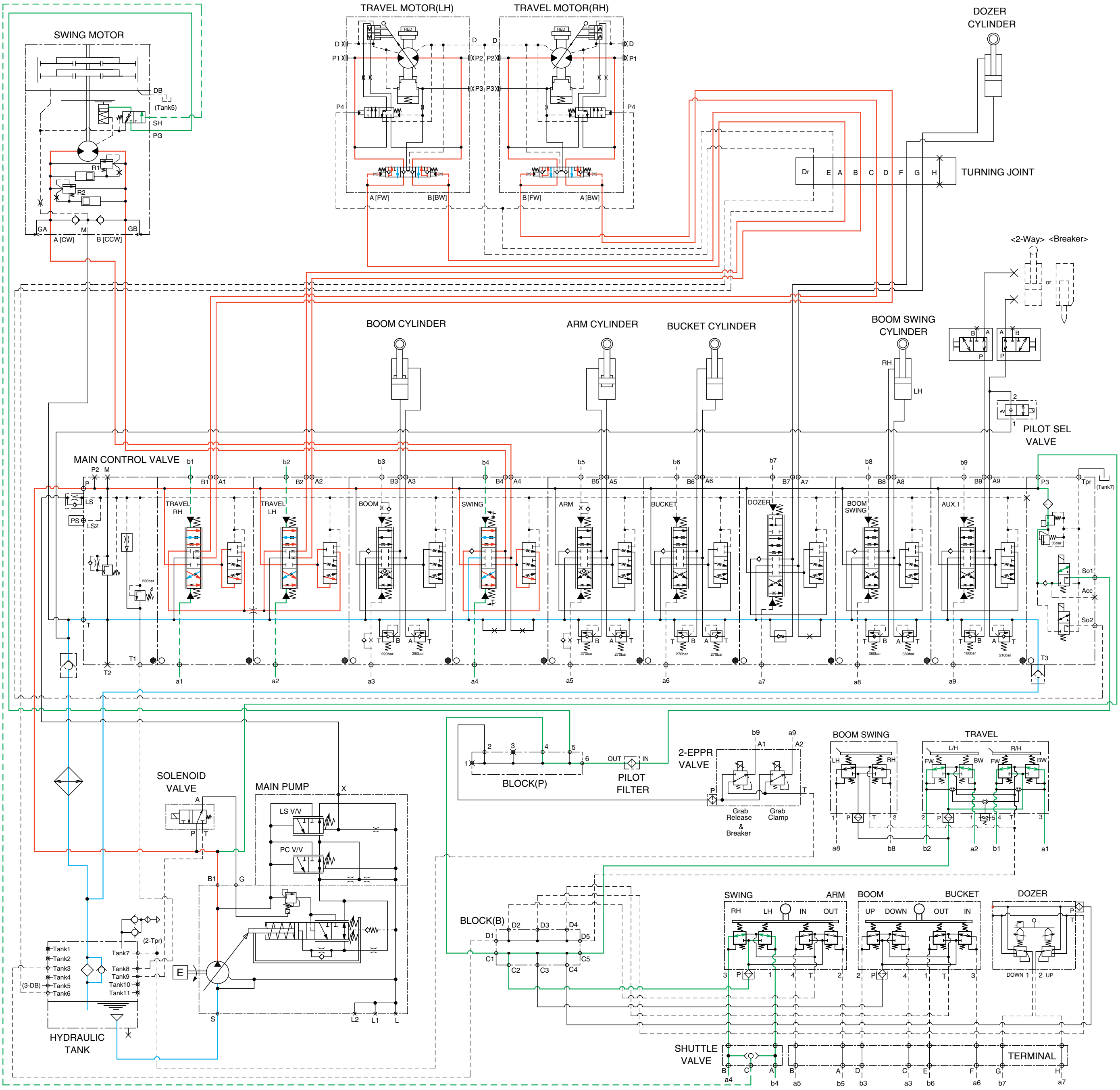
The oil from the main pump flows into the boom cylinder, arm cylinder and bucket cylinder through the boom spool, arm spool, bucket spool by the parallel passage.

Also, the oil flows into the swing motor through the swing spool via the parallel passage.

The superstructure swings and the boom, arm and bucket are operated.

※ The circuit diagram may differ from the equipment, so please check before a repair.

6. COMBINED SWING AND TRAVEL OPERATION



40A3HC35

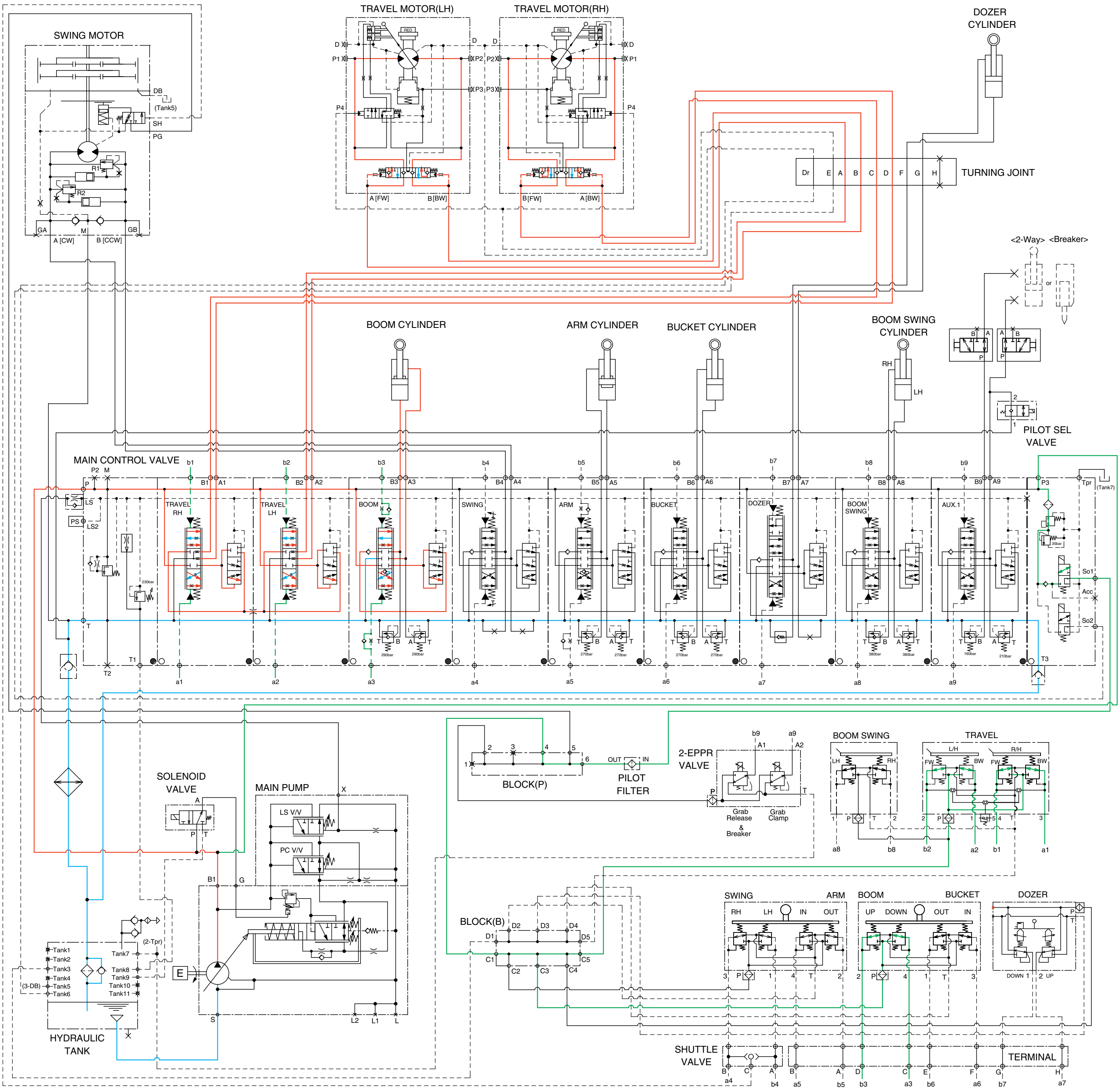
When the swing and travel functions are operated, simultaneously the swing spool and travel spools in the main control valve are moved to the functional position by the pilot oil pressure (a4, b4, a1, b1, a2, b2) from the remote control valve.

The oil from the main pump flows into the swing motor and LH and RH travel motors through the swing spool and both travel spools via the parallel passage.

The superstructure swings and the machine travels straight.

※ The circuit diagram may differ from the equipment, so please check before a repair.

7. COMBINED BOOM AND TRAVEL OPERATION



40A3HC36

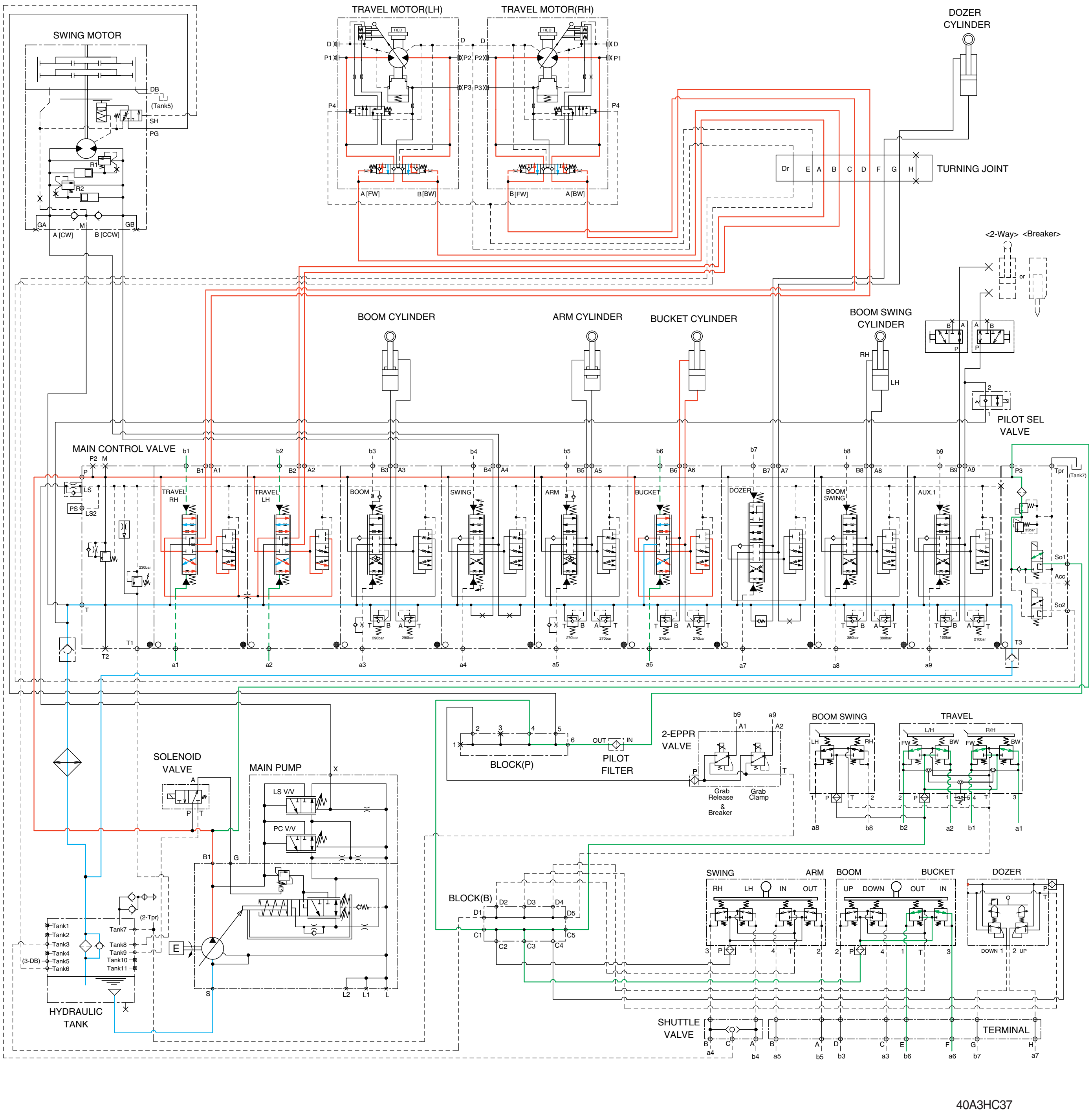
When the boom and travel functions are operated, simultaneously the boom spool and travel spools in the main control valve are moved to the functional position by the pilot oil pressure (a3, b3, a1,b1, a2, b2) from the remote control valve.

The oil from the main pump flows into the boom cylinder and the travel motors through boom, travel LH and travel RH spools via the parallel passage.

The boom is operated and the machine travels straight.

※ The circuit diagram may differ from the equipment, so please check before a repair.

8. COMBINED ARM AND TRAVEL OPERATION



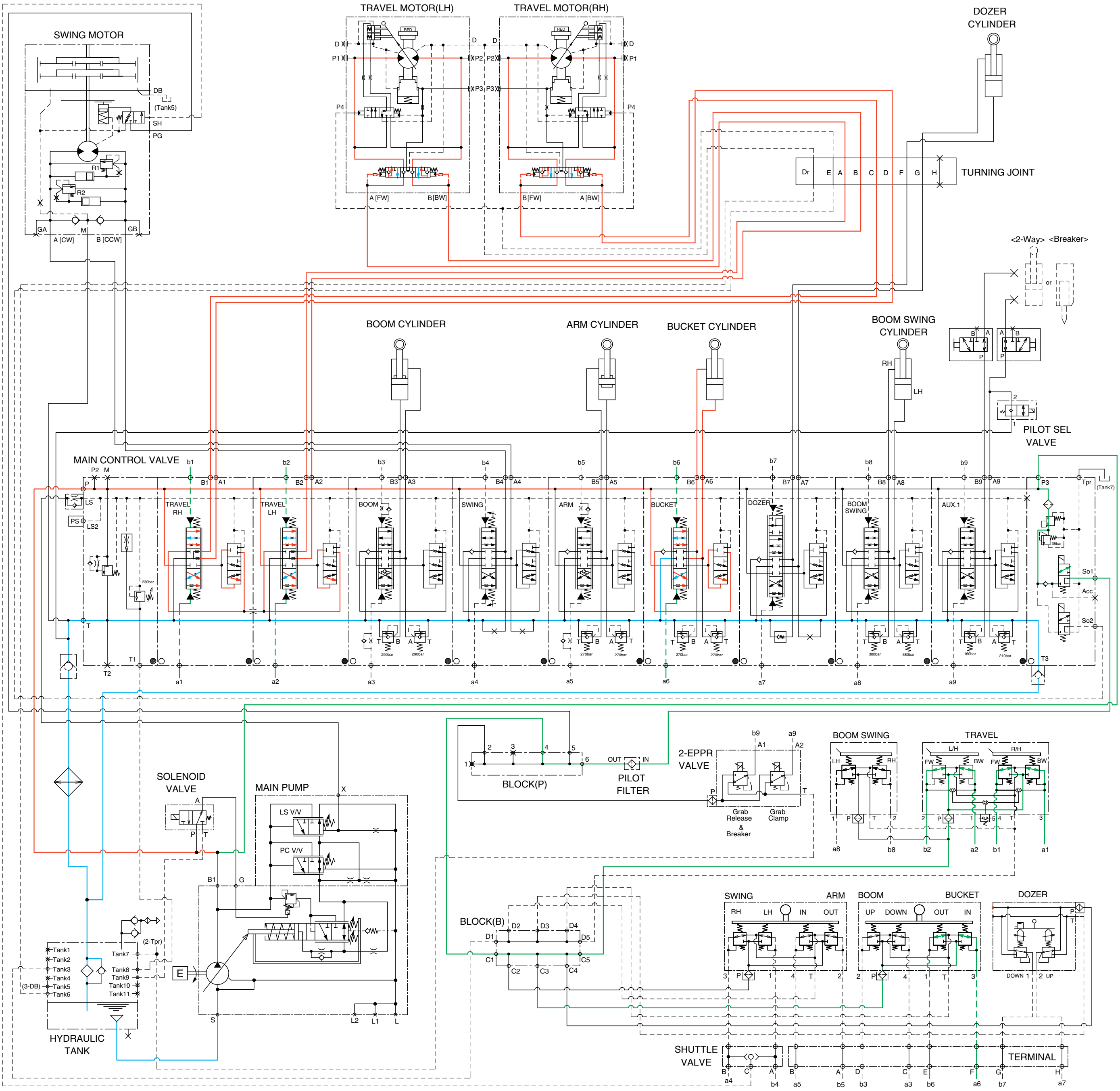
When the arm and travel functions are operated, simultaneously the arm spool and travel spools in the main control valve are moved to the functional position by the pilot oil pressure (a5, b5, a1, b1, a2, b2) from the remote control valve.

The oil from the main pump flows into the travel motors and the arm cylinder through travel spools and arm spools via the parallel passage.

The arm is operated and the machine travels straight.

※ The circuit diagram may differ from the equipment, so please check before a repair.

9. COMBINED BUCKET AND TRAVEL OPERATION



40A3HC38

When the bucket and travel functions are operated, simultaneously the bucket spool and travel spools in the main control valve are moved to the functional position by the pilot oil pressure (a6, b6, a1, b1, a2, b2) from the remote control valve. The oil from the main pump flows into the travel motors and the bucket cylinder through the travel spools and the bucket spool via the parallel passage.

The bucket is operated and the machine travels straight.

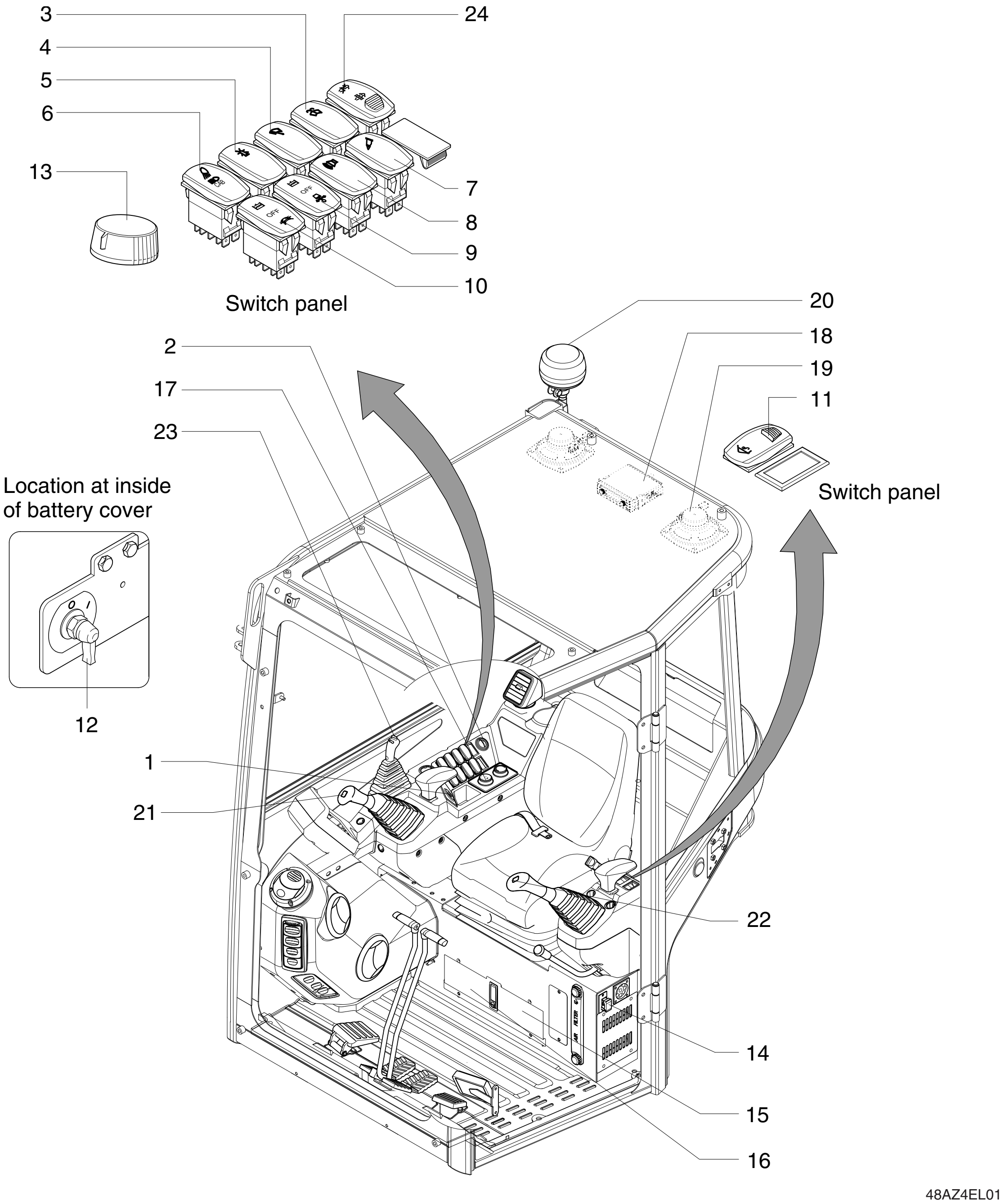
※ The circuit diagram may differ from the equipment, so please check before a repair.

SECTION 4 ELECTRICAL SYSTEM

SECTION 4 ELECTRICAL SYSTEM

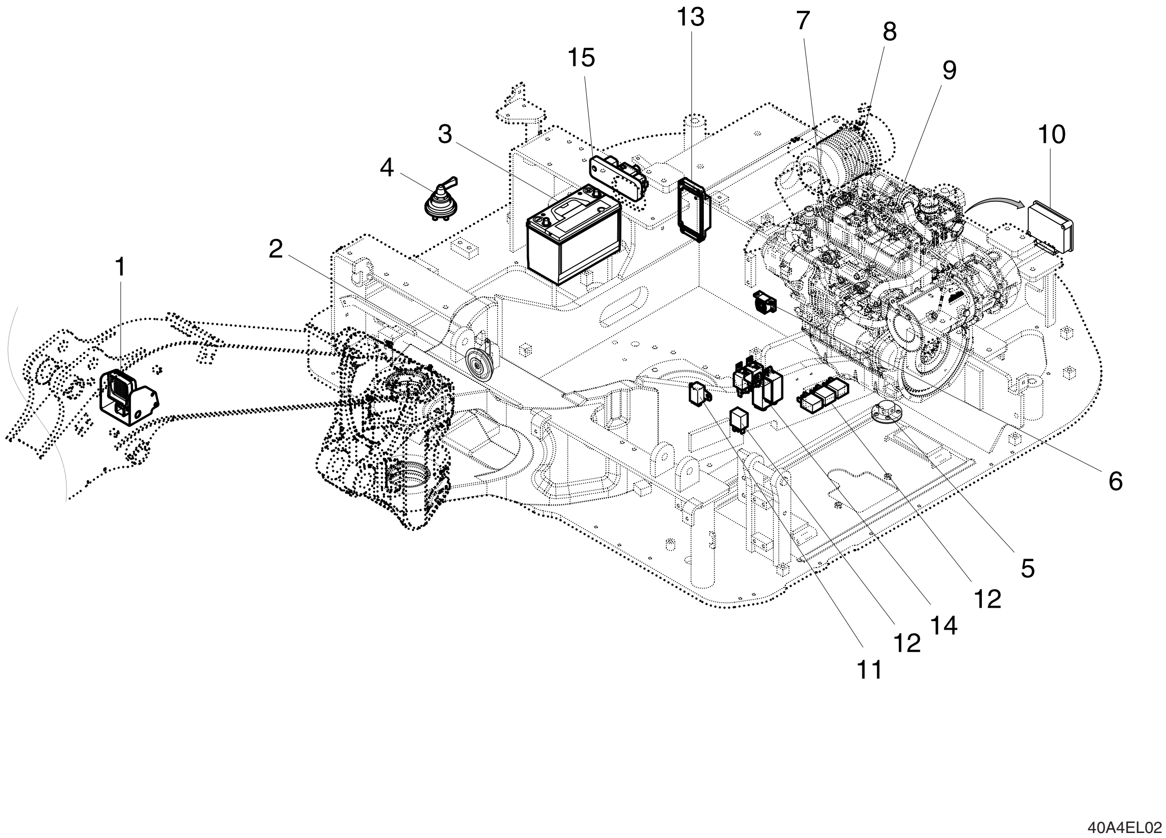
GROUP 1 COMPONENT LOCATION

1. LOCATION 1



1	Start switch	10	Aux 1 switch	19	Speaker
2	Power socket	11	Quick coupler switch	20	Beacon lamp
3	Washer switch	12	Master switch	21	RH control lever switch (horn, quick coupler, breaker, 2-way)
4	Wiper switch	13	Accel dial		
5	Beacon lamp switch	14	Emergency stop switch	22	LH control lever switch (rotating, proportional on/off)
6	Work light switch	15	Relay box		
7	Breaker select switch	16	Fuse box	23	Dozer control switch (dozer floating, angle dozer, 2-speed travel)
8	Travel alarm switch	17	Air conditioner switch		
9	Aux 2 switch	18	New cassette radio	24	DPF switch

2. LOCATION 2



1	Work lamp	6	Travel alarm buzzer	11	Inlet wiper relay
2	Horn	7	Engine oil pressure switch	12	Micro 12V relay
3	Battery	8	Air cleaner pressure switch	13	Hydraulic control unit
4	Master switch	9	Water temperature sender	14	Power relay
5	Fuel sender	10	ECU	15	Battery power relay

GROUP 2 MONITORING SYSTEM

1) CLUSTER

The cluster consists of LCD and switches as shown below. The LCD is to warn the operator in case of abnormal machine operation or conditions for the appropriate operation and inspection.

The LCD is to display for monitoring, manage and display set with the switches.

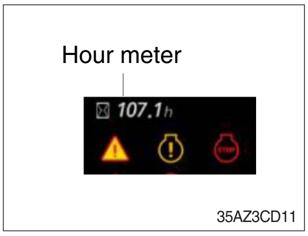
※ The cluster installed on this machine does not entirely guarantee the condition of the machine. Daily inspection should be performed according to the operator's manual chapter 6, Maintenance.

※ When the cluster provides a warning, immediately check the problem and perform the required action.

48AZ4CD05

2) GAUGES AND DISPLAYS

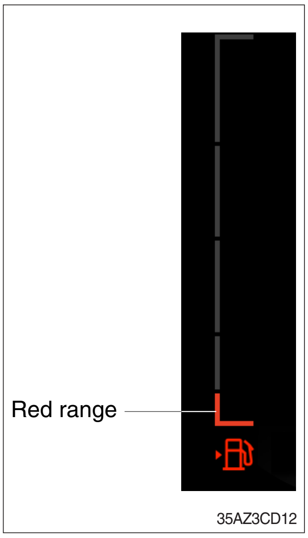
(1) Hour meter



① This meter shows the total operation hours of the machine.

② Always ensure the operating condition of the meter during the machine operation.
Inspect and service the machine based on hours as indicated in chapter 6, maintenance.

(2) Fuel gauge

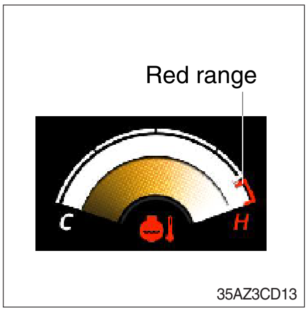


① This gauge indicates the amount of fuel in the fuel tank.

② Fill the fuel when in the red range or warning lamp ON.

※ **If the gauge illuminates the red range or warning lamp ON even though the machine is in the normal condition range, check the electric device as this can be caused by poor connection of sensor.**

(3) Engine coolant temperature gauge



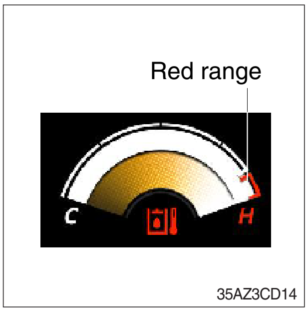
① This indicates the temperature of coolant.
· Red range : Above 110°C (230°F)

② When the red range pointed or warning lamp ON, engine do not abruptly stop but run it at medium speed to allow it to cool gradually, then stop it.
Check the radiator and engine.

※ **If the engine is stopped without cooled down running, the temperature of engine parts will rise suddenly, this could cause severe engine trouble.**

※ **If the gauge indicates the red range or warning lamp ON in red even though the machine is in the normal condition range, check the electric device as this can be caused by poor connection of sensor.**

(4) Hydraulic oil temperature gauge



① This gauge indicates the temperature of hydraulic oil.
 · Red range : Above 105°C (221°F)

② If the indicator is in the red range or lamp ON in red, reduce the load on the system. If the gauge stays in the red range, stop the machine and check the cause of the problem.

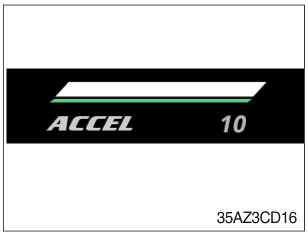
※ If the gauge indicates the red range or warning lamp ON in red even though the machine is in the normal condition range, check the electric device as this can be caused by poor connection of sensor.

(5) Engine rpm gauge and clinometer

① This displays the engine speed.

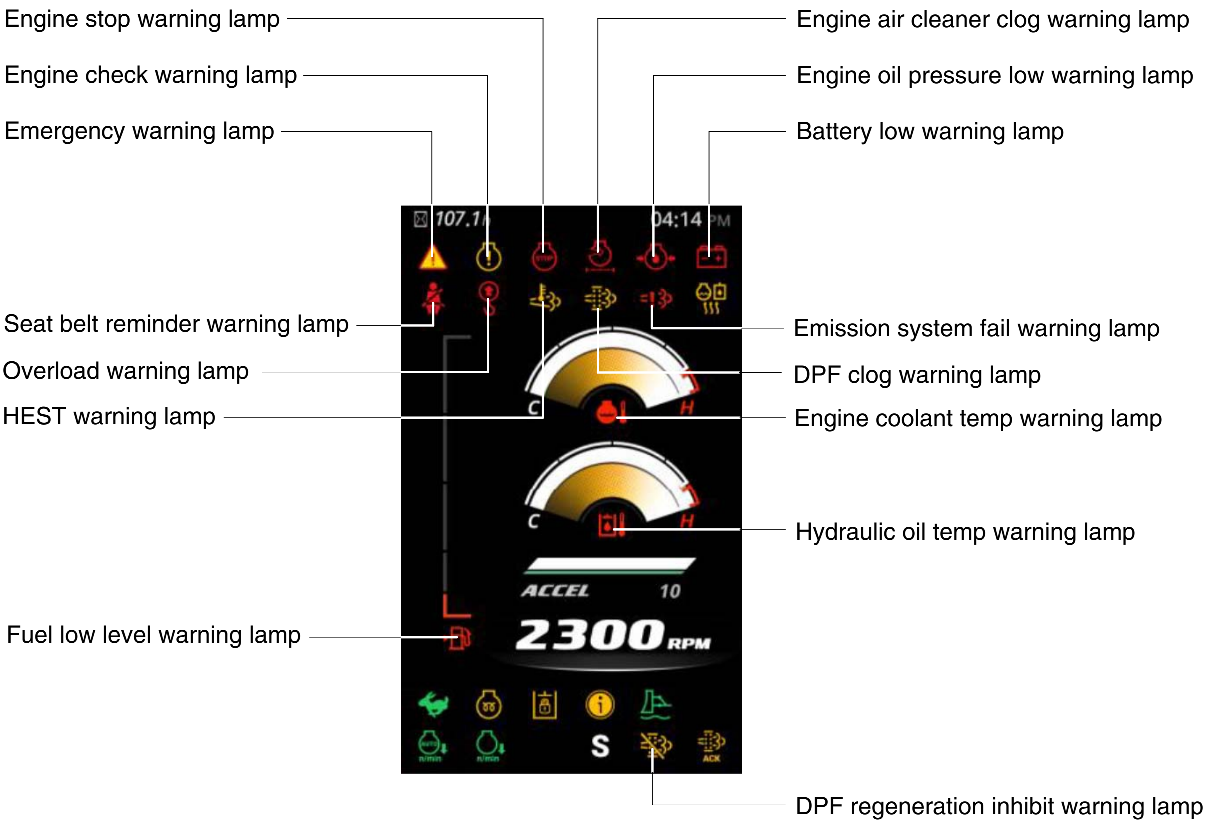
② This displays the tilt of machine.

(6) Accel dial gauge



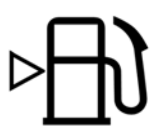
① This gauge indicates the level of accel dial from 0 to 10 step.

3) WARNING LAMPS



48AZ3CD20

(1) Fuel low level warning lamp

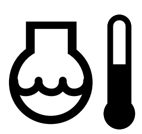


35AZ3CD21

① This lamp lights up and buzzer sounds when the level of fuel is below 18.9 ℓ (5.0 U.S. gal).

② Fill the fuel immediately when the lamp ON.

(2) Engine coolant temperature warning lamp

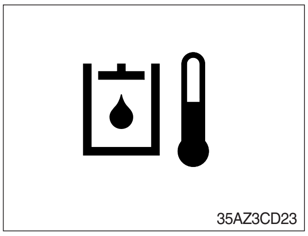


35AZ3CD22

① This lamp lights up and buzzer sounds when the temperature of coolant is over the normal temperature 115°C (239°F) .

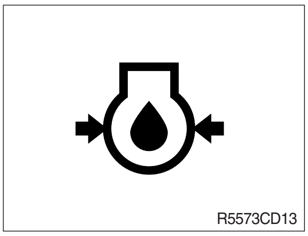
② Check the cooling system when the lamp ON.

(3) Hydraulic temperature warning lamp



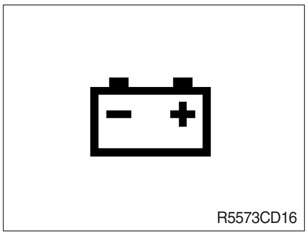
① This lamp lights up and buzzer sounds when the temperature of coolant is over the normal temperature 105°C (221°F).
② Check the cooling system when the lamp ON.

(4) Engine oil pressure low warning lamp



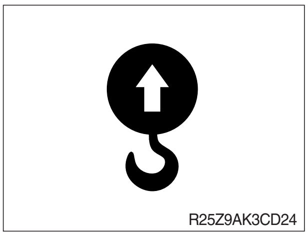
① This lamp lights up and buzzer sounds after starting the engine because of the low oil pressure.
② If the lamp ON during engine operation, shut OFF engine immediately. Check oil level.

(5) Battery low warning lamp



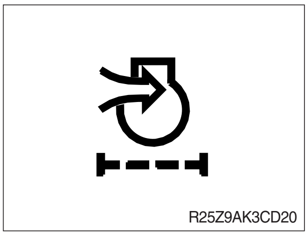
① This lamp lights up and buzzer sounds when the starting switch is ON, it is turned OFF after starting the engine.
② Check the battery charging circuit when this lamp blinks during engine operation.

(6) Overload warning lamp



① When the machine is overloaded, this lamp blinks and buzzer sounds.
② Reduce the machine load.

(7) Air cleaner clog warning lamp



① This lamp lights up and buzzer sounds when the element of the air cleaner is clogged.
② Check, clean or replace element.

(8) Emergency warning lamp

290F3CD64

① This lamp pops up and the buzzer sounds when each of the below warnings occurs.
- Hydraulic oil temperature high warning lamp ON
- Engine coolant temperature high warning lamp ON
- Communication error with ECU

※ **The pop-up warning lamp moves to the original position and lights up when the buzzer stop switch is pushed or pop-up is touched. The buzzer will stop.**
This is same as following warning lamps.

② When this warning lamp lights up, machine must be checked and serviced immediately.

(9) Check engine warning lamp

290F3CD66

① This warning lamp lights up and buzzer sounds when the engine must be checked.

※ **When the warning lamp lights up, stop the machine and find the cause for repair.**

(10) Engine stop warning lamp

290F3CD252

① If this warning lamp lights up and buzzer sounds, stop the engine immediately and check the engine.

② Check the fault codes on the monitor.

※ **Please contact your Hyundai service center or local dealer.**

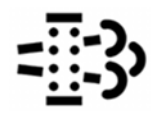
(11) Seat belt reminder warning lamp

300A3CD25

① When operator does not fasten the operator's the seat belt, the seat belt reminder warning lamp pops up and buzzer sounds.

② Fasten the seat belt.

(12) DPF clog warning lamp



290F3CD70A

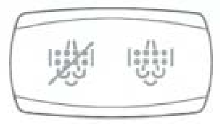
① This warning lamp lights up and the buzzer sounds when the regeneration is needed.
② For details, please refer to the after-treatment system below.

※ DPF : Diesel Particulate Filter

※ After-treatment system
The after-treatment system uses DOG and DPF to satisfy the exhaust regulations.
The oxidation catalyst of DOG reduces the emission of hydrocarbon and carbon monoxide through the catalyst, and the particle materials (PM) discharged from the engine are collected.
DPF regeneration is composed of “forced regeneration” during driving and “manual regeneration” performed by the driver.
When the regeneration is not performed successfully according to the procedure, warning lamp relevant to the each operating condition is turned ON.
When the warning lamp is turned ON, park the machine on a safe place, and perform the regeneration process manually according to the following procedure.
The warning lamp is turned OFF when the regeneration process is performed successfully.

⚠ Engine power can be reduced when the regeneration process is not performed manually after the warning lamp is turned ON.

※ Manual (Forced) DPF regeneration method


HW65A3CD24K

DPF regeneration procedure is activated manually by the driver when the driver selects to initiate the regeneration procedure. Because the operating condition is inappropriate for the hot engine exhaust temperature (Ex.: Work near the inflammable materials), manual regeneration may be required if the driver prohibited the active regeneration procedure for long period.

① Manual regeneration condition
- Coolant (Engine oil) temperature : 40°C or more
- Engine RPM : Low-speed idle run
- Parking brake must be applied (Only relevant to the wheel-type machine)
- When the soot concentration is accumulated to 20% or more

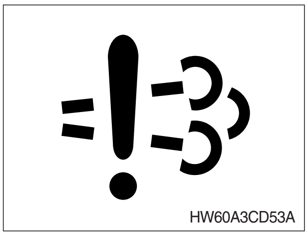
② Manual (Forced) regeneration procedure

Park the machine on a well-ventilated area, and keep away from inflammable materials to set the machine as shown below.
- Operate the machine until the engine coolant and oil temperature becomes 40°C or more.
- Engine speed is set to low speed.
- Put the gear lever on neutral, and apply the parking brake. (Only relevant to wheel-type machine)
- Safety lever is placed on the locking position.
- When the regeneration mode is in "Prohibit", DPF switch is pressed to the manual regeneration position.

③ Regeneration switch is activated to initiate the regeneration procedure.

※ Refer to the operator's manual page 3-35 for the DPF switch.

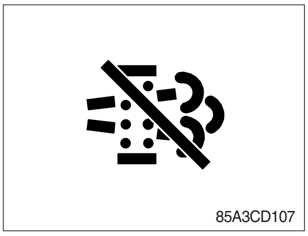
(13) Exhaust system failure warning lamp



① This warning lamp is turned ON in 3 cases such as when the quantitative distribution is stopped, poor reagent quality and monitoring malfunction, etc.
② Please refer to the exhaust gas control system below.

※ Exhaust gas control system
This machine is equipped with the engine exhaust gas emission control system that satisfies the exhaust gas emission regulations. The owner/driver has the responsibility of proper operation and maintenance on the exhaust control system provided in the guaranteed provisions related to emission.
The engine exhaust system is mounted on the DPF. DPF is a emission reduction device that reduces the diesel particulate matter or soot from the exhaust gas of the diesel engine. DPF is stored until the particulate matter is combusted. The process of combustion and elimination of the stored particulate matter is referred to as "Regeneration". After the regeneration process is completed, residue is remaining, and it must be removed from the DPF regularly.

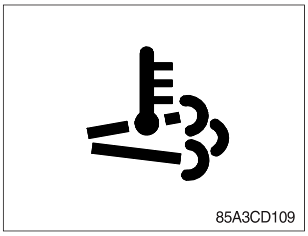
(14) DPF regeneration inhibit warning lamp



① This warning lamp indicates, the DPF switch is pushed to the inhibit position, therefore automatic and manual regeneration can not occur.

※ Refer to page the operator's manual 3-35 for the DPF switch.

(15) HEST (High exhaust system temperature) warning lamp

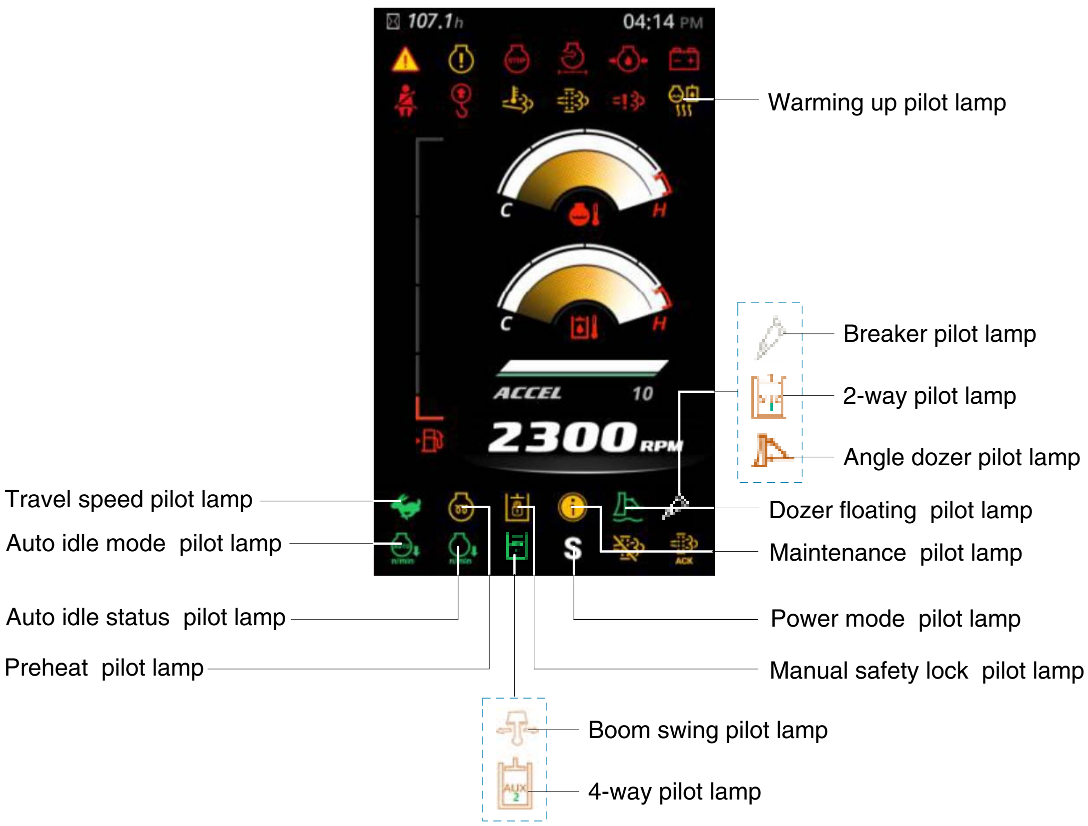


① This warning lamp indicates, when illuminated, that exhaust temperatures are high due to regeneration of the DPF.
② The lamp will also illuminate during a manual regeneration.
③ When this lamp is illuminated, be sure the exhaust pipe outlet is not directed at any surface or material that can melt, burn, or explode.

⚠ When this lamp is illuminated, the exhaust gas temperature could reach 600°C [1112°F], which is hot enough to ignite or melt common materials, and to burn people.

※ The lamp does not signify the need for any kind of equipment or engine service; It merely alerts the equipment operator to high exhaust temperatures. It is common for the lamp to illuminate on and off during normal equipment operation as the engine completes regeneration cycles.

4) PILOT LAMP

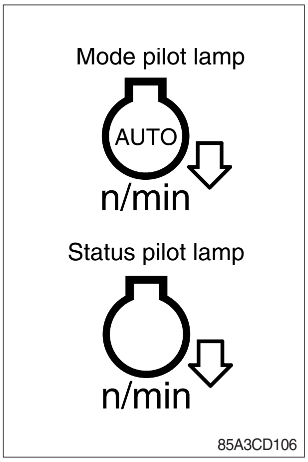


35AZ3CD30

(1) Power mode pilot lamp

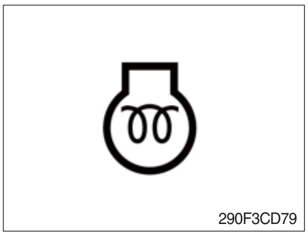
No	Mode	Pilot lamp	Selected mode
1	Power mode	S	Standard power mode
2	Travel mode	 	Low speed traveling High speed traveling

(2) Auto idle status/ mode pilot lamp



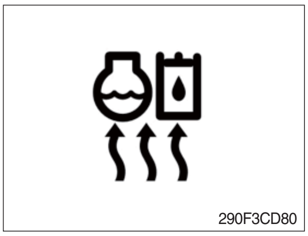
① The auto idle mode pilot lamp will light up when the idle mode is selected.
② The auto idle status pilot lamp will light up when all levers and pedals are at neutral position and the auto idle mode is selected.
③ One of the lever or pedal is operated, the status lamp will go off and the engine speed returns to the previous conditions.

(3) Preheat pilot lamp



① Turning the start key switch to the ON position starts preheating in cold weather.
② Start the engine after this lamp goes OFF.
※ Refer to the operator's manual page 4-4 for details.

(4) Warming up pilot lamp



① This lamp lights up when the coolant temperature is below 30°C (86°F).
② The automatic warming up is cancelled when the engine coolant temperature is above 30°C (86°F), or when 10 minutes have passed since starting the engine.

(5) Maintenance pilot lamp

① This lamp lights up when consumable parts are in need of replacement. It means that the change or replacement interval of parts is 30 hours from the required change interval.
② Check the message in maintenance information of main menu. Also, this lamp lights up for 3 minutes when the start switch is switched to the ON position.

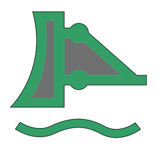
(6) Manual safety lock pilot lamp

140WA3CD37

① This lamp lights up when the safety lever is set to the LOCK position.

※ Refer to the operator's manual page 3-35 for the safety lever.

(7) Dozer floating pilot lamp

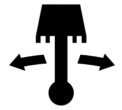


85A3CD112

① This lamp will be light up when the dozer floating lever is pressed.

※ Refer to the operator's manual page 3-37.

(8) Boom swing pilot lamp

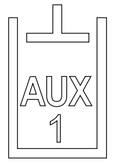


HX603CD82

① This lamp lights up when the boom offset switch is pressed.

※ Refer to the operator's manual page 3-35.

(9) 2-way pilot lamp

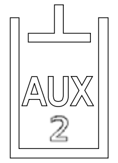


35AZ3CD491

① This lamp lights up when the option flow control function is activated in the cluster.

※ Refer to the page 4-28.

(10) 4-way (rotating) pilot lamp

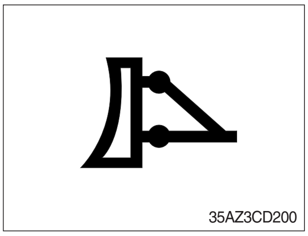


35AZ3CD481

① This lamp lights up when the boom swing selection switch is set to the rotator (not used boom swing) and the 4-way operation switch on the LH control lever is pressed.

※ Refer to the page 4-28.

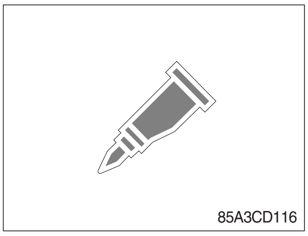
(11) Angle dozer pilot lamp



① This lamp will be light up when the AUX 1 switch is pressed to ANGLE DOZER positions.

※ Refer to the operator's manual page 3-35.

(12) Breaker pilot lamp



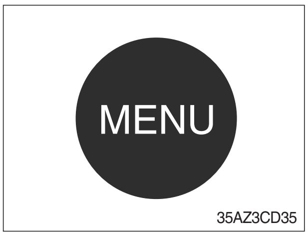
① This lamp will be light up when the breaker select switch is pressed.

※ Refer to the operator's manual page 3-34.

5) SWITCHES

Sound short beep when each button is pressed.

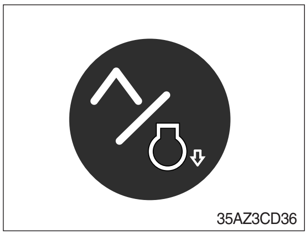
(1) Menu button



① Go into the menu screen.

※ Please refer to page 4-17.

(2) Left/up/(+) and auto idle button

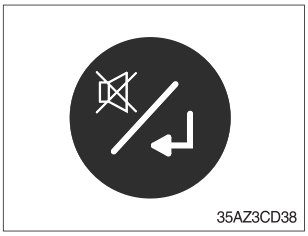


① Move left in sub menu.
② Move up in menu list
③ Increase input value in menu
④ Auto idle ON or OFF in the operation screen

(3) Right/down/(-) button

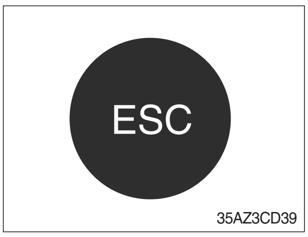
① Move right in sub menu.
② Move down in menu list
③ Decrease input value in menu

(4) Enter and buzzer stop button



① Select menu (enter).
② Stop buzzer sound when press this button more than 1.7 sec.

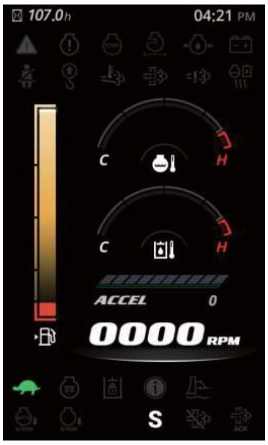
(5) ESC/ rear camera button



① Escape in the menu.
② Rear camera ON or OFF in the operation screen

6) MAIN MENU

Operation screen



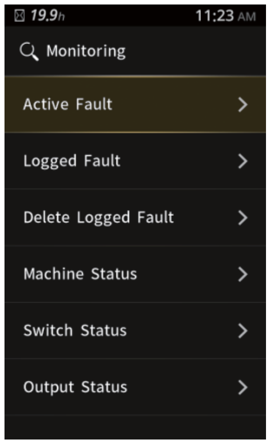
35AZ3CD100

press MENU button

Main menu screen

35AZ3CD106

Sub menu screen

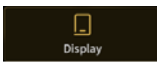


35AZ3CD107A

※ Please refer to the switches, page 4-16 for selection and change of menus and input values.

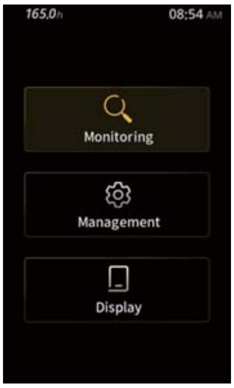
※ In the operation screen, press the menu button to access the sub-menu screen.

(1) Structure

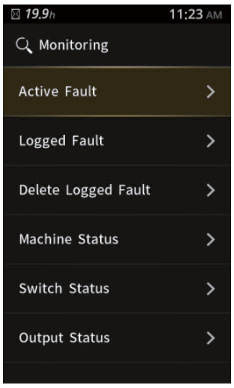
No	Main menu	Sub menu	Description
1	 Monitoring 35AZ3CD103A	Active fault Logged fault Del logged fault Analog Switch Output	Machine, Engine Machine, Engine Machine, Engine Hyd oil temp, Coolant temp, Battery volt Engine speed, Accel dial volt Safety lever, Dozer floating, Seat belt, Travel speed Travel speed sol, Dozer floating sol, Start limit relay, Buzzer
2	 Management 35AZ3CD104A	Operating hours Maintenance Start limit mode Warning setting on/off Change password Machine information A/S phone number Auxilary flow	Operating hours Elapsed time, Change interval, Replacement etc. Disabled, Enable (Always), Enable (Interval) Overload on/off Change password Machine, Engine, CMCU A/S phone number, A/S phone number change Auxilary flow
3	 Display 35AZ3CD105A	Clock Brightness Unit Language	12 Hour, 24 Hour Manual, Auto Temperature, Pressure Korean, English, Turkish

(2) Monitoring

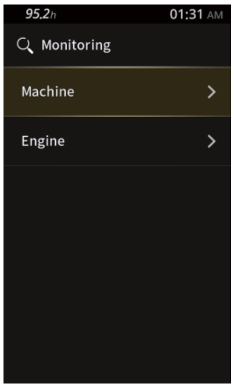
① Active fault



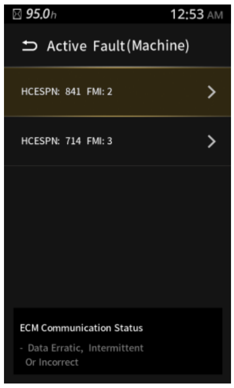
35AZ3CD106



35AZ3CD107A

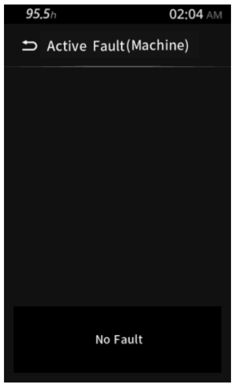


35AZ3CD108

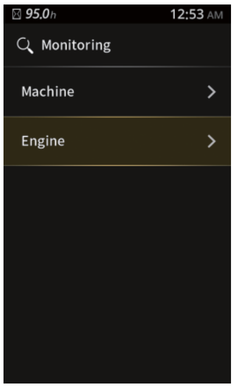


35AZ3CD110A

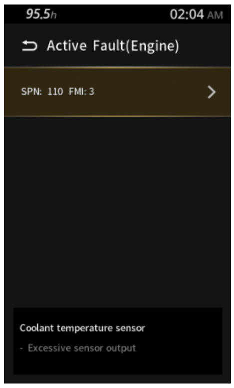
- The active fault of the machine and engine can be checked by this menu.



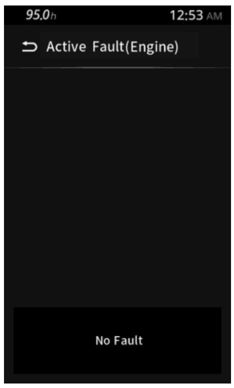
35AZ3CD135A



35AZ3CD109

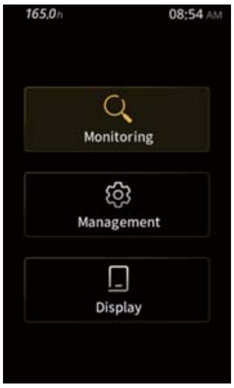


35AZ3CD111A

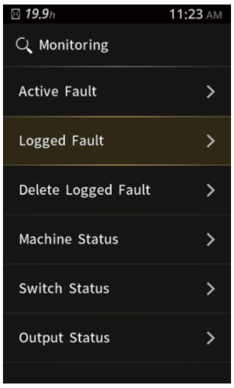


35AZ3CD136A

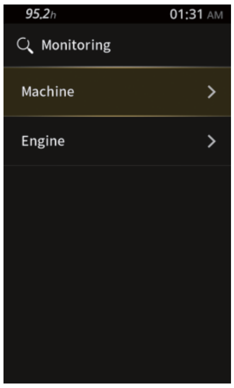
② Logged fault



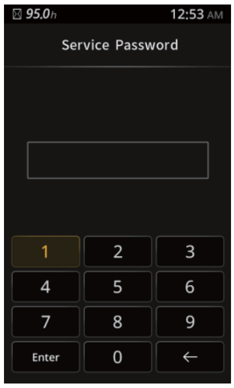
35AZ3CD106



35AZ3CD112A

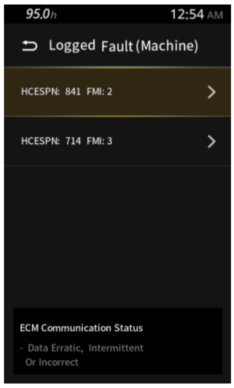


35AZ3CD108

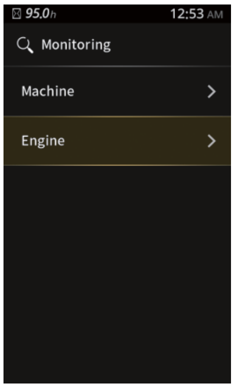


35AZ3CD113

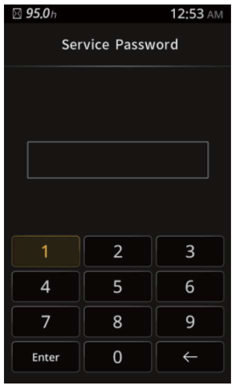
- The logged fault of the machine and engine can be checked by this menu.
· This menu can be used only HD HCE service man.



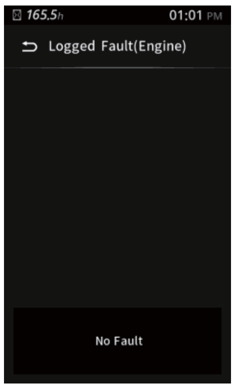
35AZ3CD114A



35AZ3CD109



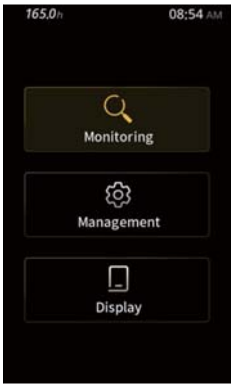
35AZ3CD113



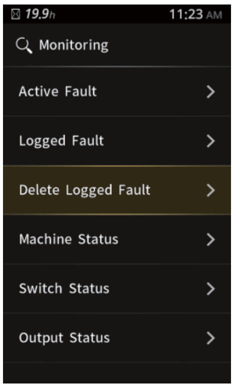
35AZ3CD137A

③ Delete logged fault

"All logged faults deleted" or "Failure"



35AZ3CD106

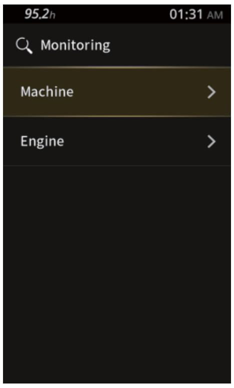


35AZ3CD116A

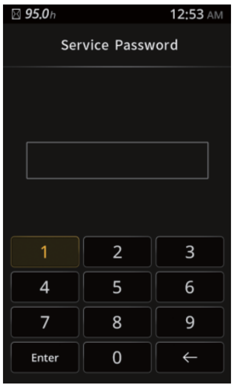
35AZ3CD119A

35AZ3CD118A

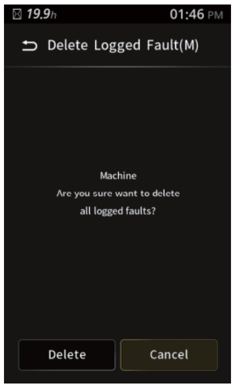
- The logged fault of the machine and engine can be deleted by this menu.
(It is possible under the engine stop conditions)



35AZ3CD108

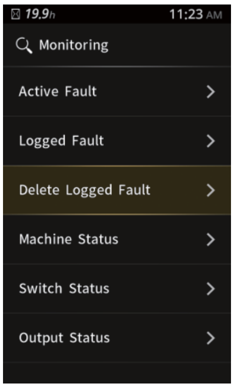


35AZ3CD113



35AZ3CD117A

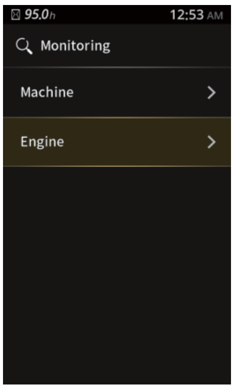
"All logged faults deleted" or "Failure"



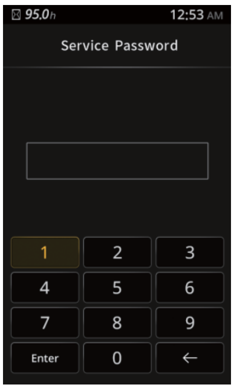
35AZ3CD116A

35AZ3CD122A

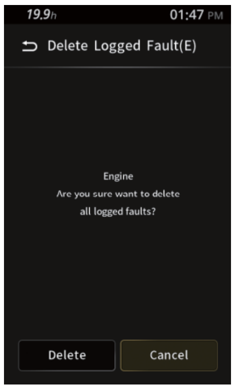
35AZ3CD123A



35AZ3CD109

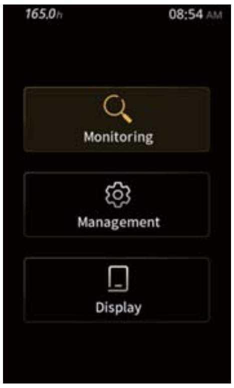


35AZ3CD113

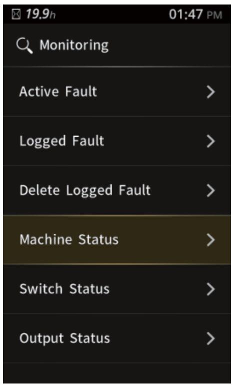


35AZ3CD124A

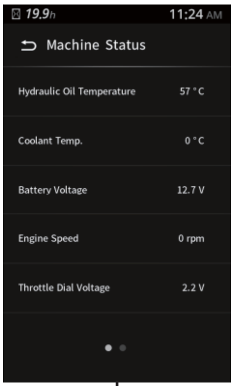
④ Machine status



35AZ3CD106

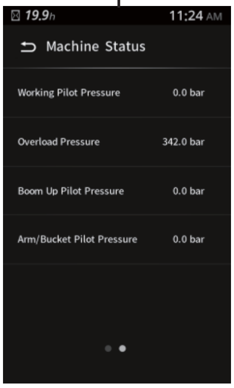


35AZ3CD125A



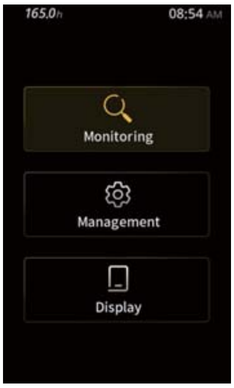
35AZ3CD126A

- The machine status such as the engine rpm, oil temperature, voltage and pressure etc. can be checked by this menu.

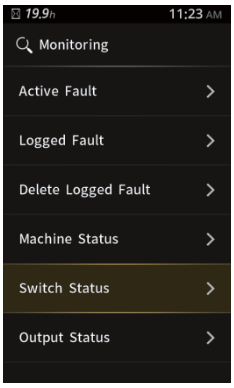


35AZ3CD127A

⑤ Switch status

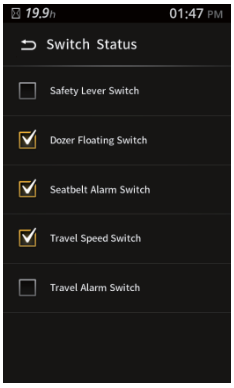


35AZ3CD106



35AZ3CD128A

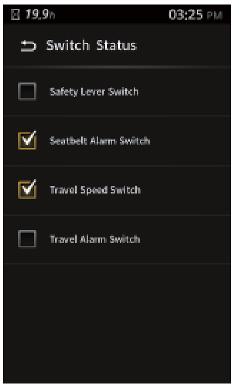
With DPC option



35AZ3CD129A

- You can select to display the lamps of the switches on the cluster by this menu.

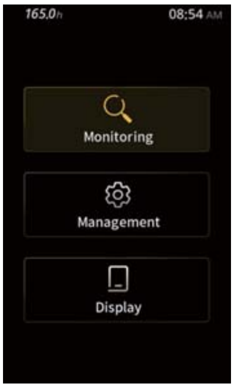
Without DPC option



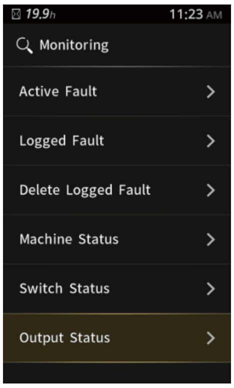
35AZ3CD229A

⑥ Output statue

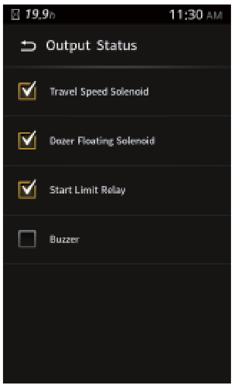
With DPC option



35AZ3CD106



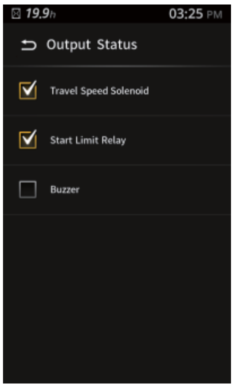
35AZ3CD130A



35AZ3CD131A

- The output status can be confirmed by this menu.

Without DPC option

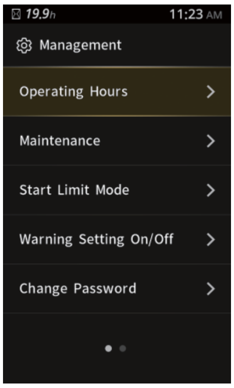


35AZ3CD231A

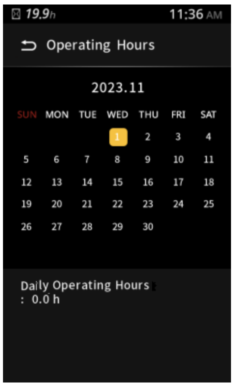
(3) Management

① Operating hours

35AZ3CD140A



35AZ3CD141A

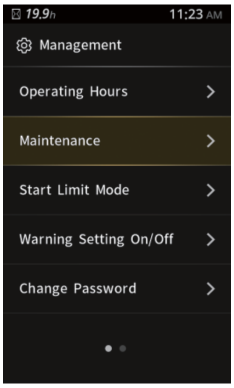


35AZ3CD142A

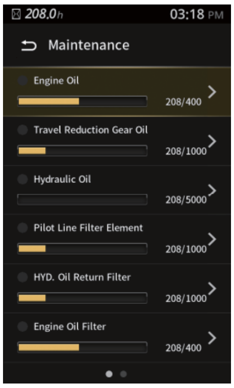
- You can check the operating hours by this menu.

② Maintenance

35AZ3CD140A



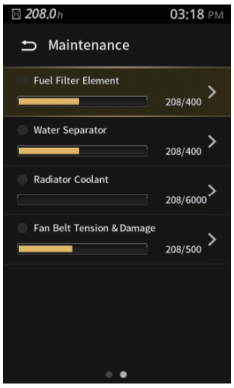
35AZ3CD143A



35AZ3CD144

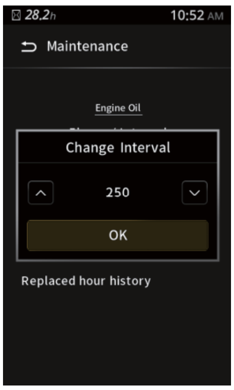
- Elapse : Maintenance elapsed time.
- Interval : The change intervals can be changed in hour increments of 50.
- History-Hourmeter : Display elapsed time.
- Replacement : The elapsed time will be reset to zero (0).

※ Refer to section, Maintenance chart for further information of maintenance interval.



35AZ3CD145A

35AZ3CD146A

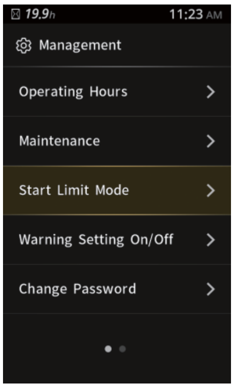


35AZ3CD147A

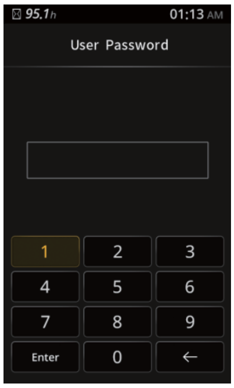
35AZ3CD148A

③ Start limit mode

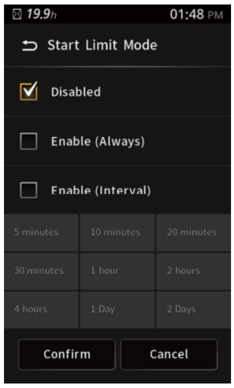
35AZ3CD140A



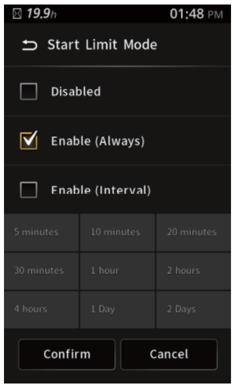
35AZ3CD150A



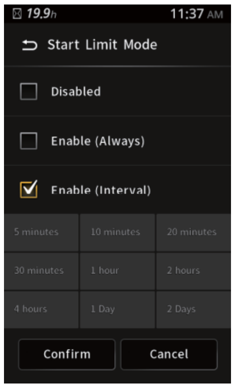
35AZ3CD151



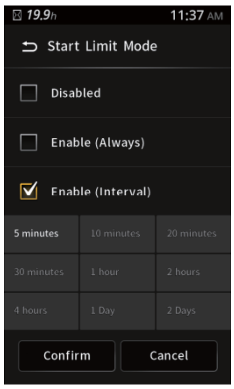
35AZ3CD152A



35AZ3CD153A



35AZ3CD154A



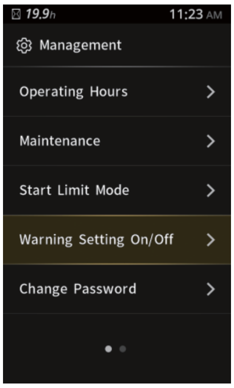
35AZ3CD155A

Start limit mode setting

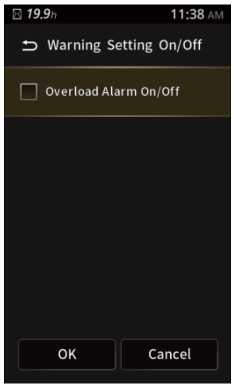
- Start limit mode is designed to be a theft deterrent or will prevent the unauthorized operation of the machine.
- When you Enable the start limit mode, the password will be required when the starting switch is turned to the on position.
- Machine security
  · Disable : Start limit function is disabled and password is not required to start engine.
  · Enable (Always) : The password is required whenever the operator starts engine.
  · Enable (Interval) : The password is required when the operator starts engine first. But the operator can restart the engine within the interval time without inputting the password. The interval time can be set to a maximum 2 days.

④ Warning setting on/off

35AZ3CD140A



35AZ3CD156A

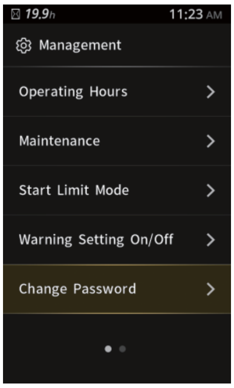


35AZ3CD157A

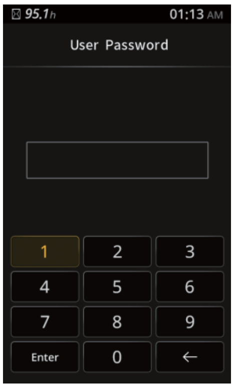
- You can set the warning items by this menu.

⑤ Change password

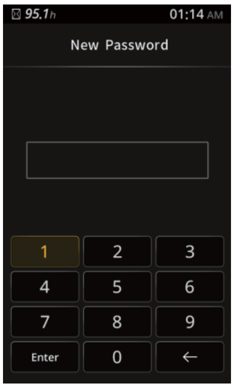
35AZ3CD140A



35AZ3CD158A



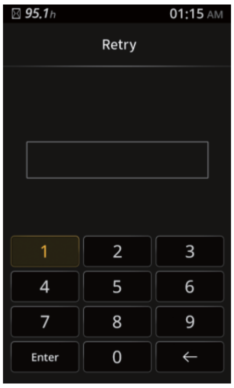
35AZ3CD151



35AZ3CD159

- The password is 5~10 digits.

※ Before first use, please set user password and owner password in advance for machine security.

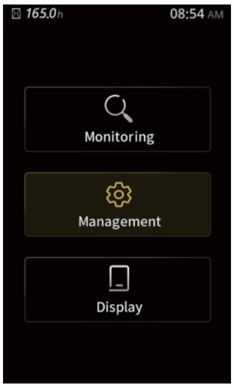


35AZ3CD160

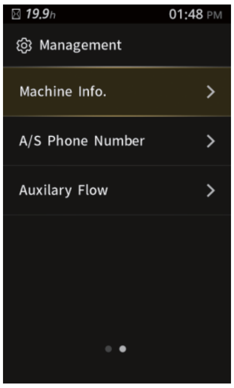
35AZ3CD162A

35AZ3CD161A

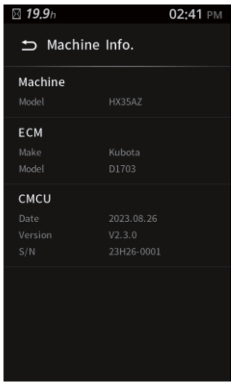
⑥ Machine information



35AZ3CD140A



35AZ3CD163A

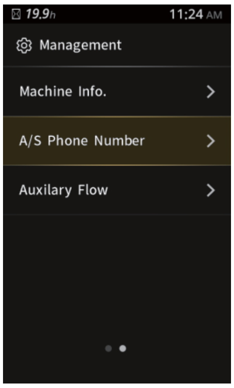


35AZ3CD164A

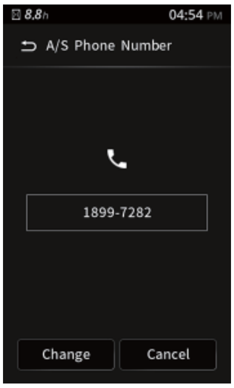
- This can confirm the identification of the machine, engine and cluster.

⑦ Contact

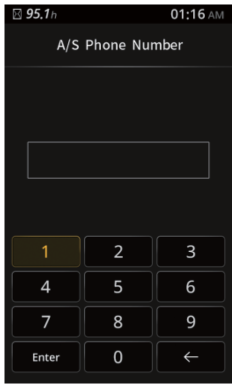
35AZ3CD140A



35AZ3CD165A



35AZ3CD166A



35AZ3CD167

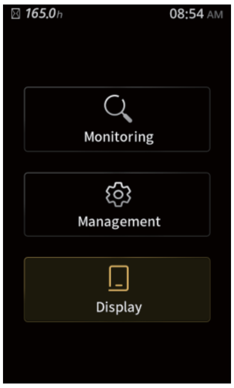
- The A/S phone number can be checked and changed.

⑧ Aux. Flow

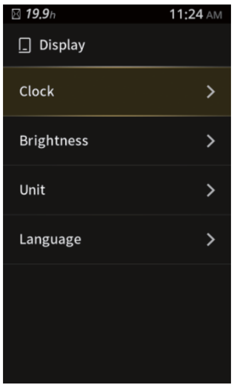
- 3 kinds of option attachment can be selected by this menu.
  a. Rotary grapple (4-way)
  b. Grapple (2-way)
  c. Auger (2-way)
- There are two user modes (type A or B) in each option attachment.

(4) Display set

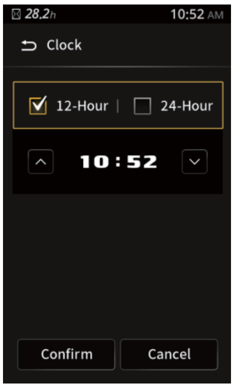
① Clock



35AZ3CD185A



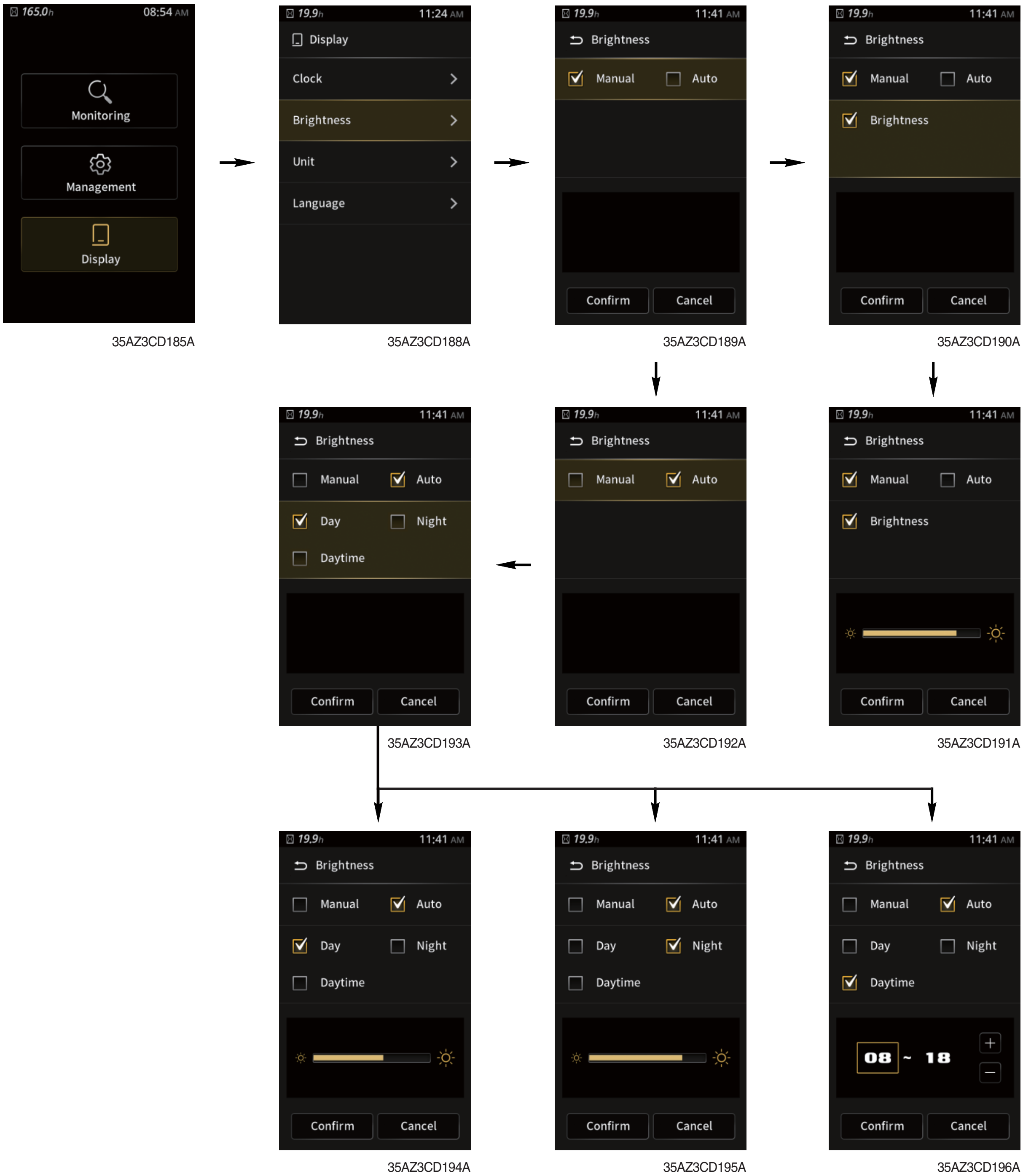
35AZ3CD186A



35AZ3CD187A

- Set the time (12 hours or 24 hours)

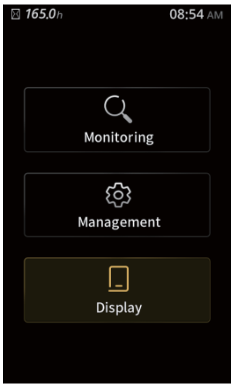
② Brightness



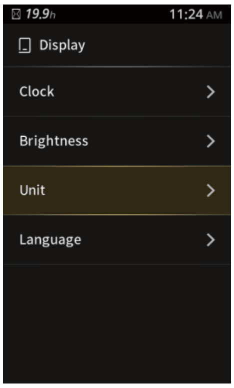
- Manual : Manual setting for LCD brightness.
- Automatic : Automatic control of LCD brightness as set level of Day/Night.
- Setting day time : Set the time for daylight.

(in figure, black area represents night time while orange shows day time)

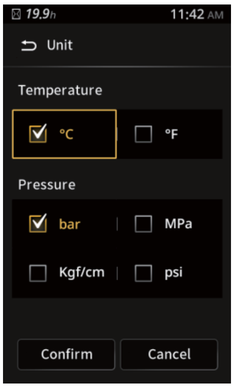
③ Unit



35AZ3CD185A



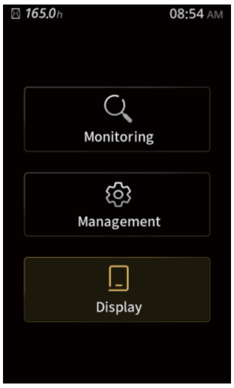
35AZ3CD197A



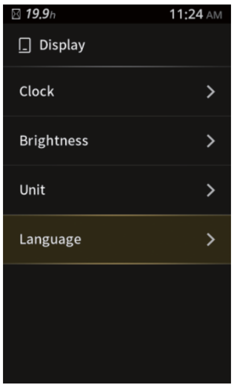
35AZ3CD198A

- Temperature : °C ↔ °F
- Pressure : bar ↔ MPa ↔ kgf/cm² ↔ psi

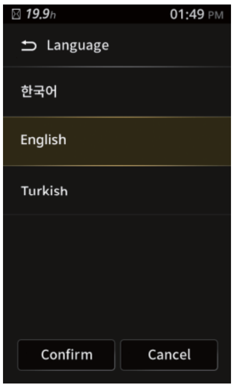
④ Language



35AZ3CD185A



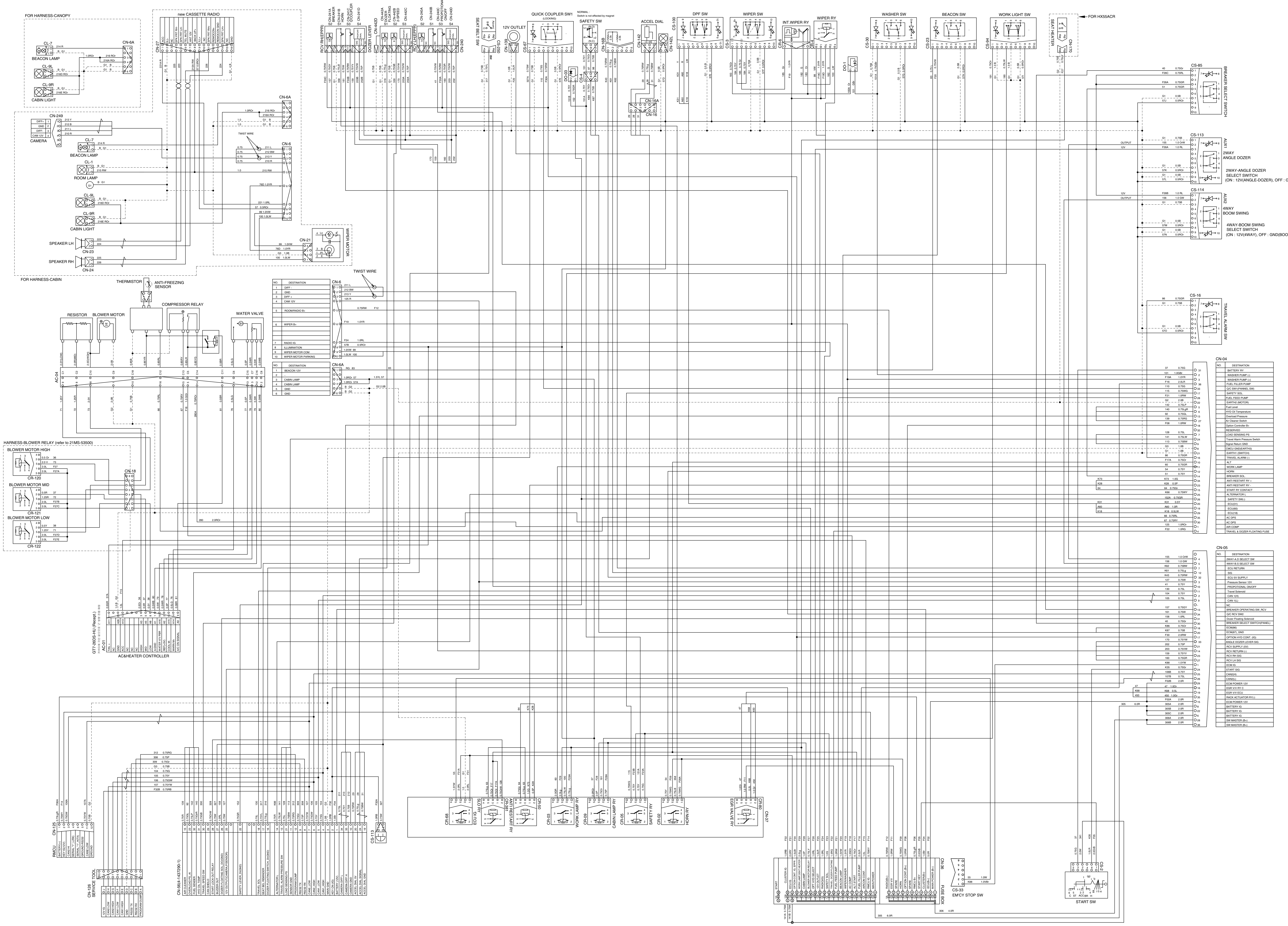
35AZ3CD199A



35AZ3CD184A

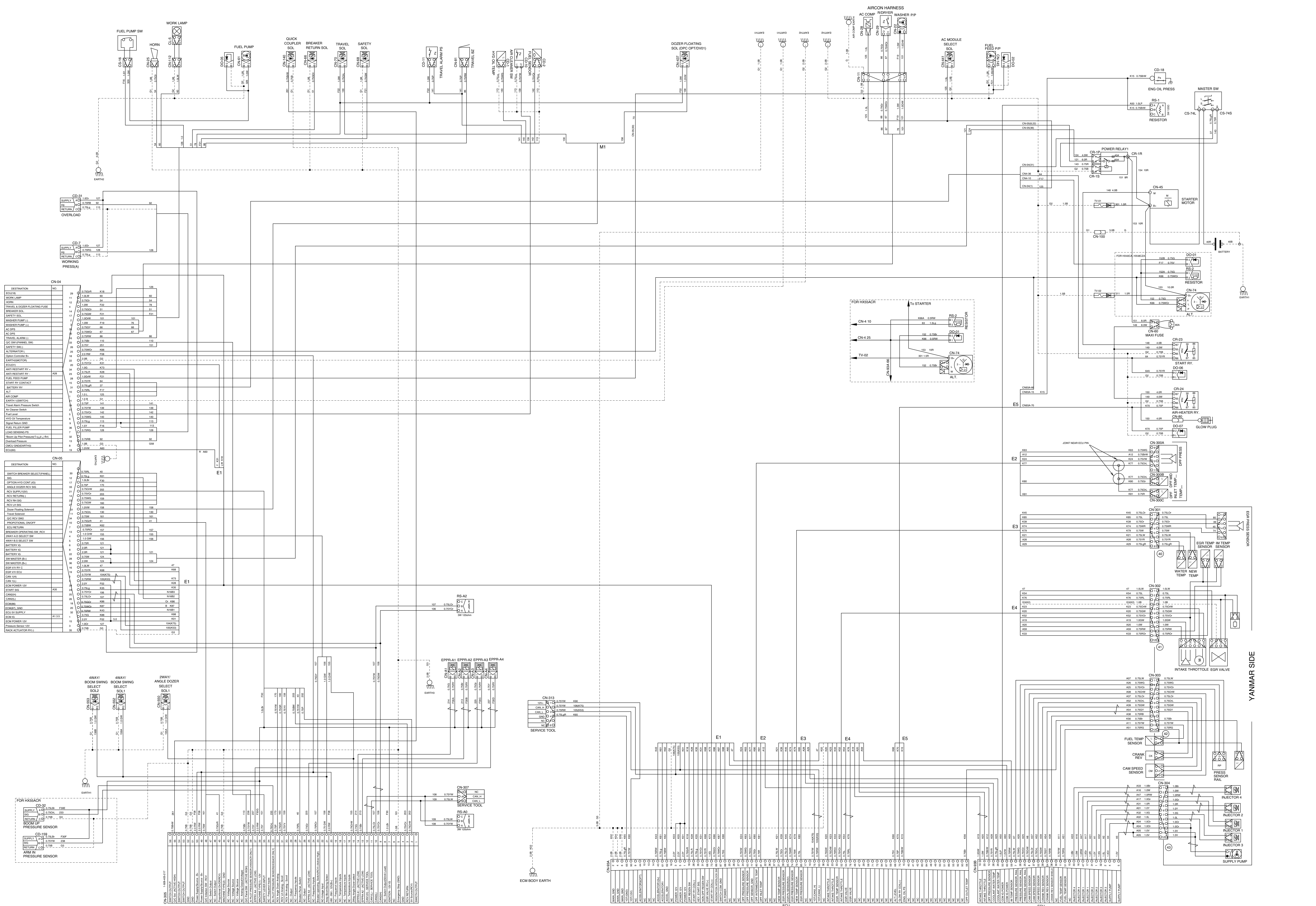
- User can select preferable language and all displays are changed to the selected language (한국어, English or Turkish).

· ELECTRICAL CIRCUIT (1/2)



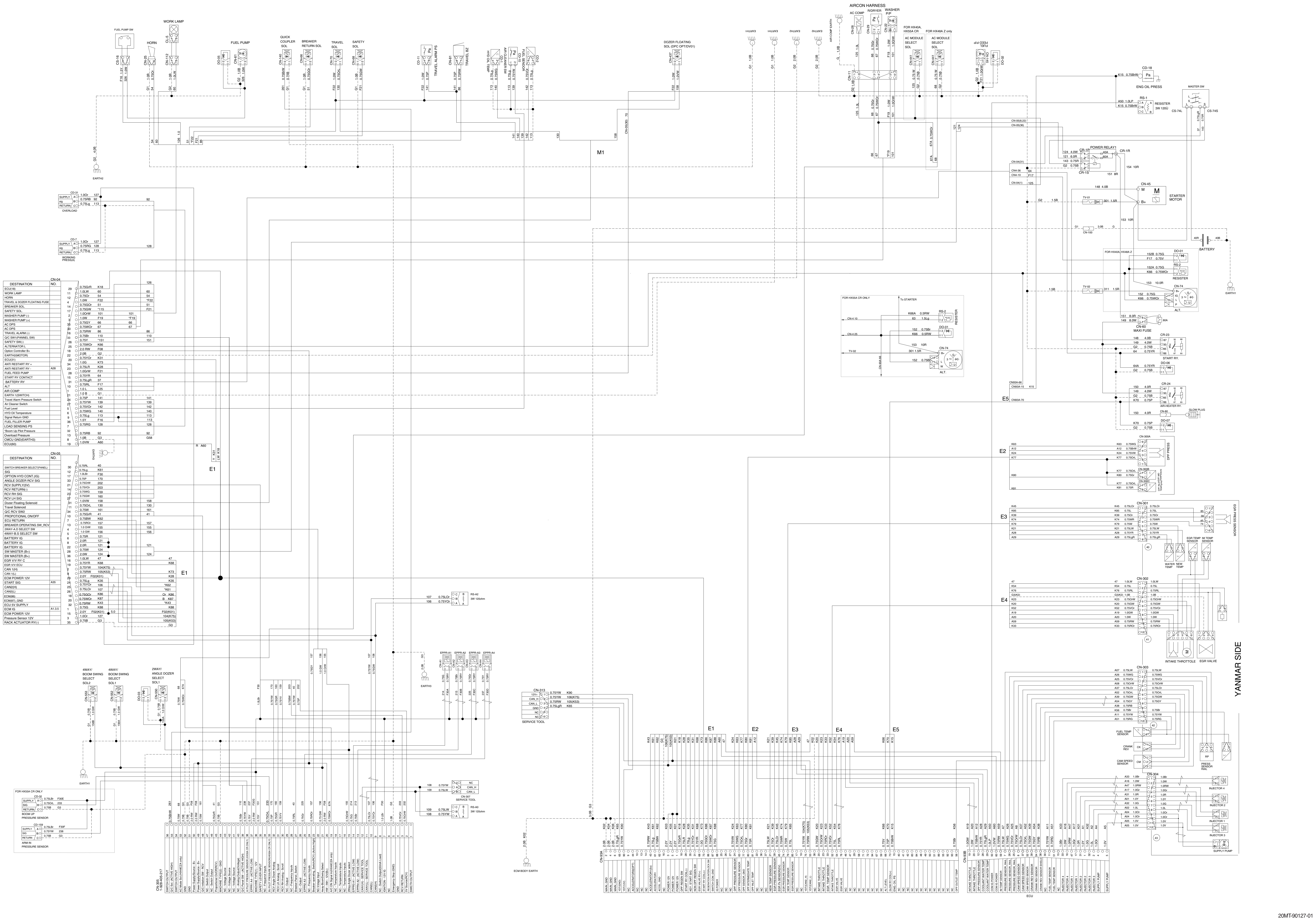
20MT-90117-00

· ELECTRICAL CIRCUIT (2/2, Machine Serial No. : -#0197)



20MT-90126-02

· ELECTRICAL CIRCUIT (2/2, Machine Serial No. : #0198-)



MEMORANDUM

1. POWER CIRCUIT

The negative terminal of battery is grounded to the machine chassis.

When the start switch is in the OFF position, the current flows from the positive battery terminal as shown below.

1) OPERATING FLOW

Battery → Master switch [CS-74L] → Starter motor [CN-45 (B+)]
→ Alternator [CN-74 (B+)]
→ Power relay 1 [CR-1R] → Maxi fuse [CN-60] → Start relay [CR-23 (30)]
→ Glow heater relay [CR-24 (30)]
→ Power relay 1 [CR-1P (1)] → I/conn [CN-05 (28, 36)]
→ Fuse box [No.4] → I/conn [CN-05 (15, 29)] → ECU [CN-93A (1, 3, 5)]
→ Fuse box [No.5] → Cluster [CN-56 (1)]
→ Fuse box [No.6] → Start switch [CS-2 (1)]
→ Fuse box [No.7] → RMCU [CN-125 (1)]
→ Fuse box [No.9] → I/conn [CN-04 (18)] → EPPR controller [CN-305 (20, 49, 50)]
→ Fuse box [No.10] → Horn relay [CR-02 (1, 3)]
→ Fuse box [No.12] → EGR valve relay [CR-80 (3)]
→ Fuse box [No.13] → I/conn [CN-6 (5)] → New cassette radio [CN-27 (8)]
→ Room lamp [CL-1 (2)]

※ I/conn : Intermediate connector

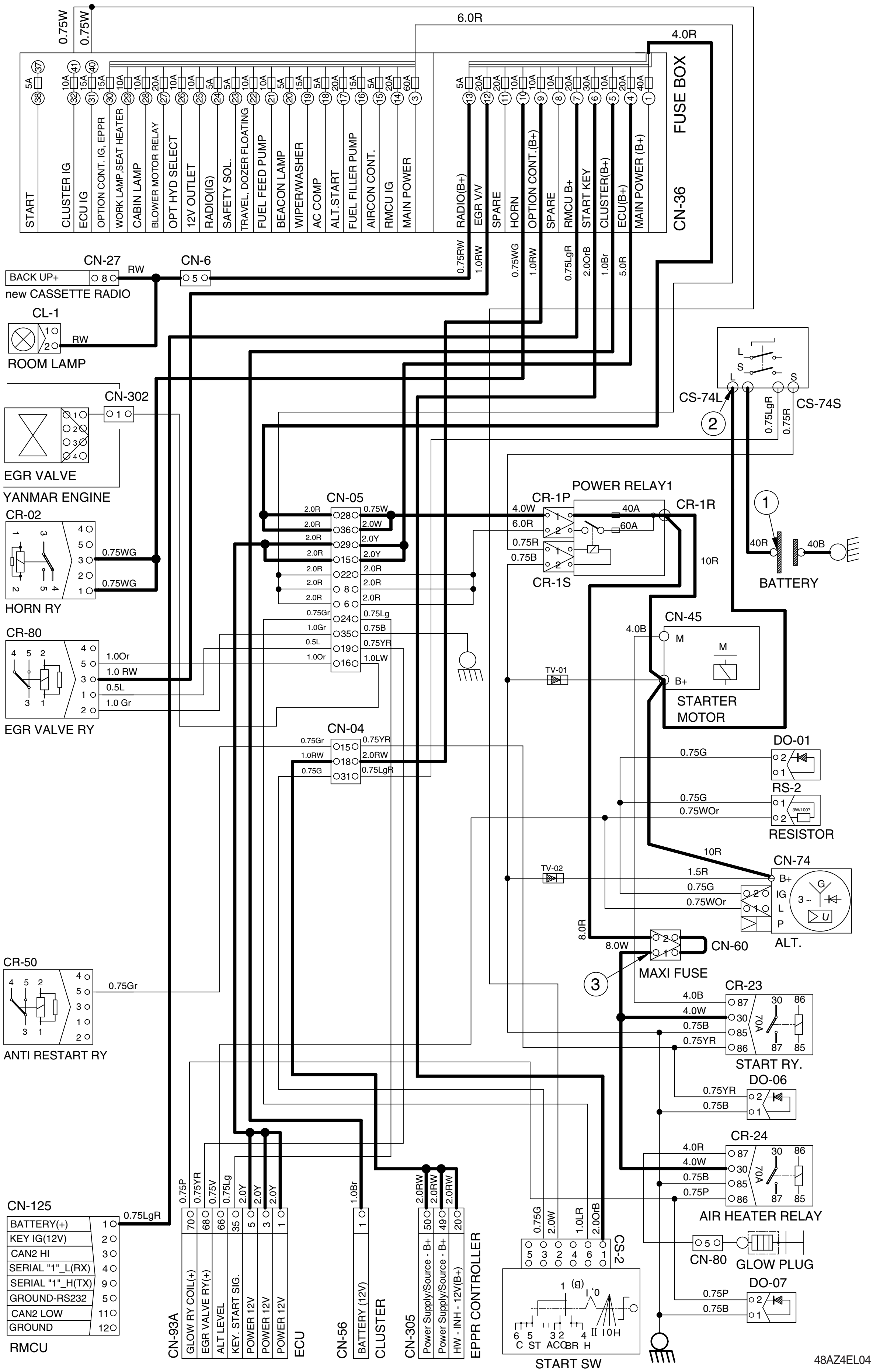
2) CHECK POINT

Engine	Start switch	Check point	Voltage
STOP	OFF	① - GND (battery) ② - GND (master switch) ③ - GND (maxi fuse)	10~12.5 V

※ GND : Ground

※ The circuit diagram may differ from the equipment, so please check before a repair.

POWER CIRCUIT



※ The circuit diagram may differ from the equipment, so please check before a repair.

2. STARTING CIRCUIT

1) OPERATING FLOW

Battery (+) terminal → Master switch [CS-74L] → Starter motor [CN-45 (B+)] → Power relay 1 [CR-1P (1)] → I/conn [CN-05 (28, 36)] → Fuse box No.5 → Start switch [CS-2 (1)]

(1) Start switch : ON

Start switch ON [CS-2 (2)]
- → Fuse box [No. 40 → 31] → ECU IG relay [CR-68 (1, 3) → (5)]
  - → Emergency stop switch [CS-33 (2) → (1)] → I/conn [CN-05 (1)]
  - → ECU [CN-93A (88)]
- → Fuse box [No. 41 → 32] → Cluster [CN-56 (2)]

Start switch ON [CS-2 (3)] → I/conn [CN-04 (31)] → Master switch [CS-74S] → Power relay 1 [CR-1S (1)] → Power relay 1 [CR-1P (2)] → I/conn [CN-05 (6, 8, 22)]
- → Fuse box [No.23] → Safety relay [CR-05 (1, 3)]
- → Fuse box [No.17] → SLO relay [CR-381 (1, 3) → (2)] → Cluster [CS-56 (2)]

(2) Start switch : START

Start switch START [CS-2 (6)] → I/conn [CN-05 (24)] → ECU [CN-93A (35) → (73, 88)] → I/conn [CN-05 (23, 34)] → Anti restart relay [CR-50 (1, 2) → (5)] → I/conn [CN-04 (15)] → Start relay [CR-23 (86) → (87)] → Start motor [CN-45 (M)] → Starter operating

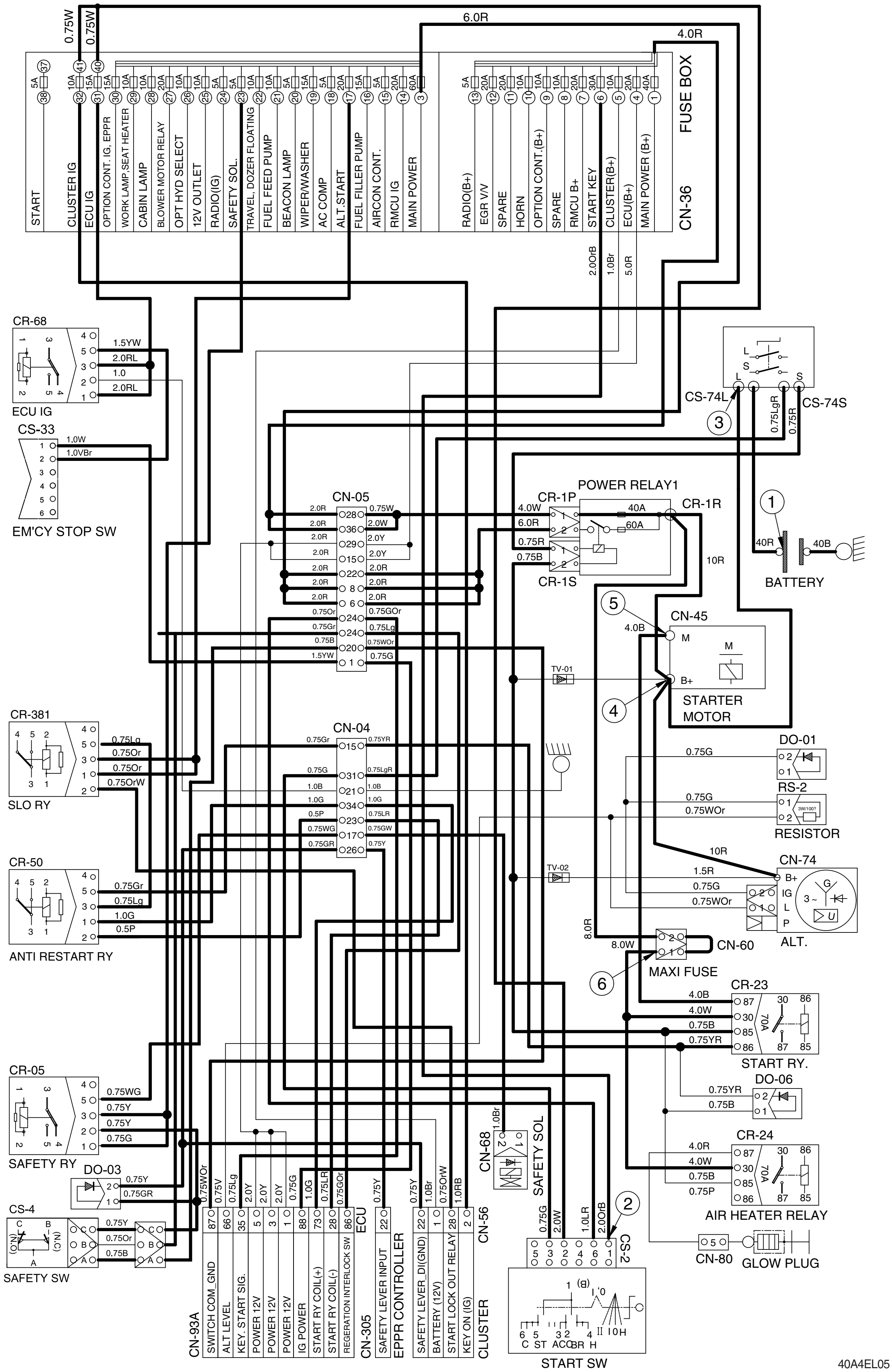
2) CHECK POINT

Engine	Start switch	Check point	Voltage
Operating	START	① - GND (battery) ② - GND (start key) ③ - GND (master switch) ④ - GND (starter B+) ⑤ - GND (starter M) ⑥ - GND (maxi fuse)	10~12.5 V

※ GND : Ground

※ The circuit diagram may differ from the equipment, so please check before a repair.

STARTING CIRCUIT



※ The circuit diagram may differ from the equipment, so please check before a repair.

3. CHARGING CIRCUIT

When the starter is activated and the engine is started, the operator releases the start switch to the ON position.

Charging current generated by operating the alternator flows into the battery through the master switch (CS-74).

The current also flows from alternator to each electrical component and controller through the fuse box.

1) OPERATING FLOW

(1) Warning flow

Alternator [CN-74 (1)] → I/conn [CN-04 (25)] → Cluster [CN-56 (14)] → Cluster warning lamp
→ ECU [CN-93A (66)]

(2) Charging flow

Alternator [CN-74 (B+)] → Start motor [CN-45 (B+)]
→ Master switch [CS-74L] → Battery (+) terminal → Battery charging
→ Power relay 1 [CR-1P (1)] → I/conn [CN-05 (28, 36)] → Fuse box [No.1, 4~13]
→ Power relay 1 [CR-1P (2)] → I/conn [CN-05 (6, 8, 22)] → Fuse box [No.3, 14~30]

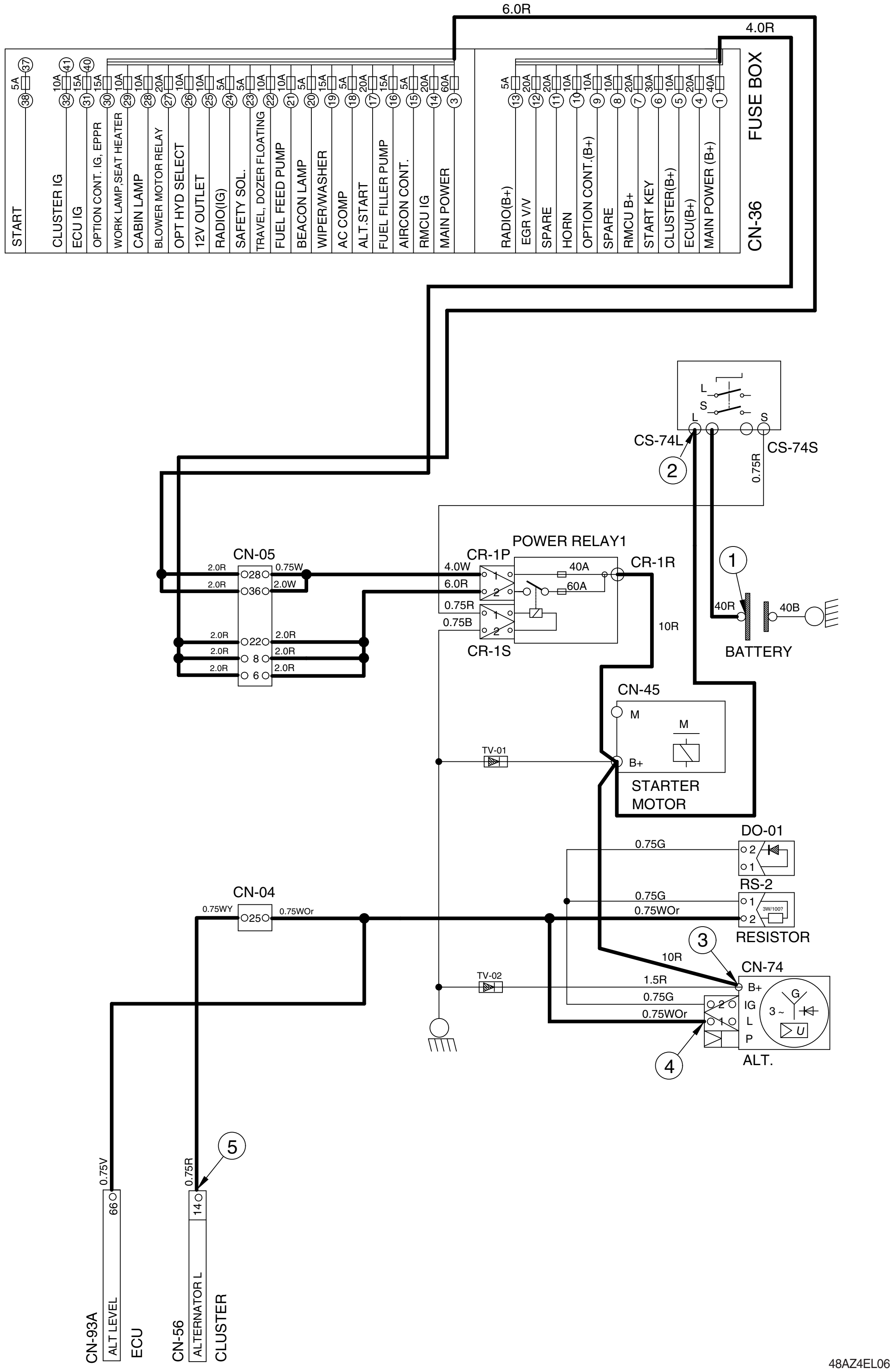
2) CHECK POINT

Engine	Start switch	Check point	Voltage
Operating	START	① - GND (battery voltage) ② - GND (master switch) ③ - GND (alternator B^+ terminal) ④ - GND (alternator 1 terminal) ⑤ - GND (cluster)	10~12.5 V

※ GND : Ground

※ The circuit diagram may differ from the equipment, so please check before a repair.

CHARGING CIRCUIT



※ The circuit diagram may differ from the equipment, so please check before a repair.

4. CABIN AND WORK LAMP CIRCUIT

1) OPERATING FLOW

Fuse box (No.28) → Cabin lamp relay [CR-09 (1, 3)]
Fuse box (No.29) → Work lamp relay [CR-03 (1, 3)

(1) Work lamp switch ON : 1st step

Work lamp switch ON [CS-94 (1)] → Cabin lamp relay [CR-09 (2) → (5)]
- → I/conn [CN-6A (3, 4)]
  - → LH cabin lamp ON [CL-9L (2)]
  - → RH cabin lamp ON [CL-9R (2)]
- → I/conn [CN-6 (8)] → New cassette radio illumination lamp ON [CN-27 (9)]
- → AC/Heater controller illumination lamp ON [AC-01 (16)]
- → Quick coupler switch illumination lamp ON [CS-67 (8)]
- → Wiper switch illumination lamp ON [CS-3 (8)]
- → Washer switch illumination lamp ON [CS-30 (8)]
- → Travel alarm switch illumination lamp ON [CS-16 (8)]
- → Work lamp switch illumination lamp ON [CS-94 (8)]
- → Breaker select switch illumination lamp ON [CS-85 (8)]
- → Aux 1 switch illumination lamp ON [CS-113 (8, 10)]
- → Aux 2 switch illumination lamp ON [CS-114 (8, 10)]
- → Beacon lamp switch illumination lamp ON [CS-23 (8)]
- → Accel dial illumination lamp [CN-142L (2)]
- → DPF switch illumination lamp [CS-100 (8)]

(2) Work lamp switch ON : 2st step

Work lamp switch ON [CS-94 (4)] → Work lamp relay [CR-03 (1) → (5)] → I/conn [CN-04 (11)]
→ I/conn [CN-112 (2)] → Work lamp ON [CL-5 (2)]

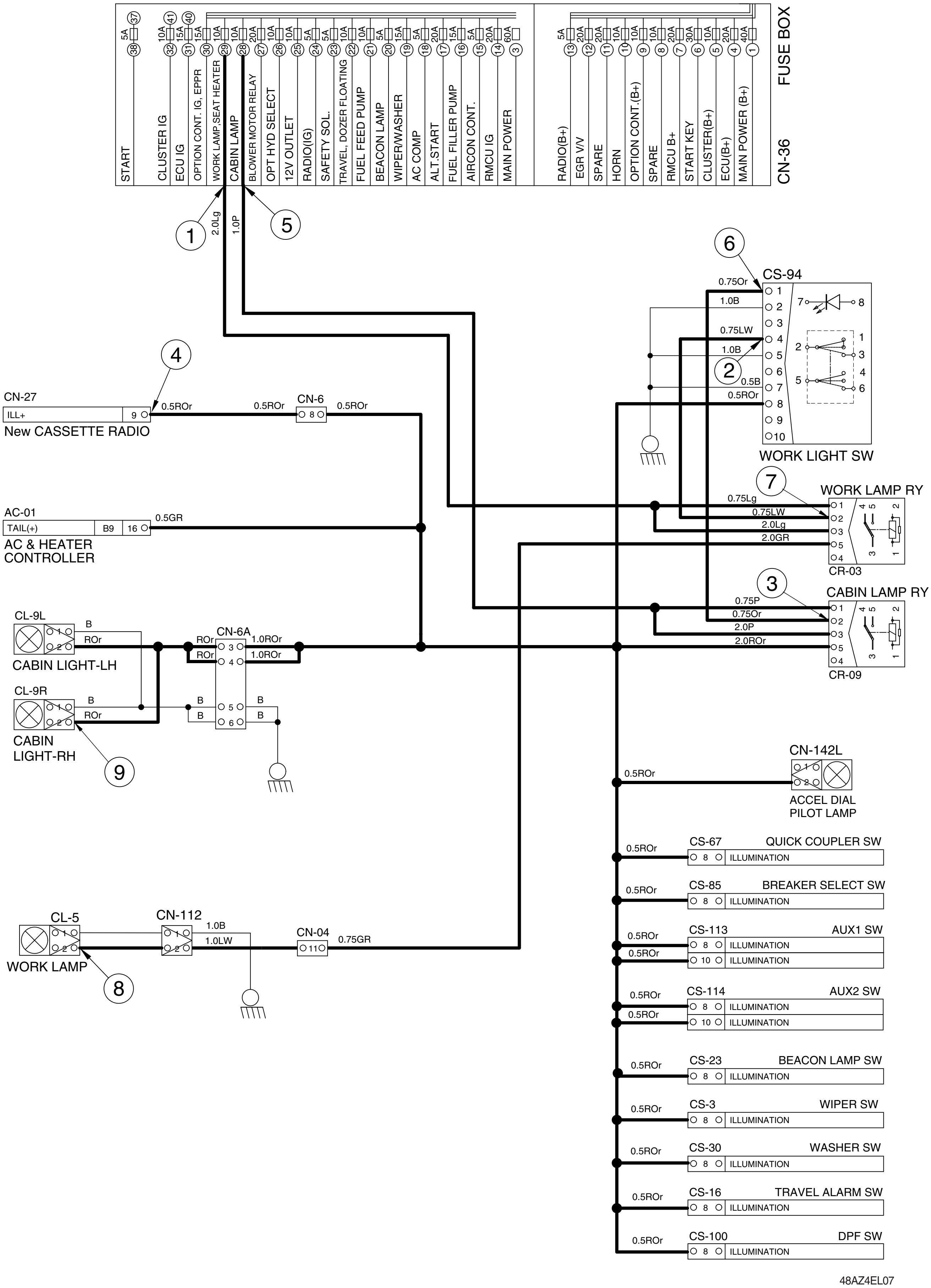
2) CHECK POINT

Engine	Start switch	Check point	Voltage
STOP	ON	① - GND (fuse box) ② - GND (switch power input) ③ - GND (switch power output) ④ - GND (illumination lamp) ⑤ - GND (fuse box) ⑥ - GND (switch power input) ⑦- GND (switch power output) ⑧ - GND (work light) ⑨ - GND (cabin light)	10~12.5 V

※ GND : Ground

※ The circuit diagram may differ from the equipment, so please check before a repair.

CABIN AND WORK LAMP CIRCUIT



※ The circuit diagram may differ from the equipment, so please check before a repair.

5. BEACON LAMP CIRCUIT

1) OPERATING FLOW

Fuse box (No.20) → Beacon lamp switch [CS-23 (2)]

(1) Beacon lamp switch ON

Beacon lamp switch ON [CS-23 (1)] → I/conn [CN-6A (1)] → Beacon lamp ON [CL-7 (2)]

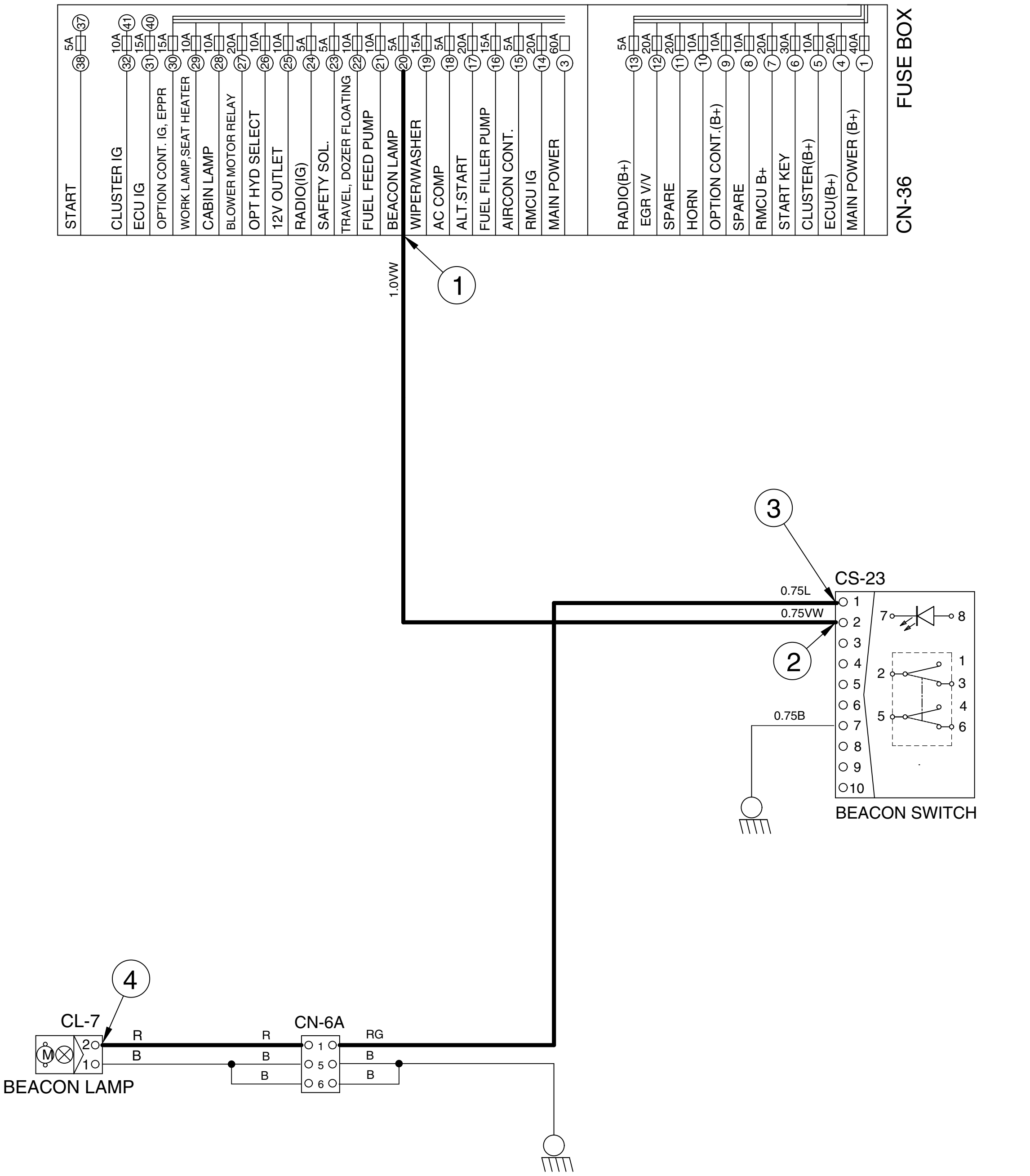
2) CHECK POINT

Engine	Start switch	Check point	Voltage
STOP	ON	① - GND (fuse box) ② - GND (switch power input) ③ - GND (switch power output) ④ - GND (beacon lamp)	10~12.5 V

※ GND : Ground

※ The circuit diagram may differ from the equipment, so please check before a repair.

BEACON LAMP CIRCUIT



※ The circuit diagram may differ from the equipment, so please check before a repair.

6. WIPER AND WASHER CIRCUIT

1) OPERATING FLOW

(1) Start switch ON

Fuse box (No.19) → Wiper relay [CR-4 (1, 5)]
→ Int wiper relay [CR-6 (3)]
→ I/conn [CN-6 (6)] → Wiper motor [CN-21 (3)]

(2) Wiper switch ON : 1st step (low speed)

Wiper switch ON [CS-3 (3)] → Int wiper relay [CR-6 (4) → (2)]
→ Wiper relay [CR-4 (2) → (3)] → I/conn [CN-6 (9)]
→ Washer motor operating [CN-21 (4)]

(3) Wiper switch ON : 2nd step (washer)

Wiper switch ON [CS-3 (4)] → Int wiper relay [CR-6 (1)]
→ Washer switch [CS-30 (2)]
→ Wiper relay [CR-4 (2) → (4)] → I/conn [CN-6 (10)] → Wiper motor operating [CN-21 (1)]
Washer switch ON [CS-30 (2)] → I/conn [CN-04 (2)] → Washer pump operating [CN-22 (1)]
→ I/conn [CN-11 (6)]

(4) Auto parking (when switch OFF)

Switch OFF → Wiper relay [CN-21 (1)] → Wiper switch [CS-3]
→ Int wiper relay [CR-6 (4) → (2)] → Wiper relay [CR-4 (2) → (3)] → I/conn [CN-6 (9)]
→ Wiper motor [CN-21 (4)] → Wiper motor parking position by wiper motor controller

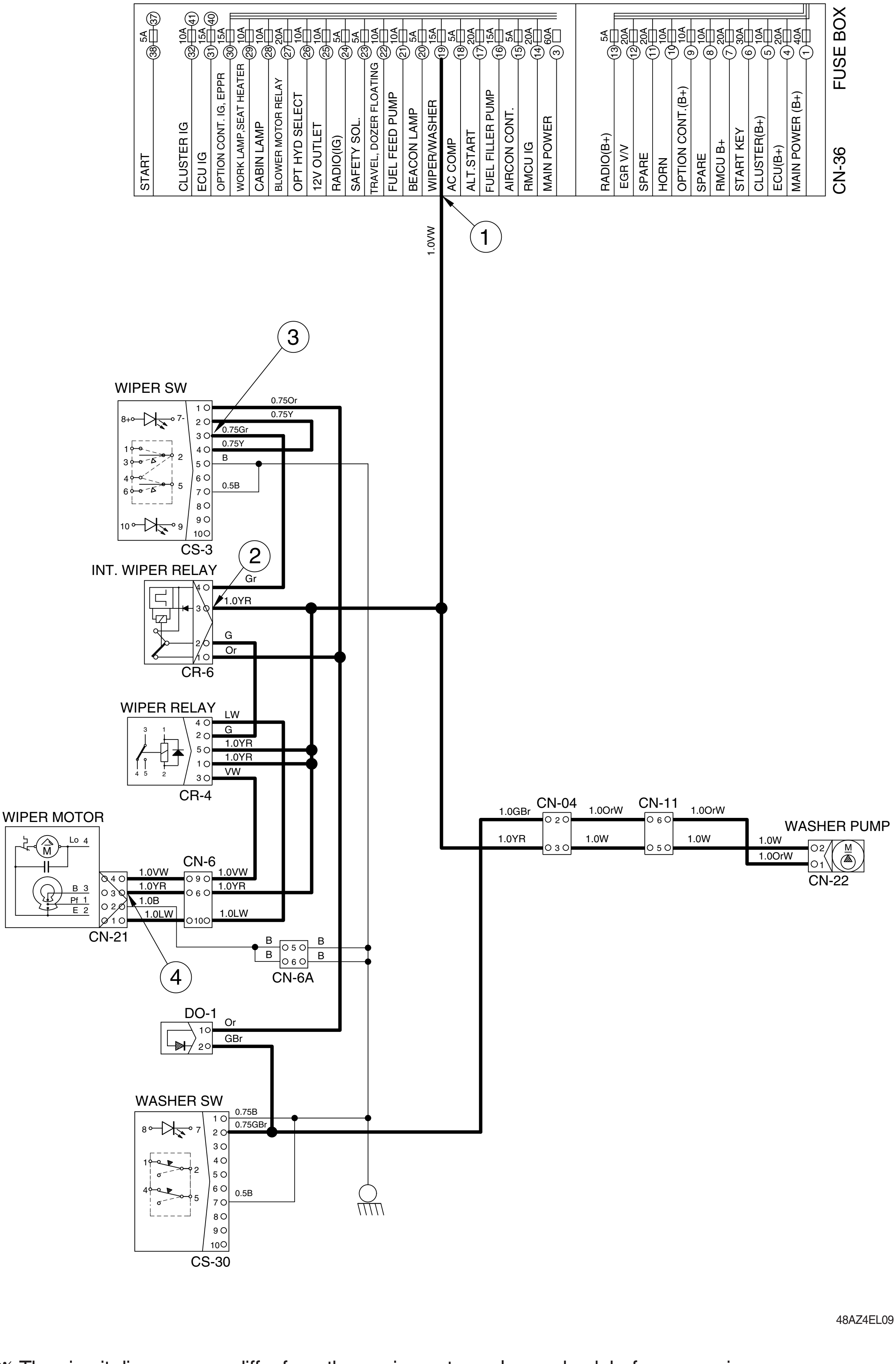
2) CHECK POINT

Engine	Start switch	Check point	Voltage
STOP	ON	① - GND (fuse box) ② - GND (int relay power input) ③ - GND (switch power output) ④ - GND (wiper motor)	10~12.5 V

※ GND : Ground

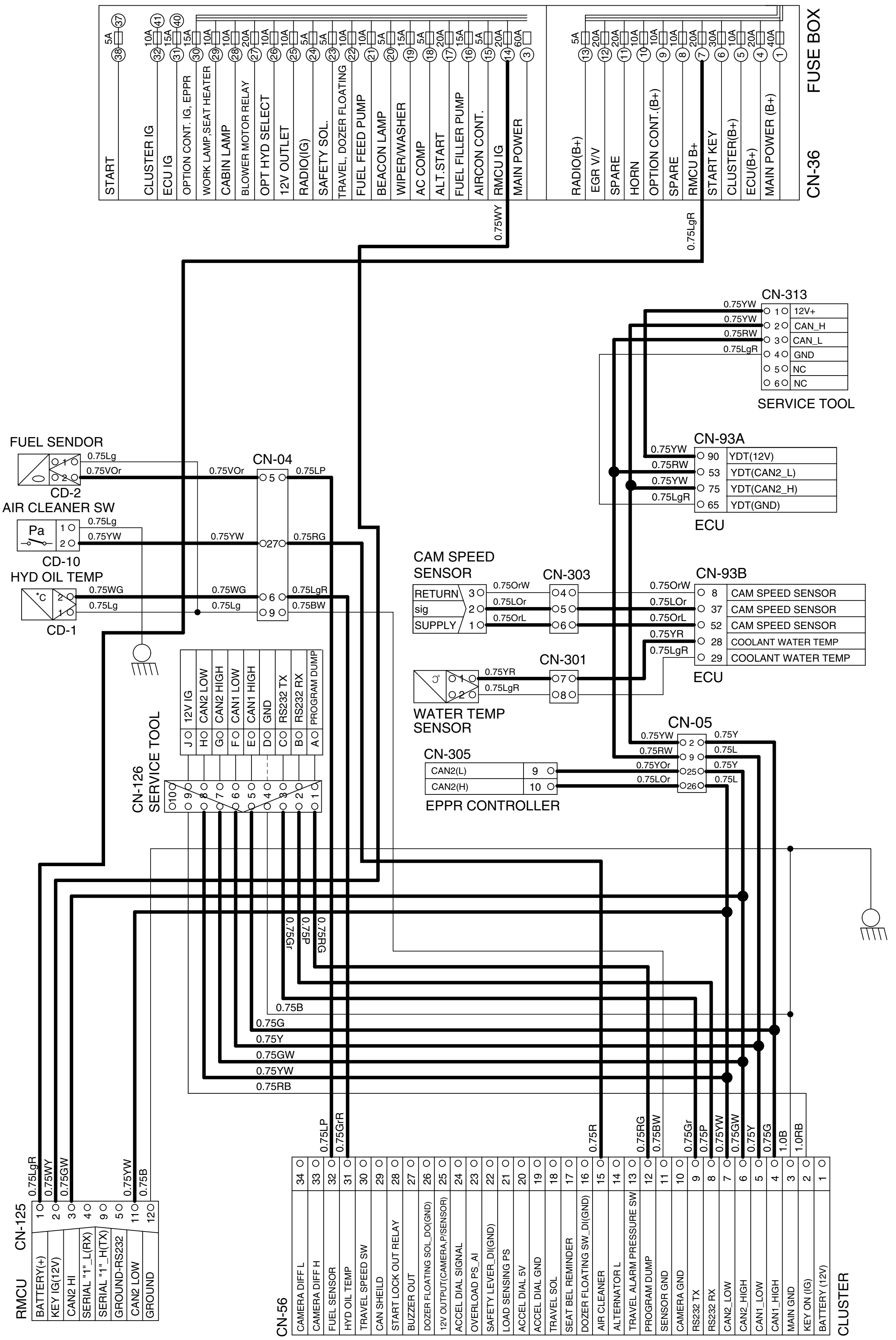
※ The circuit diagram may differ from the equipment, so please check before a repair.

WIPER AND WASHER CIRCUIT



※ The circuit diagram may differ from the equipment, so please check before a repair.

MONITORING CIRCUIT



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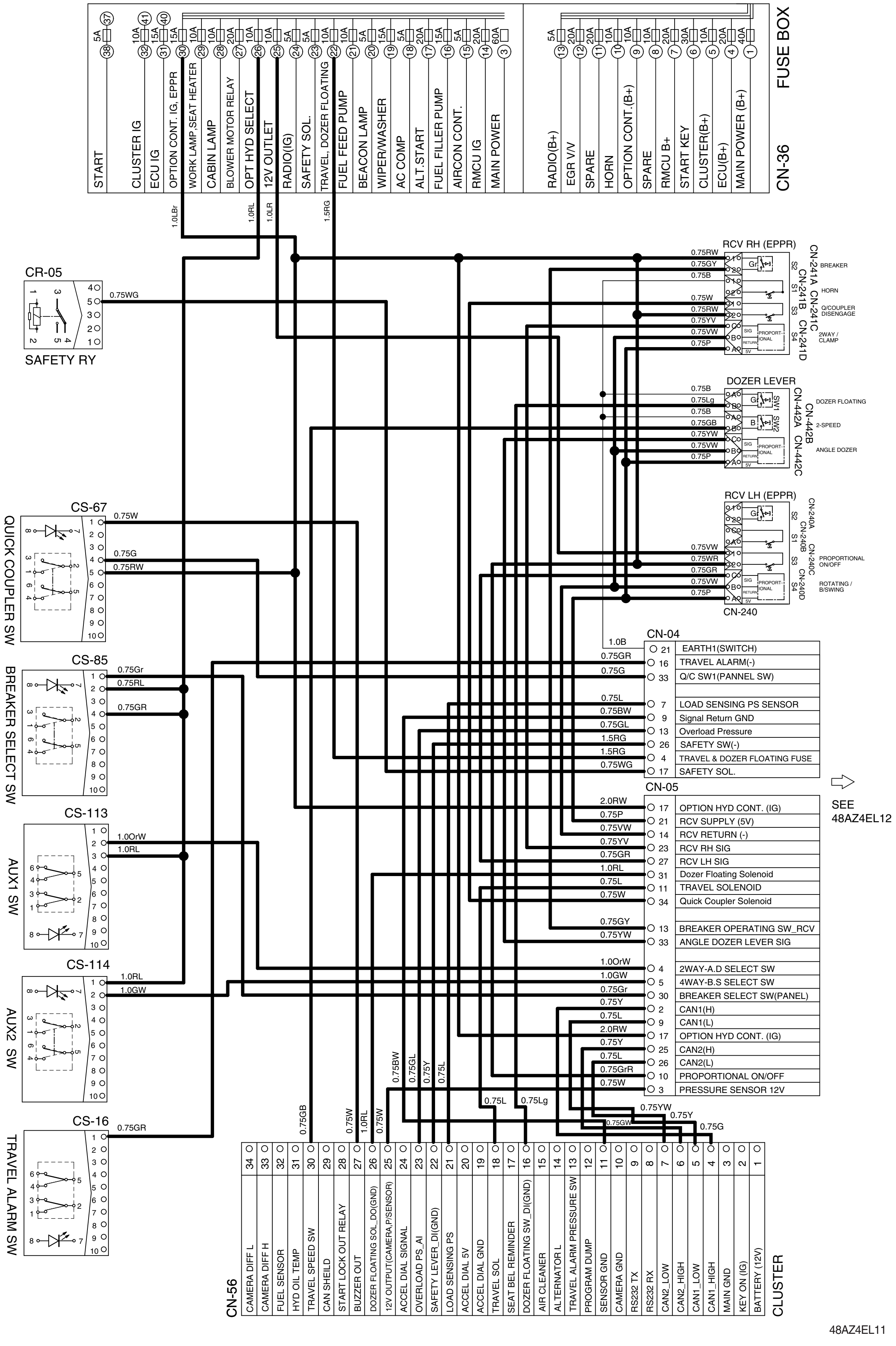
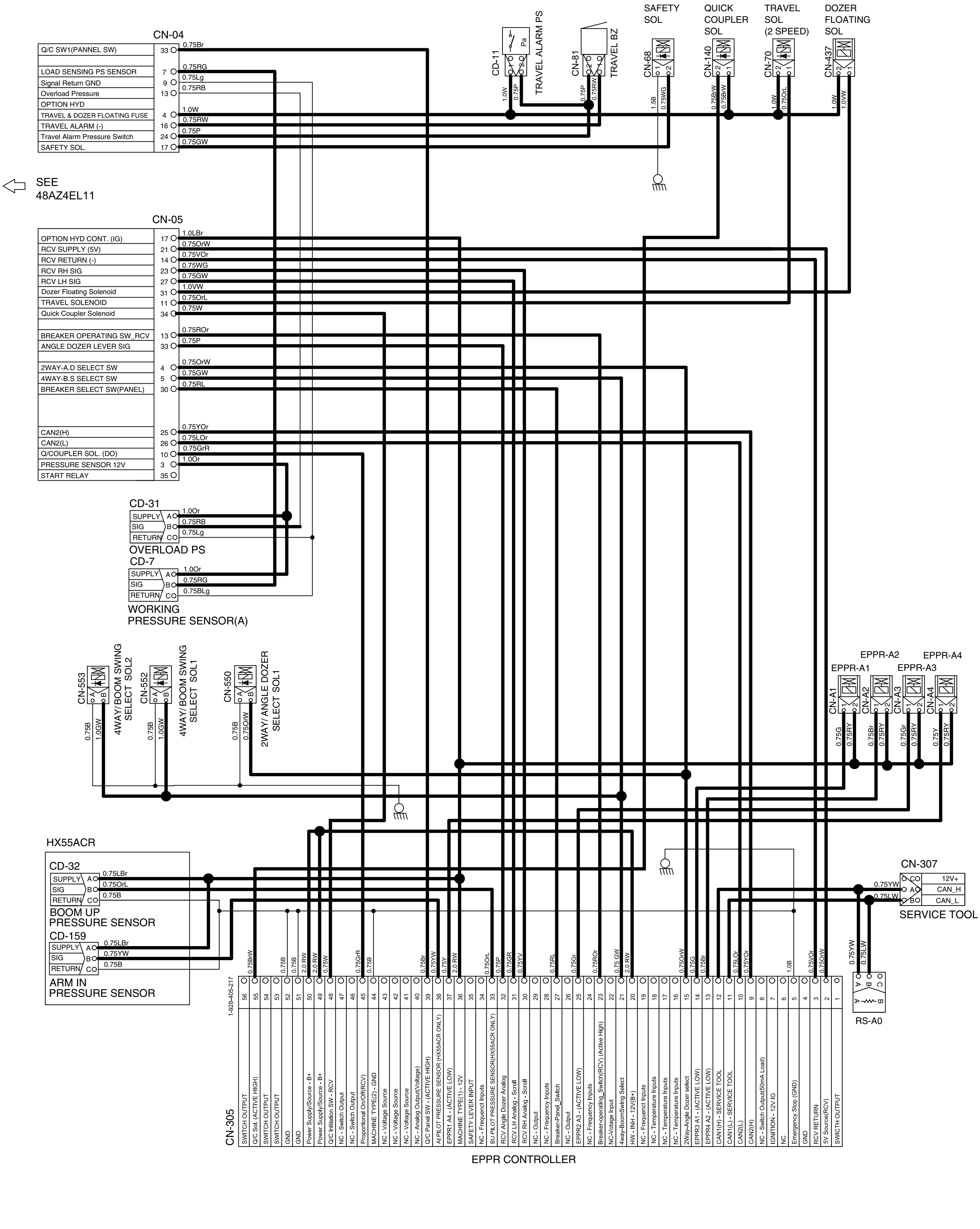
※ The circuit diagram may differ from the equipment, so please check before a repair.

ELECTRIC CIRCUIT FOR HYDRAULIC (1/2)



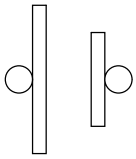
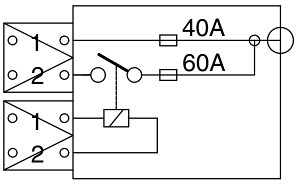
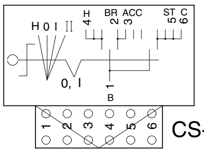
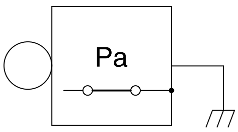
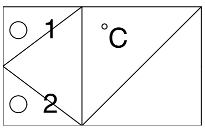
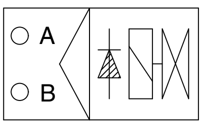
※ The circuit diagram may differ from the equipment, so please check before a repair.

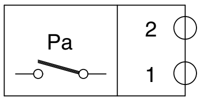
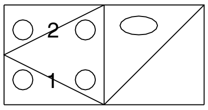
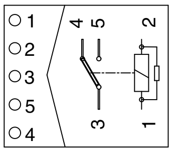
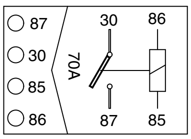
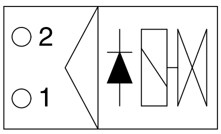
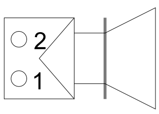
ELECTRIC CIRCUIT FOR HYDRAULIC (2/2)

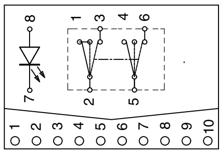
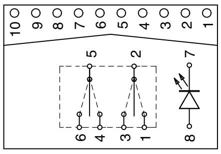
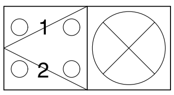
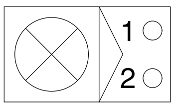
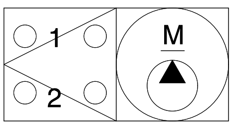
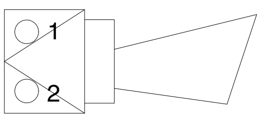


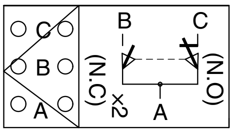
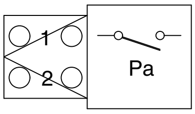
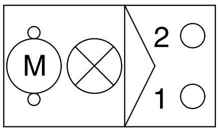
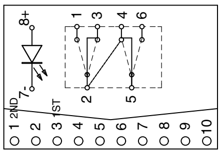
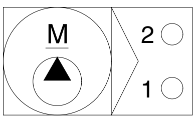
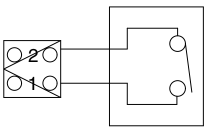
※ The circuit diagram may differ from the equipment, so please check before a repair.

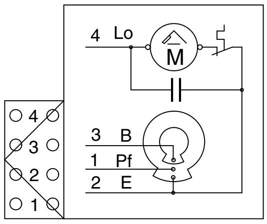
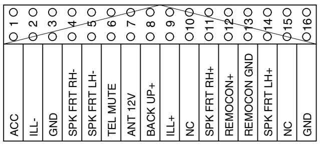
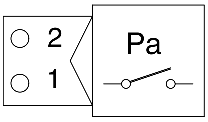
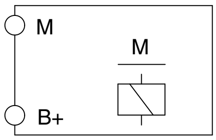
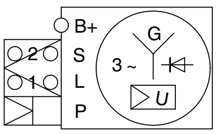
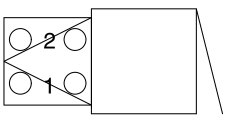
GROUP 4 ELECTRICAL COMPONENT SPECIFICATION

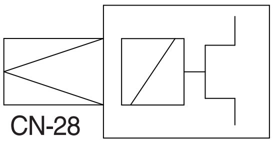
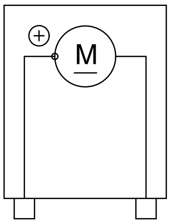
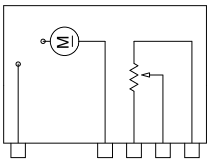
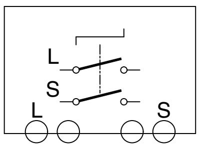
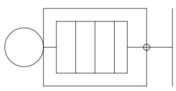
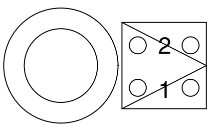
Part name	Symbol	Specification	Check
Battery		12V × 100Ah	※ Check specific gravity 1.280 over : over charged 1.280 ~ 1.250 : normal 1.250 below : recharging
Power relay 1	 CR-1	Rated load : 12V 100A (continuity) 1000A (30 second)	※ Check coil resistance Normal : about 12Ω ※ Check contact Normal : ∞Ω
Start switch	 CS-2	12V	※Check contact OFF : ∞Ω (for each terminal) ON : 0Ω (for terminal 1-3 and 1-2) START : 0Ω (for terminal 1-6)
Pressure switch (for engine oil)	 CD-18	0.5 kgf/cm² (N.C TYPE)	※ Check resistance Normal : 0Ω (CLOSE)
Hydraulic oil temperature sensor	 CD-1	0.5 kgf/cm² (N.C TYPE)	※ Check resistance 50°C : 804Ω 80°C : 310Ω 100°C : 180Ω
Solenoid valve	 CN-550 CN-552 CN-553	12V 1A	※ Check resistance Normal : 15~25Ω (for terminal 1-2)

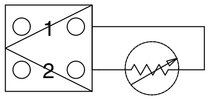
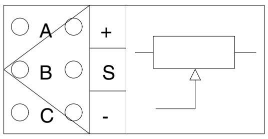
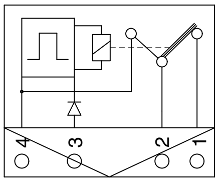
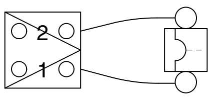
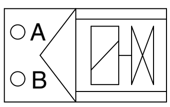
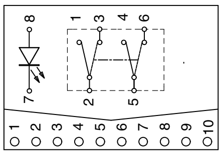
Part name	Symbol	Specification	Check
Air cleaner pressure switch	 CD-10	Pressure: 635mmH_2O (N.O TYPE)	※ Check contact Normal : ∞Ω (for terminal 1-2)
Fuel sender	 CD-2	-	※ Check resistance Full : 100Ω Low : 500Ω Empty warning :700Ω
Relay	 CR-02 CR-03 CR-04 CR-05 CR-09 CR-50 CR-68 CR-80 CR-120 CR-121 CR-122 CR-381	12V 20A	※ Check resistance Normal : about 200Ω (for terminal 2-4) : 0Ω (for terminal 1-5) : ∞Ω (for terminal 1-3)
Relay	 CR-23 CR-24	12V 60A	※ Rated coil current 1.2±0.3A
Solenoid valve	 CN-66 CN-68 CN-70 CN-140 CN-437 CN-441	12V 1A	※ Check resistance Normal : 15~25Ω (for terminal 1-2)
Speaker	 CN-23(LH) CN-24(RH)	4Ω 20W	※Check resistance Normal : 4Ω

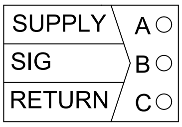
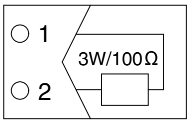
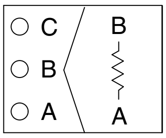
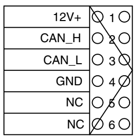
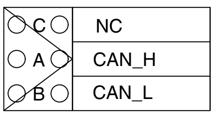
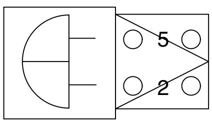
Part name	Symbol	Specification	Check
Work lamp switch	 CS-94	12V 16A	※ Check contact Normal OFF - ∞Ω (for terminal 2-1, 5-4) - 0Ω (for terminal 2-3, 5-6)
Quick coupler switch 1	 CS-67	12V 16A	※ Check contact Normal OFF - ∞Ω (for terminal 2-3, 5-6)
Lamp	 CL-5 CL-9L CL-9R	12V LED	※ Check disconnection Normal : 1.2Ω
Room lamp	 CL-1	12V 10W	※ Check disconnection Normal : a few Ω
Fuel filler pump	 CN-61	12V 35 ℓ/min	※Check operation Supply power (for terminal 1-2) : 12V
Horn	 CN-20 CN-25	12V	132±5dB

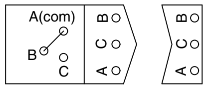
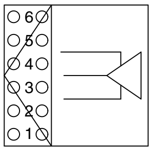
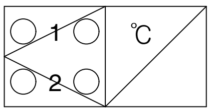
Part name	Symbol	Specification	Check
Safety switch	 CS-4	Micro	※ Check contact Normal : 0Ω (for terminal A-B) : ∞Ω (for terminal A-C) Operating : ∞Ω (for terminal A-B) : 0Ω (for terminal A-C)
Pressure switch	 CD-11	10bar (N.C type)	※ Check contact Normal : 0.1Ω
Beacon lamp	 CL-7	12V LED (Strobe type)	※ Check disconnection Normal : a few Ω
Wiper switch	 CS-3	12V 16A	※Check contact Normal : ∞Ω (for terminal 2-1, 5-6)
Washer pump	 CN-22	12V 3.8A	※Check contact Normal : 3Ω (for terminal 1-2)
Fuel pump switch	 CS-16	12V	-

Part name	Symbol	Specification	Check
Wiper motor	 CN-21	12V 3A	※Check contact Normal : 6Ω(for terminal 2-4)
Radio & USB player	 CN-27	12V 2A	※ Check voltage 10 ~ 12.5V (for terminal 1-3, 3-8)
Receiver dryer	 CN-29	12V	※ Check contact Normal : 0Ω
Starter	 CN-45	12V 2.3kW	※ Check contact Normal : 0.1Ω
Alternator	 CN-74	12V 55A	※ Check contact Normal : 10 ~ 12.5V
Travel buzzer	 CN-81	12V 600mA	※ Check contact Normal : 5.2Ω

Part name	Symbol	Specification	Check
Compressor	 CN-28	12V 79W	-
Blower motor		12V 9.5A	※ Check resistance 2.5Ω (for terminal 1-2)
Water valve		12V	-
Master switch	 CS-74	12V 1000A	-
Preheater	 CN-80	12V 42A 500W	-
12V outlet	 CN-139	12V 120W	-

Part name	Symbol	Specification	Check
Anti-freezing		-	-
Accel dial	 CN-142	-	※ Check resistance Normal : about 5kΩ (for terminal A-C) ※ Check voltage Normal : about 5V (for terminal A-C) : 2~4.5V (for terminal C-B)
Int wiper relay		12V 12A	-
Maxi fuse	 CN-60	12V 80A	-
EPPR valve	 CN-A1 CN-A2 CN-A3 CN-A4	-	-
Switch	 CS-16 CS-23 CS-30 CS-85 CS-113 CS-114	-	※ Check contact Normal OFF - ∞Ω (for terminal 2-1, 5-4) 0Ω (for terminal 2-3, 5-6)

Part name	Symbol	Specification	Check
Pressure sensor	 CD-7 CD-31 CD-32 CD-159	12V	-
Resistor	 RS-2	3W 100Ω	-
Resistor	 RS-A0 RS-1 RS-A2	3W 120Ω	-
Service tool	 CN-313	-	-
Service tool	 CN-307	-	-
Buzzer	 CS-113	12V	-

Part name	Symbol	Specification	Check
Seat belt switch	 CS-250	12V	-
DPF press switch	 CN-300A	-	-
DPF temp sensor	 CN-300B CN-300C	-	-

GROUP 5 CONNECTORS

1. CONNECTOR DESTINATION

Connector number	Type	No. of pin	Destination	Connector part No.	
				Female	Male
CN-04	AMP	36	Main harness - Seat base harness	1743059-2	1743062-2
CN-05	AMP	36	Main harness - Seat base harness	1743632-2	1743636-2
CN-6	AMP	10	Seat base harness - Cab harness	174655-2	174657-2
CN-6A	AMP	6	Seat base harness	174262-2	174264-2
CN-11	AMP	6	Air-con	174262-2	174264-2
CN-16	AMP	6	Accel dial	-	174264-2
CN-16A	AMP	6	Accel dial	174262-2	-
CN-16B	AMP	6	Emergency rpm dial connector	174262-2	21NB-10710
CN-18	AMP	8	Blower relay harness - Seat base harness	174982-2	174984-2
CN-21	KET	4	Wiper motor	MG610047	-
CN-22	KET	2	Washer tank	MG640650	-
CN-23	YAZAKI	2	Speaker-LH	7123-1520	-
CN-24	YAZAKI	2	Speaker-RH	7123-1520	-
CN-25	DEUTSCH	2	Horn	DT06-2S-EP06	-
CN-27	-	16	New cassette radio	PK145-16017	-
CN-28	-	-	Air conditioner compressor	1723-2815	-
CN-28	KET	2	Washer pump	-	MG640605
CN-29	KET	2	Receiver dryer	MG640795	-
CN-36	-	-	Fuse box	21MN-55010	-
CN-37	-	-	Relay box	21HN-55110	-
CN-45B+	RING TERM	-	Start motor B+	JOCP25-8-2	-
CN-45M	RING TERM	-	Start motor M	S820-304000	-
CN-56	AMP	34	Cluster	4-1437290-0	-
CN-60	MTA	-	Maxi fuse	03. 21000	-
CN-61	DEUTSCH	2	Fuel filler pump	DT06-2S-EP06	DT04-2P-E005
CN-66	DEUTSCH	2	Breaker return solenoid	DT06-2S-EP06	-
CN-68	DEUTSCH	2	Safety solenoid	DT06-2S-EP06	-
CN-70	DEUTSCH	2	Travel solenoid	DT06-2S-EP06	-
CN-74	KET	2	Alternator	MG610043	-
CN-74	RING TERM	-	Alternator B+	S820-306000	-
CN-80	YAZAKI	1	Glow plug	7323-3010	-
CN-81	KET	2	Buzzer	MG610320	-
CN-93A	AMP	60	ECU	1897635-2	-
CN-93B	AMP	94	ECU	3-1355136-3	-
CN-100	KET	1	ECU earth	MG640944-5	-
CN-112	DEUTSCH	2	Main harness-Boom harness	DT06-2S-EP06	DT04-2P-E003

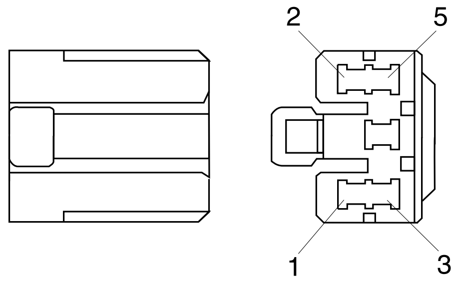
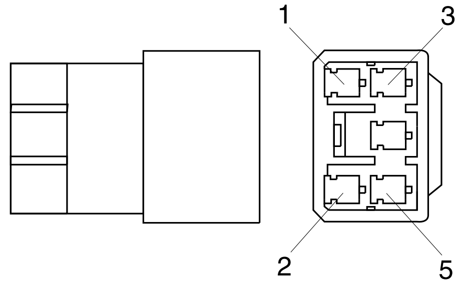
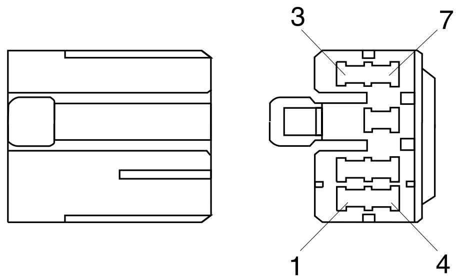
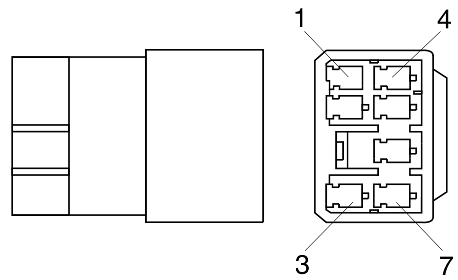
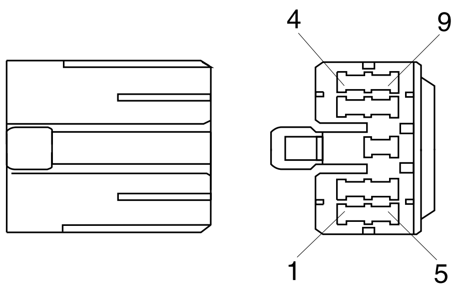
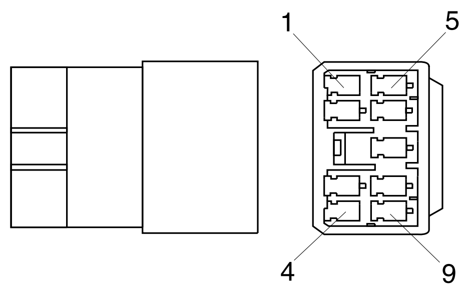
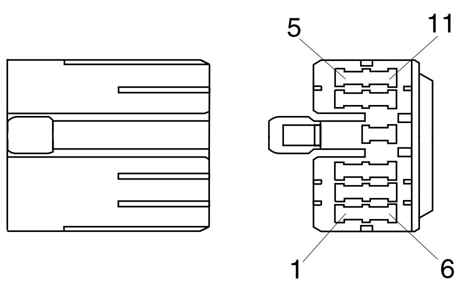
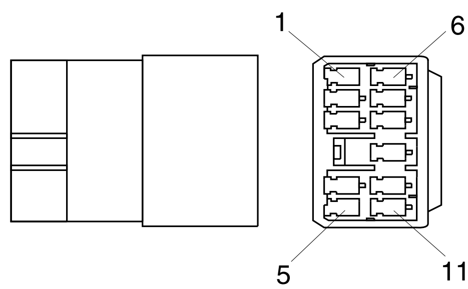
Connector number	Type	No. of pin	Destination	Connector part No.	
				Female	Male
CN-113	KET	6	Buzzer	MG614354	-
CN-120	MICRO	5	Blower motor-high	VCFM-1002	-
CN-121	MICRO	5	Blower motor-mid	VCFM-1002	-
CN-122	MICRO	5	Blower motor-low	VCFM-1002	-
CN-125	DEUTSCH	12	RMCU	DT06-12S-EP06	DT04-12P-E005
CN-126	DEUTSCH	9	Service tool	-	HD10-9-96P
CN-126	AMP	10	Service tool	174655-2	S816-110002
CN-126	AMP	10	Service tool	174655-2	-
CN-139	AMP	2	Power socket	172434-2	-
CN-140	DEUTSCH	2	Quick coupler solenoid	DT06-2S-EP06	DT04-2P-E005
CN-142	AMP	2	Accel dial pilot lamp	174352-2	-
CN-142L	DEUTSCH	3	Accel dial	DT06-3S-EP06	-
CN-145	YAZAKI	2	Fuel feed pump	7123-6423-30	-
CN-240C	-	1	Proportional ON/OFF	-	CA104
CN-240D	DEUTSCH	3	LH RCV EPPR	DT06-3S-EP06	-
CN-241A	DEUTSCH	2	Breaker sw	DT06-2S-EP06	-
CN-241B	DEUTSCH	2	Horn sw	-	DT04-2P-E005
CN-241C	-	1	Quick coupler sw	CB104	-
CN-241D	DEUTSCH	3	EPPR sw	DT06-3S-EP06	-
CN-249	DEUTSCH	6	Rear camera	DT06-6S-EP06	DT04-6P-E005
CN-300A	AMP	6	DPF pressure switch	1438153-5	-
CN-300B	FCI	2	DPF mid temp sensor	54200206	-
CN-300C	FCI	2	DPF inlet temp sensor	50200208	-
CN-301	AMP	8	EGR sensor	776532-1	-
CN-302	AMP	12	EGR valve	776533-1	-
CN-303	AMP	12	E/sensor	776533-2	-
CN-304	AMP	12	C/rail	776533-3	-
CN-305	REXROTH	56	EPPR controller	1-928-405-217	-
CN-307	DEUTSCH	3	EPPR service tool	DT06-3S-E006	DT04-3P-E005
CN-313	DEUTSCH	6	Service tool	DT06-6S	DT04-6P
CN-437	DEUTSCH	2	Dozer float switch	DT06-2S-EP06	DT04-2P-E005
CN-439	DEUTSCH	2	Option solenoid (2way/angle dozer sel)	DT06-2S-EP06	DT04-2P-E005
CN-441	DEUTSCH	2	AC mode solenoid	DT06-2S-EP06	DT04-2P-E005
CN-442A	DEUTSCH	2	Dozer floating switch	DT06-2S-EP06	-
CN-442B	DEUTSCH	2	2-speed switch	-	DT04-2P-E005
CN-442C	DEUTSCH	3	Angle dozer	DT06-3S-EP06	DT04-3P-E005
CN-442D	-	1	GND	CB104	-
CN-552	DEUTSCH	2	Option solenoid 1 (4way/boom swing)	DT06-2S-EP06	DT04-2P-E005
CN-553	DEUTSCH	2	Option solenoid 2 (4way/boom swing)	DT06-2S-EP06	DT04-2P-E005

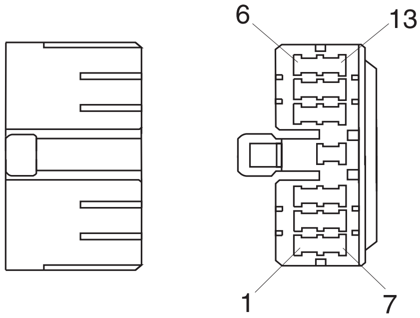
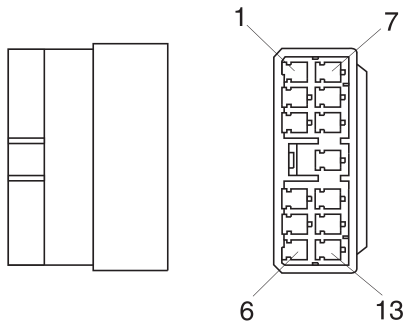
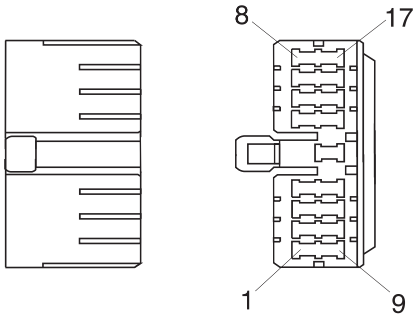
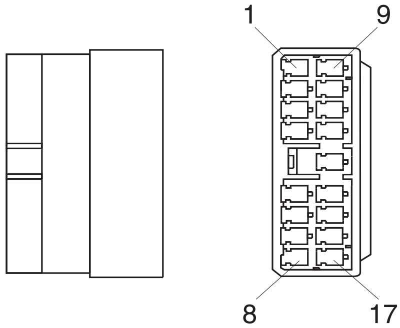
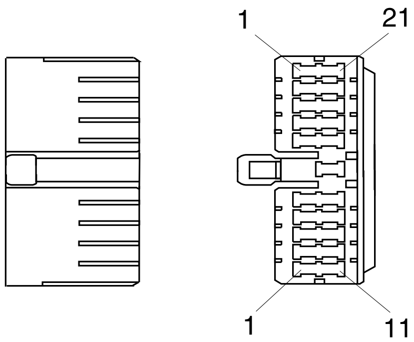
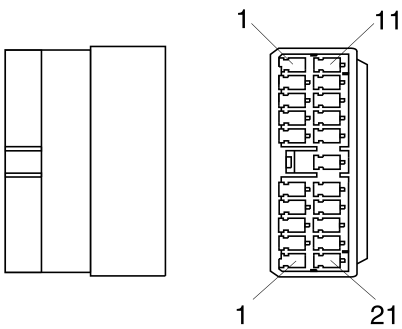
Connector number	Type	No. of pin	Destination	Connector part No.	
				Female	Male
CN-A1	DEUTSCH	2	EPPR-A1	DT06-2S-EP06	DT04-2P-E005
CN-A2	DEUTSCH	2	EPPR-A2	DT06-2S-EP06	DT04-2P-E005
CN-A3	DEUTSCH	2	EPPR-A3	DT06-2S-EP06	DT04-2P-E005
CN-A4	DEUTSCH	2	EPPR-A4	DT06-2S-EP06	DT04-2P-E005
AC-01	HIROSE	26	HAVC controller	GT7-26DS-HU	-
AC-02	KET	6	Brower switch	MG610049	-
AC-04	AMP	18	HAVC unit	936204-1	-
· LAMP					
CL-1	KET	2	Room lamp	MG610392	-
CL-5	DEUTSCH	2	Work lamp	DT06-2S-E003	-
CL-7	DEUTSCH	2	Beacon lamp	DT06-2S-EP06	DT04-2P-E005
CL-9L	DEUTSCH	2	Work lamp - LH	DT06-2S-EP06	DT04-2P-E005
CL-9R	DEUTSCH	2	Work lamp - RH	DT06-2S-EP06	DT04-2P-E005
· RELAY					
CR-1R	RING TERM	-	Power relay 1	S820-608000	-
CR-1P	-	2	Power relay 1	32004-A2	-
CR-1S	-	2	Power relay 1	282080-1	-
CR-04	MICRO	5	Wiper motor relay	VCFM-1002	-
CR-06	KET	6	Wiper int relay	MG610049	-
CR-23	KET	4	Start relay	MG612017-5	-
CR-24	KET	4	Air heater relay	MG612017-5	-
· SENSOR					
CD-1	AMP	2	Hydraulic temp sender	85202-1	-
CD-2	DEUTSCH	2	Fuel sender	DT06-2S-E006	-
CD-7	DEUTSCH	3	Working pressure sensor	DT06-3S-E006	-
CD-10	AMP	2	Air cleaner switch	85202-1	-
CD-11	KET	2	Travel pressure switch	MG640795	-
CD-17	YAZAKI	3	Engine speed sensor	7283-8732-40	-
CD-18	YAZAKI	1	Engine oil pressure switch	7123-5014	-
CD-31	DEUTSCH	3	Overload pressure sensor	DT06-3S-E006	DT04-3P-E005
CD-32	DEUTSCH	3	Boom up pressure sensor	DT06-3S-E006	DT04-3P-E005
CD-159	DEUTSCH	3	Arm in pressure sensor	DT06-3S-E006	DT04-3P-E005
DO-01	-	2	Diode	21EA-50550	-
DO-02	-	2	Diode	174352-2	21EA-50550
DO-03	-	2	Diode	174352-2	-
DO-05	-	2	Diode	174352-2	21EA-50550
DO-06	-	2	Diode	174352-2	21EA-50550
DO-07	-	2	Diode	174352-2	21EA-50550

Connector number	Type	No. of pin	Destination	Connector part No.	
				Female	Male
· SWITCH					
CS-2	KET	6	Start switch	MG610335	-
CS-3	CARLING	10	Wiper switch	21HN-56300	-
CS-4	DEUTSCH	3	Safety switch	DT06-3S-EP06	-
CS-16	CARLING	10	Travel alarm switch	21NH-56300	174354-2
CS-16	AMP	2	Fuel filler pump switch	174352-2	-
CS-23	CARLING	10	Beacon switch	21HN-56300	-
CS-30	CARLING	10	Washer switch	21HN-56300	-
CS-33	AMP	6	Emergency stop switch	174262-2	-
CS-67	CARLING	10	Quick coupler switch	21HN-56300	-
CS-74L	RING TERM	-	Master switch L	S820-106000	-
CS-74S	RING TERM	-	Master switch S	S820-608000	-
CS-85	CARLING	10	Breaker select switch	21HN-56300	-
CS-94	CARLING	10	Work lamp switch	21HN-56300	-
CS-100	CARLING	10	DPF switch	21HN-56300	-
CS-113	CARLING	10	Aux 1 switch	21HN-56300	-
CS-114	CARLING	10	Aux 2 switch	21HN-56300	-
CS-250	DEUTSCH	3	Seat belt warning	DT06-3S-EP06	DT04-3P-E005

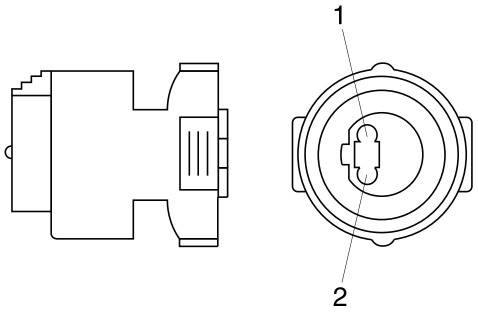
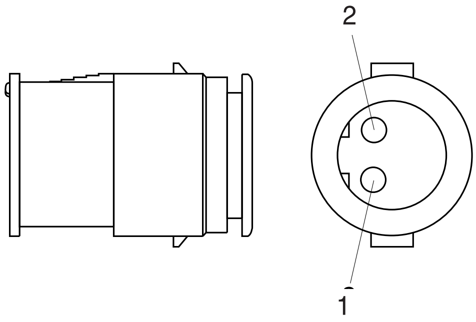
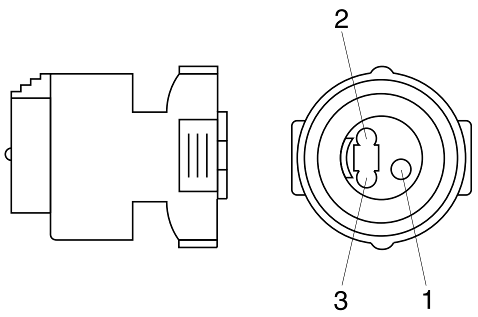
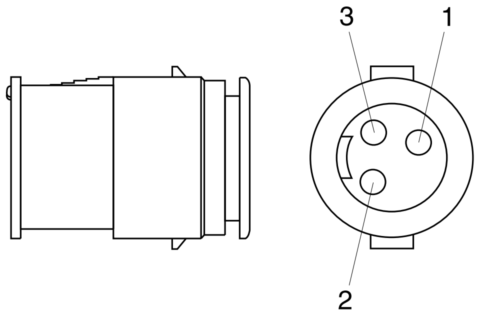
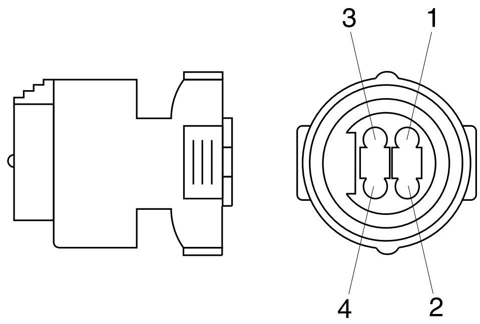
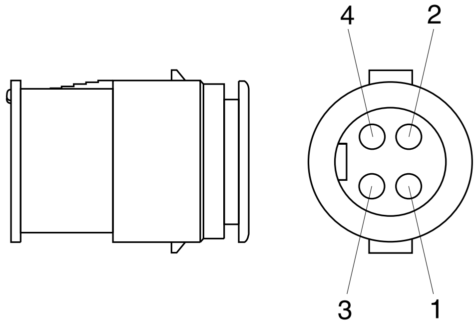
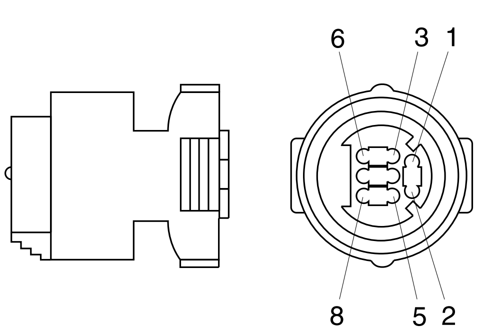
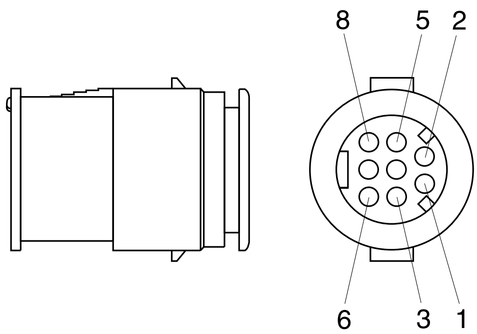
2. CONNECTION TABLE FOR CONNECTORS

1) PA TYPE CONNECTOR

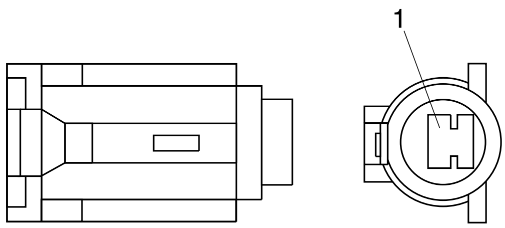
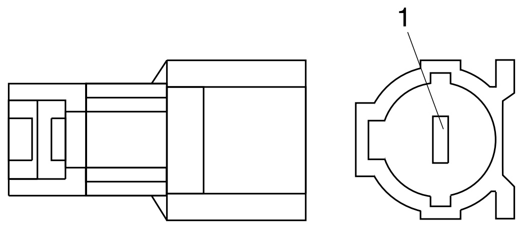
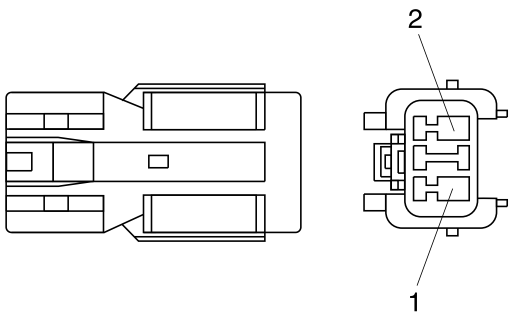
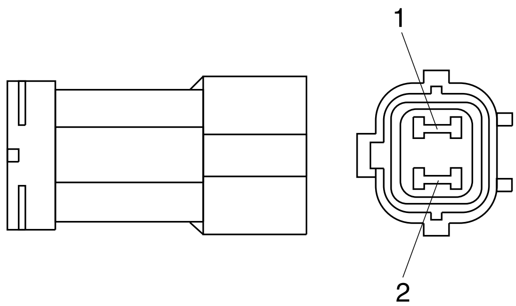
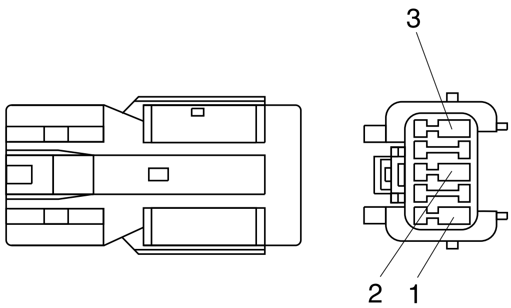
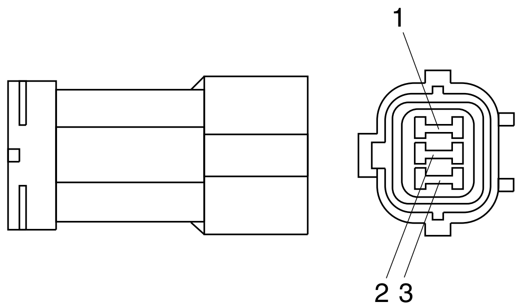
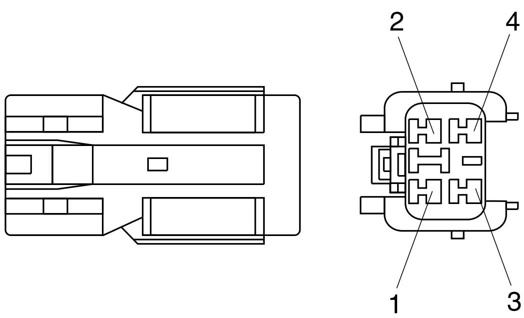
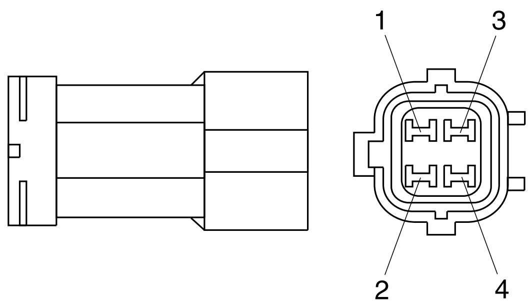
No. of pin	Receptacle connector (female)	Plug connector (male)
5	 S811-005002	 S811-105002
7	 S811-007002	 S811-107002
9	 S811-009002	 3S811-109002
11	 S811-011002	 S811-111002

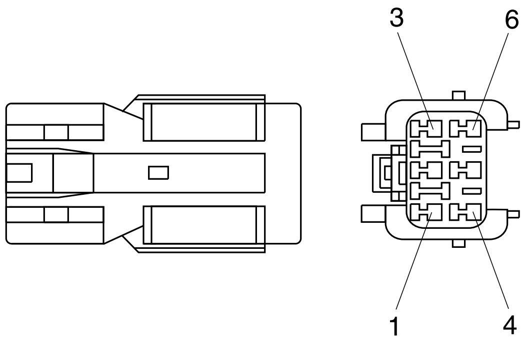
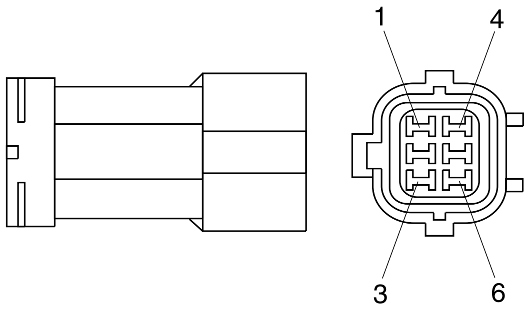
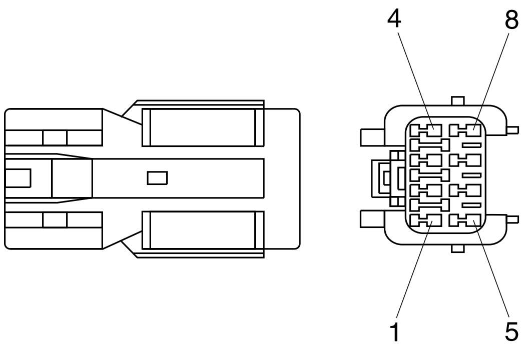
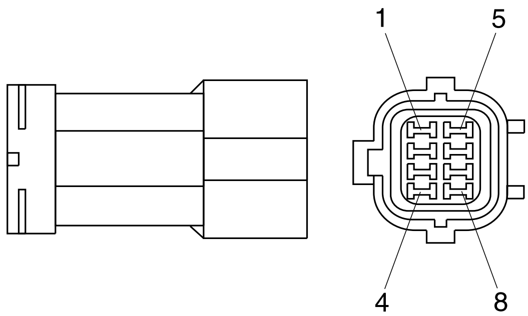
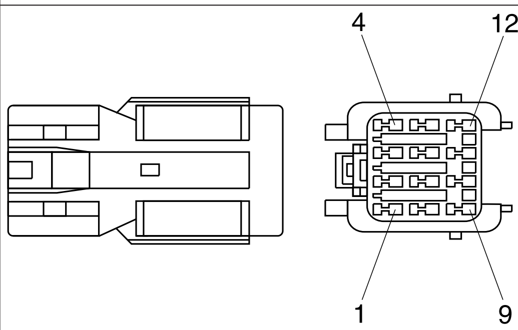
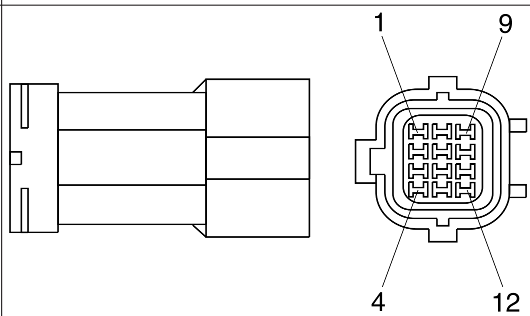
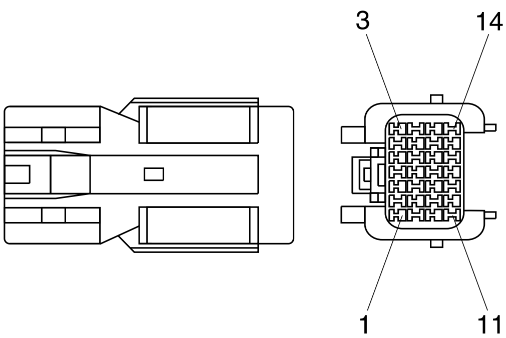
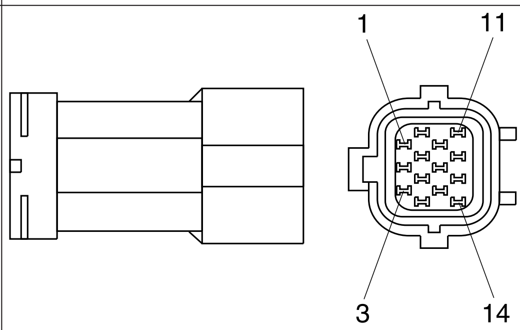
No. of pin	Receptacle connector (female)	Plug connector (male)
13	 S811-013002	 S811-113002
17	 S811-017002	 S811-117002
21	 S811-021002	 S811-121002

2) J TYPE CONNECTOR

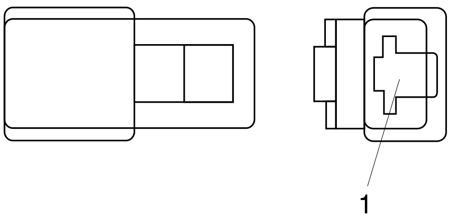
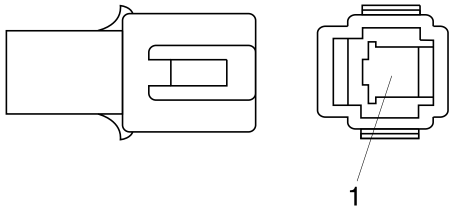
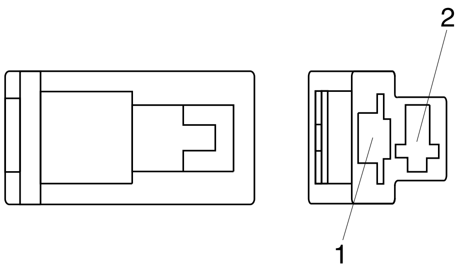
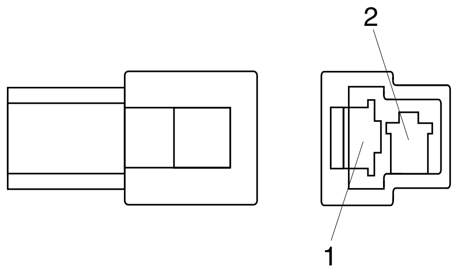
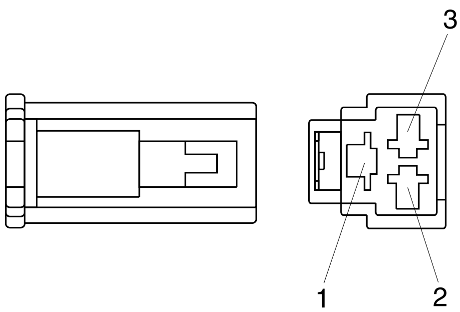
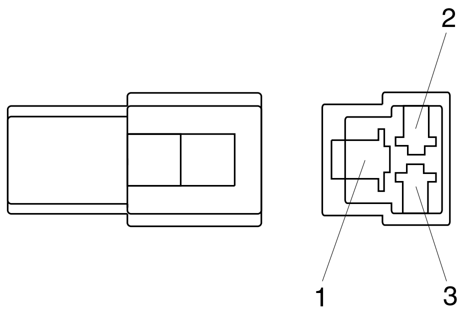
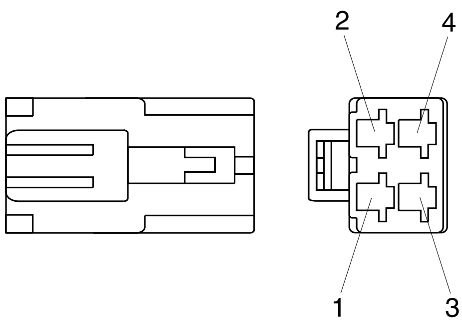
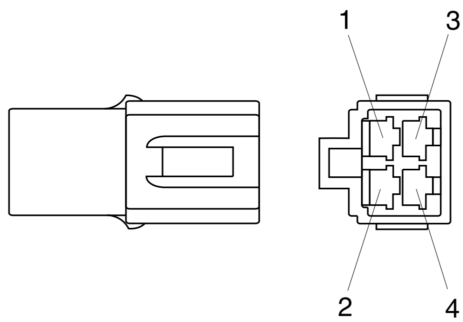
No. of pin	Receptacle connector (female)	Plug connector (male)
2	 S816-002001	 S816-102001
3	 S816-003001	 S816-103001
4	 S816-004001	 S816-104001
8	 S816-008001	 S816-108001

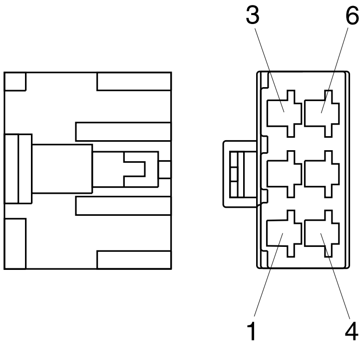
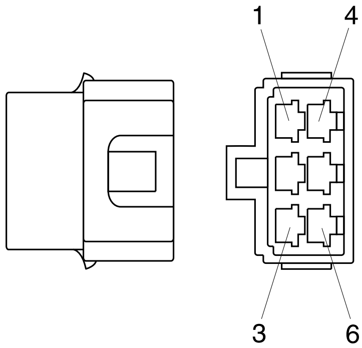
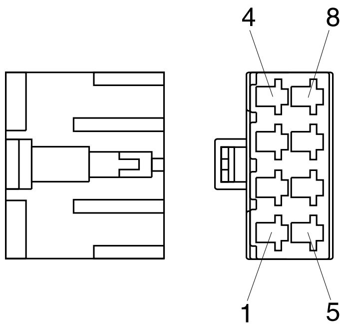
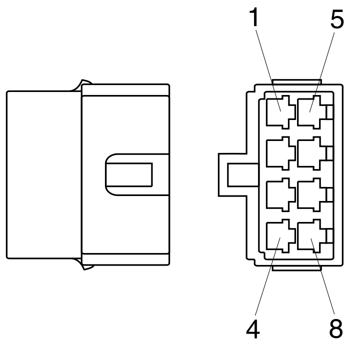
3) SWP TYPE CONNECTOR

No. of pin	Receptacle connector (female)	Plug connector (male)
1	 S814-001000	 S814-101000
2	 S814-002000	 S814-102000
3	 S814-003000	 S814-103000
4	 S814-004000	 S814-104000

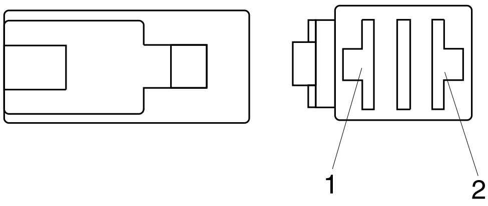
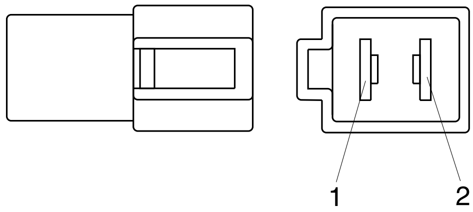
No. of pin	Receptacle connector (female)	Plug connector (male)
6	 S814-006000	 S814-106000
8	 S814-008000	 S814-108000
12	 S814-012000	 S814-112000
14	 S814-014000	 S814-114000

4) CN TYPE CONNECTOR

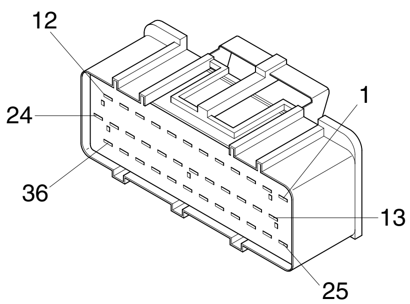
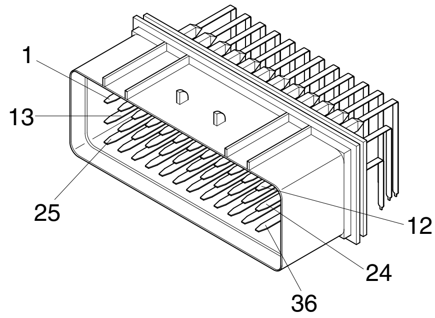
No. of pin	Receptacle connector (female)	Plug connector (male)
1	 S810-001202	 S810-101202
2	 S810-002202	 S810-102202
3	 S810-003202	 S810-103202
4	 S810-004202	 S810-104202

No. of pin	Receptacle connector (female)	Plug connector (male)
6	 S810-006202	 S810-106202
8	 S810-008202	 S810-108202

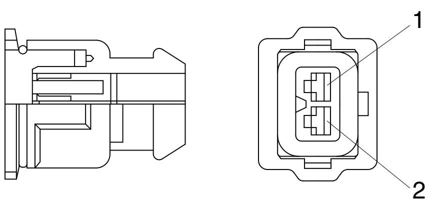
5) 375 FASTEN TYPE CONNECTOR

No. of pin	Receptacle connector (female)	Plug connector (male)
2	 S810-002402	 S810-102402

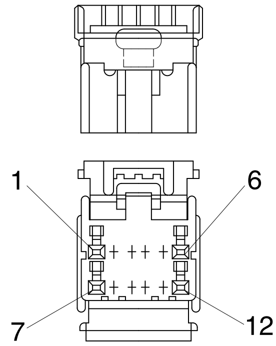
6) AMP ECONOSEAL CONNECTOR

No. of pin	Receptacle connector (female)	Plug connector (male)
36	 344111-1	 344108-1

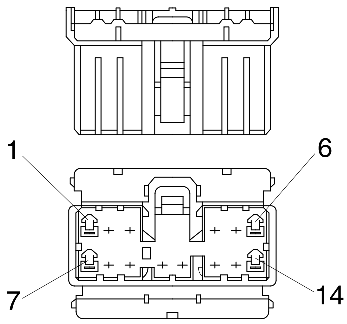
7) AMP TIMER CONNECTOR

No. of pin	Receptacle connector (female)	Plug connector (male)
2	 85202-1	

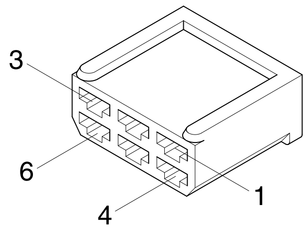
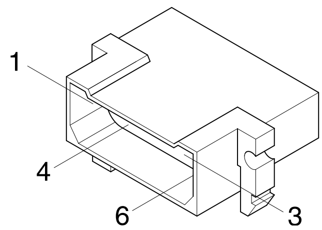
8) AMP 040 MULTILOCK CONNECTOR

No. of pin	Receptacle connector (female)	Plug connector (male)
12	 174045-2	

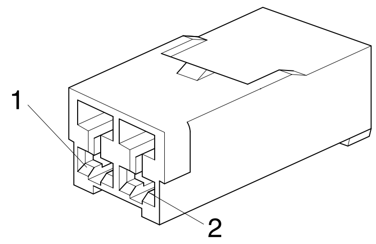
9) AMP 070 MULTILOCK CONNECTOR

No. of pin	Receptacle connector (female)	Plug connector (male)
14	 173852	

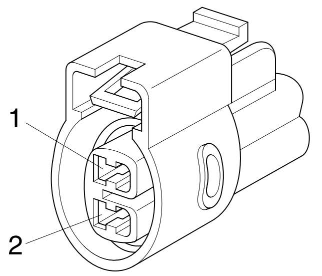
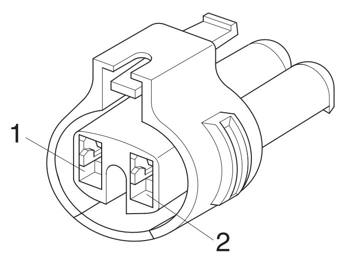
10) AMP FASTIN - FASTON CONNECTOR

No. of pin	Receptacle connector (female)	Plug connector (male)
6	 925276-0	 480003-9

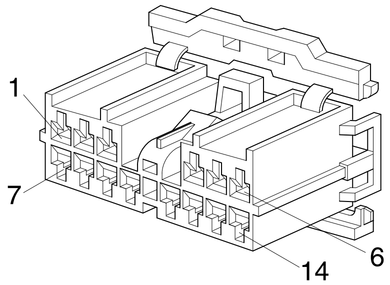
11) KET 090 CONNECTOR

No. of pin	Receptacle connector (female)	Plug connector (male)
2	 MG610070	

12) KET 090 WP CONNECTORS

No. of pin	Receptacle connector (female)	Plug connector (male)
2	 MG640605	
2	 MG640795	

13) KET SDL CONNECTOR

No. of pin	Receptacle connector (female)	Plug connector (male)
14	 MG610406	

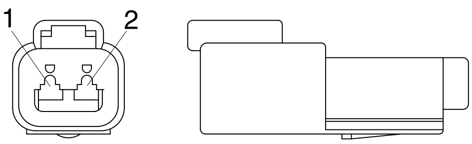
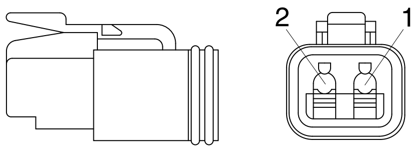
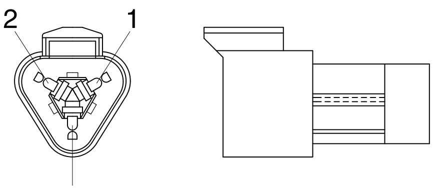
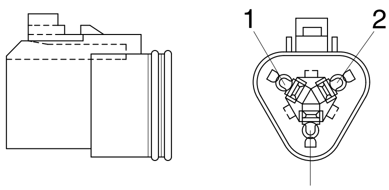
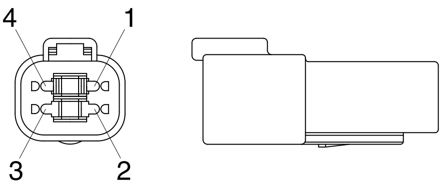
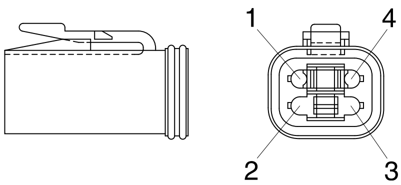
14) DEUTSCH DT CONNECTORS

DT 06 - 3S - ★★★★

- Modifications (See below)
- Number of contacts (P : Pin, S : Socket)
- 04 : Receptacle, 06 : Plug
- Deutsch connectors

※ Modification

E003 : Standard end cap - gray
E004 : Color of connector to be black
E005 : Combination - E004 & E003
EP04 : End cap
EP06 : Combination P012 & EP04
P012 : Front seal enhancement - connectors color to black for 2, 3, 4 & 6pin

No. of pin	Receptacle connector (female)	Plug connector (male)
2	 DT06-2S	 DT04-2P
3	 DT06-3S	 DT04-3P
4	 DT06-4S	 DT04-4P

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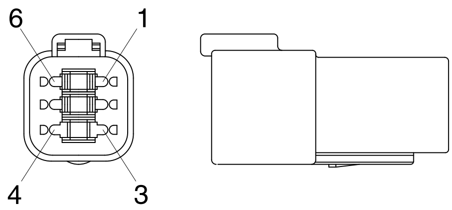
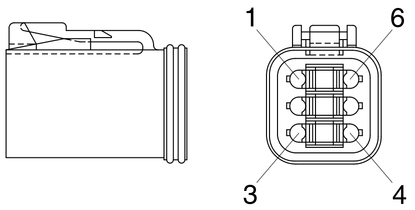
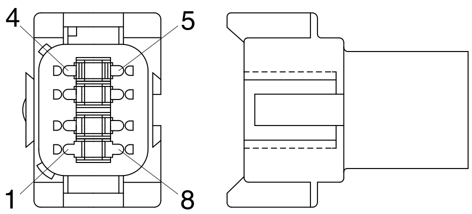
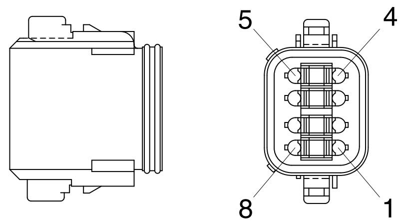
<tr><th>No. of pin</th><th>Receptacle connector (female)</th><th>Plug connector (male)</th></tr>
<tr><td>6</td><td>
DT06-6S</td><td>
DT04-6P</td></tr>
<tr><td>8</td><td>
DT06-8S</td><td>
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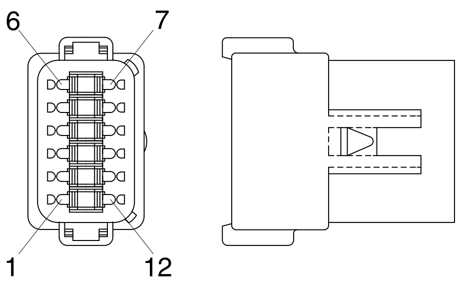
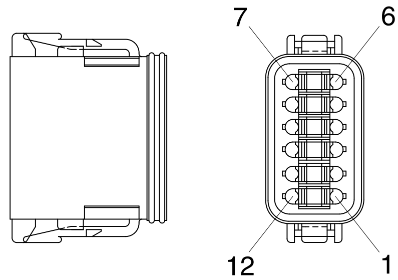
<tr><td>12</td><td>
DT06-12S</td><td>
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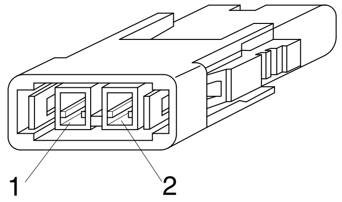
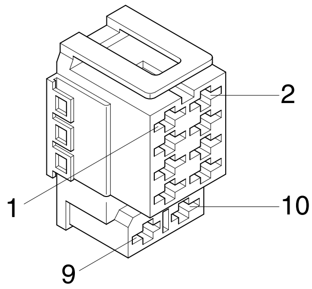
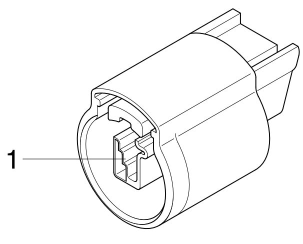
15) MOLEX 2CKTS CONNECTOR

No. of pin	Receptacle connector (female)	Plug connector (male)
2	 35215-0200	

16) ITT SWF CONNECTOR

No. of pin	Receptacle connector (female)	Plug connector (male)
10	 SWF593757	

17) MWP NMWP CONNECTOR

No. of pin	Receptacle connector (female)	Plug connector (male)
1	 NMWP01F-B	

SECTION 5 TROUBLESHOOTING

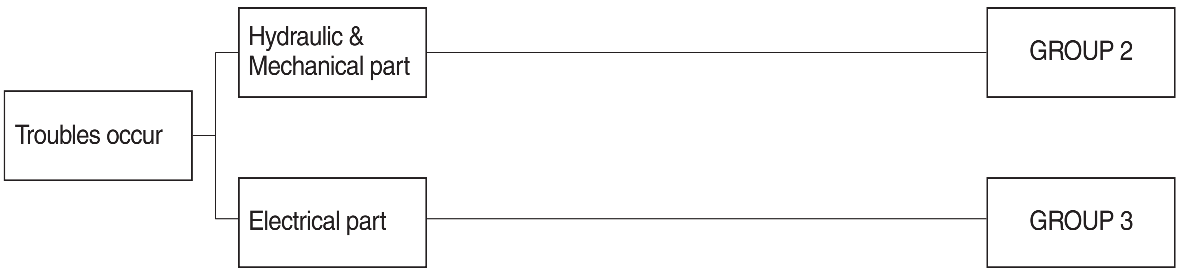
GROUP 1 BEFORE TROUBLESHOOTING

1. INTRODUCTION

When a trouble is occurred in the machine, this section will help an operator to maintain the machine with easy.

The trouble of machine is parted Hydraulic & Mechanical system and Electrical system.

At each system part, an operator can check the machine according to the troubleshooting process diagram.

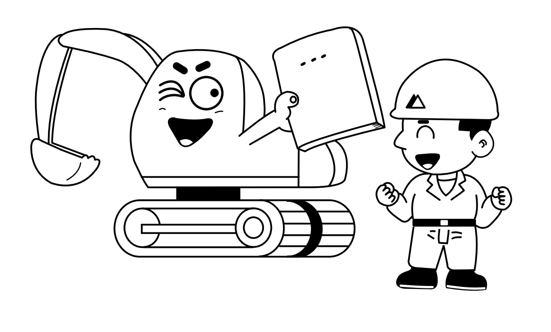


2. DIAGNOSING PROCEDURE

To carry out troubleshooting efficiently, the following steps must be observed.

STEP 1. Study the machine system

Study and know how the machine is operating, how the system is composing, what kinds of function are installed in the machine and what are specifications of the system components by the machine service manual.
Especially, deepen the knowledge for the related parts of the trouble.

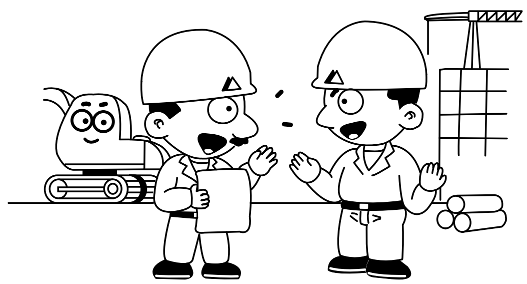


13031SH02

STEP 2. Ask the operator

Before inspecting, get the full story of malfunctions from a witness --- the operator.

1) How the machine is used and when it is serviced?
2) When the trouble was noticed and what work the machine was doing at that time?
3) What is the phenomenon of the trouble? Was the trouble getting worse, or did it come out suddenly for the first time?
4) Did the machine have any troubles previously? If so, which parts were repaired before.

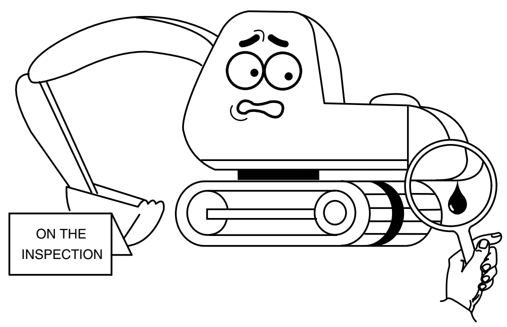


13031SH03

STEP 3. Inspect the machine

Before starting troubleshooting, check the machine for the daily maintenance points as shown in the operator's manual.

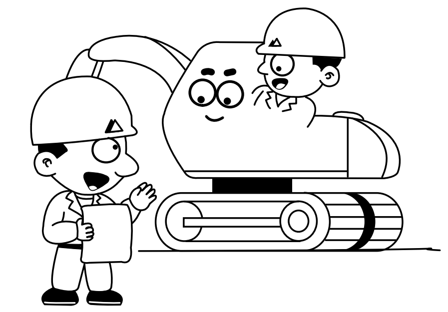
And also check the electrical system including batteries, as the troubles in the electrical system such as low battery voltage, loose connections and blown out fuses will result in malfunction of the controllers causing total operational failures of the machine.



6-2(3) 140-7

STEP 4. Inspect the trouble actually on the machine

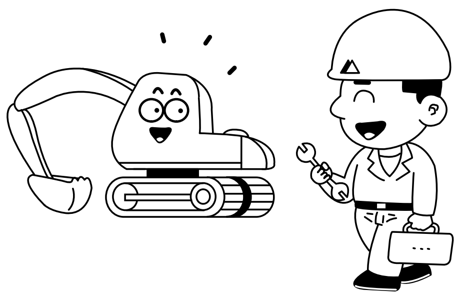
In case that some trouble cannot be confirmed, obtain the details of the malfunction from the operator.
Also, check if there are any in complete connections of the wire harnesses are or not.



6-3(1) 140-7

STEP 5. Perform troubleshooting

According to where the trouble parts are located, hydraulic & mechanical system part or electrical system part or mechatronics system part, perform troubleshooting the machine refer to the each system part's troubleshooting process diagram.

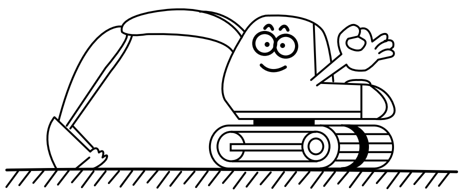


13031SH05

STEP 6. Trace a cause

Before reaching a conclusion, check the most suspectible causes again. Try to trace what the real cause of the trouble is.

Make a plan of the appropriate repairing procedure to avoid consequential malfunctions.



6-3(3) 140-7

GROUP 2 HYDRAULIC AND MECHANICAL SYSTEM

1. INTRODUCTION

1) MACHINE IN GENERAL

(1) If even a minor fault is left intact and operation is continued, a fatal failure may be caused, entailing a large sum of expenses and long hours of restoration.
Therefore when even a small trouble occurs, do not rely on your intuition and experience, but look for the cause based on the troubleshooting principle and perform maintenance and adjustment to prevent major failure from occurring. Keep in mind that a fault results from a combination of different causes.

(2) The following lists up commonly occurring faults and possible causes with this machine. For the troubleshooting of the engine, refer to the coming troubleshooting and repair.

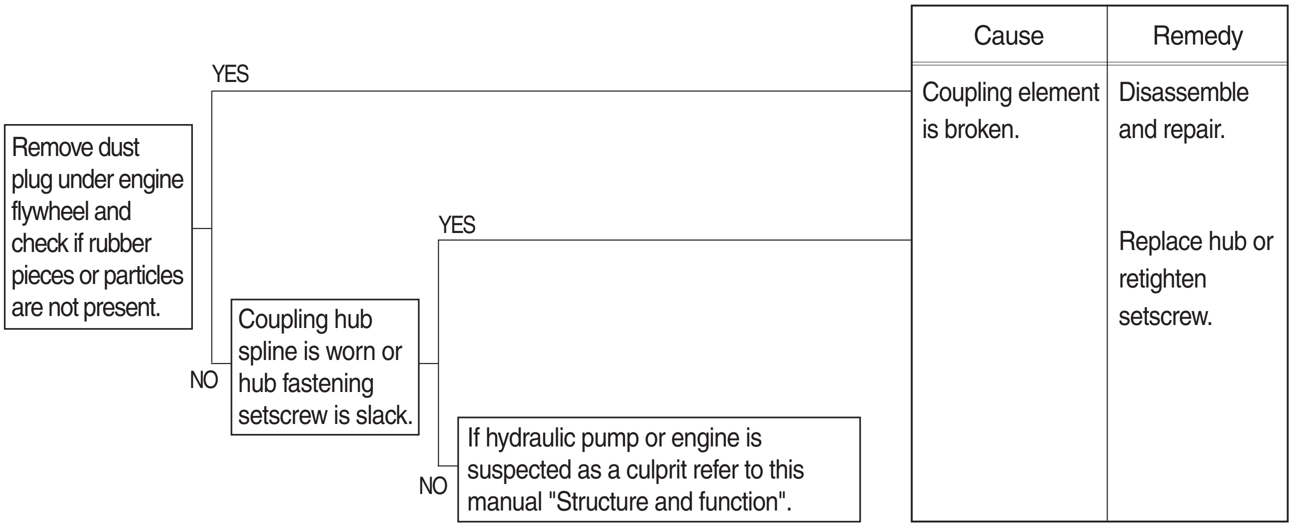
(3) When carrying out troubleshooting, do not hurry to disassemble the components.
It will become impossible to find the cause of the problem.

(4) Ask user or operator the following.
① Was there any strange thing about machine before failure occurred?
② Under what conditions did the failure occur?
③ Have any repairs been carried out before the failure?

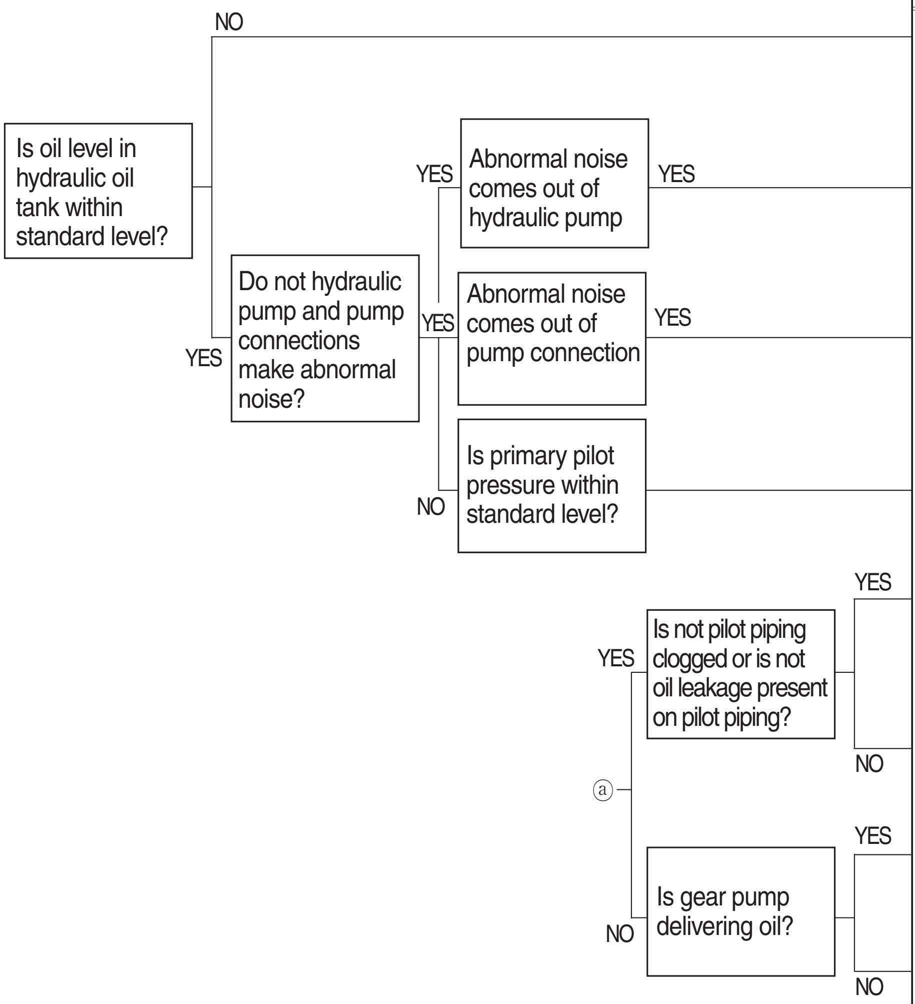
(5) Check before troubleshooting.
① Check oil and fuel level.
② Check for any external leakage of oil from components.
③ Check for loose or damage of wiring and connections.

2. DRIVE SYSTEM

1) UNUSUAL NOISE COMES OUT OF PUMP CONNECTION



2) ENGINE STARTS BUT MACHINE DOES NOT OPERATE AT ALL

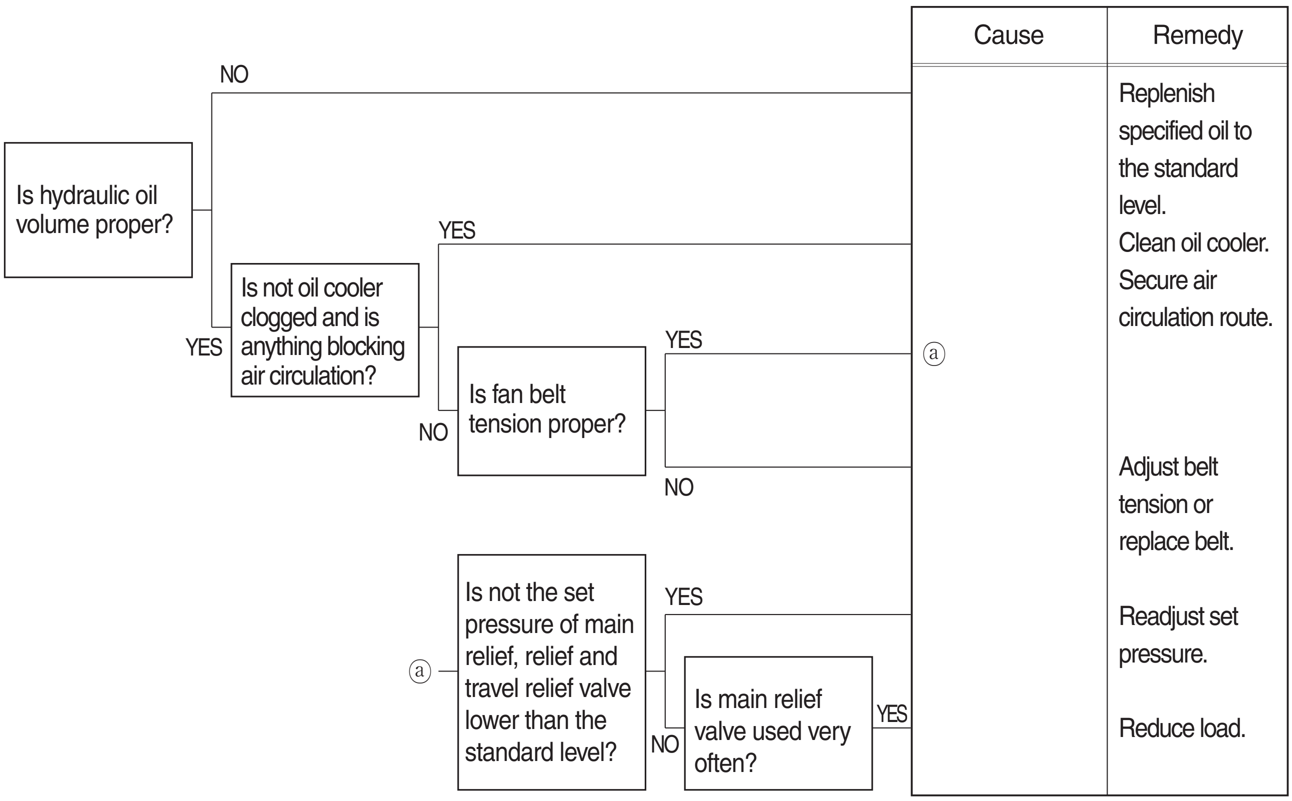


Cause	Remedy
	Replenish specified oil to the standard level.
Hydraulic pump is broken.	Disassemble and repair.
	see item 1). at page 5-5
ⓐ	
	Clean pilot piping interior or repair piping.
Pilot valve is faulty.	Disassemble and repair.
Pilot relief valve is faulty.	Repair or replace.
Gear pump is broken.	Disassemble and repair.

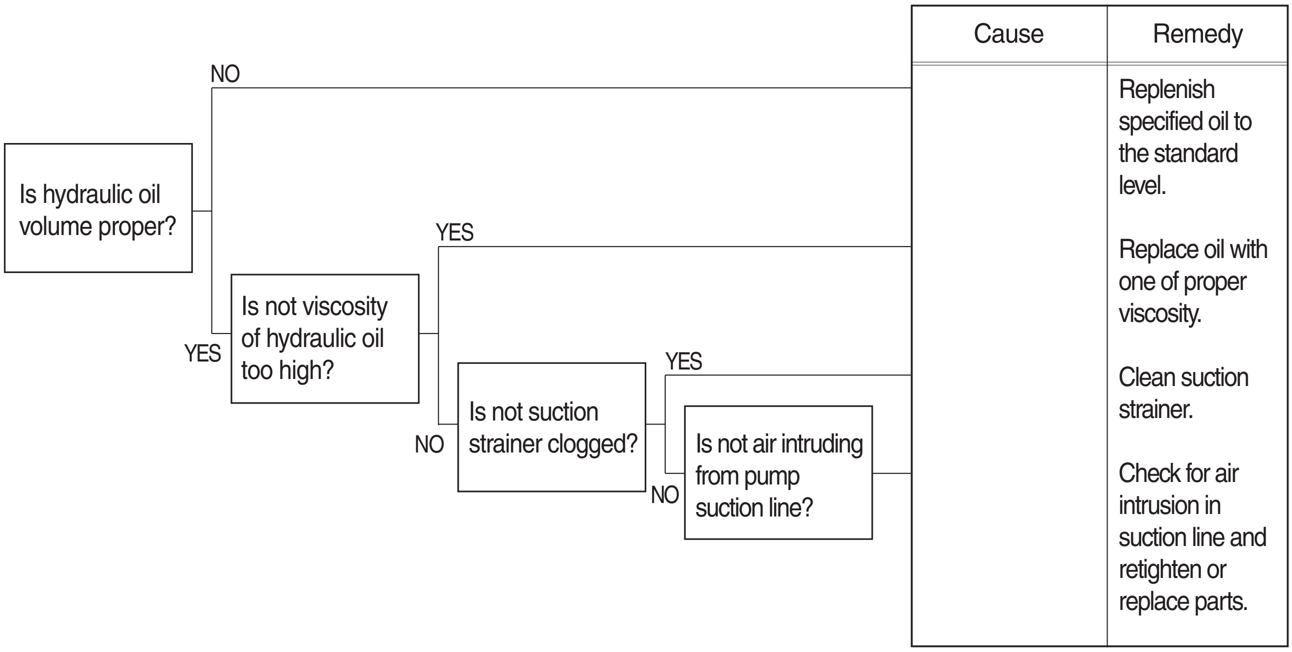
3. HYDRAULIC SYSTEM

1) HYDRAULIC OIL IS CLOUDY

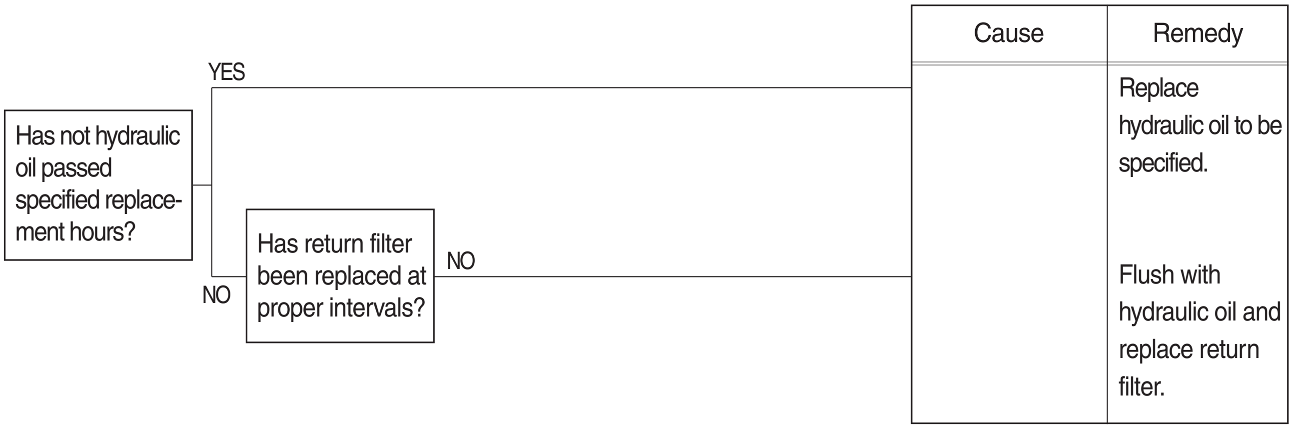
2) HYDRAULIC OIL TEMPERATURE HAS RISEN ABNORMALLY



3) CAVITATION OCCURS WITH PUMP

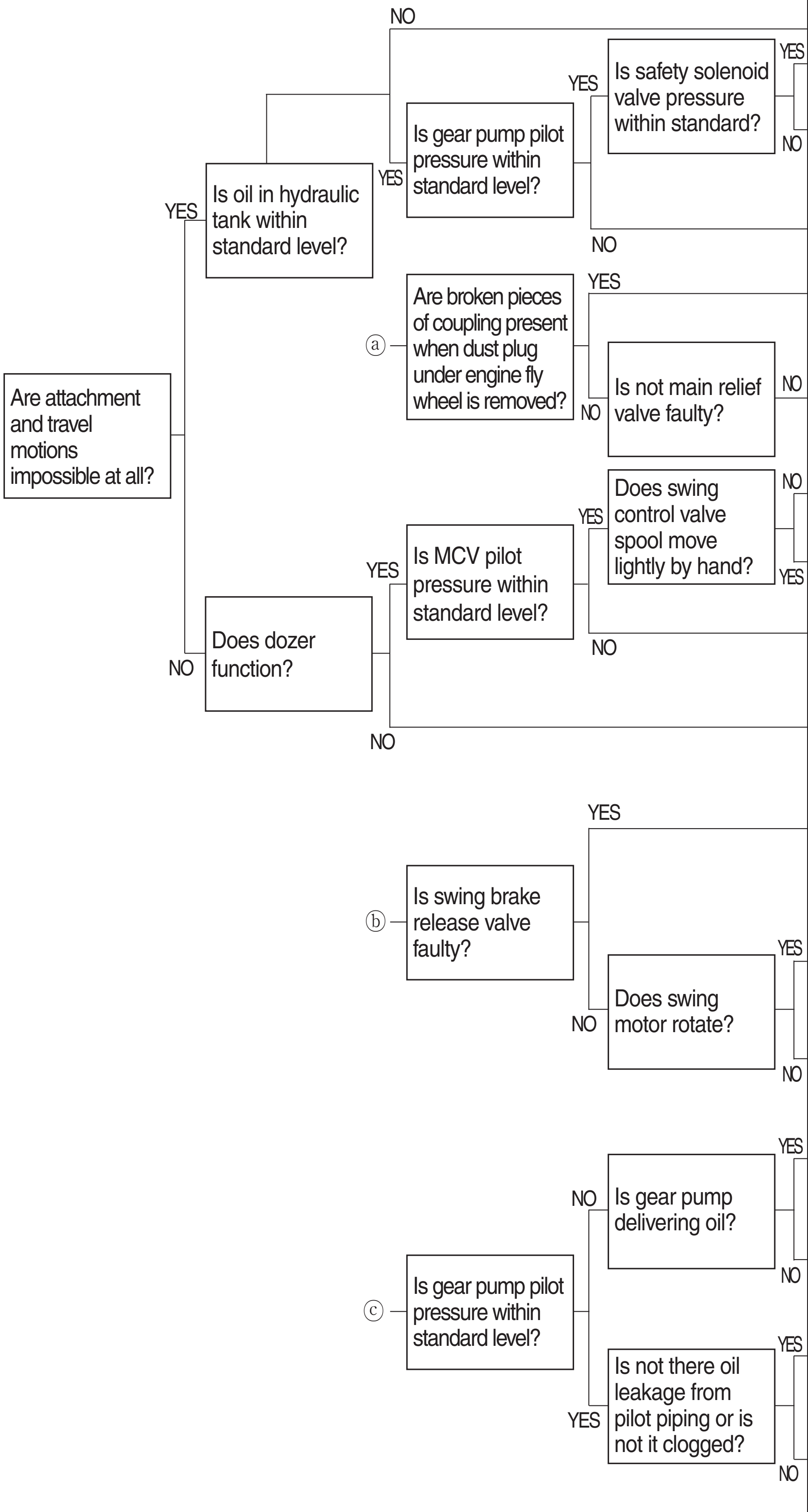


4) HYDRAULIC OIL IS CONTAMINATED



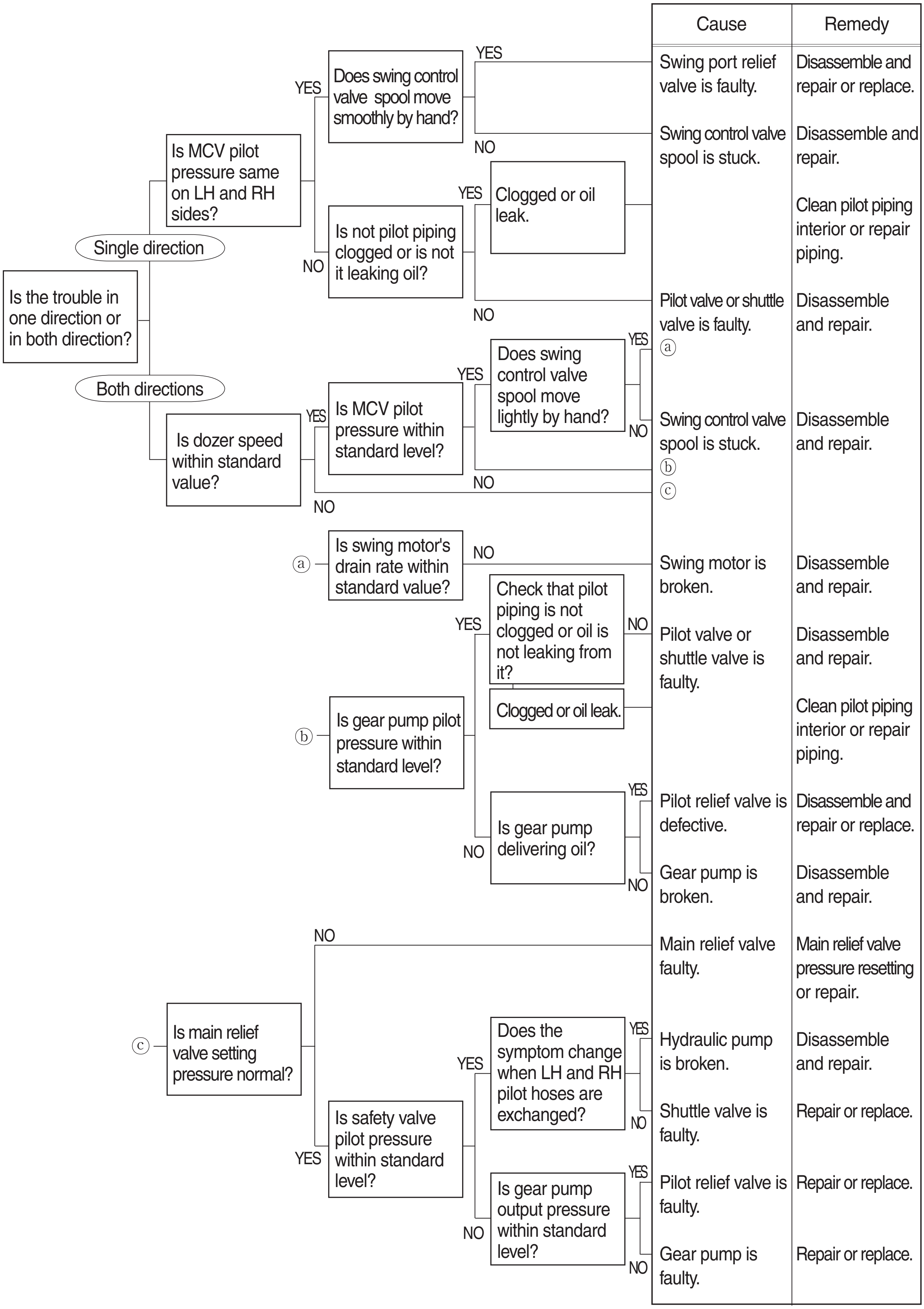
4. SWING SYSTEM

1) BOTH LH AND RH SWING ACTIONS ARE IMPOSSIBLE

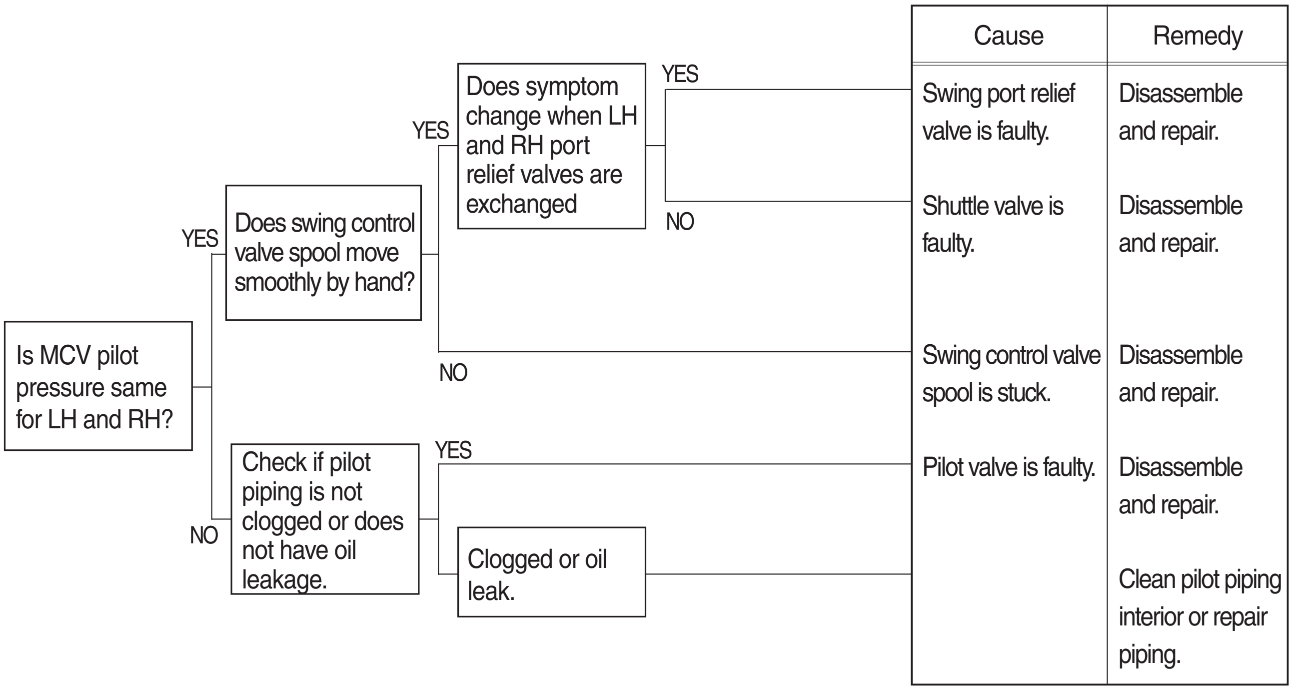


Cause	Remedy
	Replenish specified oil to the standard level.
ⓐ	
Safety valve faulty or not operated.	Repair or replace.
Gear pump faulty.	Repair or replace.
Pump connection coupling is broken.	Disassemble and repair.
Hydraulic pump is out of order.	Disassemble and repair.
Swing control valve spool is stuck.	Disassemble and repair.
ⓑ	
ⓒ	
Hydraulic pump is broken.	Disassemble and repair.
Swing brake release valve is broken.	Disassemble and repair.
Swing reduction unit is broken.	Disassemble and repair.
Swing motor is broken.	Disassemble and repair.
Pilot relief valve is faulty.	Disassemble and repair or replace.
Gear pump is out of order.	Disassemble and repair.
	Clean pilot piping interior or repair piping.
Pilot valve is broken.	Disassemble and repair.

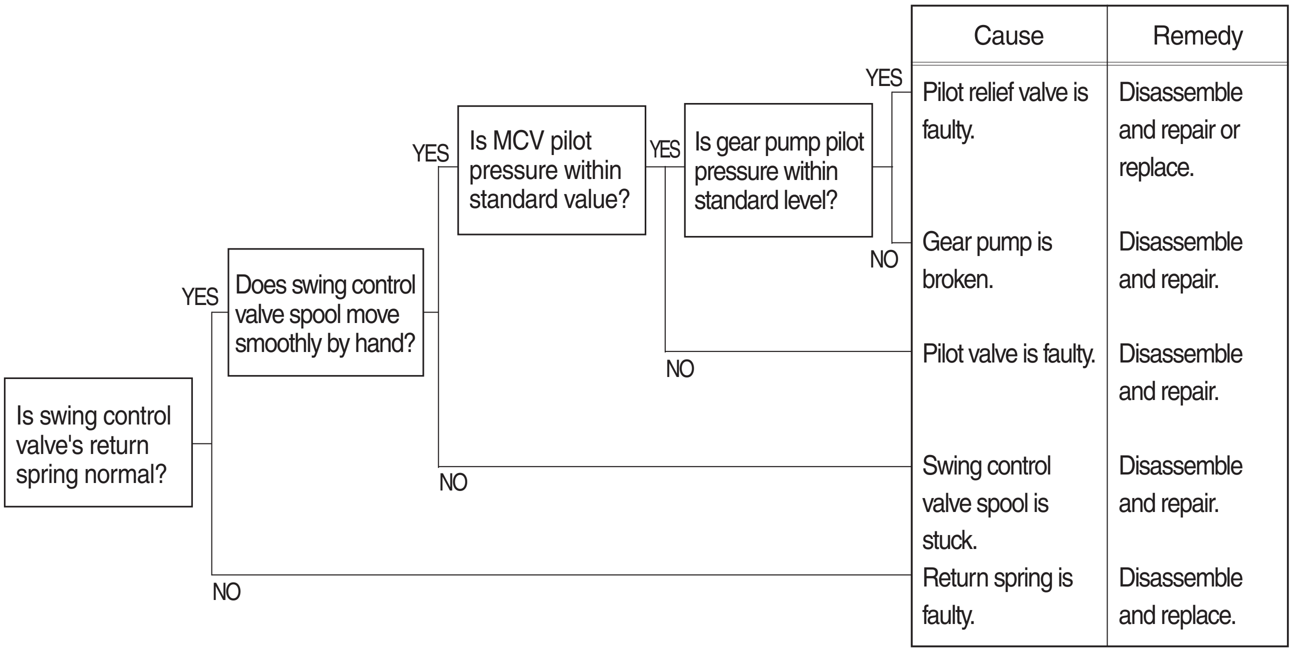
2) SWING SPEED IS LOW



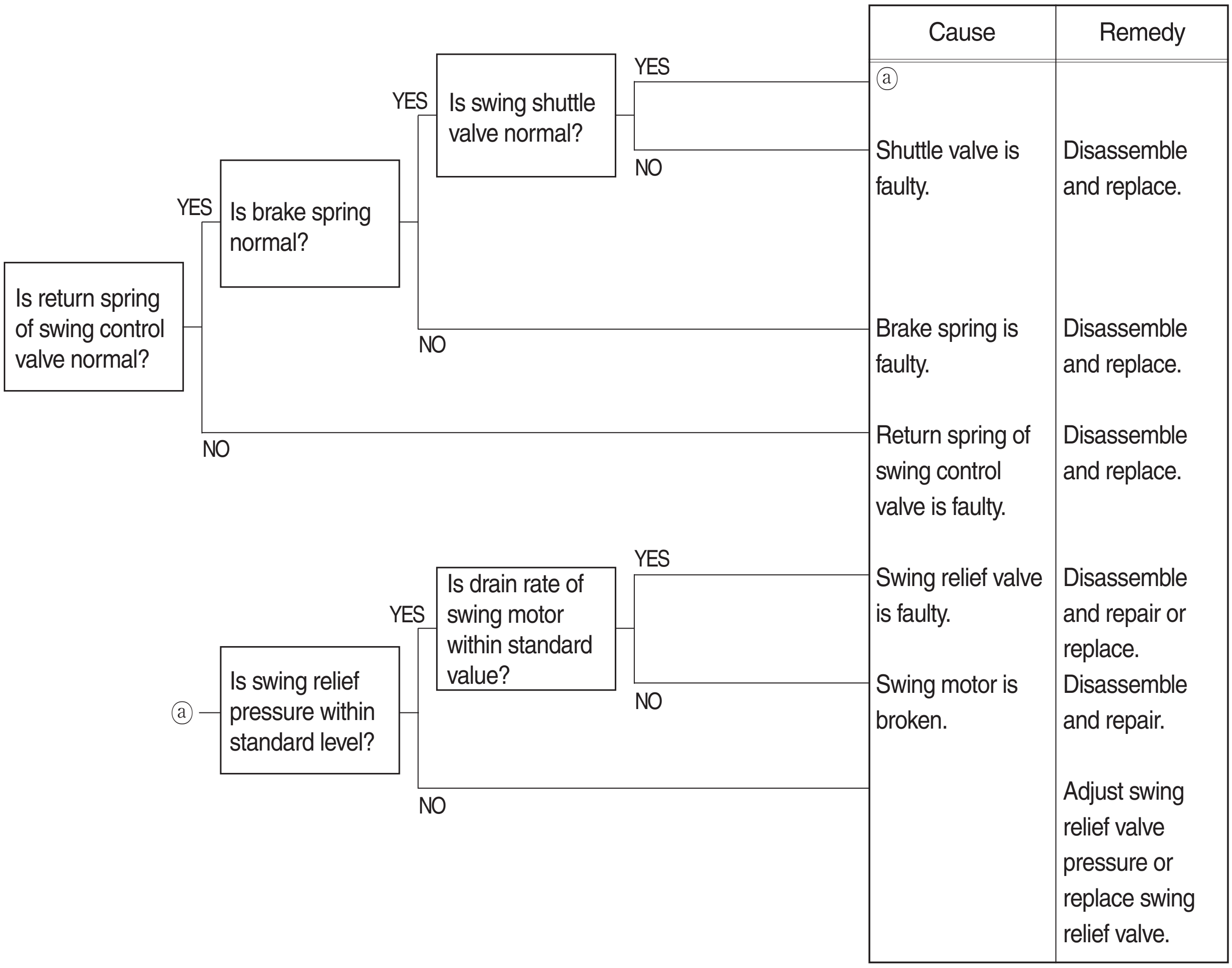
3) SWING MOTION IS IMPOSSIBLE IN ONE DIRECTION



4) MACHINE SWINGS BUT DOES NOT STOP

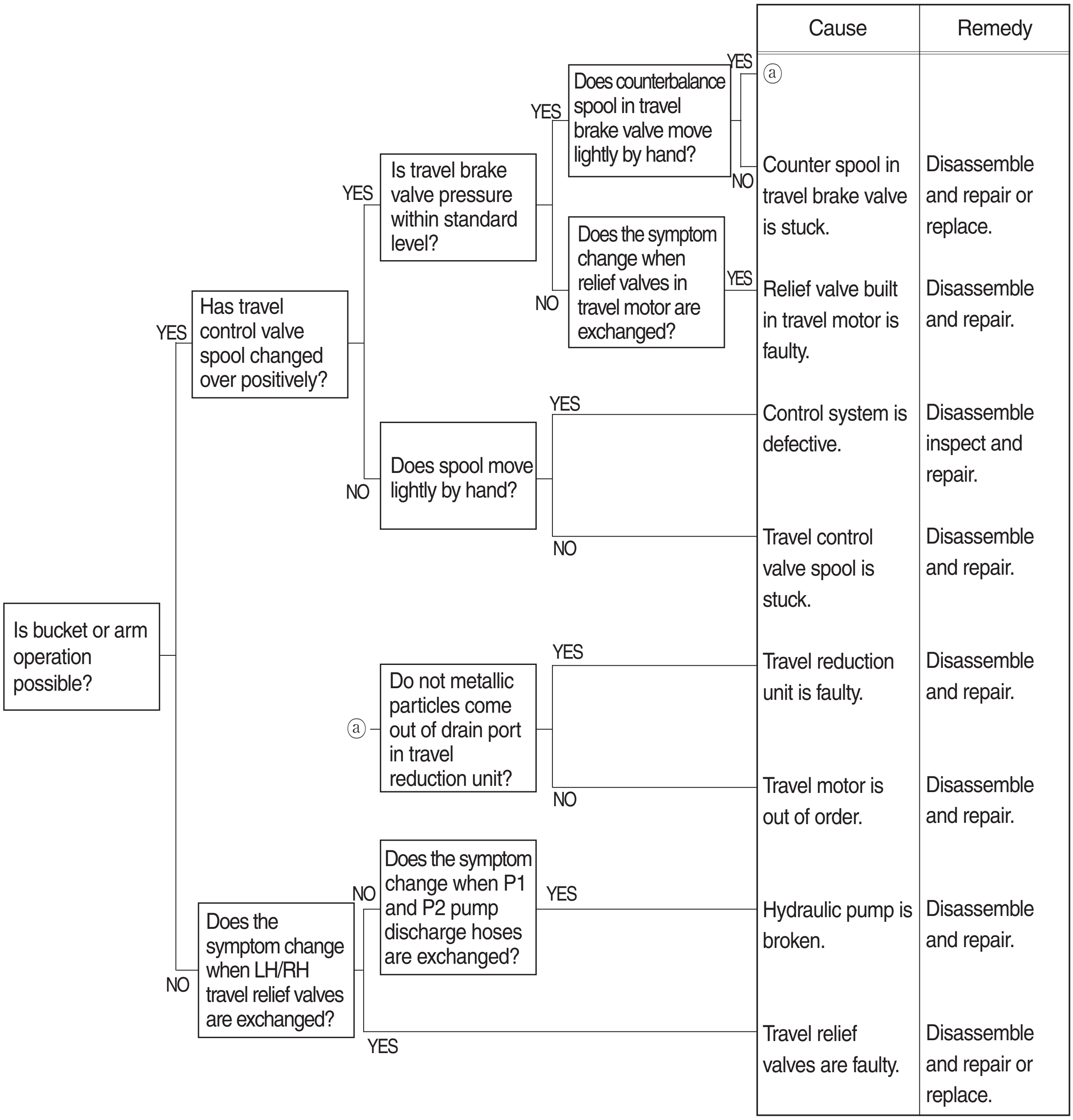


5) THE SWING UNIT DRIFTS WHEN THE MACHINE IS AT REST ON A SLOPE

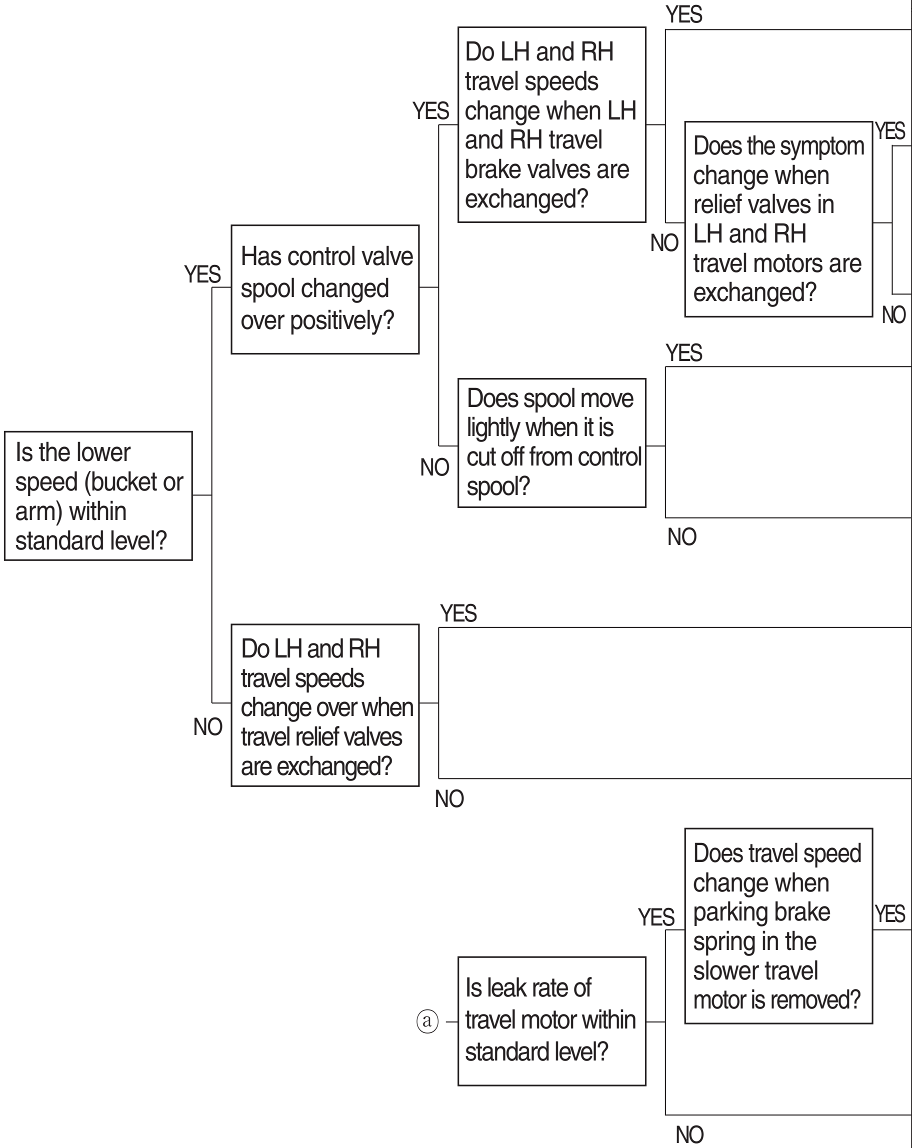


5. TRAVEL SYSTEM

1) TRAVEL DOES NOT FUNCTION AT ALL ON ONE SIDE



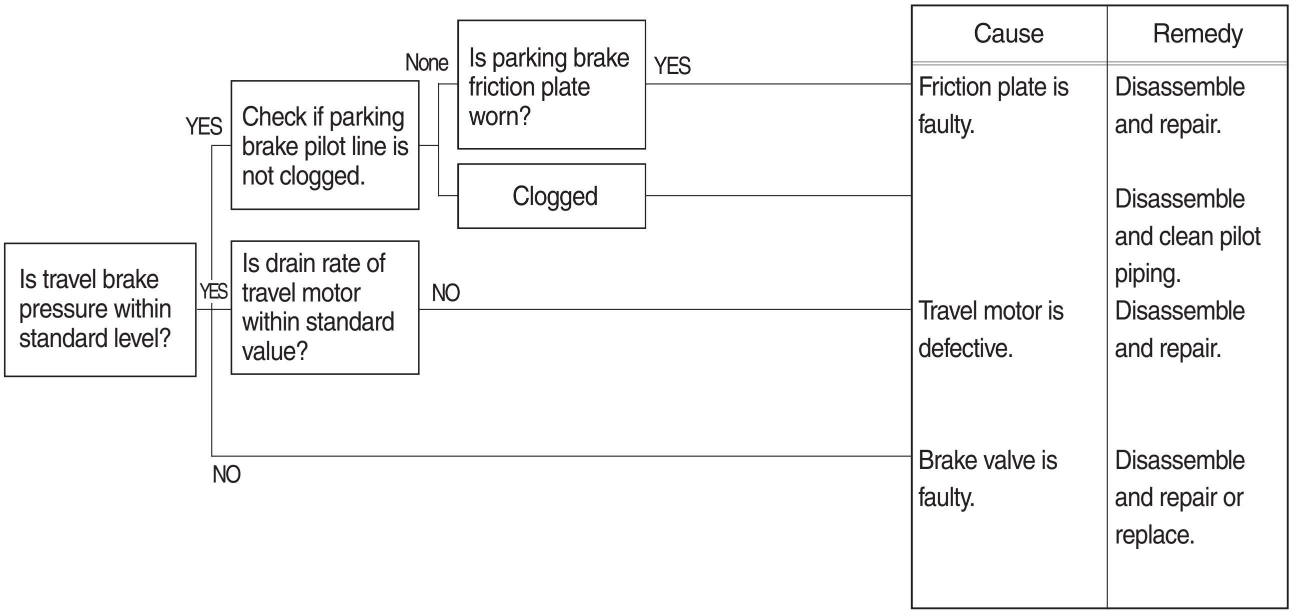
2) SPEED ON ONE SIDE FALLS AND THE MACHINE CURVES



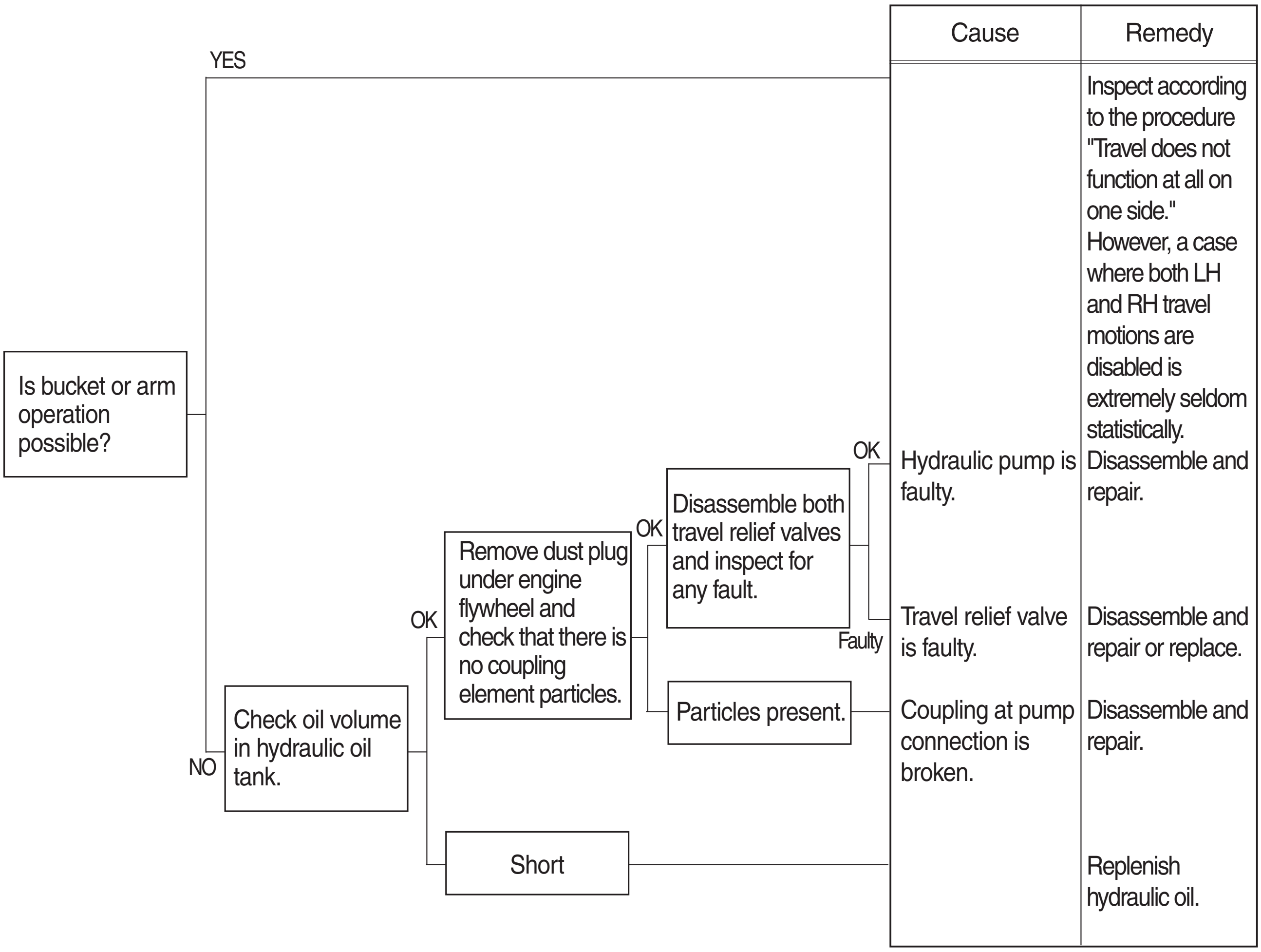
Cause	Remedy
Brake valve is defective.	Disassemble and repair or replace.
Relief valve built in travel motor is faulty.	Disassemble and repair.
ⓐ	
Control system is faulty .	Disassemble, inspect and repair.
Control valve spool is stuck.	Disassemble and repair.
Travel relief valve is faulty.	Disassemble and repair or replace.
Hydraulic pump is broken.	Disassemble and repair.
Travel motor's parking brake is not released properly.	Disassemble and clean pilot piping.
Travel motor is faulty.	Disassemble and repair.

3) MACHINE DOES NOT STOP ON A SLOPE

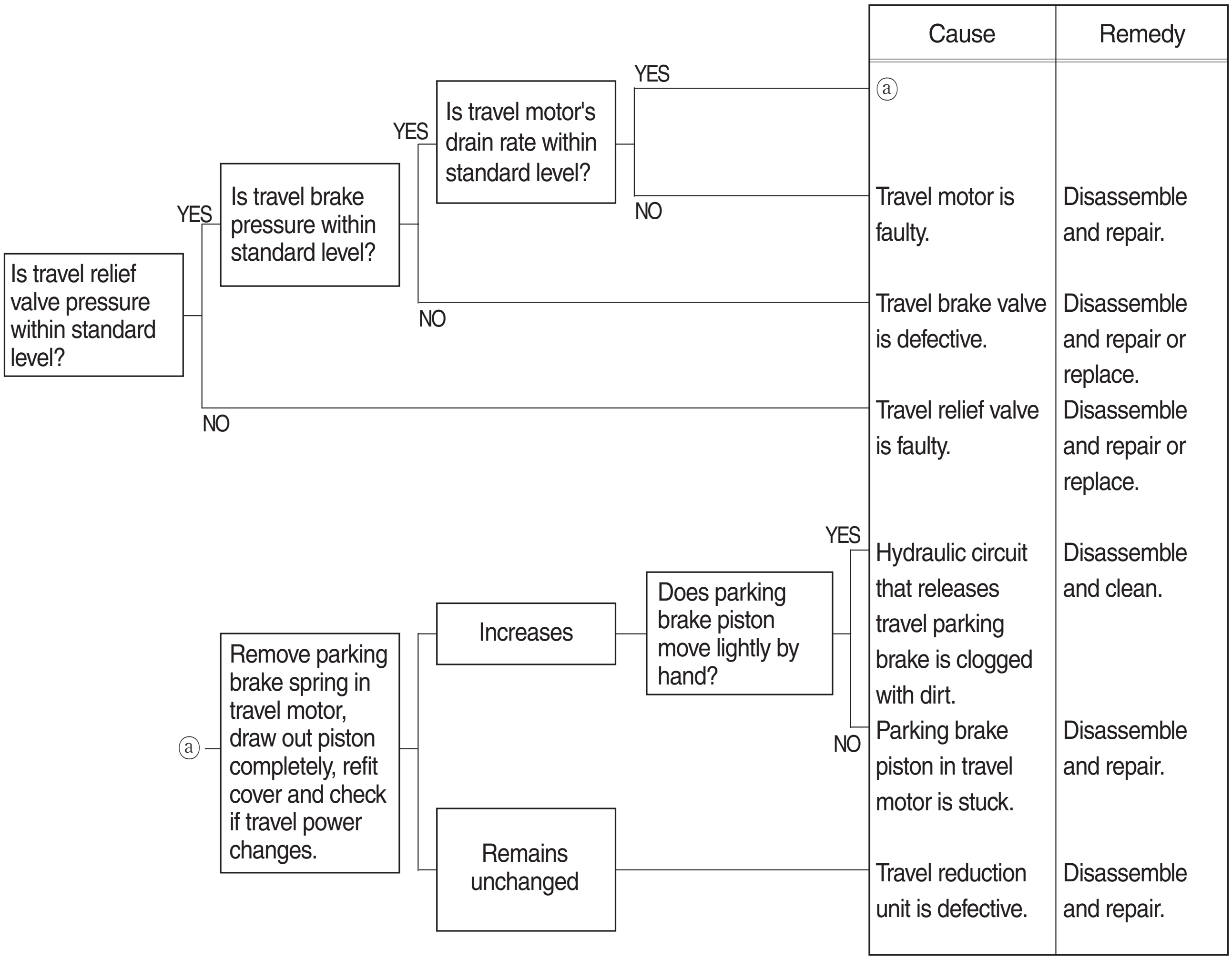
Machine is pulled forward as sprocket rotates during digging operation.



4) LH AND RH TRAVEL MOTIONS ARE IMPOSSIBLE

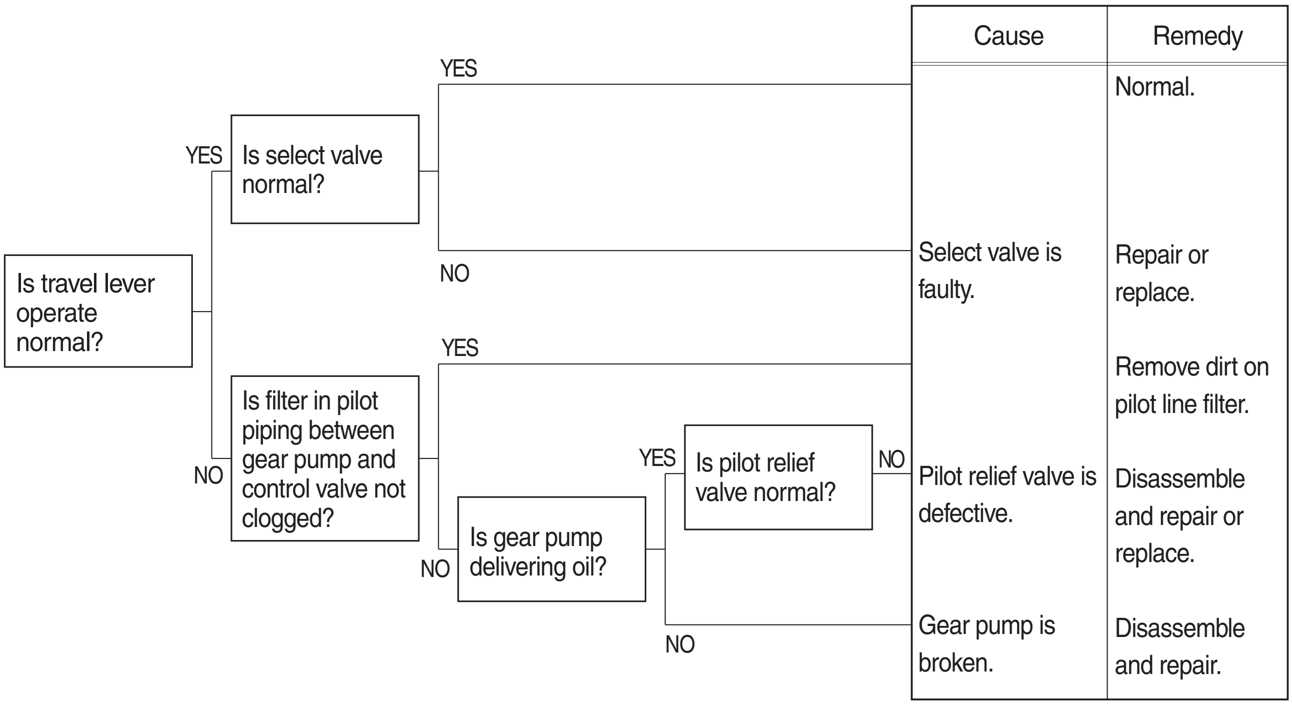


5) TRAVEL ACTION IS POWERLESS (travel only)



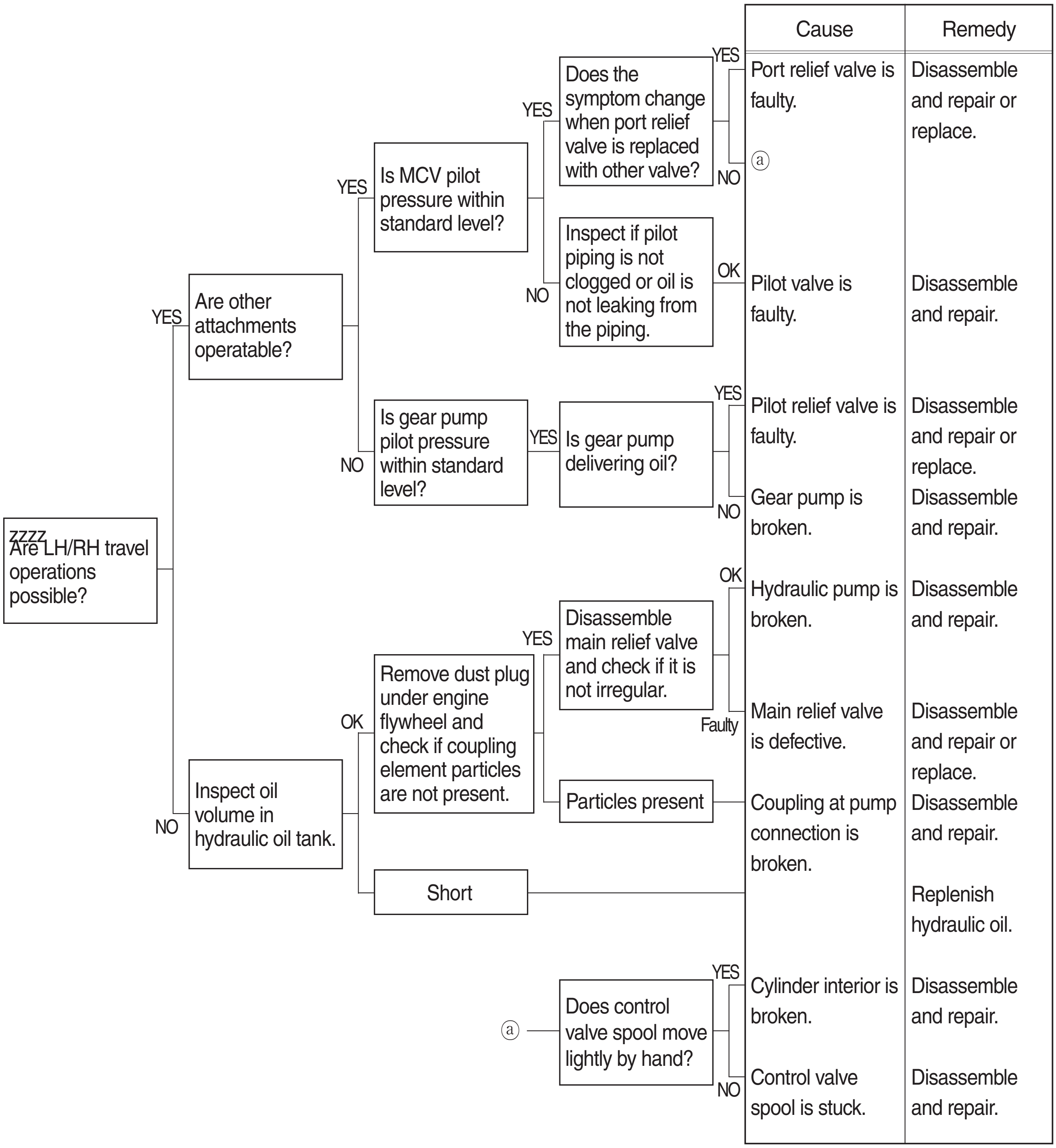
6) MACHINE RUNS RECKLESSLY ON A SLOPE

7) MACHINE MAKES A CURVED TRAVEL OR DOES NOT TRAVEL AT ALL WHEN TRAVEL AND ATTACHMENT OPERATIONS ARE EXECUTED AT THE SAME TIME

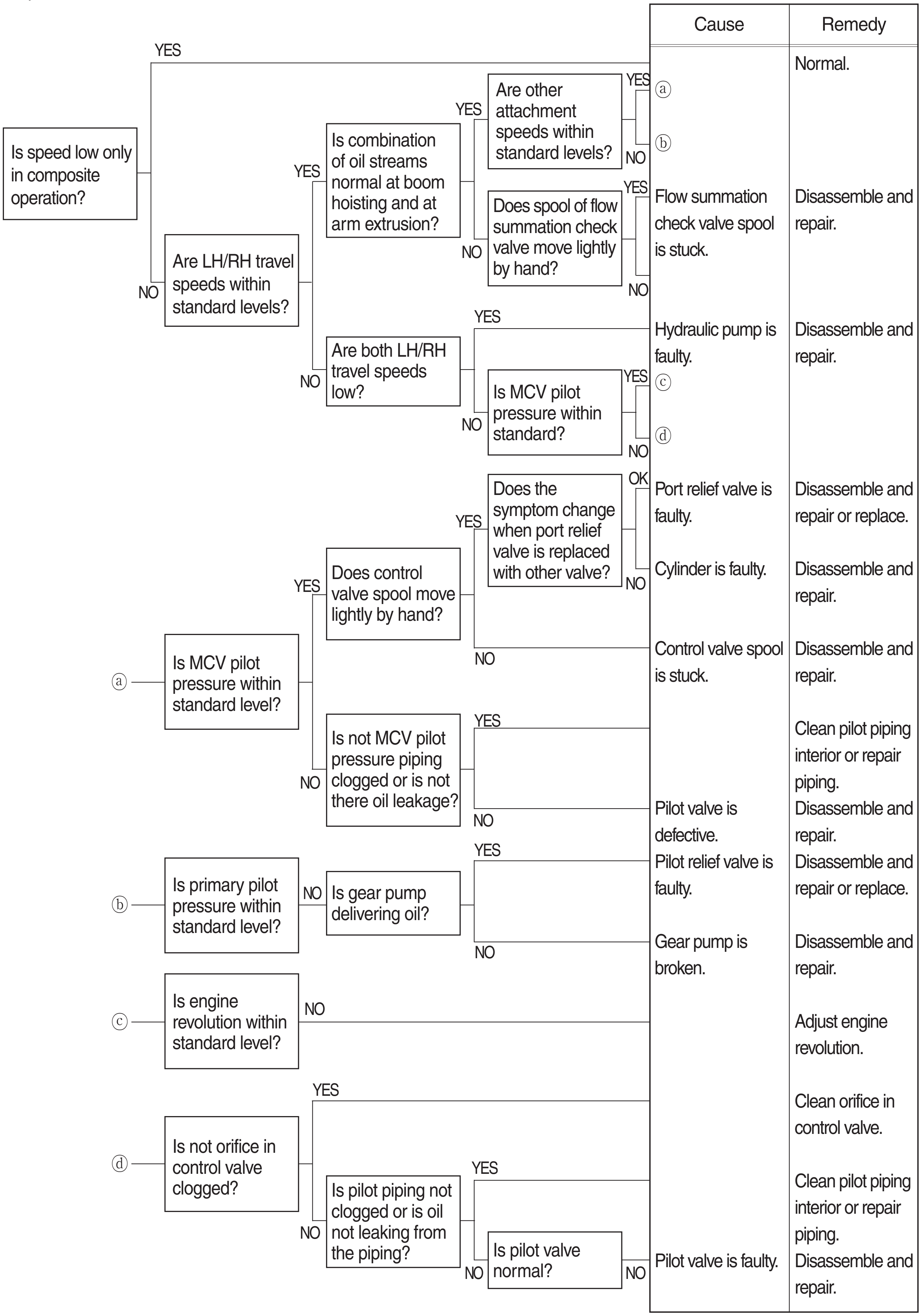


6. ATTACHMENT SYSTEM

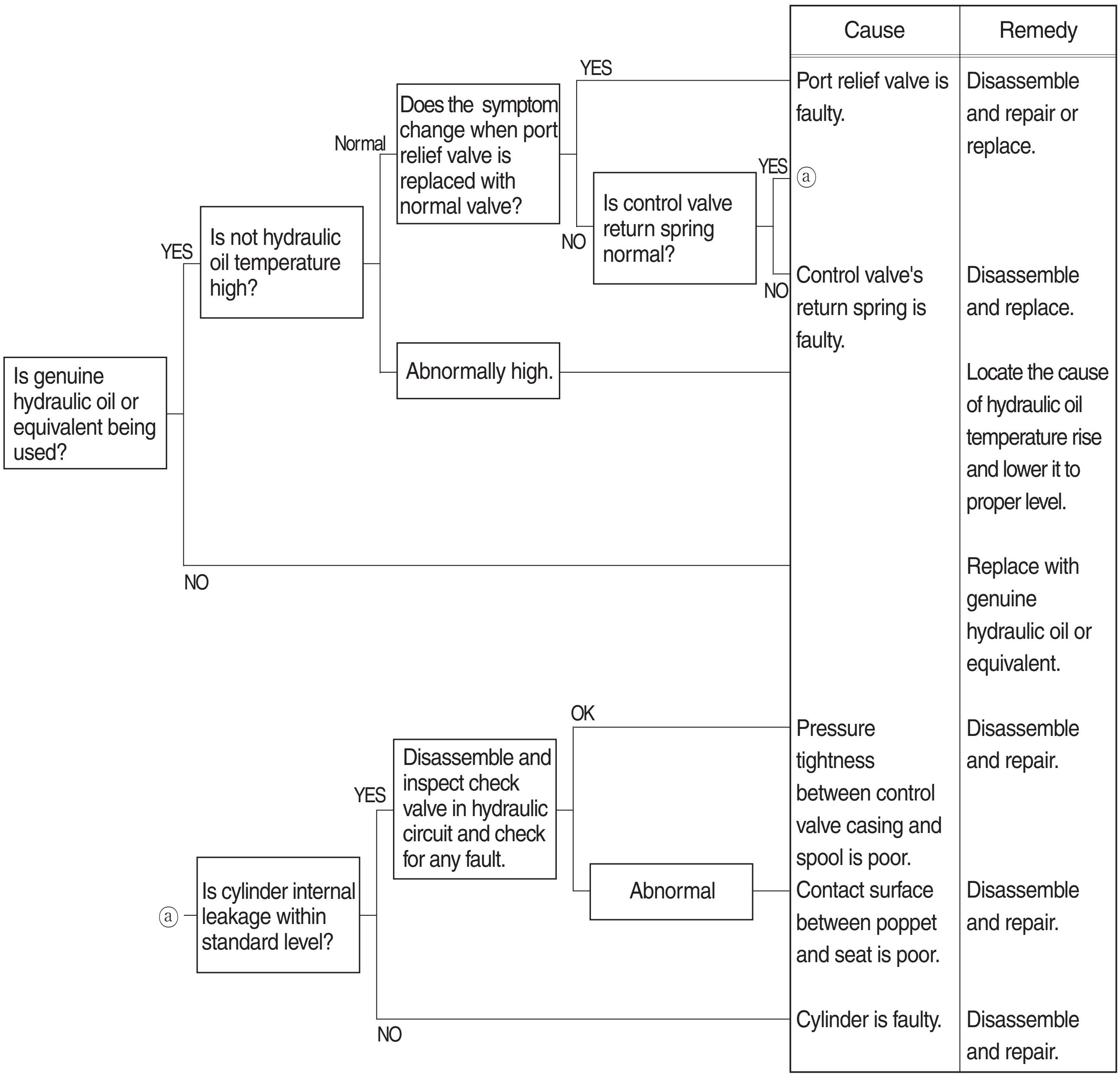
1) BOOM OR ARM ACTION IS IMPOSSIBLE AT ALL



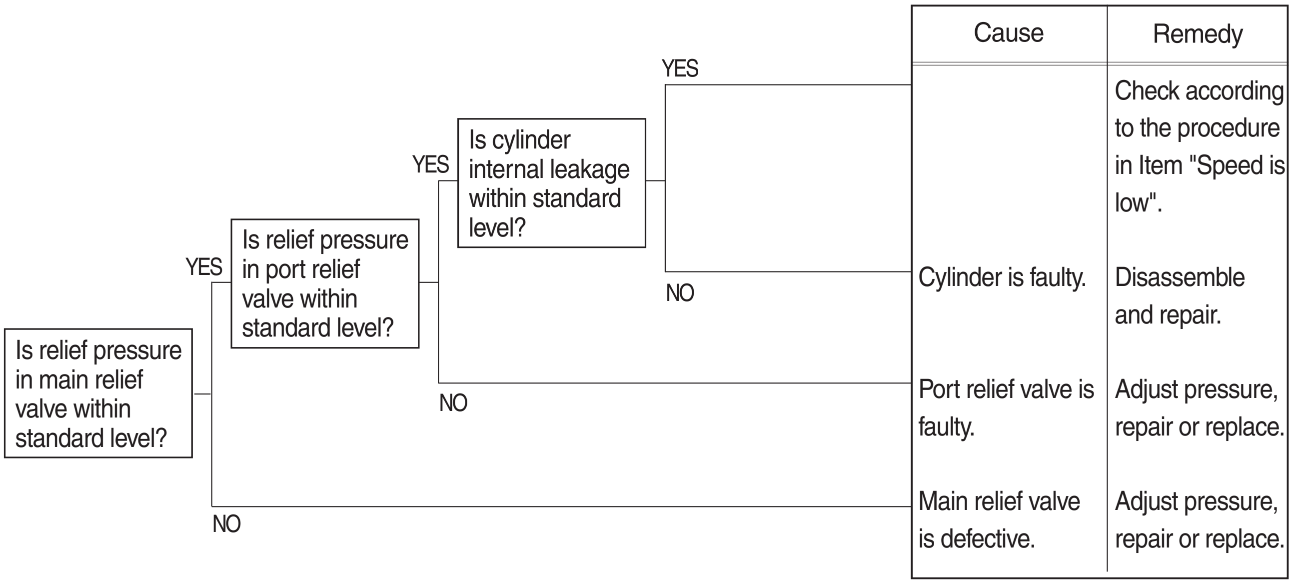
2) BOOM, ARM OR BUCKET SPEED IS LOW



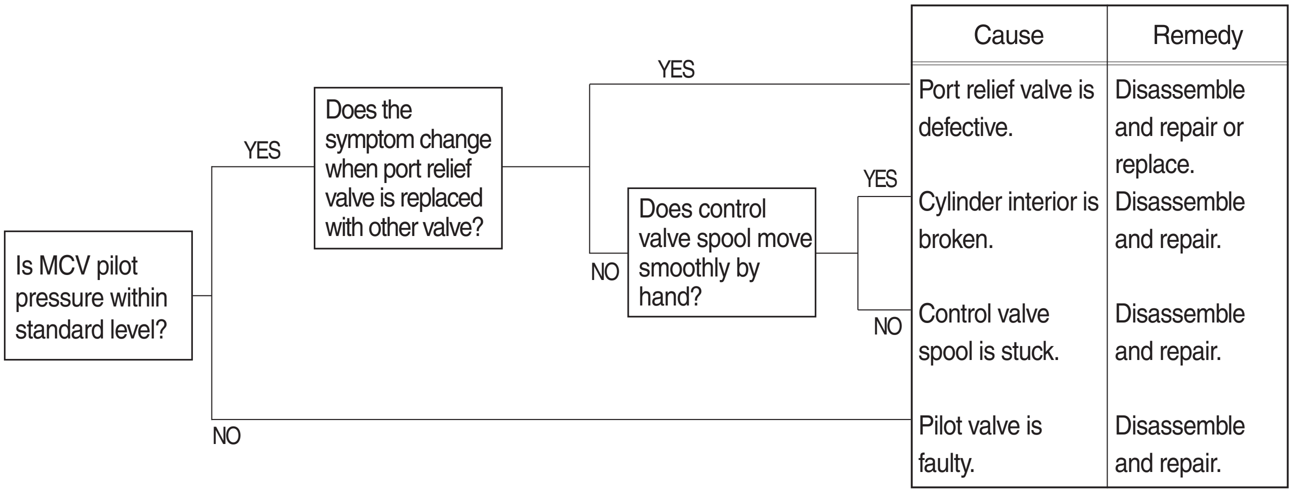
3) BOOM, ARM OR BUCKET CYLINDER EXTENDS OR CONTRACTS ITSELF AND ATTACHMENT FALLS



4) BOOM, ARM OR BUCKET POWER IS WEAK



5) ONLY BUCKET OPERATION IS TOTALLY IMPOSSIBLE



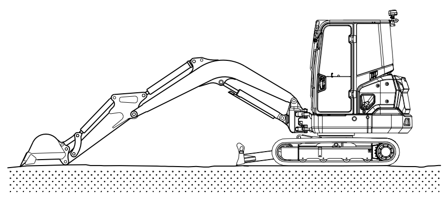
6) BOOM MAKES A SQUEAKING NOISE WHEN BOOM IS OPERATED

Is boom foot pin greased sufficiently?

	Cause	Remedy
YES		Frictional noise occurs between the sliding faces of boom cylinder's oil seal and boom proper. ※ Frictional noise will disappear if they are kept used.
NO	Boom foot pin has run out of grease.	Supply grease to it. ※ If seizure is in an initial stage, supply sufficient grease. If seizure is in a grown state, correct it by paper lapping or with an oil stone.

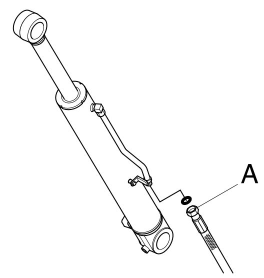
※ HOW TO CHECK INTERNAL BOOM CYLINDER LEAKAGE

1. Lower the bucket teeth to the ground with bucket cylinder fully retracted and arm cylinder rod retracted almost in full.



40A5TS01

2. Disconnect hose (A) from rod side of boom cylinder and drain oil from cylinders and hose. (put cups on piping and hose ends)



R5575BY02

3. Raise bucket OFF the ground by retracting the arm cylinder rod.

If oil leaks from piping side and boom cylinder rod is retracted there is an internal leak in the cylinder.
If no oil leaks from piping side and boom cylinder rod is retracted, there is an internal leak in the control valve.

40A5TS02

GROUP 3 ELECTRICAL SYSTEM

1. WHEN STARTING SWITCH IS TURNED ON, MONITOR PANEL DISPLAY DOES NOT APPEAR

· Before disconnecting the connector, always turn the starting switch OFF.

· Before carrying out below procedure, check all the related connectors are properly inserted and short of fuse No. 4.

· After checking, insert the disconnected connectors again immediately unless otherwise specified.

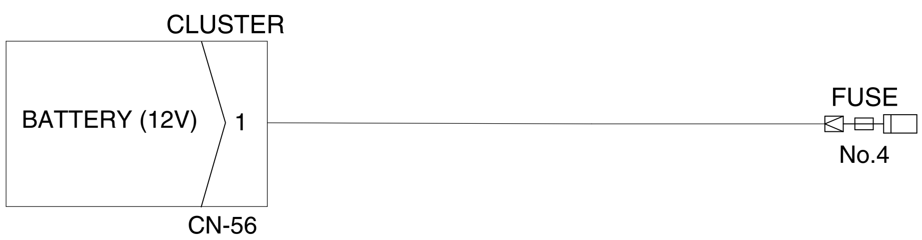
Check voltage between CN-56 (1) and chassis

Starting switch : ON
Voltage : 10~12.5V

	Cause	Remedy
YES	Defective cluster	Replace
NO	Disconnection in wiring harness or poor contact between CN-56 (1) and fuse No.4.	Repair or replace (after clean)

Check voltage

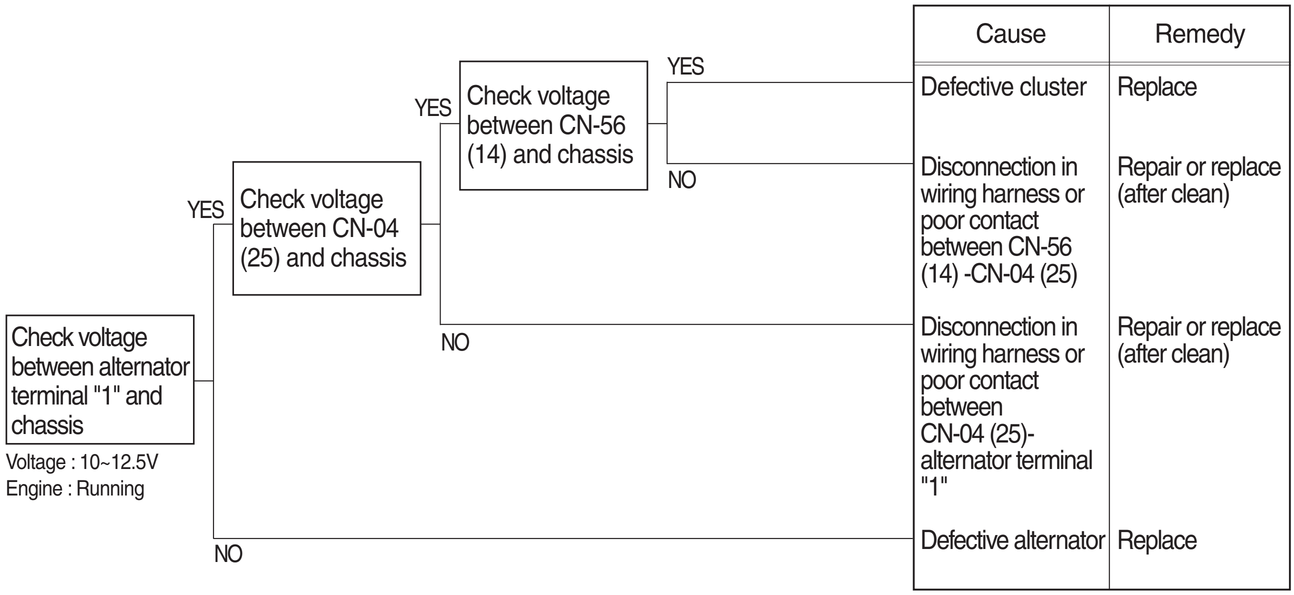
YES	10 ~ 12.5V
NO	0V



35AZ5TS10

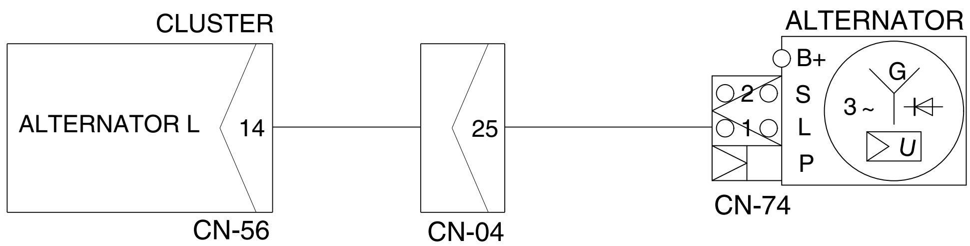
2. BATTERY CHARGING WARNING LAMP LIGHTS UP (starting switch : ON)

- Before disconnecting the connector, always turn the starting switch OFF.
- Before carrying out below procedure, check all the related connectors are properly inserted.
- After checking, insert the disconnected connectors again immediately unless otherwise specified.



Check voltage

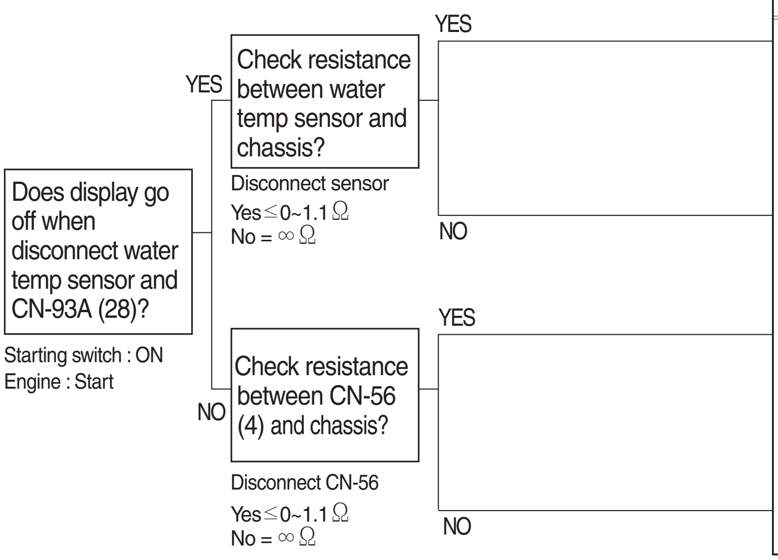
YES	10 ~ 12.5V
NO	0V



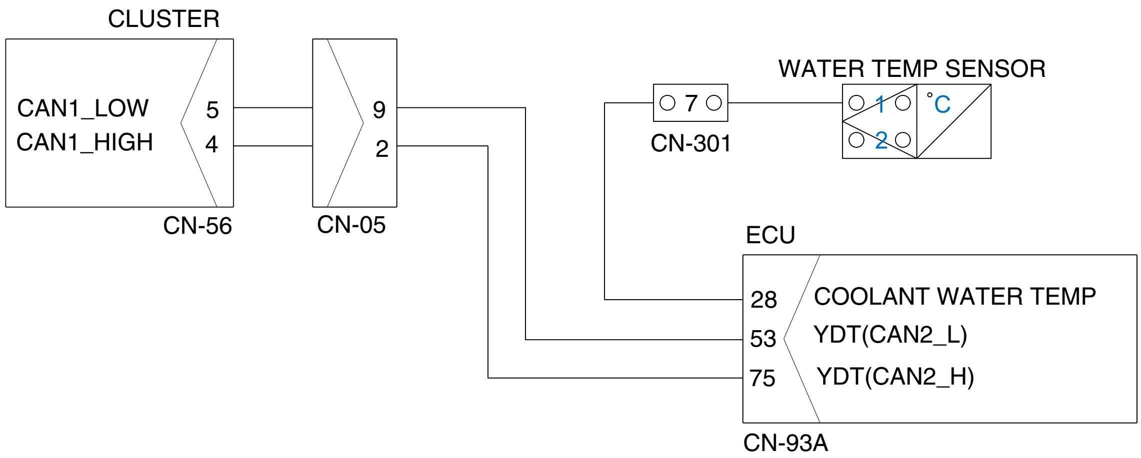
48AZ5TS11

3. WHEN COOLANT OVERHEAT WARNING LAMP LIGHTS UP (engine is started)

· Before disconnecting the connector, always turn the starting switch OFF.
· Before carrying out below procedure, check all the related connectors are properly inserted.
· After checking, insert the disconnected connectors again immediately unless otherwise specified.



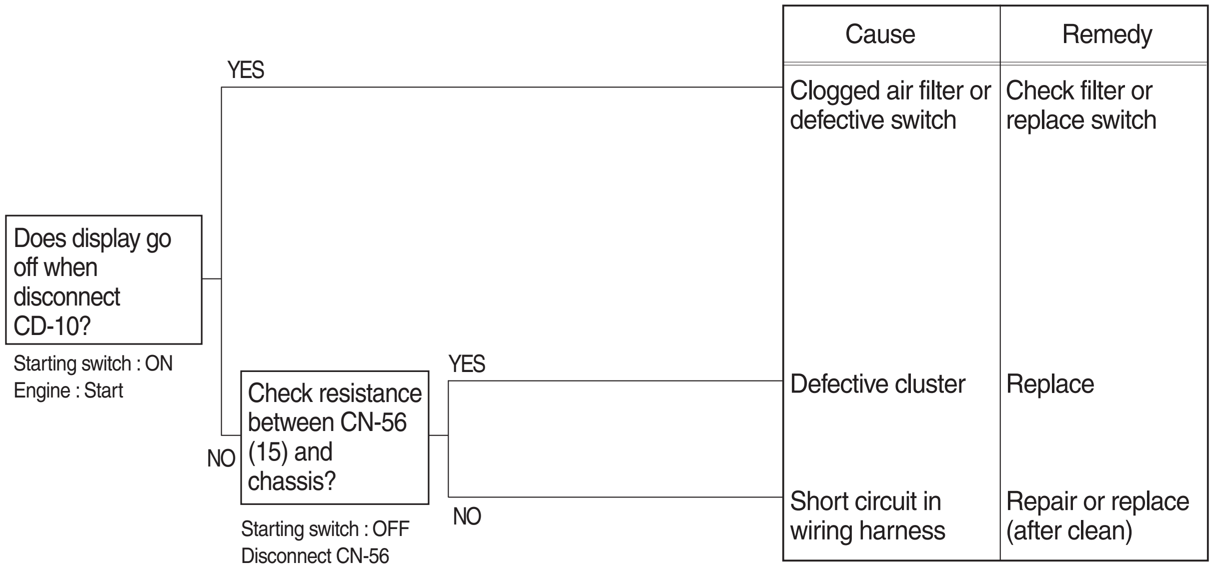
Cause	Remedy
Coolant overheat (115°C ±2°C) or defective temp sensor	Check engine cooling system or replace temp sensor
Defective ECU	Repair or replace the ECU
Short circuit in wiring harness or poor contact between CN-56 (4) and CN-93A (75)	Repair or replace (after clean)
Defective cluster	Replace



48AZ5TS12

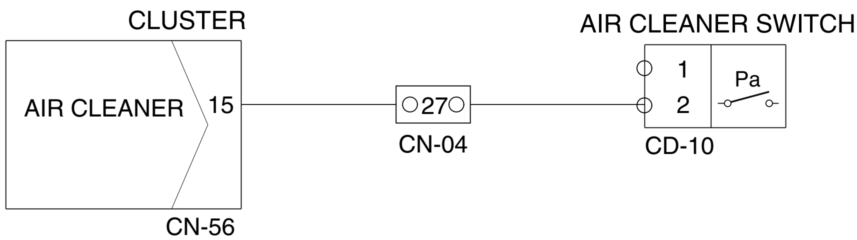
4. WHEN AIR CLEANER WARNING LAMP LIGHTS UP (engine is started)

· Before disconnecting the connector, always turn the starting switch OFF.
· Before carrying out below procedure, check all the related connectors are properly inserted.
· After checking, insert the disconnected connectors again immediately unless otherwise specified.



Check resistance

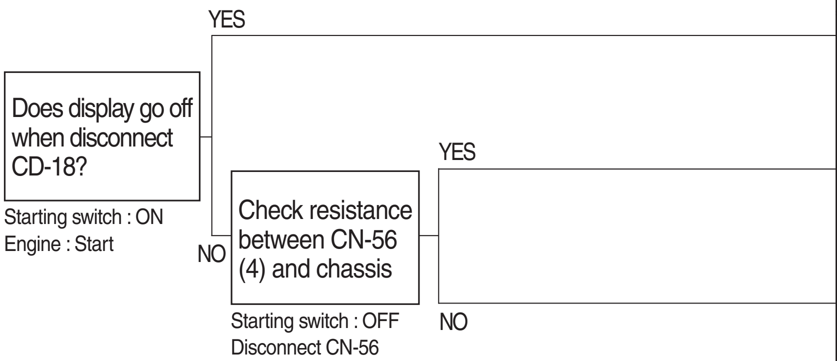
YES	MAX 1Ω
NO	MIN 1MΩ



48AZ5TS13

5. WHEN ENGINE OIL PRESSURE WARNING LAMP LIGHTS UP (engine is started)

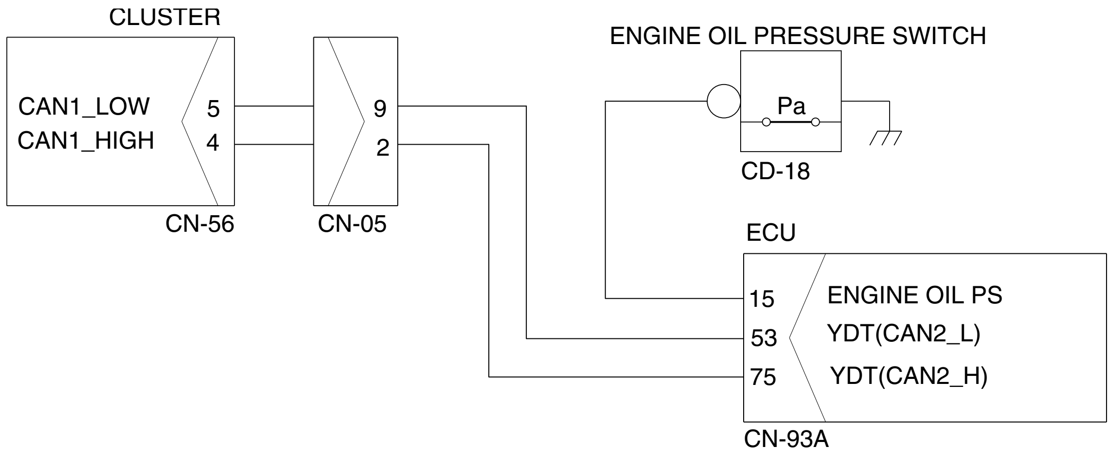
· Before disconnecting the connector, always turn the starting switch OFF.
· Before carrying out below procedure, check all the related connectors are properly inserted.
· After checking, insert the disconnected connectors again immediately unless otherwise specified.



Cause	Remedy
Engine oil leakage, or defective switch	Check engine oil level or replace switch
Defective cluster	Replace
Disconnection in wiring harness or poor contact between CN-56 (4)-CD-18	Repair or replace (after clean)

Check resistance

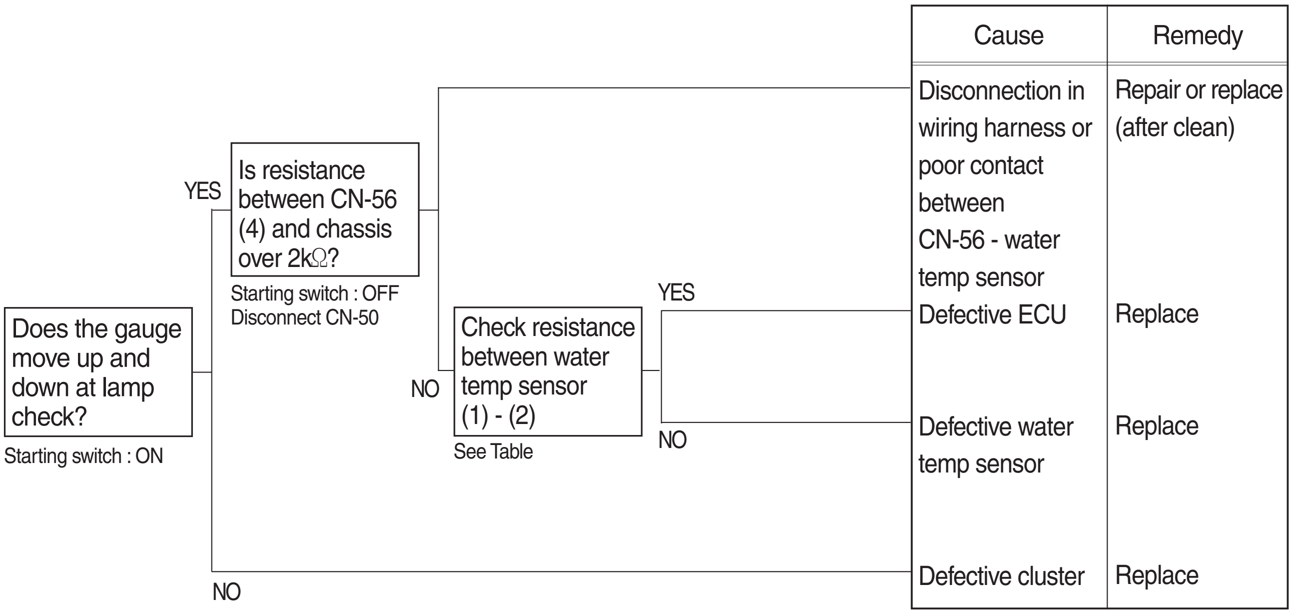
YES	MAX 1Ω
NO	MIN 1MΩ



48AZ5TS14

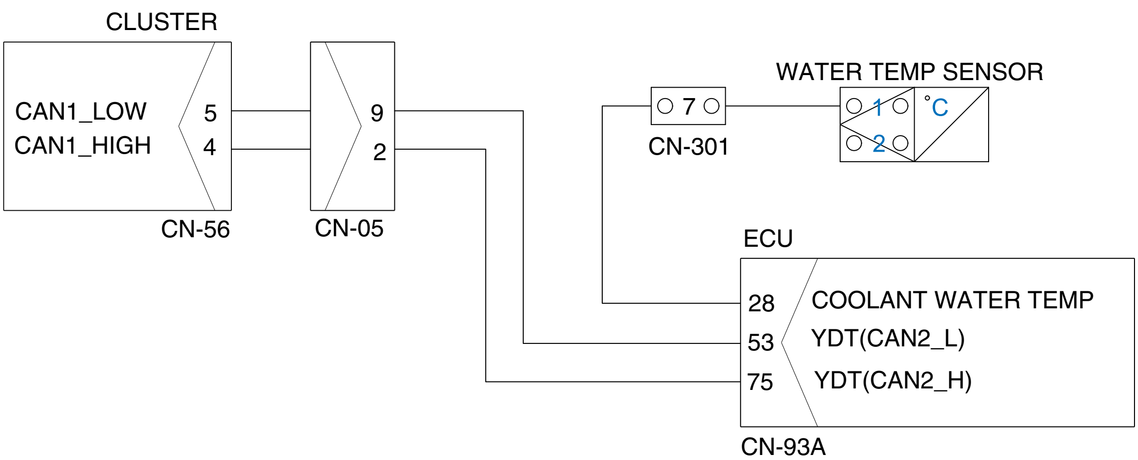
6. WHEN COOLANT TEMPERATURE GAUGE DOES NOT OPERATE

- Before disconnecting the connector, always turn the starting switch OFF.
- Before carrying out below procedure, check all the related connectors are properly inserted.
- After checking, insert the disconnected connectors again immediately unless otherwise specified.



Check Table

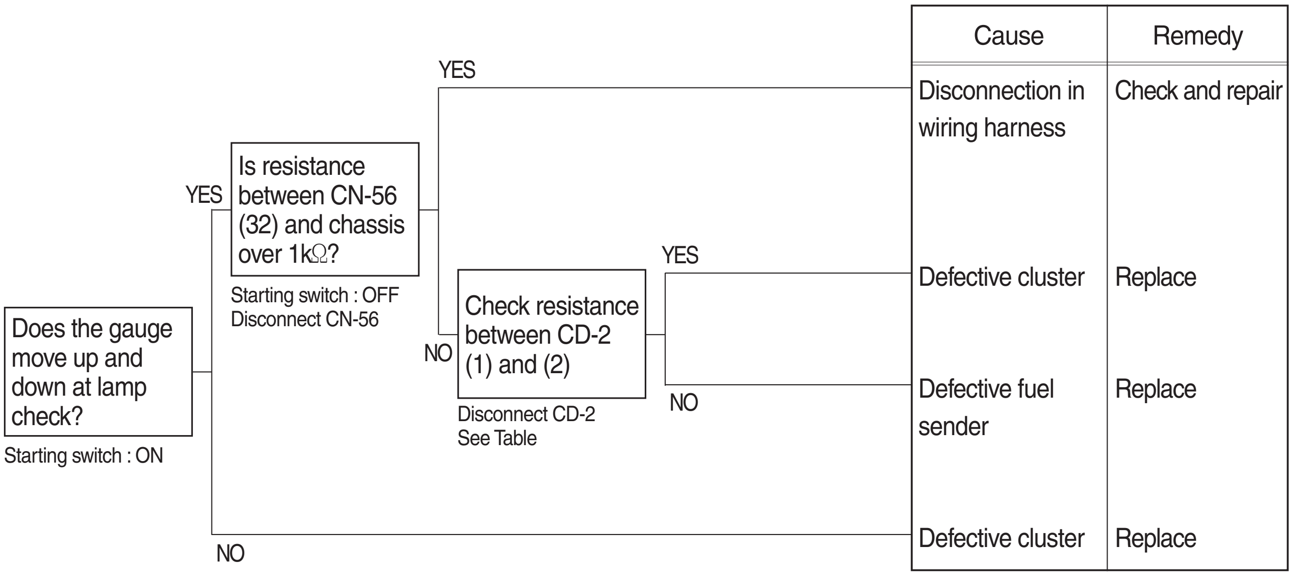
Item \ Temperature	50°C	80°C	100°C	115°C (red range)
Ω	350	118	63.5	36.2



48AZ5TS12

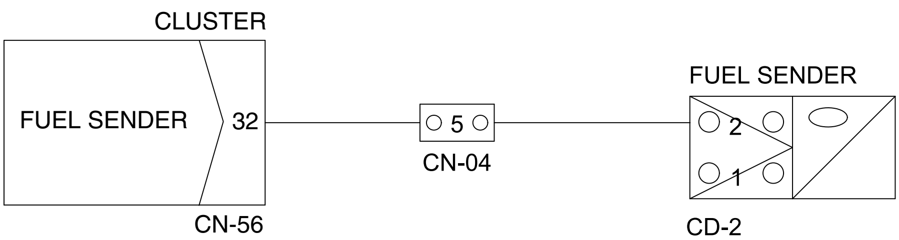
7. WHEN FUEL GAUGE DOES NOT OPERATE (check warning lamp ON/OFF)

- Before disconnecting the connector, always turn the starting switch OFF.
- Before carrying out below procedure, check all the related connectors are properly inserted.
- After checking, insert the disconnected connectors again immediately unless otherwise specified.



Check Table

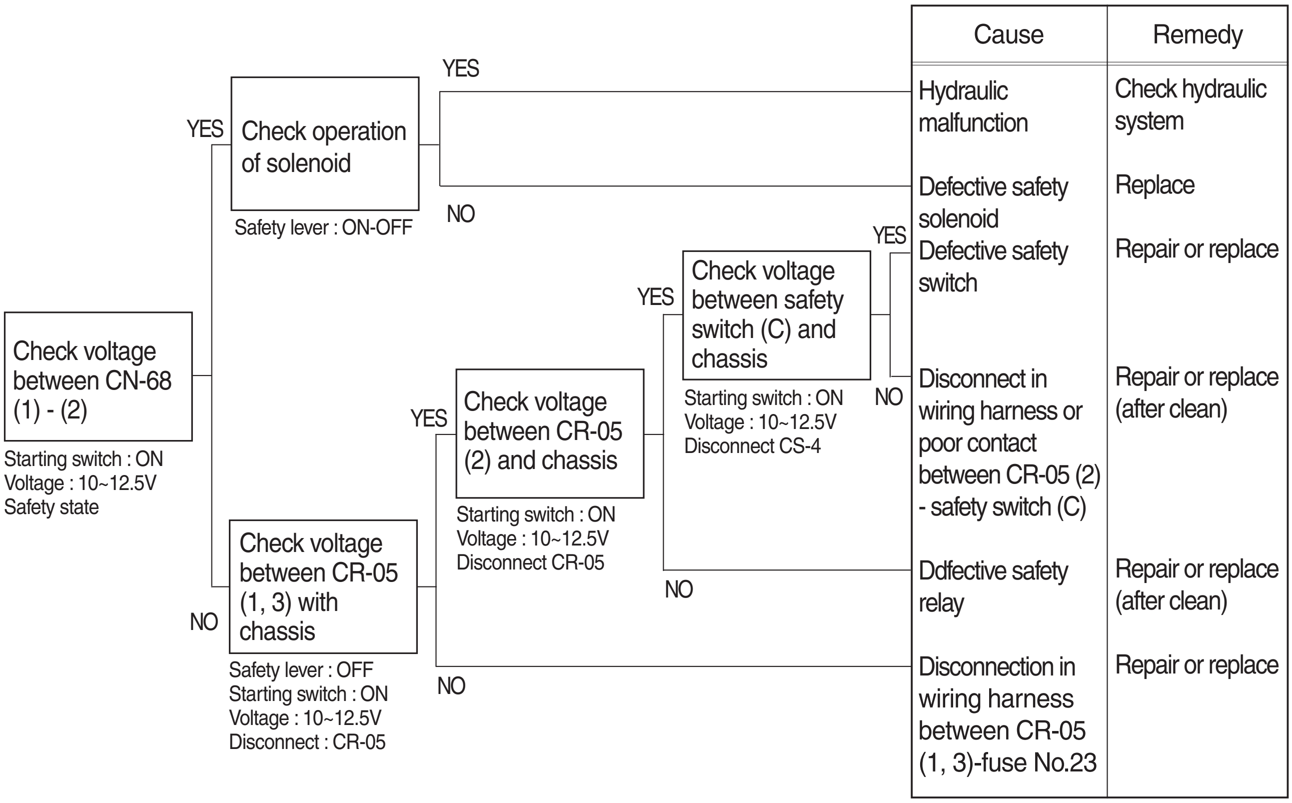
Item \ Temperature	Empty	1/2	Full
Unit resistance (Ω)	90	38	10

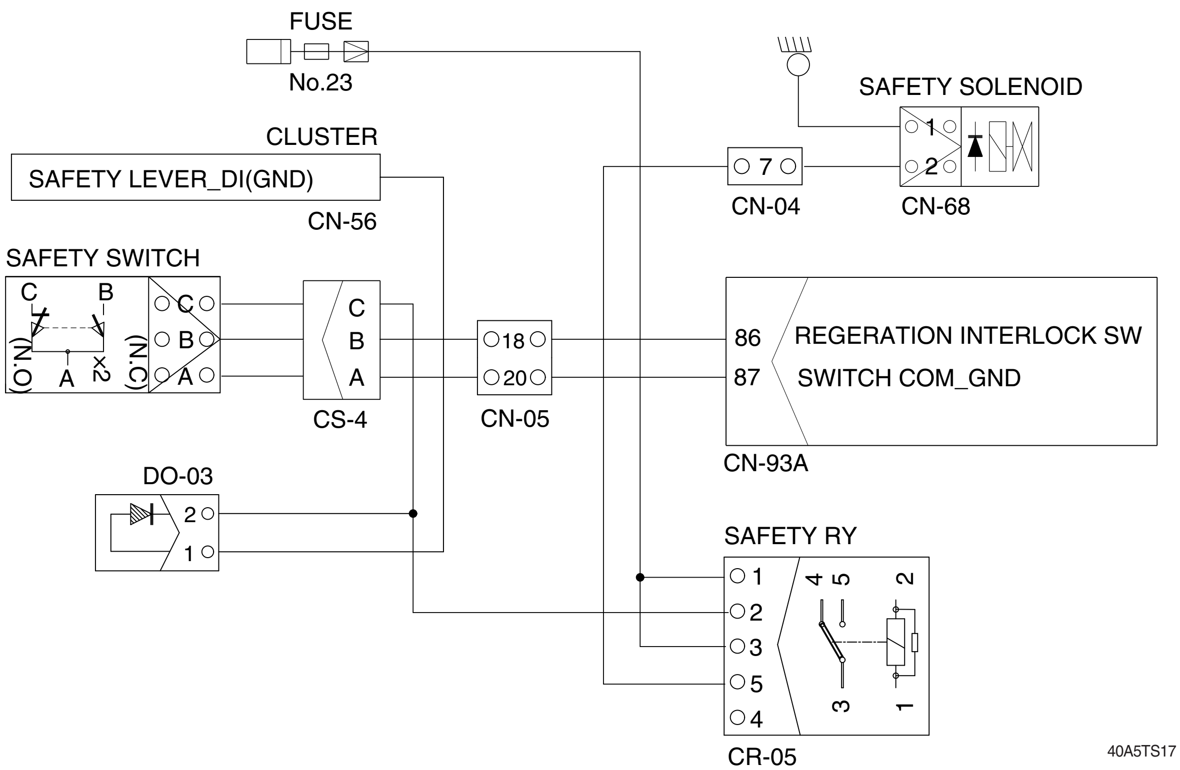


48AZ5TS16

8. WHEN SAFETY SOLENOID DOES NOT OPERATE

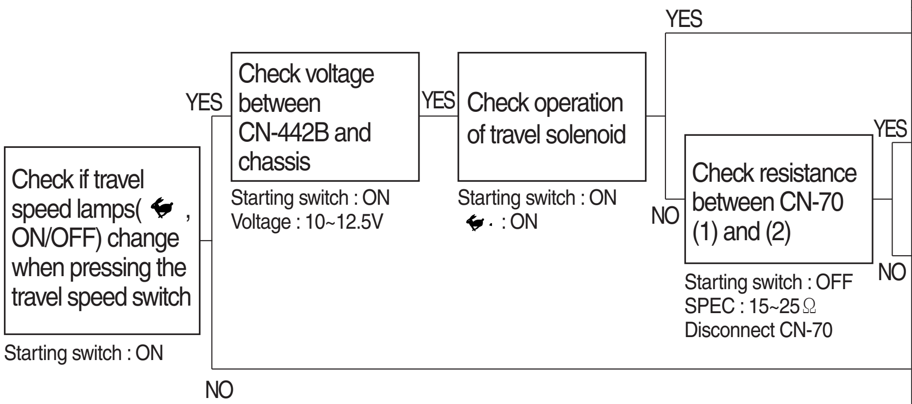
· Before disconnecting the connector, always turn the starting switch OFF.
· Before carrying out below procedure, check all the related connectors are properly inserted and short of fuse No.23.
· After checking, insert the disconnected connectors again immediately unless otherwise specified.



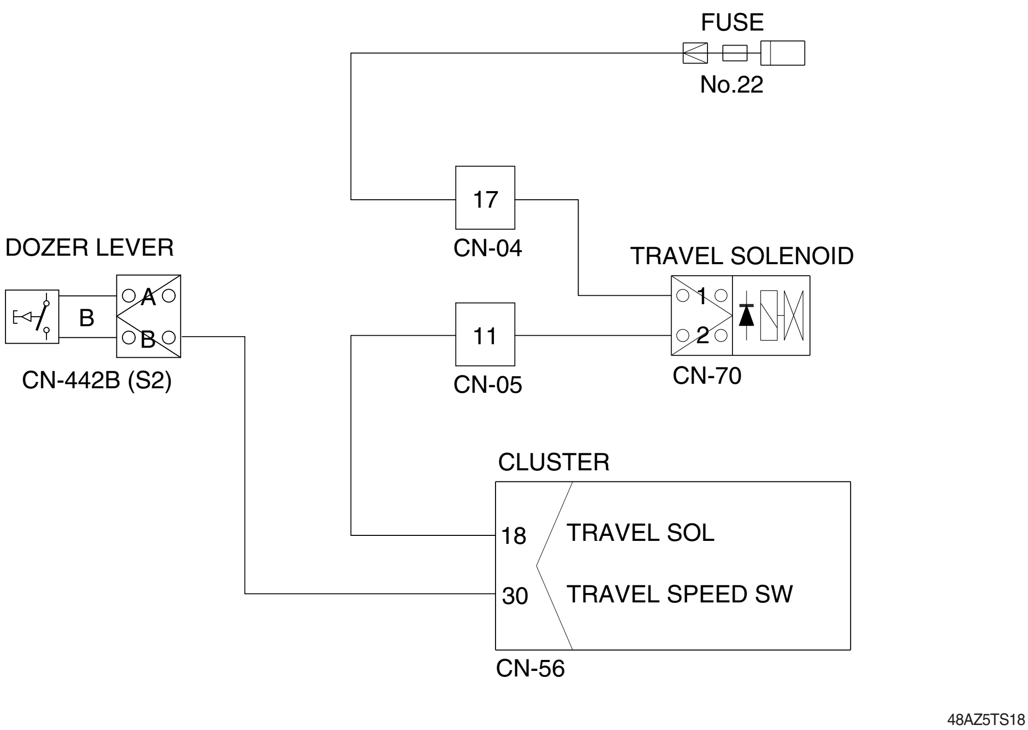


9. WHEN TRAVEL SPEED 1, 2 DOES NOT OPERATE

- Before disconnecting the connector, always turn the starting switch OFF.
- Before carrying out below procedure, check all the related connectors are properly inserted and short of fuse No.22 .
- After checking, insert the disconnected connectors again immediately unless otherwise specified.

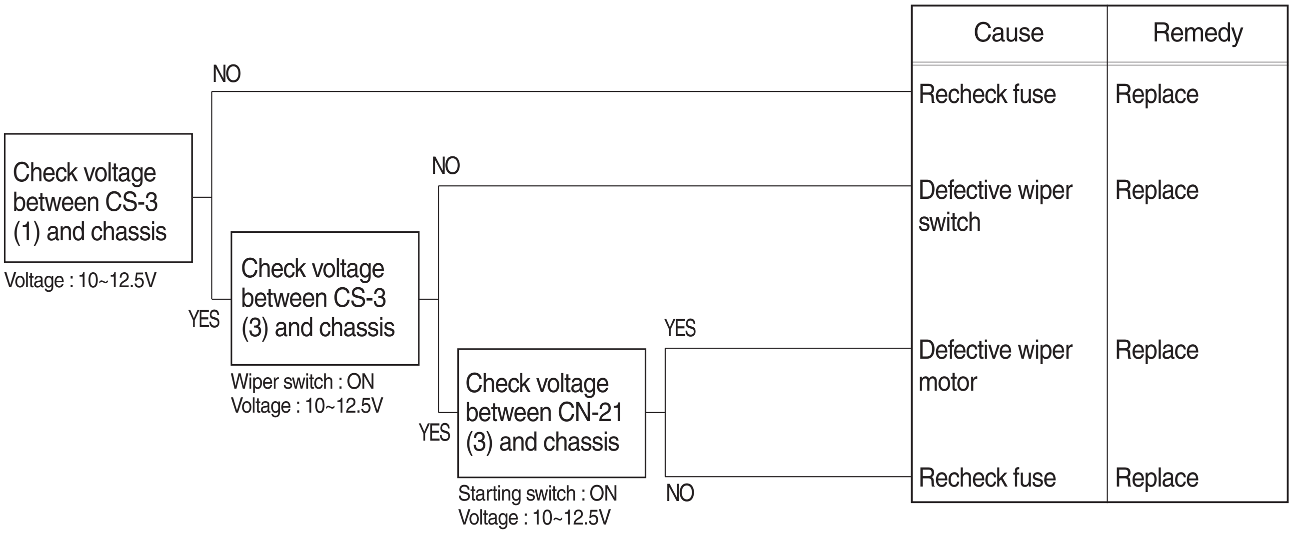


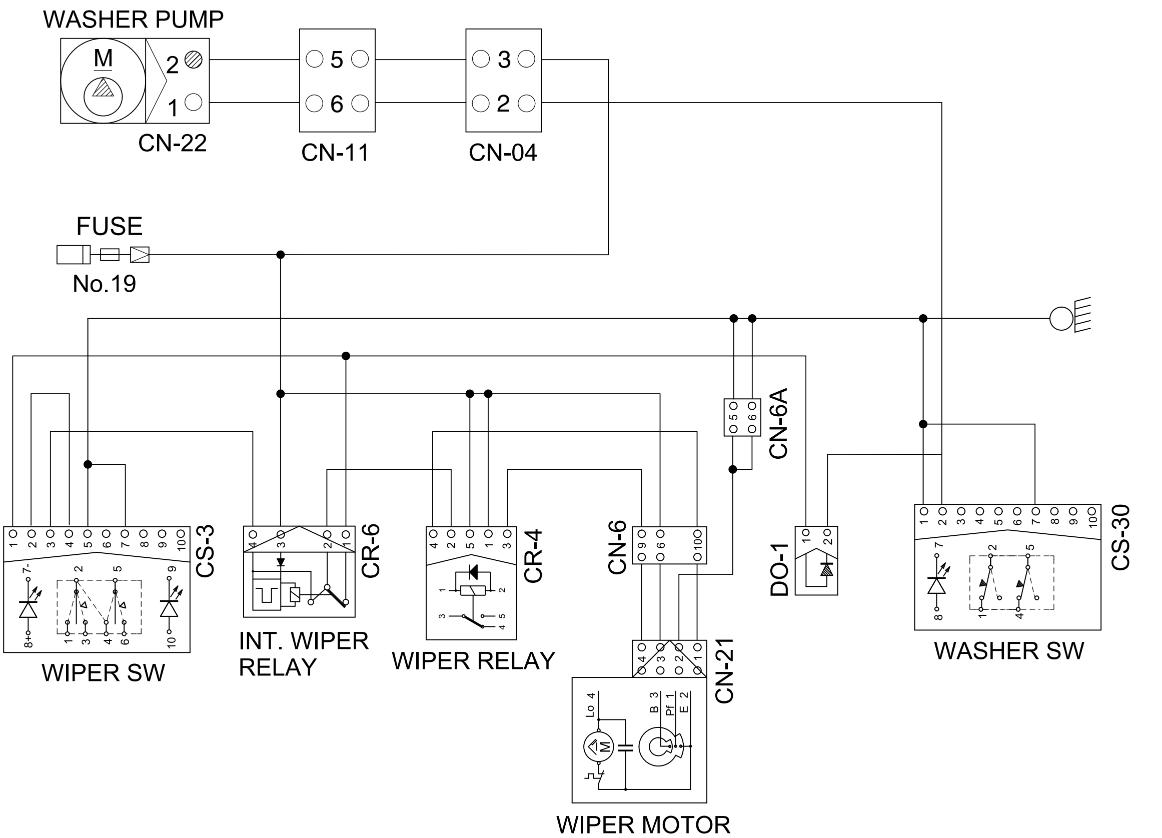
Cause	Remedy
Defective hydraulic system	Check hydraulic system
Defective cluster	Replace
Defective travel solenoid	Replace
Defective switch (CN-442B)	Replace



10. WHEN STARTING SWITCH IS TURNED ON, WIPER MOTOR DOES NOT OPERATE

- Before disconnecting the connector, always turn the starting switch OFF.
- Before carrying out below procedure, check all the related connectors are properly inserted and the fuse No.19 is not blown out.
- After checking, insert the disconnected connectors again immediately unless otherwise specified.





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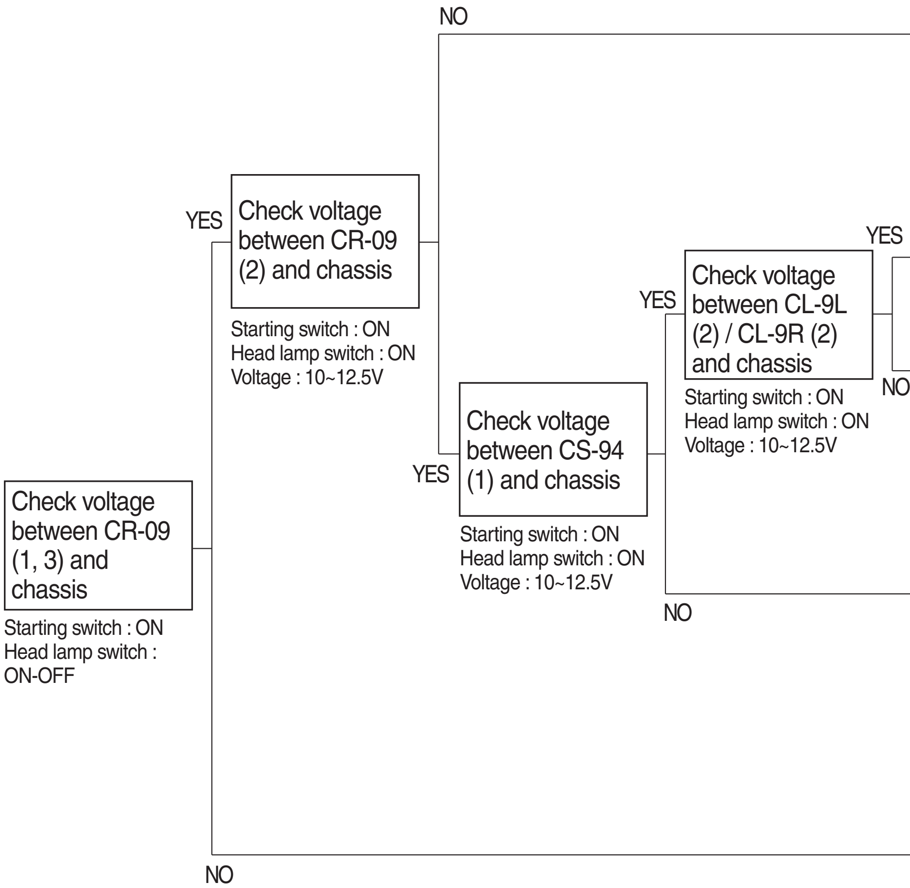
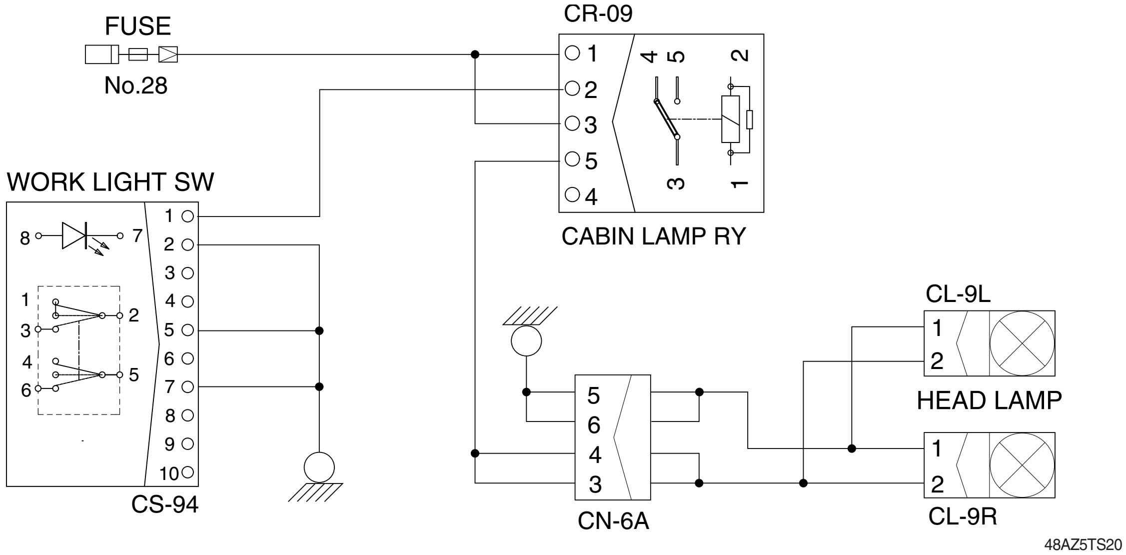
11. WHEN STARTING SWITCH IS TURNED ON, CABIN LAMP DOES NOT LIGHTS UP

· Before disconnecting the connector, always turn the starting switch OFF.
· Before carrying out below procedure, check all the related connectors are properly inserted and short of fuse No.28.
· After checking, insert the disconnected connectors again immediately unless otherwise specified.

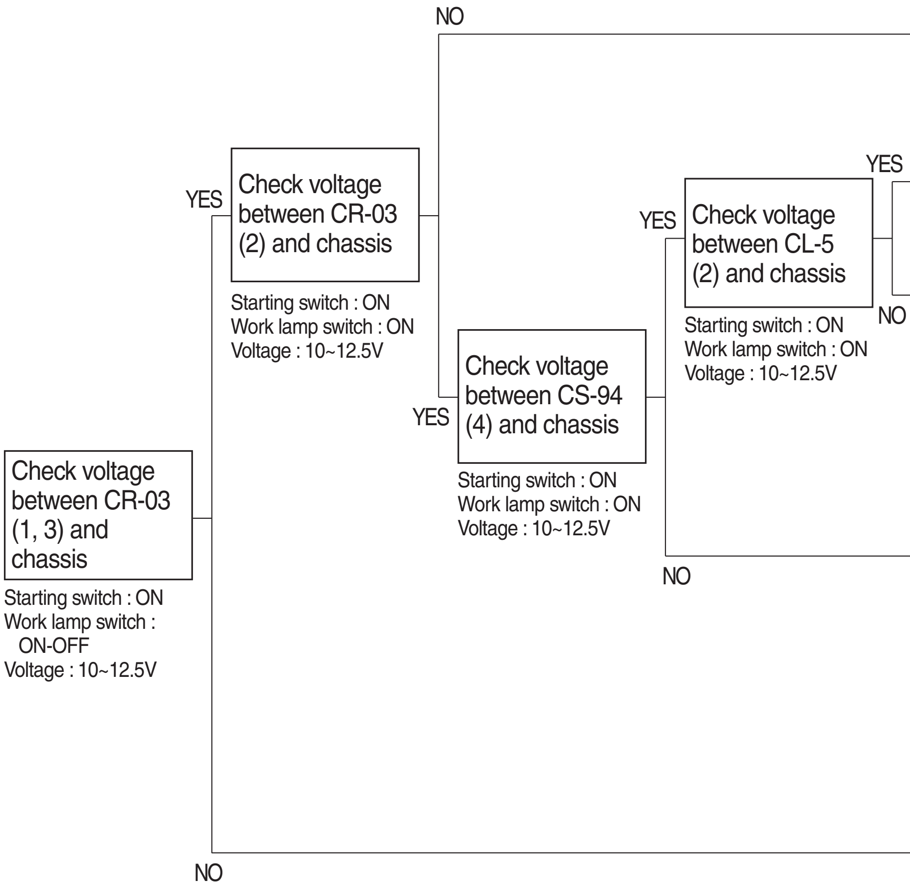


Cause	Remedy
Defective lamp switch	Replace switch
Defective bulb	Replace
Disconnection in wiring harness or poor contact between CR-09 (5) -CL-9L (2)/CL-9R (2)	Repair or replace (after clean)
Disconnection in wiring harness or poor contact between CS-94 (1)-CR-09 (2)	Repair or replace (after clean)
Disconnection in wiring harness or poor contact between CR-09 (1, 3) and fuse No.28.	Repair or replace (after clean)

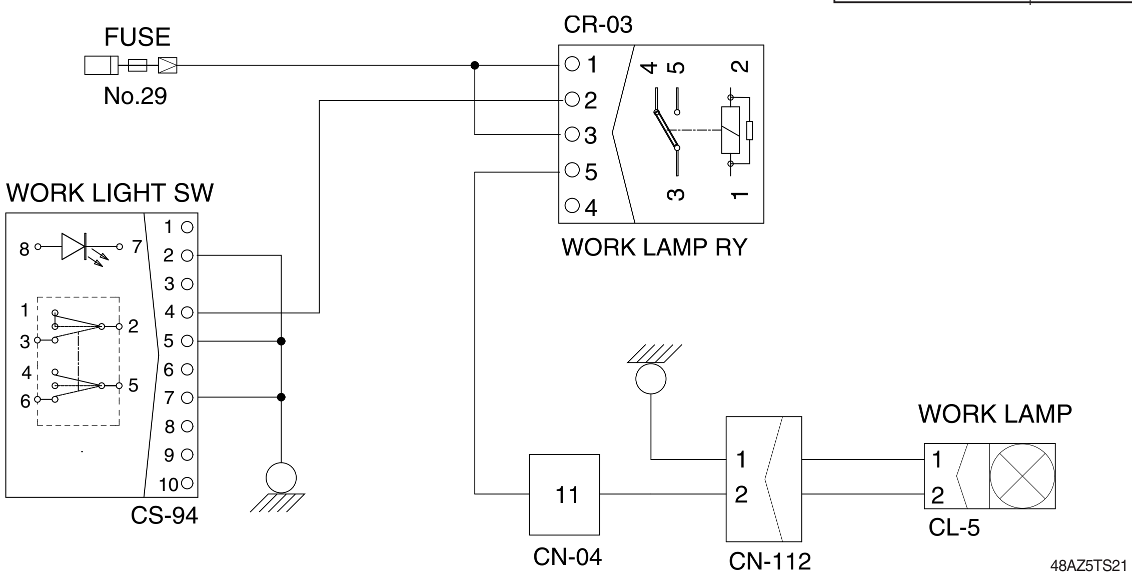


12. WHEN STARTING SWITCH IS TURNED ON, WORK LAMP DOES NOT LIGHTS UP

· Before disconnecting the connector, always turn the starting switch OFF.
· Before carrying out below procedure, check all the related connectors are properly inserted and short of fuse No.29.
· After checking, insert the disconnected connectors again immediately unless otherwise specified.

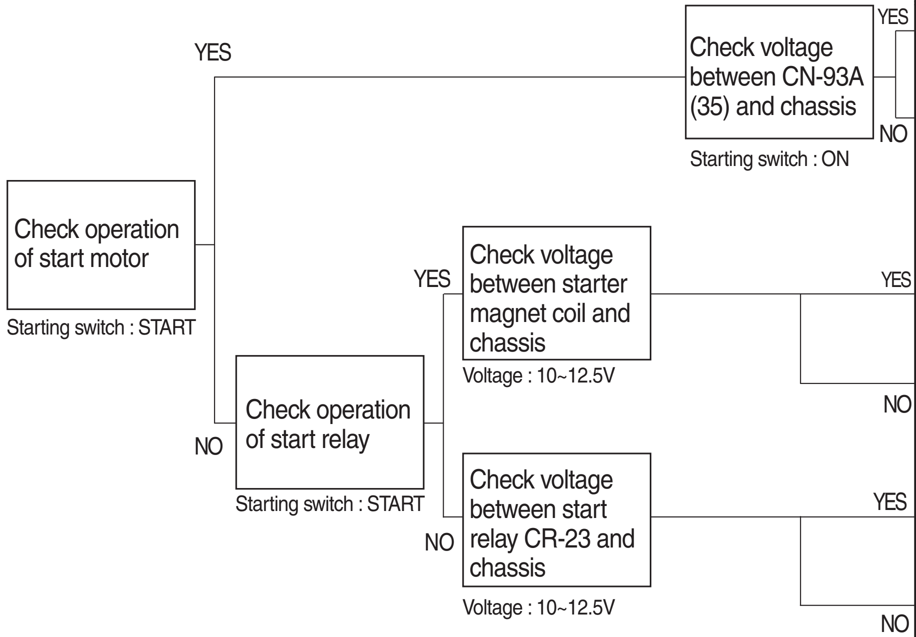


Cause	Remedy
Defective light switch	Replace switch
Defective bulb	Replace
Disconnection in wiring harness or poor contact between CR-03 (5) and CL-5 (2)	Repair or replace (after clean)
Disconnection in wiring harness or poor contact between CS-94 (4)-CR-03 (2)	Repair or replace (after clean)
Disconnection in wiring harness or poor contact between CR-03 (1, 3) and fuse No.29	Repair or replace (after clean)

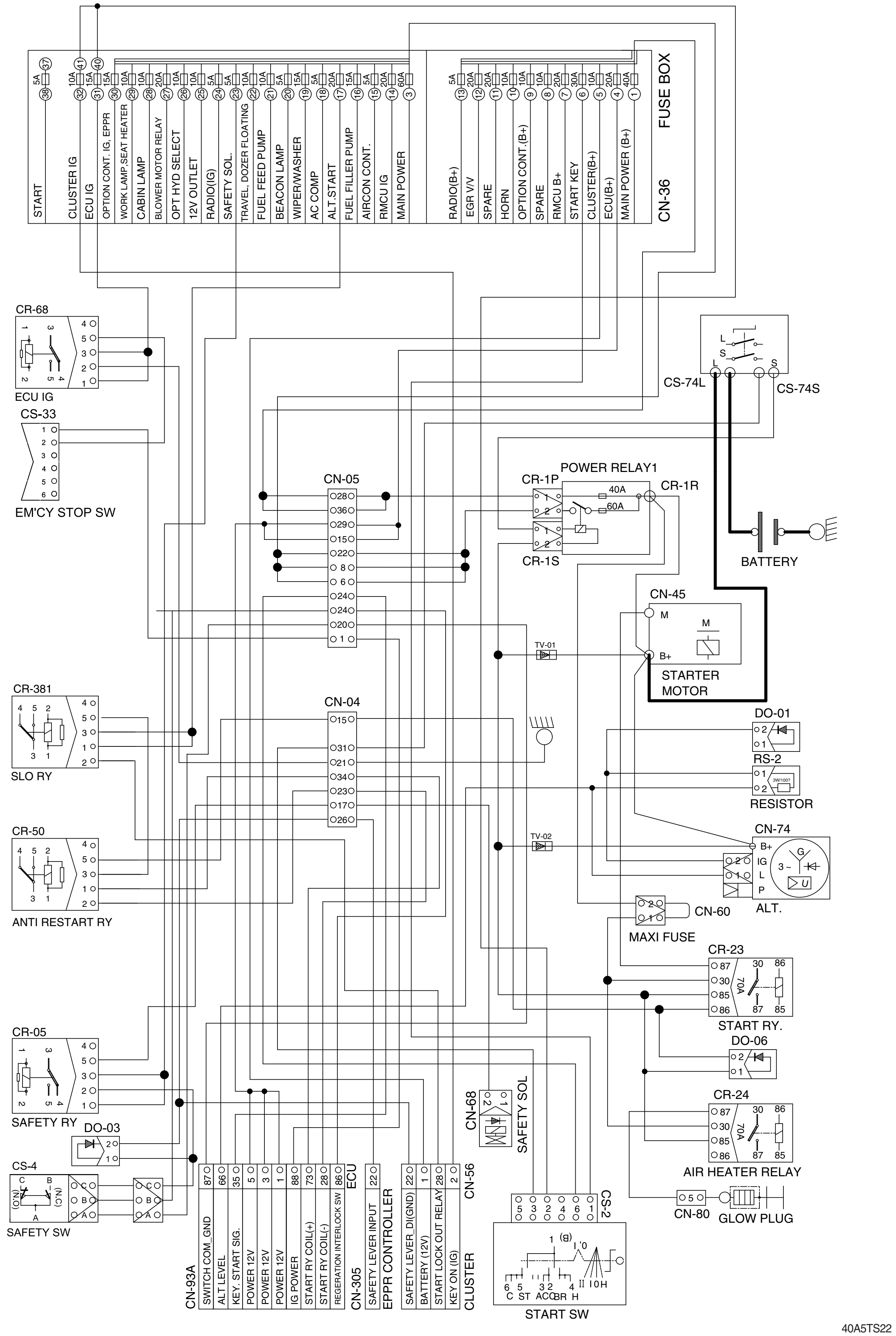


13. WHEN ENGINE DOES NOT START

· Before disconnecting the connector, always turn the starting switch OFF.
· Before carrying out below procedure, check all the related connectors are properly inserted.
· After checking, insert the disconnected connectors again immediately unless otherwise specified.

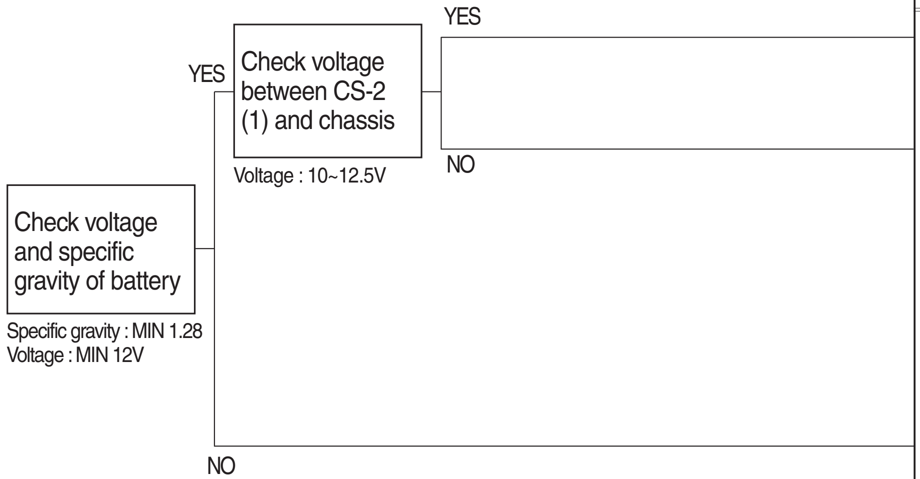


Cause	Remedy
Defective ECU	Repair or replace
Disconnection in wiring harness or poor contact between CN-93A (35) and CS-2 (6)	Repair or replace e (after clean)
Defective magnet of start motor	Repair or replace start motor
Defective start relay	Repair or replace start relay
Defective start relay	Repair or replace start relay
Disconnection in wiring harness or poor contact between CR-23 and CS-2 (6)	Repair or replace (after clean)

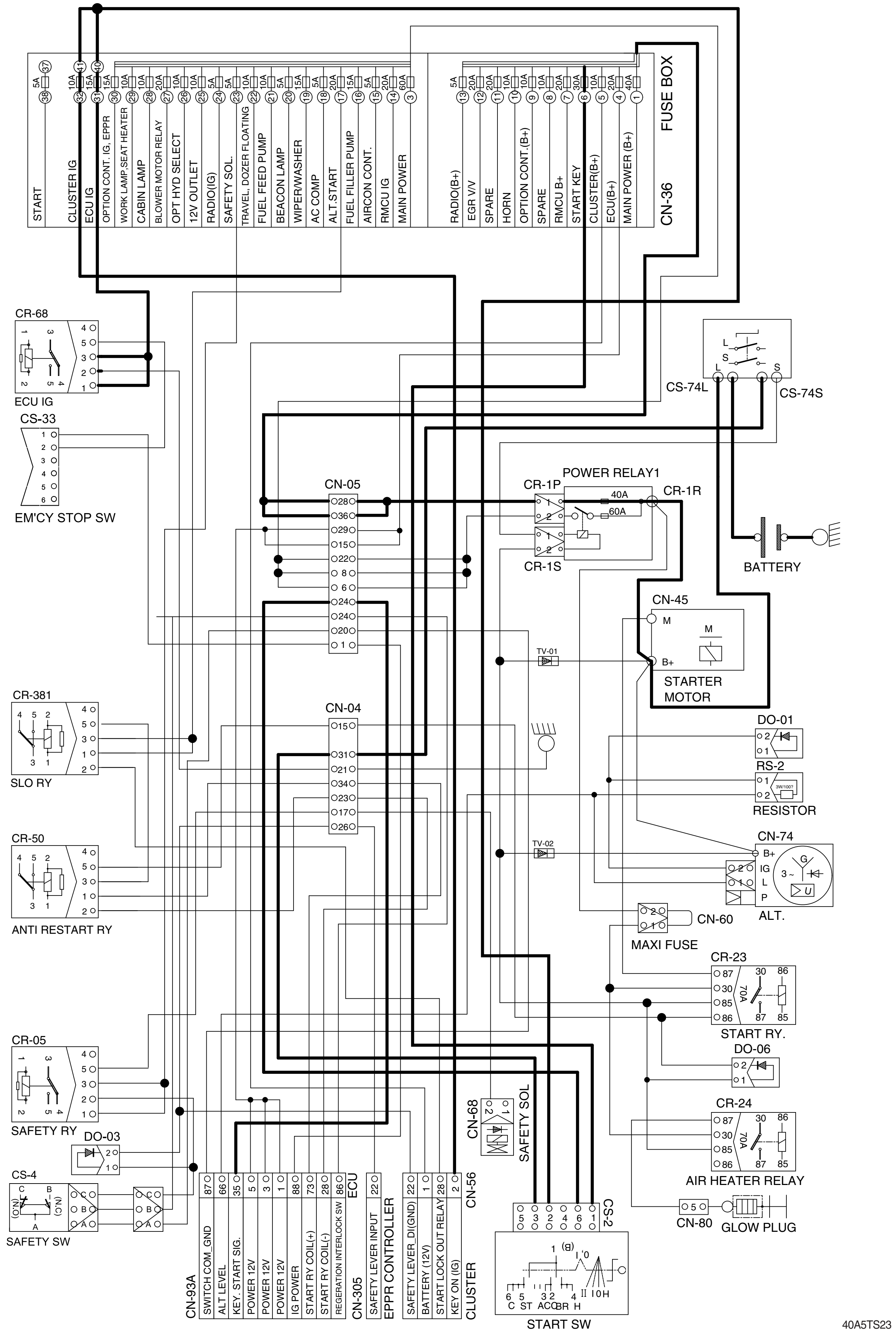


14. WHEN STARTING SWITCH ON DOES NOT OPERATE

· Before disconnecting the connector, always turn the starting switch OFF.
· Before carrying out below procedure, check all the related connectors are properly inserted and master switch ON.
· After checking, insert the disconnected connectors again immediately unless otherwise specified.



Cause	Remedy
Defective start switch	Replace
Disconnection in wiring harness or poor contact between CS-2 (1)-Master switch or defective power relay 1	Replace
Battery capacity too low	Charge or replace (after clean)



SECTION 6 MAINTENANCE STANDARD

GROUP 1 OPERATIONAL PERFORMANCE TEST

1. PURPOSE

Performance tests are used to check:

1) OPERATIONAL PERFORMANCE OF A NEW MACHINE

Whenever a new machine is delivered in parts and reassembled at a customer's site, it must be tested to confirm that the operational performance of the machine meets Hyundai spec.

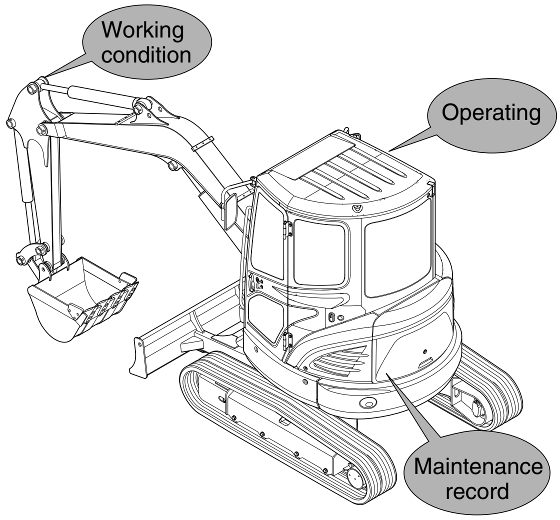
2) OPERATIONAL PERFORMANCE OF A WORKING MACHINE

With the passage of time, the machine's operational performance deteriorates, so that the machine needs to be serviced periodically to restore it to its original performance level.

Before servicing the machine, conduct performance tests to check the extent of deterioration, and to decide what kind of service needs to be done (by referring to the "Service Limits" in this manual).

3) OPERATIONAL PERFORMANCE OF A REPAIRED MACHINE

After the machine is repaired or serviced, it must be tested to confirm that its operational performance was restored by the repair and/or service work done.

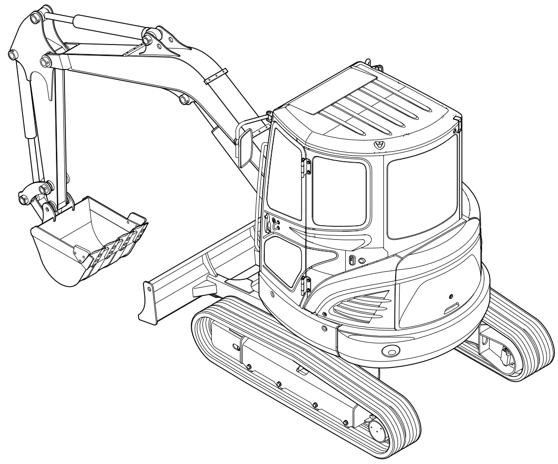


R35Z76MC01

2. TERMINOLOGY

1) STANDARD

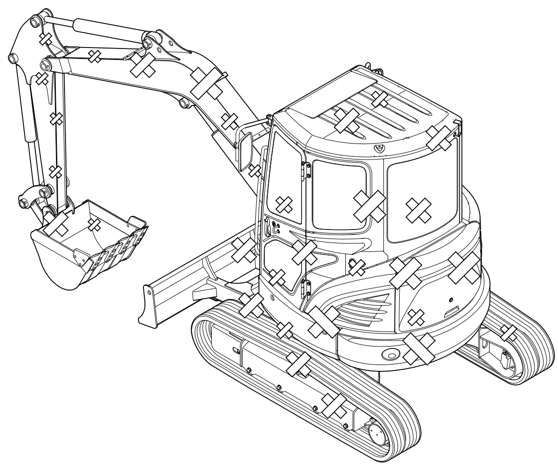
Specifications applied to the brand-new machine, components and parts.



R35Z76MC02

2) SERVICE LIMIT

The lowest acceptable performance level. When the performance level of the machine falls below this level, the machine must be removed from work and repaired. Necessary parts and components must be replaced.



R35Z76MC03

3. OPERATION FOR PERFORMANCE TESTS

1) Observe the following rules in order to carry out performance tests accurately and safely.

(1) The machine

Repair any defects and damage found, such as oil or water leaks, loose bolts, cracks and so on, before starting to test.

(2) Test area

① Select a hard, flat surface.

② Secure enough space to allow the machine to run straight more than 20m, and to make a full swing with the front attachment extended.

③ If required, rope off the test area and provide signboards to keep unauthorized personnel away.

(3) Precautions

① Before starting to test, agree upon the signals to be employed for communication among coworkers. Once the test is started, be sure to communicate with each other using these signals, and to follow them without fail.

② Operate the machine carefully and always give first priority to safety.

③ While testing, always take care to avoid accidents due to landslides or contact with high voltage power lines. Always confirm that there is sufficient space for full swings.

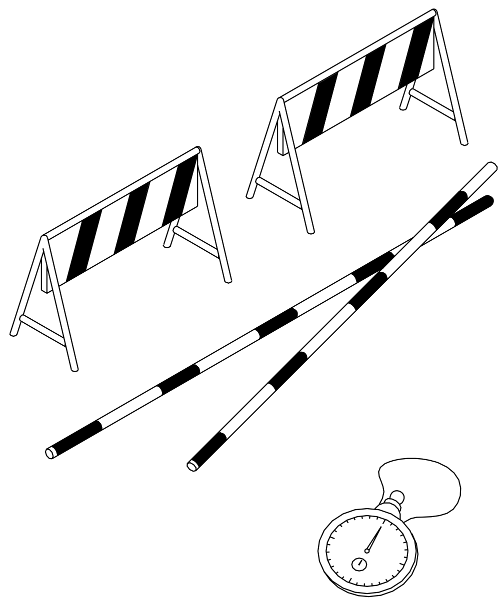
④ Avoid polluting the machine and the ground with leaking oil. Use oil pans to catch escaping oil. Pay special attention to this when removing hydraulic pipings.

(4) Make precise measurements

① Accurately calibrate test instruments in advance to obtain correct data.

② Carry out tests under the exact test conditions prescribed for each test item.

③ Repeat the same test and confirm that the test data obtained can be procured repeatedly. Use mean values of measurements if necessary.



7-3 (140-7)

2) ENGINE SPEED

(1) Measure the engine speed at the maximum RPM.

※ The engine speed must meet standard RPM; if not, all other operational performance data will be unreliable. It is essential to perform this test first.

(2) Preparation and measurement

① Warm up the machine, until the engine coolant temperature reaches 50°C or more, and the hydraulic oil is 50±5°C.

② Set the accel dial switch at the maximum position.

③ Measure the engine RPM.

(3) Evaluation

The measured speeds should meet the following specifications.

Unit : rpm

Model	Engine speed	Standard	Remarks
HX40A	Low idle	1300±50	
	High idle	2200±50	

3) TRAVEL SPEED

(1) Measure the time required for the excavator to travel a 20 ㎧ test track.

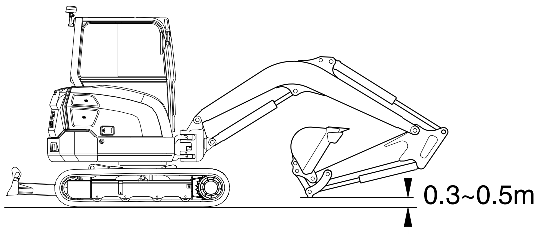
(2) Preparation

① Adjust the tension of both tracks to be equal.

② Prepare a flat and solid test track 20 m in length, with extra length of 3 to 5 m on both ends for machine acceleration and deceleration.

③ Hold the bucket 0.3 to 0.5 m above the ground with the arm and bucket rolled in.

④ Keep the hydraulic oil temperature at 50±5°C.



40A6MC04

(3) Measurement

① Measure both the low and high speeds of the machine.

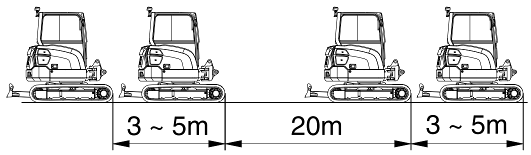
② Before starting either the low or high speed tests, adjust the travel mode switch to the speed to be tested.

③ Start traveling the machine in the acceleration zone with the travel levers at full stroke.

④ Measure the time required to travel 20 m.

⑤ After measuring the forward travel speed, turn the upperstructure 180° and measure the reverse travel speed.

⑥ Repeat steps ④ and ⑤ three times in each direction and calculate the average values.



40A6MC05

(4) Evaluation

The average measured time should meet the following specifications.

Unit : Seconds / 20 m

Model	Travel speed	Standard	Remarks
HX40A	1 Speed	21.5±2.0	
	2 Speed	14.5±2.0	

4) TRACK REVOLUTION SPEED

(1) Measure the track revolution cycle time with the track raised off ground.

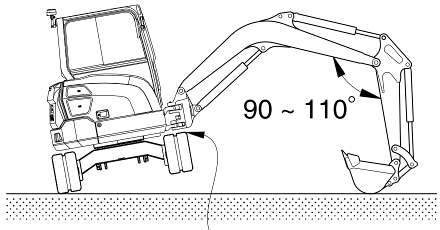
(2) Preparation

① Adjust the tension of both side tracks to be equal.

② On the track to be measured, mark one shoe with chalk.

③ Swing the upperstructure 90° and lower the bucket to raise the track off ground. Keep the boom-arm angle between 90 to 110° as shown. Place blocks under machine frame.

④ Keep the hydraulic oil temperature at 50±5°C.



40A6MC06

(3) Measurement

① Select the following switch positions.

· Travel mode switch : 1 or 2 speed

② Operate the travel control lever of the raised track in full forward and reverse.

③ Rotate 1 turn, then measure time taken for next 3 revolutions.

④ Raise the other side of machine and repeat the procedure.

⑤ Repeat steps ③ and ④ three times and calculate the average values.

(4) Evaluation

The revolution cycle time of each track should meet the following specifications.

Unit : Seconds / 3 revolutions

Model	Travel speed	Standard	Remarks
HX40A	1 Speed	16.3±1.5	
	2 Speed	10.7±1.5	

5) TRAVEL DEVIATION

(1) Measure the deviation by the tracks from a 20㎙ straight line.

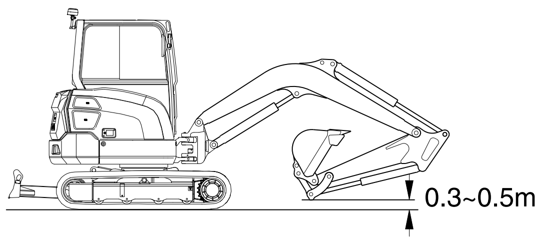
(2) Preparation

① Adjust the tension of both tracks to be equal.

② Provide a flat, solid test yard 20 ㎙ in length, with extra length of 3 to 5 ㎙ on both ends for machine acceleration and deceleration.

③ Hold the bucket 0.3 to 0.5 ㎙ above the ground with the arm and bucket rolled in.

④ Keep the hydraulic oil temperature at 50±5°C.



40A6MC04

(3) Measurement

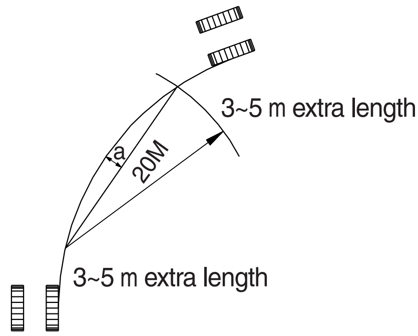
① Measure the amount of mistracking at high and low travel speeds.

② Start traveling the machine in the acceleration zone with the travel levers at full stroke.

③ Measure the distance between a straight 20㎙ line and the track made by the machine. (Dimension a)

④ After measuring the tracking in forward travel, turn the upperstructure 180°and measure that in reverse travel.

⑤ Repeat steps ③ and ④ three times and calculate the average values.



7-7(2) 140-7

(4) Evaluation

Mistrack should be within the following specifications.

Unit : ㎜ / 20 ㎙

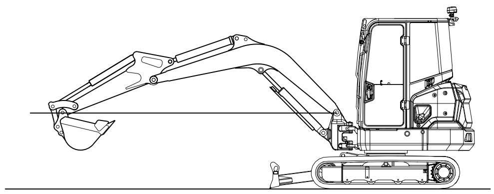
Model	Standard	Maximum allowable	Remarks
HX40A	200 below	240	

6) SWING SPEED

(1) Measure the time required to swing three complete turns.

(2) Preparation

① Check the lubrication of the swing gear and swing bearing.
② Place the machine on flat, solid ground with ample space for swinging. Do not conduct this test on slopes.
③ With the arm rolled out and bucket rolled in, hold the bucket so that the height of the bucket pin is the same as the boom foot pin. The bucket must be empty.
④ Keep the hydraulic oil temperature at 50±5°C.



40A6MC07

(3) Measurement

① Operate swing control lever fully.
② Swing 1 turn and measure time taken to swing next 2 revolutions.
③ Repeat steps ① and ② three time and calculate the average values.

(4) Evaluation

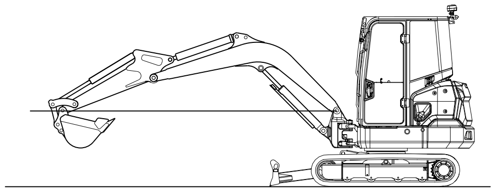
The time required for 2 swings should meet the following specifications.

Unit : Seconds / 2 revolutions

Model	Standard	Remarks
HX40A	12.0±0.5	

7) SWING FUNCTION DRIFT CHECK

(1) Measure the swing drift on the bearing outer circumference when stopping after a 360° full speed swing.



40A6MC07

(2) Preparation

① Check the lubrication of the swing gear and swing bearing.

② Place the machine on flat, solid ground with ample space for swinging. Do not conduct this test on slopes.

③ With the arm rolled out and bucket rolled in, hold the bucket so that the height of the bucket pin is the same as the boom foot pin. The bucket must be empty.

④ Make two chalk marks: one on the swing bearing and one directly below it on the track frame.

⑤ Swing the upperstructure 360°.

⑥ Keep the hydraulic oil temperature at 50±5°C.

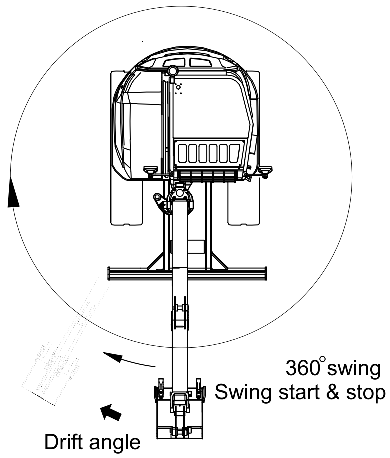
(3) Measurement

① Operate the swing control lever fully and return it to the neutral position when the mark on the upperstructure aligns with that on track frame after swinging 360°

② Measure the distance between the two marks.

③ Align the marks again, swing 360°, then test the opposite direction.

④ Repeat steps ② and ③ three times each and calculate the average values.



40A6MC08

(4) Evaluation

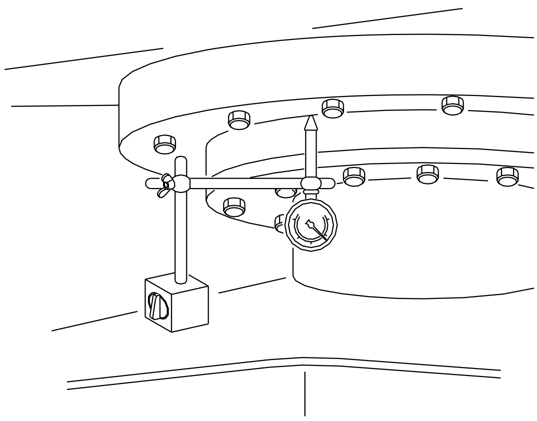
The measured drift angle should be within the following specifications.

Unit : Degree

Model	Standard	Maximum allowable	Remarks
HX40A	40 below	50	

8) SWING BEARING PLAY

(1) Measure the swing bearing play using a dial gauge to check the wear of bearing races and balls.



7-10(1) 140-7

(2) Preparation

① Check swing bearing mounting cap screws for loosening.

② Check the lubrication of the swing bearing. Confirm that bearing rotation is smooth and without noise.

③ Install a dial gauge on the track frame as shown, using a magnetic base.

④ Position the upperstructure so that the boom aligns with the tracks facing towards the front idlers.

⑤ Position the dial gauge so that its needle point comes into contact with the bottom face of the bearing outer race.

⑥ Bucket should be empty.

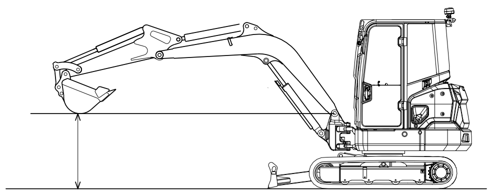
(3) Measurement

① With the arm rolled out and bucket rolled in, hold the bottom face of the bucket to the same height of the boom foot pin.
Record the dial gauge reading (h1).

② Lower the bucket to the ground and use it to raise the front idler 50 ㎝.
Record the dial gauge reading (h2).

③ Calculate bearing play (H) from this data (h1 and h2) as follows.
H=h2-h1

Measurement : h1



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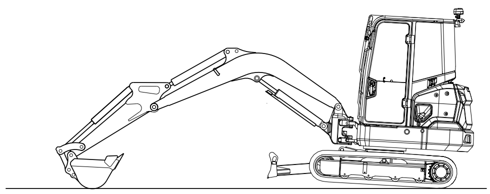
Measurement : h2



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(4) Evaluation

The measured drift should be within the following specifications.

Unit : mm

Model	Standard	Maximum allowable	Remarks
HX40A	0.5 ~ 1.2	2.4	

9) HYDRAULIC CYLINDER CYCLE TIME

(1) Measure the cycle time of the boom, standard arm, and standard bucket cylinders.

(2) Preparation

① To measure the cycle time of the boom cylinders:
With the arm rolled out and the empty bucket rolled out, lower the bucket to the ground, as shown.

② To measure the cycle time of the arm cylinder.
With the empty bucket rolled in, position the arm so that it is vertical to the ground. Lower the boom until the bucket is 0.5 m above the ground.

③ To measure the cycle time of the bucket cylinder.
The empty bucket should be positioned at midstroke between roll-in and roll-out, so that the sideplate edges are vertical to the ground.

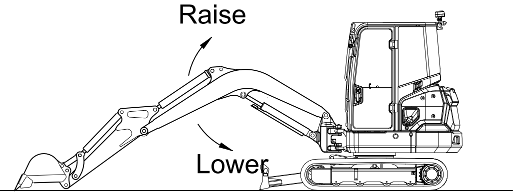
④ Keep the hydraulic oil temperature at $50\pm5^{\circ}C$.

(3) Measurement

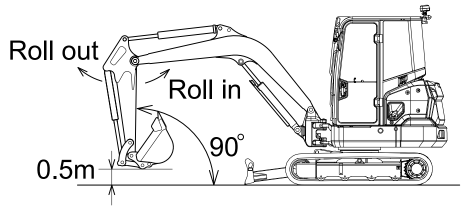
① To measure cylinder cycle times.

- Boom cylinders
  Measure the time it takes to raise the boom, and the time it takes to lower the boom. To do so, position the boom at one stroke end then move the control lever to the other stroke end as quickly as possible.
- Arm cylinder
  Measure the time it takes to roll in the arm, and the time it takes to roll out the arm. To do so, position the bucket at one stroke end, then move the control lever to the other stroke end as quickly as possible.

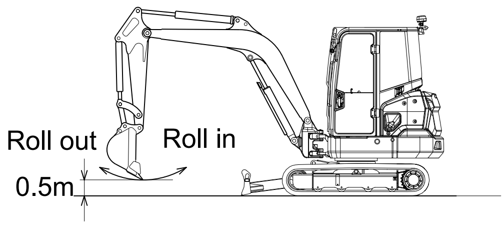
Boom cylinder



Arm cylinder



Bucket cylinder



40A6MC11

- Bucket cylinders
  Measure the time it takes to roll in the bucket, and the time it takes to roll out the bucket. To do so, position the bucket at one stroke end, then move the control lever to the other stroke end as quickly as possible.
- Repeat each measurement 3 times and calculate the average values.

(4) Evaluation

The average measured time should meet the following specifications.

Unit : Seconds

Model	Function	Standard	Remarks
HX40A	Boom raise	2.3±0.4	
	Boom lower	2.1±0.4	
	Arm in	2.5±0.4	
	Arm out	2.2±0.3	
	Bucket load	2.4±0.4	
	Bucket dump	2.0±0.3	
	Boom swing (LH)	6.6±0.3	
	Boom swing (RH)	6.6±0.3	
	Dozer up (raise)	1.9±0.3	
	Dozer down (lower)	2.3±0.3	

10) DIG FUNCTION DRIFT CHECK

(1) Measure dig function drift, which can be caused by oil leakage in the control valve and boom, standard arm, and standard bucket cylinders, with the loaded bucket.
When testing the dig function drift just after cylinder replacement, slowly operate each cylinder to its stroke end to purge air.

(2) Preparation

① Load bucket fully. Instead of loading the bucket, weight (W) of the following specification can be used.

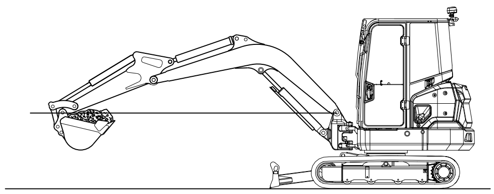
· $W = M^3 \times 1.5$
Where :
M^3 = Bucket heaped capacity(m^3)
1.5= Soil specific gravity

② Position the arm cylinder with the rod 20 to 30 mm extended from the fully retracted position.

③ Position the bucket cylinder with the rod 20 to 30 mm retracted from the fully extended position.

④ With the arm rolled out and bucket rolled in, hold the bucket so that the height of the bucket pin is the same as the boom foot pin.

⑤ Keep the hydraulic oil temperature at 50±5°C.



40A6MC12

(3) Measurement

① Stop the engine.

② Five minutes after the engine has been stopped, measure the changes in the positions of the boom, arm and bucket cylinders.

③ Repeat step ② three times and calculate the average values.

(4) Evaluation

The measured drift should be within the following specifications.

Unit : mm / 5 min

Model	Drift to be measured	Standard	Remarks
HX40A	Boom cylinder	10 below	
	Arm cylinder	20 below	
	Bucket cylinder	20 below	
	Dozer cylinder	30 below	

11) CONTROL LEVER OPERATING FORCE

(1) Use a spring scale to measure the maximum resistance of each control lever at the middle of the grip.

(2) Preparation

① Keep the hydraulic oil temperature at 50±5°C.

(3) Measurement

① Start the engine.
② Operate each boom, arm, bucket and swing lever at full stroke and measure the maximum operating force for each.
③ Lower the bucket to the ground to raise one track off the ground. Operate the travel lever at full stroke and measure the maximum operating force required. When finished, lower the track and then jack-up the other track.
④ Repeat steps ② and ③ three times and calculate the average values.

(4) Evaluation

The measured operating force should be within the following specifications.

Unit : kgf

Model	Kind of lever	Standard	Maximum allowable	Remarks
HX40A	Boom lever	1.5 or below	1.9	
	Arm lever	1.5 or below	1.9	
	Bucket lever	1.5 or below	1.9	
	Swing lever	1.5 or below	1.9	
	Travel lever	2.0 or below	2.5	

12) CONTROL LEVER STROKE

(1) Measure each lever stroke at the lever top using a ruler.

※ **When the lever has play, take a half of this value and add it to the measured stroke.**

(2) Preparation

Keep the hydraulic oil temperature at 50±5°C.

(3) Measurement

① Stop the engine.

② Measure each lever stroke at the lever top from neutral to the stroke end using a ruler.

③ Repeat step ② three times and calculate the average values.

(4) Evaluation

The measured drift should be within the following specifications.

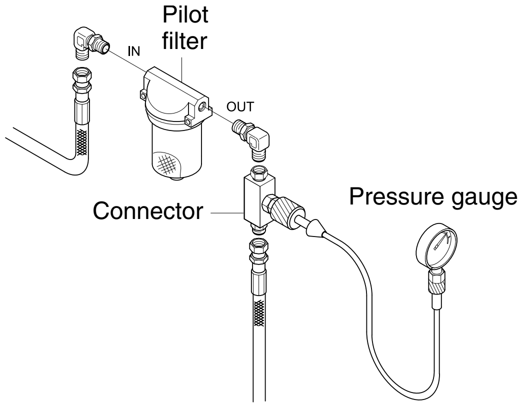
Unit : mm

Model	Kind of lever	Standard	Maximum allowable	Remarks
HX40A	Boom lever	87±10	109	
	Arm lever	87±10	109	
	Bucket lever	87±10	109	
	Swing lever	87±10	109	
	Travel lever	86±10	105	

13) PILOT PRIMARY PRESSURE

(1) Preparation

① Stop the engine.
② Push the pressure release button to bleed air.
③ Loosen the cap of screw coupling at the fitting near pilot filter and connect pressure gauge.
④ Start the engine and check for oil leakage from the port.
⑤ Keep the hydraulic oil temperature at 50±5°C.



40A6MC14

(2) Measurement

① Measure the primary pilot pressure in the H mode.

(3) Evaluation

The average measured pressure should meet the following specifications:

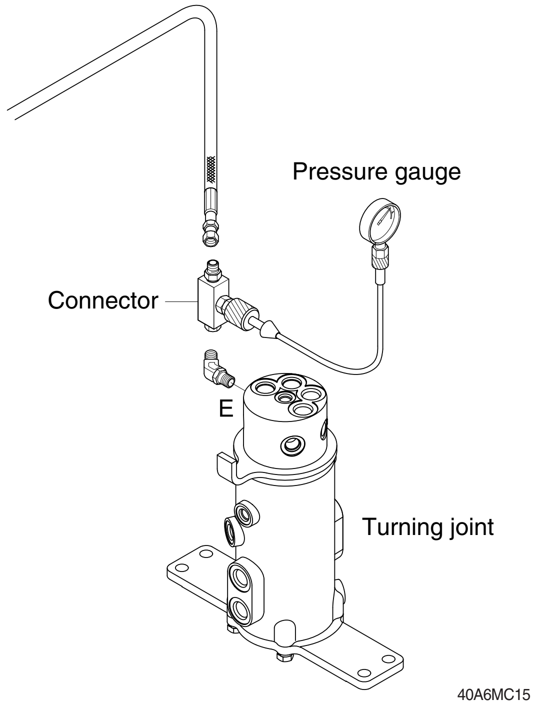
Unit : kgf / cm^2

Model	Standard	Remarks
HX40A	35~40	-

14) TRAVEL SPEED SELECTING PRESSURE

(1) Preparation

① Stop the engine.
② Push the pressure release button to bleed air.
③ To measure the speed selecting pressure: Install a connector and pressure gauge assembly to turning joint E port as shown.
Start the engine and check for on
④ leakage from the adapter.
Keep the hydraulic oil temperature at
⑤ 50±5°C.



Measurement

(2) Select the following switch positions.
① Travel mode switch : 1 speed
2 speed
② Measure the travel speed selecting pressure in the Hi or Lo mode.
③ Lower the bucket to the ground to raise the track off the ground. Operate the travel lever at full stroke and measure the fast speed pressure.
④ Repeat steps ② and ③ three times and calculate the average values.

(3) Evaluation

The average measured pressure should be within the following specifications.

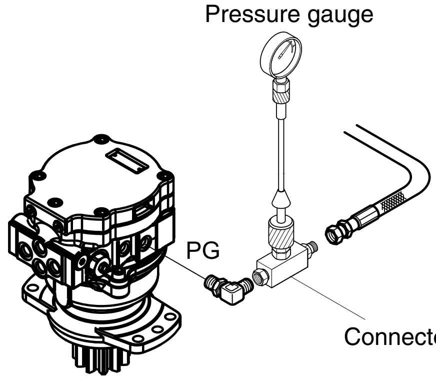
Unit : kgf / cm^2

Model	Travel speed mode	Standard	Maximum allowable	Remarks
HX40A	1 Speed	0	-	
	2 Speed	35~40	-	

15) SWING PARKING BRAKE RELEASING PRESSURE

(1) Preparation

① Stop the engine.
② Push the pressure release button to bleed air.
③ Install a connector and pressure gauge assembly to swing motor PG port, as shown.
④ Start the engine and check for oil leakage from the adapter.
⑤ Keep the hydraulic oil temperature at 50±5°C.



40A6MC16

(2) Measurement

① Operate the swing function or arm roll in function and measure the swing brake control pressure with the brake disengaged. Release the control lever to return to neutral and measure the control pressure when the brake is applied.
② Repeat three times and calculate the average values.

(3) Evaluation

The average measured pressure should be within the following specifications.

Unit : kgf / cm^2

Model	Engine speed	Standard	Remarks
HX40A	Brake disengaged	35~40	
	Brake applied	0	

16) MAIN PUMP DELIVERY PRESSURE

(1) Preparation

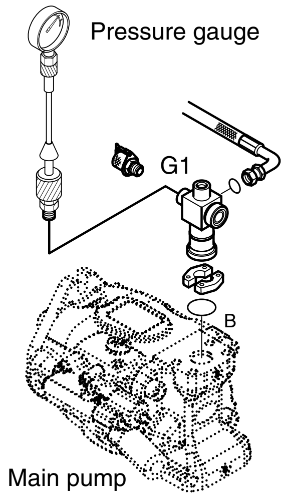
① Stop the engine.

② Push the pressure release button to bleed air.

③ To measure the main pump pressure. Loosen the cap of screw coupling and connect pressure gauge to the main pump gauge port (G1) as shown.

④ Start the engine and check for oil leakage from the port.

⑤ Keep the hydraulic oil temperature at 50±5°C.



48AZ6MC17

(2) Measurement

① Measure the main pump delivery pressure at high idle.

(3) Evaluation

The average measured pressure should meet the following specifications.

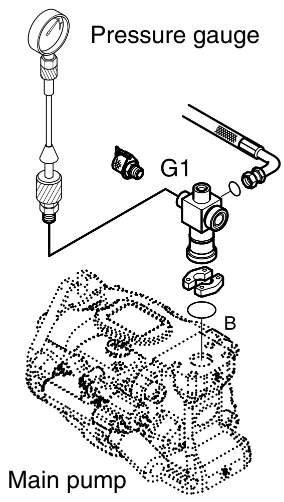
Unit : kgf / cm^2

Model	Engine speed	Standard	Allowable limits	Remarks
HX40A	High idle	20±5	-	

17) SYSTEM PRESSURE REGULATOR RELIEF SETTING

(1) Preparation

① Stop the engine.
② Push the pressure release button to bleed air.
③ To measure the system relief pressure. Loosen the cap of screw coupling and connect pressure gauge to the main pump gauge port (G1, G2, G3) as shown.
④ Start the engine and check for oil leakage from the port.
⑤ Keep the hydraulic oil temperature at 50±5°C.



48AZ6MC17

(2) Measurement

① Slowly operate each control lever of boom, arm and bucket functions at full stroke over relief and measure the pressure.
② In the swing function, place bucket against an immovable object and measure the relief pressure.
③ In the travel function, lock undercarriage with an immovable object and measure the relief pressure.

(3) Evaluation

The average measured pressure should be within the following specifications.

Unit : kgf / cm^2

Model	Function to be tested	Standard
HX40A	Boom	250±10
	Arm, bucket	250±10
	Travel	250±10
	Swing	217±10

GROUP 2 MAJOR COMPONENT

1. MAIN PUMP

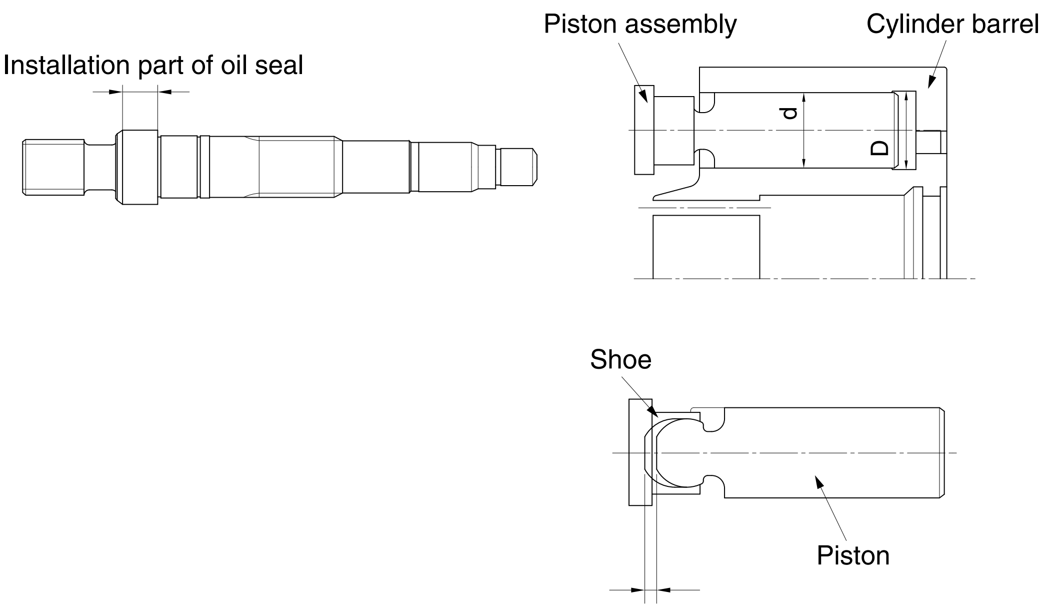
Before inspection, wash the parts well and dry them completely.

Inspect the principal parts with care and replace them with new parts when any abnormal wear exceeding the allowable limit or damage considered harmful is found.

Replace the seal also when any remarkable deformation and damage are found.

1) INSPECTION POINTS WHEN DISASSEMBLED

Part	Extent of the damage	Inspection standard	Action
Shaft	Excessive wear on the seal surface.	Worn depth : 0.025 mm or more	Replace the shaft.
Valve plate	Excessive wear or damages on the sliding surface.	Worn depth : 0.020 mm or more	Replace the cylinder barrel kit.
Cylinder barrel	Excessive wear or damages on the sliding surface.	Worn depth : 0.020 mm or more	Replace the cylinder barrel kit.
	Clearance between the pistons (D-d)	0.030 mm or more	Replace the cylinder barrel kit.
Piston and shoe	Wear of joint section	Check play (ε) between the shoe and the piston ε: 0.2 mm or more by hand operation.	Replace the cylinder barrel kit.
Seals (O-rings, gasket, etc.)	Damage, excessive rust	-	Replace each part.



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2) TROUBLESHOOTING AND COUNTERMEASURE

No.	Trouble	Possible cause	Countermeasure
1	Overload to engine	· Speed is higher than standard · Setting pressure is higher than specifications · Damage of internal parts of pump	· Readjust it as standard · Readjust it as spec · Repair or replace
2	Low pump flow or low pressure	· Speed down of engine · Wrong coupling · Damage of internal parts of pump	· Readjust of engine speed · Repair or replace · Repair or replace
3	Abnormal noise or abnormal vibration (cavitations)	· The level of oil in the tank is low · Air in the oil · Water in the oil · Clog of suction filter · High suction pressure · Damage of piston shoe · Installation condition is no good · Wrong coupling	· Replenish a tank with oil · Check piping Bleed the air in the hydraulic circuit · Replace oil · Clean or replace · Correction · Replace · Correction · Replace
4	Oil leakage	· Damage of O-ring or packing · Loosened plug · Leaking from oil seal	· Replace · Tight up · Replace Replace of oil seal

2. MAIN CONTROL VALVE

Part name	Inspection item	Criteria & measure
Block	· Existence of scratch, rusting or corrosion.	· In case of damage in following section, replace part. - Sliding sections of casing fore and spool, especially land sections applied with holded pressure. - Seal pocket section where spool is inserted. - Seal section of port where O-ring contacts. - Seal section of each relief valve for main, travel, and port. - Other damages that may damage normal functions.
Spool	· Existence of scratch, gnawing, rusting or corrosion. · O-ring seal sections at both ends. · Insert spool in casing hole, rotate and reciprocate it.	· Replacement when its outside sliding section has scratch (especially on seals-contacting section). · Replacement when its sliding section has scratch. · Correction or replacement when O-ring is damaged or when spool does not move smoothly.
Poppet	· Damage of poppet or spring · Insert poppet into casing and function it.	· Correction or replacement when sealing is incomplete. · Normal when it can function lightly without being caught.
Around spring	· Rusting, corrosion, deformation or breaking of spring, spring seat, plug or cover.	· Replacement for significant damage.
Around seal for spool	· External oil leakage. · Rusting, corrosion or deformation of seal plate.	· Correction or replacement. · Correction or replacement.
Main relief valve & port relief valve	· External rusting or damage. · Contacting face of valve seat. · Contacting face of poppet. · Abnormal spring. · O-rings, back up rings and seals.	· Replacement. · Replacement when damaged. · Replacement when damaged. · Replacement. · 100% replacement in general.

3. SWING MOTOR

Replace the parts referring to the following table.

1) MOTOR

Part name	Service criteria
Piston assembly (2-13)	1. The sliding parts are scratched deeply or the sliding surface has become rough. 2 The clearance between the piston and the cylinder block bore is too large. Upper limit of diameter clearance : 0.04 mm 3. The piston shoe ball is loose excessively. Max. clearance (movement) : 0.4 mm
Thrust plate (2-4) Retainer holder (2-11) Retainer plate (2-12) Brake piston (2-15) Valve plate (2-24)	1. The sliding parts are scratched deeply or the sliding surface has become rough.
Cylinder block (2-5)	1. The sliding parts are scratched deeply or the sliding surface has become rough. 2. The meshing surface is worn excessively or cut.
Disc (2-14)	1. The disc (friction material) is scratched deeply or peeled. 2. The meshing surface is worn excessively or cut.
Ball bearings (2-2) (2-22)	1. The rolling contact surface has been flaked or peeled. 2. The rolling contact surface is dented. 3. Bearing rotation produces abnormality (abnormal noise, irregular rotation).
Spring (2-7)	1. The spring is broken or deformed excessively.
O-rings (2-16), (2-17), (2-20), (2-26), (2-42), (2-44), (2-46)	1. Damage that is likely to cause oil leak, damage that is likely to deteriorate the sealing or permanent deformation is noticed.

2) REDUCTION GEAR

Part name	Service criteria
Pinion shaft (1-2)	1. The gear tooth surface is damaged excessively, worn of flaked.
Plates (1-3), (1-8)	1. The plate is damaged or worn excessively.
Taper roller bearings (1-5), (1-7)	1. The roller or the race is damaged excessively, dented or flaked. 2. The rotation produces abnormal noise or is not smooth. ※ To replace the bearing, replace the body assembly.
Oil seal (1-6)	1. The lip is damaged, deformed or worn excessively. 2. The lip is hardened.
Housing (1-1) Holders (1-10), (1-18) Drive gear (1-24) Sun gear (1-17)	1. The gear tooth surface is damaged excessively, worn or flaked. ※ To replace the housing, replace the body assembly.
Inner races (1-12), (1-20)	1. The surface of the needle bearings is damaged excessively or worn or flaked.
Needle bearings (1-13), (1-21)	1. The surface of the needle bearings is damaged excessively or worn or flaked.
Planetary gears (1-14), (1-22)	1. The gear tooth surface is excessively damaged, worn of flaked. 2. The rolling contact surface in contact with the needle bearing is excessively damaged, worn or flaked.
Thrust plates (1-15), (1-23)	1. The sliding surface is excessively damaged, worn or seized.

3) VALVE

Part name	Service criteria
Piston (2-38-14) Case (2-1)	1. The sliding surface is damaged deeply or rough. 2. The clearance between the piston and the case hole is large. Upper limit of diameter clearance : 0.04 mm
Spring (2-40)	1. The spring is broken or deformed excessively.
Plugs (2-38-6), (2-41) Check valve (2-39) O-rings (2-38-8, 9, 10, 11), (2-42) Backup rings (2-38-12, 13)	1. Damage that is likely to cause oil leak, damage that is likely to deteriorate the sealing or permanent deformation is noticed.

4) OTHERS

Part name	Service criteria
Other plugs and O-rings	Damage that is likely to cause oil leak, damage that is likely to deteriorate the sealing or permanent deformation is noticed.

4. TRAVEL MOTOR

Wash all parts disassembly in treated oil and dry in the compressed air.

Perform maintenance including replacement or corrections in accordance with the following criterion.

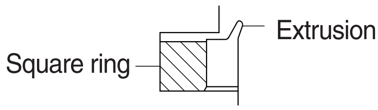
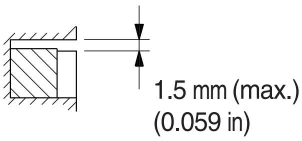
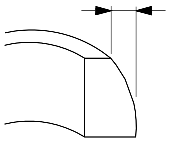
No.	Part name	Check Points	Criterion (recommended standards for replacement)	Measures
1	Floating seal (1-2)	Sliding surface	No remarkable flaws, wear, or seizure are noted.	Replacement
2	Angular bearing (1-3)	Rolling surface	No remarkable flaws, wear, or flaking are noted on balls and race.	Replacement
3	Housing (1-6)	Gear tooth surface	No remarkable flaws, wear, or flaking are noted on gear tooth surface. (note 1)	Replacement
4	Planetary gear A (1-18), B (1-9)	Gear tooth surface and rolling surface of inner side	No remarkable flaws, wear, or flaking are noted as same as No.3	Replacement
5	Needle bearing (1-10), (1-19)	Rolling surface of needle bearing	No remarkable flaws, wear, or flaking are noted.	Replacement
6	Inner race (1-11), (1-20)	Rolling surface of inner race	No remarkable flaws, wear, or flaking are noted.	Replacement
7	Thrust washer (1-12)	Sliding surface	No remarkable flaws, wear, or seizure are noted.	Replacement
8	Thrust plate (1-13), (1-23)	Sliding surface	No remarkable flaws, wear, or seizure are noted.	Replacement
9	Sun gear (1-15)	Gear tooth surface	Same as No. 3	Replacement
10	Holder (1-17)	Sliding surface of planetary gear A	No remarkable flaws, wear, or seizure are noted.	Replace planetary A and holder.
11	Drive gear (1-22)	Gear tooth surface	Same as No. 3	Replacement
13	O-ring (1-25), (1-29), (28), (29), (39), (31-5), (44), (50-5), (50-6), (50-7), (65), (66), (74)	Surface and hardness	No flaws and deflection are noted. Not hardened.	Recommend that seals be replaced with new ones at time of reassembly, since rubber materials normally deteriorate with age.
14	Shaft (2)	Sliding surface of oil seal	No remarkable flaws, wear.	Replacement
15	Ball bearing (3), (27)	Same as No. 2.	Same as No. 2.	Replacement
16	Oil seal (4)	Surface and hardness of seal lip	No flaw, wear or deflection are noted. Not hardened.	Replacement

Note 1 : Pitching in this instance refers to a case where pitching occurs in more than 10% of engagement area per tooth surface.

No.	Part name	Check Points	Criterion (recommended standards for replacement)	Measures
17	Swash plate (5)	Sliding surface and roughness between piston sub assembly and swash plate	No remarkable flaws (over 0.02 [mm] in thickness), wear, or seizure are noted. 0.4a (0.8a)	Correct lapping (#1000) if sliding surface is rough. Replace if proper correction cannot be made.
18	Cylinder block (7)	Clearance between piston sub assembly and cylinder block.	0.02 [mm] (0.04 [mm])	Replace both cylinder block and piston sub assembly concurrently. Correct lapping (#1000) if sliding surface is rough. Replace both cylinder block and piston sub assembly with new, if sliding surfaces cannot be properly corrected.
		Sliding surface and roughness between valve plate and cylinder block.	No remarkable flaws (over 0.02[mm] in thickness), wear, or seizure are noted. 0.4a (0.8a)	
19	Spring (9), (20), (37) (42), (31-3), (50-3), (62), (63)	Breakage or deflection is big.	-	Replacement
20	Piston sub assembly (15)	Clearance between piston sub assembly and cylinder block.	Same as No. 18.	Same as No. 18.
		Sliding surface and roughness between piston sub assembly and swash plate.	Same as No. 17. 0.2a (0.8a)	Same as No. 17.
		Loosen between piston and shoe is big.	0.15 [mm] (0.4 [mm])	Replacement
21	Piston (19)	Clearance between piston sub assembly and flange holder.	Same as No. 18.	Same as No. 18.
		Sliding surface and roughness between piston sub assembly and swash plate.	Same as No. 17.	Same as No. 17.
22	Valve plate (25)	Sliding surface and roughness between valve plate cylinder block.	Same as No. 18.	Same as. No. 18.
		Thickness; 5 [mm]	4.8 [mm]	Replacement
23	Base plate (30)	Sliding surface between plunger and base plate.	No remarkable flaws, wear, or seizure are noted.	Replace both base plate and plunger.
		Sliding surface between spool and base plate.	No remarkable flaws, wear, or seizure are noted.	Replace both base plate and spool.

No.	Part name	Check Points	Criterion (recommended standards for replacement)	Measures
24	Plunger (31-1)	Sliding surface between plunger and base plate.	No remarkable flaws, wear, or seizure are noted.	Replace both base plate and plunger.
		Sliding surface between plunger and check valve.	No remarkable flaws, wear, or seizure are noted.	Replace both check valve and plunger.
25	Check valve (31-2)	Sliding surface between plunger and check valve.	No remarkable flaws, wear, or seizure are noted.	Replace plunger assy.
		Seat surface between plunger and check valve.	No remarkable flaws, wear, or seizure are noted. Entire surface of seats are rubbing.	Replace both check valve and plunger.
26	Spool (41)	Sliding surface between plunger and check valve.	Same as No. 23	Same as No. 23
27	Valve body (50-1)	Sliding surface between spool and valve body.	No remarkable flaws, wear, or seizure are noted.	Replace valve assy.
28	Without parking brake check valve (50-2)	Sliding surface between plunger and check valve.	No remarkable flaws, wear, or seizure are noted.	Replace valve assy.
	With parking brake spool (50-2)	Sliding surface between spool and valve body.	No remarkable flaws, wear, or seizure are noted.	Replace valve assy.

5. TURNING JOINT

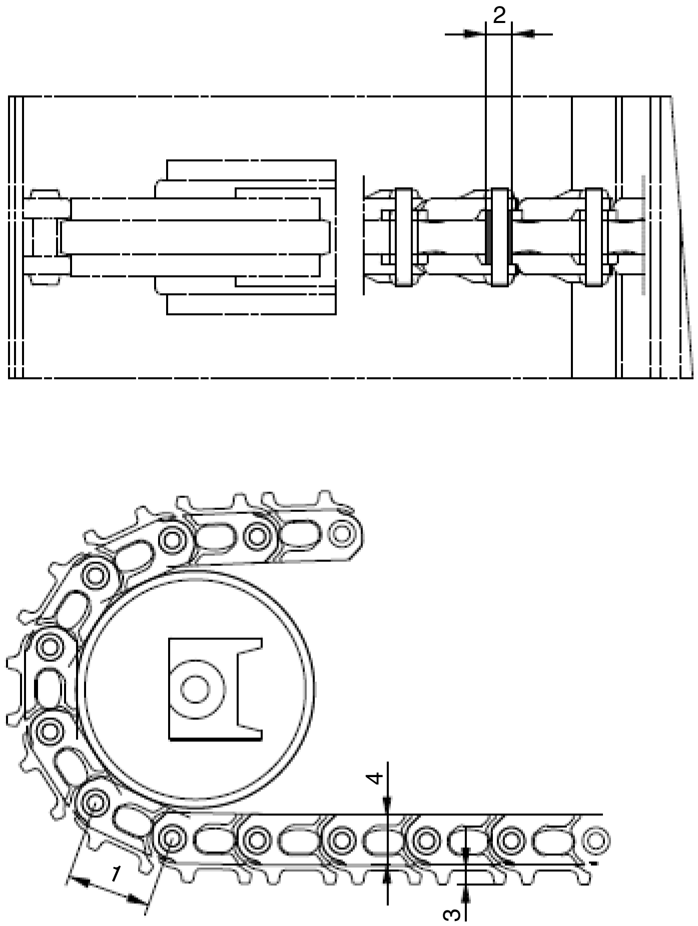
Parts Name		Check Points	Measures
Body, Stem	Sliding surface with sealing sections.	Plating worn or peeled due to seizure or contamination.	Replace
	Sliding surface between body and stem other than sealing section.	· Worn abnormality or damaged more than 0.1 mm (0.0039 in) in depth due to seizure contamination.	Replace
		· Damaged more than 0.1 mm (0.0039 in) in depth.	Smooth with oilstone.
	Sliding surface with thrust plate.	· Worn more than 0.5 mm (0.02 in) or abnormality.	Replace
		· Worn less than 0.5 mm (0.02 in).	Smooth
		· Damage due to seizure or contamination remediable within wear limit (0.5 mm) (0.02 in).	Smooth
Cover	Sliding surface with thrust plate.	· Worn more than 0.5 mm (0.02 in) or abnormality.	Replace
		· Worn less than 0.5 mm (0.02 in).	Smooth
		· Damage due to seizure or contamination remediable within wear limit (0.5 mm) (0.02 in).	Replace
Seal set	-	· Extruded excessively from seal groove square ring. 	Replace
	-	· Slipper ring 1.5 mm (0.059 in) narrower than seal groove, or narrower than back ring. 	Replace
	-	· Worn more than 0.5 mm (0.02 in) ~ 1.5 mm (MAX.) (0.059 in) 	Replace

6. CYLINDER

Part name	Inspecting section	Inspection item	Remedy
Piston rod	· Neck of rod pin	· Presence of crack	· Replace
	· Weld on rod hub	· Presence of crack	· Replace
	· Stepped part to which piston is attached.	· Presence of crack	· Replace
	· Threads	· Presence of crack	· Recondition or replace
	· Plated surface	· Plating is not worn off to base metal. · Rust is not present on plating. · Scratches are not present.	· Replace or replate · Replace or replate · Recondition, replate or replace
	· Rod	· Wear of O.D.	· Recondition, replate or replace
	· Bushing at mounting part	· Wear of I.D.	· Replace
Cylinder tube	· Weld on bottom	· Presence of crack	· Replace
	· Weld on head	· Presence of crack	· Replace
	· Weld on hub	· Presence of crack	· Replace
	· Tube interior	· Presence of faults	· Replace if oil leak is seen
	· Bushing at mounting part	· Wear on inner surface	· Replace
Gland	· Bushing	· Flaw on inner surface	· Replace if flaw is deeper than coating

1. TRACK SHOE

1) STEEL SHOE

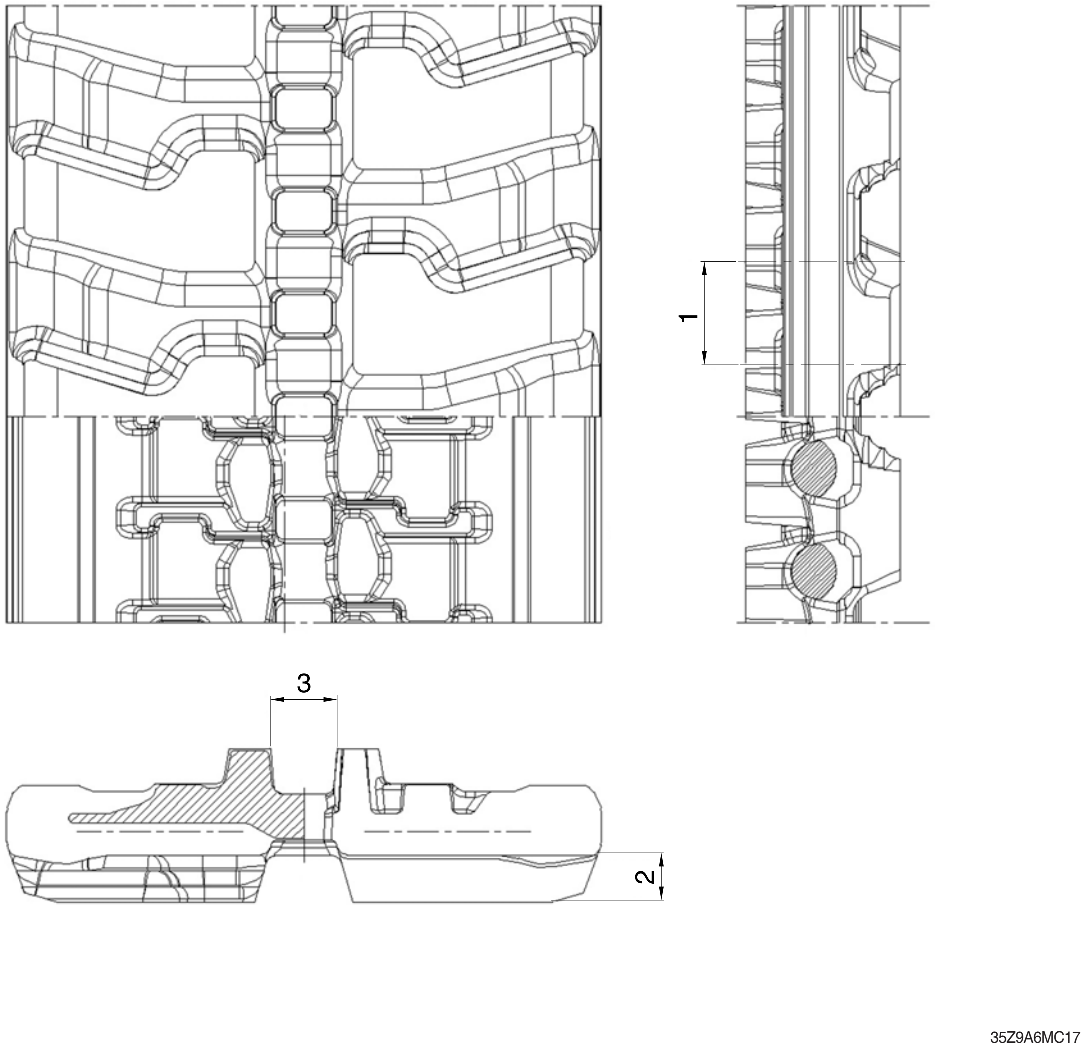


35AZ6MC18

Unit : mm

No	Check item	Criteria		Remedy
		Standard size	Repair limit	
1	Link pitch	101.6	105	Replace bushing and pin and link assembly
2	Outside diameter of bushing	Ø32.2	Ø28.6	
3	Height of grouser	16.5	12.5	Lug welding, rebuild or replace
4	Height of link	65	60	

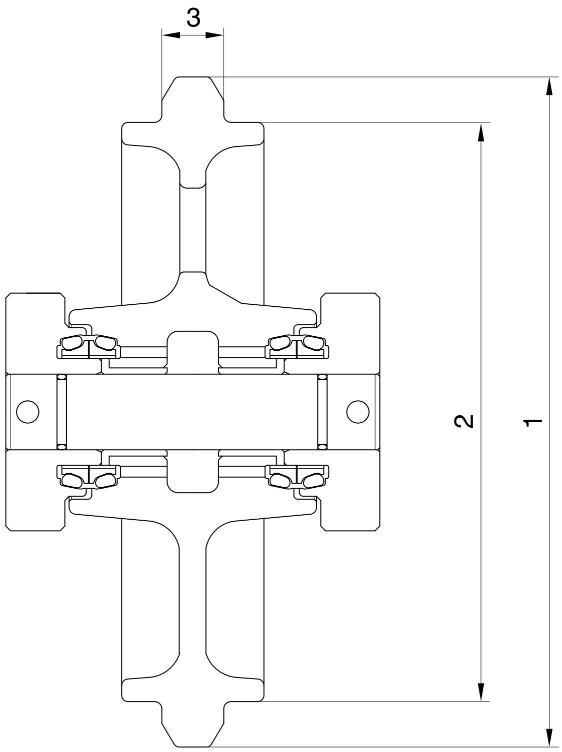
2) RUBBER SHOE



Unit : mm

No	Check item	Criteria		Remedy
		Standard size	Repair limit	
1	Link pitch	54.5	56.5	Replace
2	Height of grouser	23.5	5	
3	Width of link	44	57	

2. IDLER

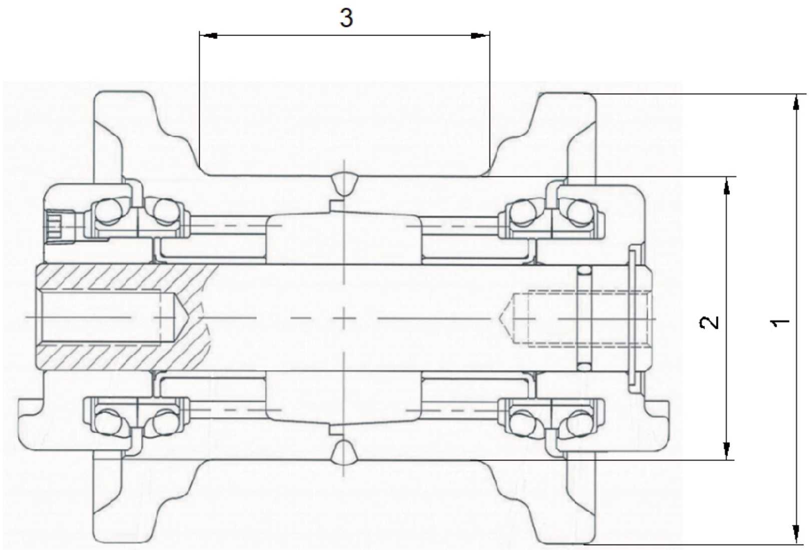


35Z9A6MC18

Unit : mm

No	Check item	Criteria		Remedy
		Standard size	Repair limit	
1	Outside diameter of flange	Ø331	-	Rebuild or replace
2	Outside diameter of thread	Ø289	Ø279	
3	Width of flange	38	32	

3. TRACK ROLLER

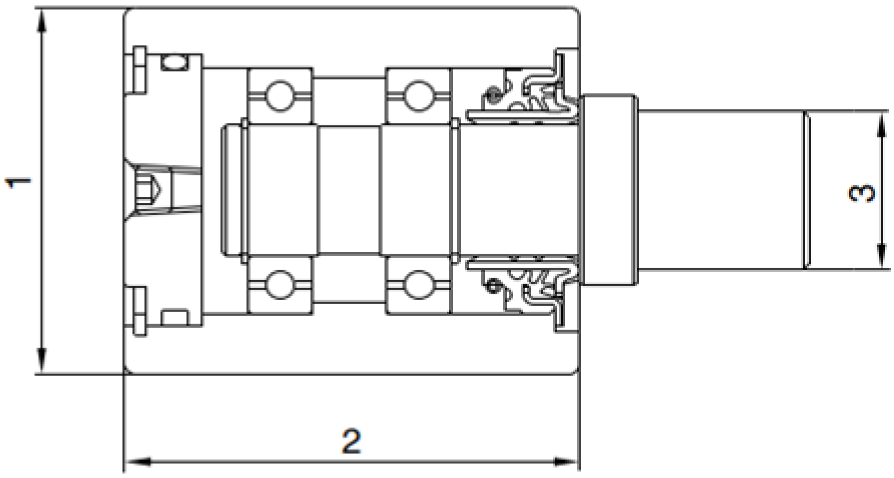


35AZ6MC19

Unit : mm

No	Check item	Criteria		Remedy
		Standard size	Repair limit	
1	Outside diameter of flange	Ø127	Ø121	Rebuild or replace
2	Outside diameter of thread	Ø80	Ø74.0	
3	Width of flange	89	93	

4. CARRIER ROLLER

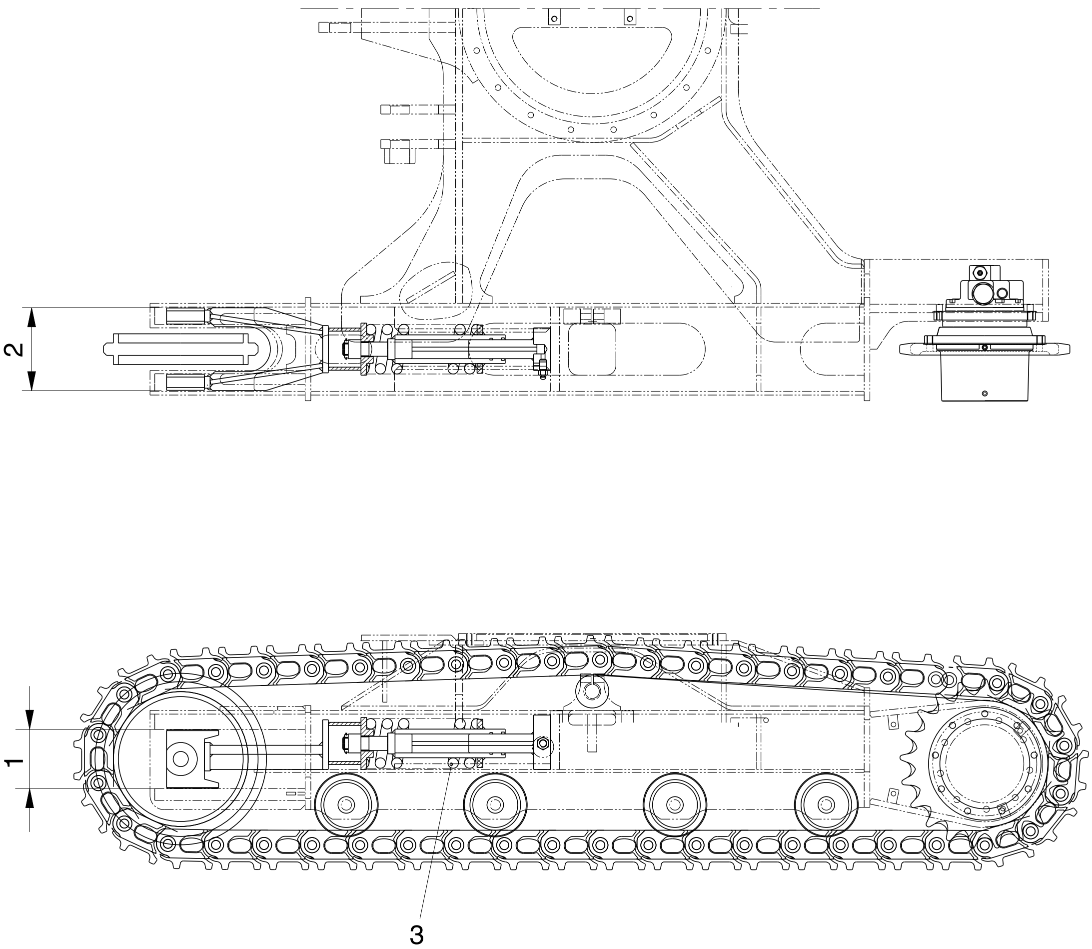


40A6MC20

Unit : ㎜

No	Check item	Criteria		Remedy
		Standard size	Repair limit	
1	Outside diameter of flange	Ø70	Ø66	Replace
2	Width of tread	86	-	
3	Diameter of shaft	Ø30	-	

5. TENSION CYLINDER

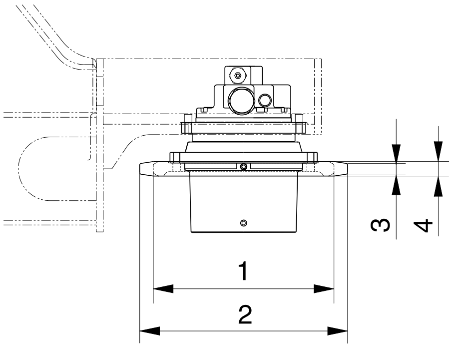


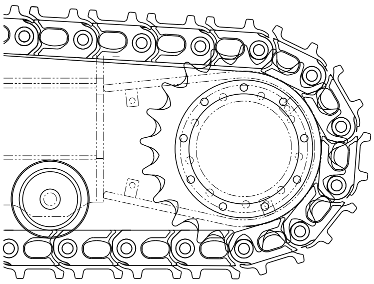
R35Z76MC21

Unit : mm

<table>
<tr><th rowspan="2">No</th><th rowspan="2">Check item</th><th colspan="5">Criteria</th><th rowspan="2">Remedy</th></tr>
<tr><th></th><th colspan="2">Standard size</th><th colspan="2">Repair limit</th></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Vertical width of idler guide</td><td>Track frame</td><td colspan="2">91</td><td colspan="2">95</td><td>Rebuild</td></tr>
<tr><td>Idler support</td><td colspan="2">90</td><td colspan="2">88</td><td>Rebuild or replace</td></tr>
<tr><td rowspan="2">2</td><td rowspan="2">Horizontal width of idler guide</td><td>Track frame</td><td colspan="2">175</td><td colspan="2">177</td><td>Rebuild</td></tr>
<tr><td>Idler guide</td><td colspan="2">174</td><td colspan="2">170</td><td>Rebuild or replace</td></tr>
<tr><td rowspan="3">3</td><td rowspan="3">Recoil spring</td><td colspan="3">Standard size</td><td colspan="2">Repair limit</td><td rowspan="3">Replace</td></tr>
<tr><td>Free length</td><td>Installed length</td><td>Installed load</td><td>Free length</td><td>Installed load</td></tr>
<tr><td>256</td><td>203</td><td>3140 kg</td><td>-</td><td>2512 kg</td></tr>
</table>

6. SPROCKET

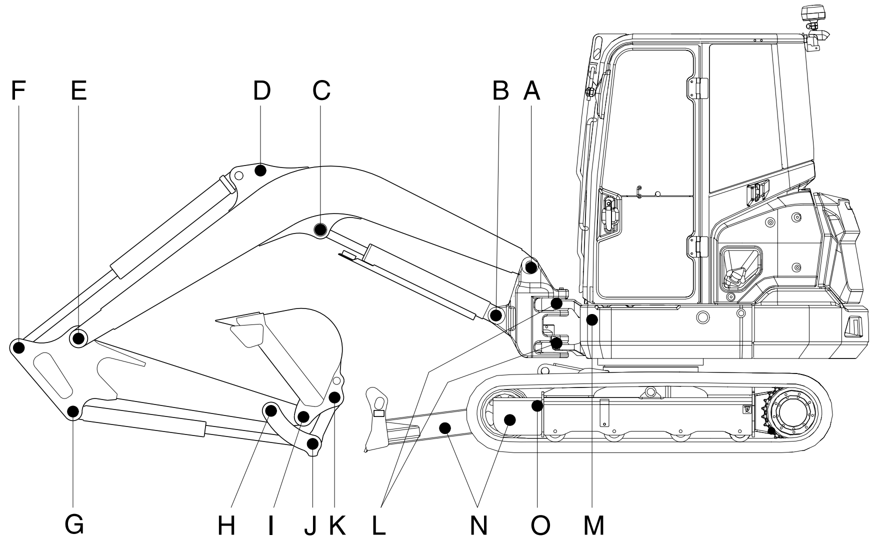




R35Z76MC22

No	Check item	Criteria		Remedy
		Standard size	Repair limit	
1	Wear out of sprocket tooth lower side diameter	Ø344	Ø336	Repair or Replace
2	Wear out of sprocket tooth upper side diameter	Ø381	-	
3	Wear out of sprocket tooth upper side width	26	-	
4	Wear out of sprocket tooth lower side width	29	21	

7. WORK EQUIPMENT



40A6MC30

Unit : ㎜

Mark	Measuring point (Pin and Bushing)	Normal value	Pin		Bushing		Remedy & Remark
			Recomm. service limit	Limit of use	Recomm. service limit	Limit of use	
A	Boom Rear	50	49	48.5	50.5	51	Replace
B	Boom Cylinder Head	50	49	48.5	50.5	51	〃
C	Boom Cylinder Rod	50	49	48.5	50.5	51	〃
D	Arm Cylinder Head	45	44	43.5	45.5	46	〃
E	Boom Front	45	44	43.5	45.5	46	〃
F	Arm Cylinder Rod	45	44	43.5	45.5	46	〃
G	Bucket Cylinder Head	40	39	38.5	40.5	41	〃
H	Arm Link	40	39	38.5	40.5	41	〃
I	Bucket and Arm Link	40	39	38.5	40.5	41	〃
J	Bucket Cylinder Rod	40	39	38.5	40.5	41	〃
K	Bucket Link	40	39	38.5	40.5	41	〃
L	Boom swing post	90	89	88.5	90.5	91	〃
M	Boom swing cylinder	50	49	48.5	50.5	51	〃
N	Blade cylinder	55	54	53.5	55.5	56	〃
O	Blade and frame link	45	44	43.5	45.5	46	〃

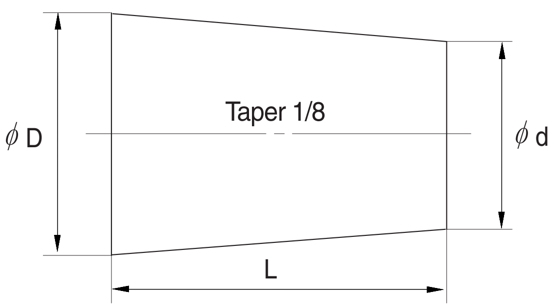
SECTION 7 DISASSEMBLY AND ASSEMBLY

GROUP 1 PRECAUTIONS

1. REMOVAL WORK

1) Lower the work equipment completely to the ground.
   If the coolant contains antifreeze, dispose of it correctly.
2) After disconnecting hoses or tubes, cover them or fit blind plugs to prevent dirt or dust from entering.
3) When draining oil, prepare a container of adequate size to catch the oil.
4) Confirm the match marks showing the installation position, and make match marks in the necessary places before removal to prevent any mistake when assembling.
5) To prevent any excessive force from being applied to the wiring, always hold the connectors when disconnecting the connectors.
6) Fit wires and hoses with tags to show their installation position to prevent any mistake when installing.
7) Check the number and thickness of the shims, and keep in a safe place.
8) When raising components, be sure to use lifting equipment of ample strength.
9) When using forcing screws to remove any components, tighten the forcing screws alternately.
10) Before removing any unit, clean the surrounding area and fit a cover to prevent any dust or dirt from entering after removal.
11) When removing hydraulic equipment, first release the remaining pressure inside the hydraulic tank and the hydraulic piping.
12) If the part is not under hydraulic pressure, the following corks can be used.

Nominal number	Dimensions		
	D	d	L
06	6	5	8
08	8	6.5	11
10	10	8.5	12
12	12	10	15
14	14	11.5	18
16	16	13.5	20
18	18	15	22
20	20	17	25
22	22	18.5	28
24	24	20	30
27	27	22.5	34



2. INSTALL WORK

1) Tighten all bolts and nuts(Sleeve nuts) to the specified torque.

2) Install the hoses without twisting or interference.

3) Replace all gaskets, O-rings, cotter pins, and lock plates with new parts.

4) Bend the cotter pin or lock plate securely.

5) When coating with adhesive, clean the part and remove all oil and grease, then coat the threaded portion with 2-3 drops of adhesive.

6) When coating with gasket sealant, clean the surface and remove all oil and grease, check that there is no dirt or damage, then coat uniformly with gasket sealant.

7) Clean all parts, and correct any damage, dents, burrs, or rust.

8) Coat rotating parts and sliding parts with engine oil.

9) When press fitting parts, coat the surface with antifriction compound(LM-P).

10) After installing snap rings, check that the snap ring is fitted securely in the ring groove(Check that the snap ring moves in the direction of rotation).

11) When connecting wiring connectors, clean the connector to remove all oil, dirt, or water, then connect securely.

12) When using eyebolts, check that there is no deformation or deterioration, and screw them in fully.

13) When tightening split flanges, tighten uniformly in turn to prevent excessive tightening on one side.

14) When operating the hydraulic cylinders for the first time after repairing and reassembling the hydraulic cylinders, pumps, or other hydraulic equipment or piping, always bleed the air from the hydraulic cylinders as follows:

(1) Start the engine and run at low idling.

(2) Operate the control lever and actuate the hydraulic cylinder 4-5 times, stopping 100mm before the end of the stroke.

(3) Next, operate the piston rod to the end of its stroke to relieve the circuit. (The air bleed valve is actuated to bleed the air.)

(4) After completing this operation, raise the engine speed to the normal operating condition.

※ If the hydraulic cylinder has been replaced, carry out this procedure before assembling the rod to the work equipment.

※ Carry out the same operation on machines that have been in storage for a long time after completion of repairs.

3. COMPLETING WORK

1) If the coolant has been drained, tighten the drain valve, and add water to the specified level. Run the engine to circulate the water through the system. Then check the water level again.

2) If the hydraulic equipment has been removed and installed again, add engine oil to the specified level. Run the engine to circulate the oil through the system. Then check the oil level again.

3) If the piping or hydraulic equipment, such as hydraulic cylinders, pumps, or motors, have been removed for repair, always bleed the air from the system after reassembling the parts.

4) Add the specified amount of grease(Molybdenum disulphied grease) to the work equipment related parts.

GROUP 2 TIGHTENING TORQUE

1. MAJOR COMPONENTS

No.	Descriptions		Bolt size	Torque	
				kgf · m	lbf · ft
1	Engine	Engine mounting bolt (Engine-Bracket)-LH	M10 × 1.5	6.63±1.0	48±7.2
2		Engine mounting bolt (Engine-Bracket)-RH	M10 × 1.5	6.63±1.0	48±7.2
3		Engine mounting bolt (Bracket-Frame)	M12 × 1.75	11.0±2.25	97.6±16.3
4		Engine mounting bolt (Frame-Pump housing)	M12 × 1.75	12.8±3.0	93±22.0
5		Radiator mounting bolt, nut	M10 × 1.5	6.9±1.4	50±10.0
6		Coupling mounting bolt	M12 × 1.75	10±1.0	72.3±7.2
7		Fuel tank mounting bolt	M10 × 1.5	6.9±1.4	50±10.0
8	Hydraulic system	Main pump mounting bolt	M12 × 1.75	14.4±2.1	104±15.2
9		Main pump housing mounting bolt	M10 × 1.5	6.63±1.0	48±7.2
10		Main control valve mounting bolt	M 8 × 1.25	2.5±0.5	18.1±3.6
11		Hydraulic oil tank mounting bolt	M12 × 1.75	12.3±2.5	89±18.1
12		Turning joint mounting bolt, nut	M12 × 1.75	12.8±3.0	93±22.0
13		Swing motor mounting bolt	M14 × 2.0	19.6±2.9	142±21.0
14	Power train system	Swing bearing upper mounting bolt	M12 × 1.75	14.4±2.1	104±15.2
15		Swing bearing lower mounting bolt	M12 × 1.75	14.4±2.1	104±15.2
16		Travel motor mounting bolt	M12 × 1.75	14.4±2.1	104±15.2
17		Sprocket mounting bolt	M12 × 1.75	12.3±1.2	89±8.7
18	Under carriage	Upper roller mounting bolt, nut	M14 × 2.0	19.6±2.9	142±21.0
19		Lower roller mounting bolt	M16 × 1.5	31.3±3.0	226±21.7
20	Others	Counterweight mounting bolt	M20 × 2.5	57.9±8.7	419±62.9
21		Cab mounting bolt, nut	M 8 × 1.25	2.5±0.5	18.1±3.6
22		Operator's seat mounting bolt	M 8 × 1.25	2.5±0.5	18.1±3.6
23		Under cover mounting bolt	M 8 × 1.25	2.5±0.5	18.1±3.6
24		Swing post pin mounting bolt, nut	M12 × 1.75	12.8±3.0	93±22.0

2. TORQUE CHART

Use following table for unspecified torque.

1) BOLT AND NUT

(1) Coarse thread

Bolt size	8T		10T	
	kg · m	lb · ft	kg · m	lb · ft
M 6 × 1.0	0.85 ~ 1.25	6.15 ~ 9.04	1.14 ~ 1.74	8.2 ~ 12.6
M 8 × 1.25	2.0 ~ 3.0	14.5 ~ 21.7	2.7 ~ 4.1	19.5 ~ 29.7
M10 × 1.5	4.0 ~ 6.0	28.9 ~ 43.4	5.5 ~ 8.3	39.8 ~ 60
M12 × 1.75	7.4 ~ 11.2	53.5 ~ 81.0	9.8 ~ 15.8	70.9 ~ 114
M14 × 2.0	12.2 ~ 16.6	88.2 ~ 120	16.7 ~ 22.5	121 ~ 163
M16 × 2.0	18.6 ~ 25.2	135 ~ 182	25.2 ~ 34.2	182 ~ 247
M18 × 2.5	25.8 ~ 35.0	187 ~ 253	35.1 ~ 47.5	254 ~ 344
M20 × 2.5	36.2 ~ 49.0	262 ~ 354	49.2 ~ 66.6	356 ~ 482
M22 × 2.5	48.3 ~ 63.3	349 ~ 458	65.8 ~ 98.0	476 ~ 709
M24 × 3.0	62.5 ~ 84.5	452 ~ 611	85.0 ~ 115	615 ~ 832
M30 × 3.0	124 ~ 168	898 ~ 1214	169 ~ 229	1223 ~ 1656
M36 × 4.0	174 ~ 236	1261 ~ 1704	250 ~ 310	1808 ~ 2242

(2) Fine thread

Bolt size	8T		10T	
	kg · m	lb · ft	kg · m	lb · ft
M 8 × 1.0	2.2 ~ 3.4	15.9 ~ 24.6	3.0 ~ 4.4	21.7 ~ 31.8
M10 × 1.2	4.5 ~ 6.7	32.5 ~ 48.5	5.9 ~ 8.9	42.7 ~ 64.4
M12 × 1.25	7.8 ~ 11.6	56.4 ~ 83.9	10.6 ~ 16.0	76.7 ~ 116
M14 × 1.5	13.3 ~ 18.1	96.2 ~ 131	17.9 ~ 24.1	130 ~ 174
M16 × 1.5	19.9 ~ 26.9	144 ~ 195	26.6 ~ 36.0	192 ~ 260
M18 × 1.5	28.6 ~ 43.6	207 ~ 315	38.4 ~ 52.0	278 ~ 376
M20 × 1.5	40.0 ~ 54.0	289 ~ 391	53.4 ~ 72.2	386 ~ 522
M22 × 1.5	52.7 ~ 71.3	381 ~ 516	70.7 ~ 95.7	511 ~ 692
M24 × 2.0	67.9 ~ 91.9	491 ~ 665	90.9 ~ 123	658 ~ 890
M30 × 2.0	137 ~ 185	990 ~ 1339	182 ~ 248	1314 ~ 1796
M36 × 3.0	192 ~ 260	1390 ~ 1880	262 ~ 354	1894 ~ 2562

2) PIPE AND HOSE (FLARE type)

Thread size (PF)	Width across flat (mm)	kgf · m	lbf · ft
1/4"	19	4	28.9
3/8"	22	5	36.2
1/2"	27	9.5	68.7
3/4"	36	18	130
1"	41	21	152
1-1/4"	50	35	253

3) PIPE AND HOSE (ORFS type)

Thread size (UNF)	Width across flat (mm)	kgf · m	lbf · ft
9/16-18	19	4	28.9
11/16-16	22	5	36.2
13/16-16	27	9.5	68.7
1-3/16-12	36	18	130
1-7/16-12	41	21	152
1-11/16-12	50	35	253

4) FITTING

Thread size	Width across flat (mm)	kgf · m	lbf · ft
1/4"	19	4	28.9
3/8"	22	5	36.2
1/2"	27	9.5	68.7
3/4"	36	18	130
1"	41	21	152
1-1/4"	50	35	253

GROUP 3 PUMP DEVICE

1. REMOVAL AND INSTALL

1) REMOVAL

(1) Lower the work equipment to the ground and stop the engine.

(2) Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping

(3) Loosen the breather slowly to release the pressure inside the hydraulic tank.

⚠ **Escaping fluid under pressure can penetrate the skin causing serious injury.**


13031GE18

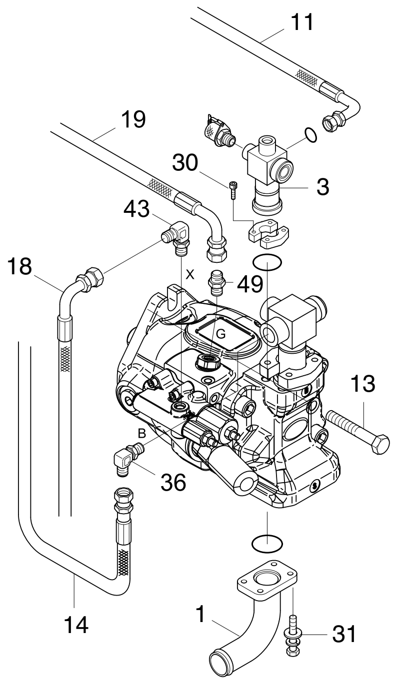
(4) Loosen the drain plug under the hydraulic tank and drain the oil from the hydraulic tank.
- · Hydraulic tank quantity : 44 ℓ (11.6 U.S.gal)

(5) Disconnect hoses (11) and loosen bolt (30) and remove pipe (3).

(6) Disconnect pilot line hoses (14, 18, 19) and remove connectors (36, 43, 49).

(7) Remove socket bolts (31) and disconnect pump suction tube (1).

※ When pump suction tube is disconnected, the oil inside the piping will flow out, so catch it in oil pan.



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(8) Sling the pump assembly and remove the pump mounting bolts (13).
- · Weight : 25 kg (54 lb)
- · Tightening torque : 12.8±3.0 kgf·m (93±22 lbf·ft)

※ Pull out the pump assembly from housing. When removing the pump assembly, check that all the hoses have been disconnected.

2) INSTALL

(1) Carry out installation in the reverse order to removal.

(2) Remove the suction strainer and clean it.

(3) Replace return filter with new one.

(4) Remove breather and clean it.

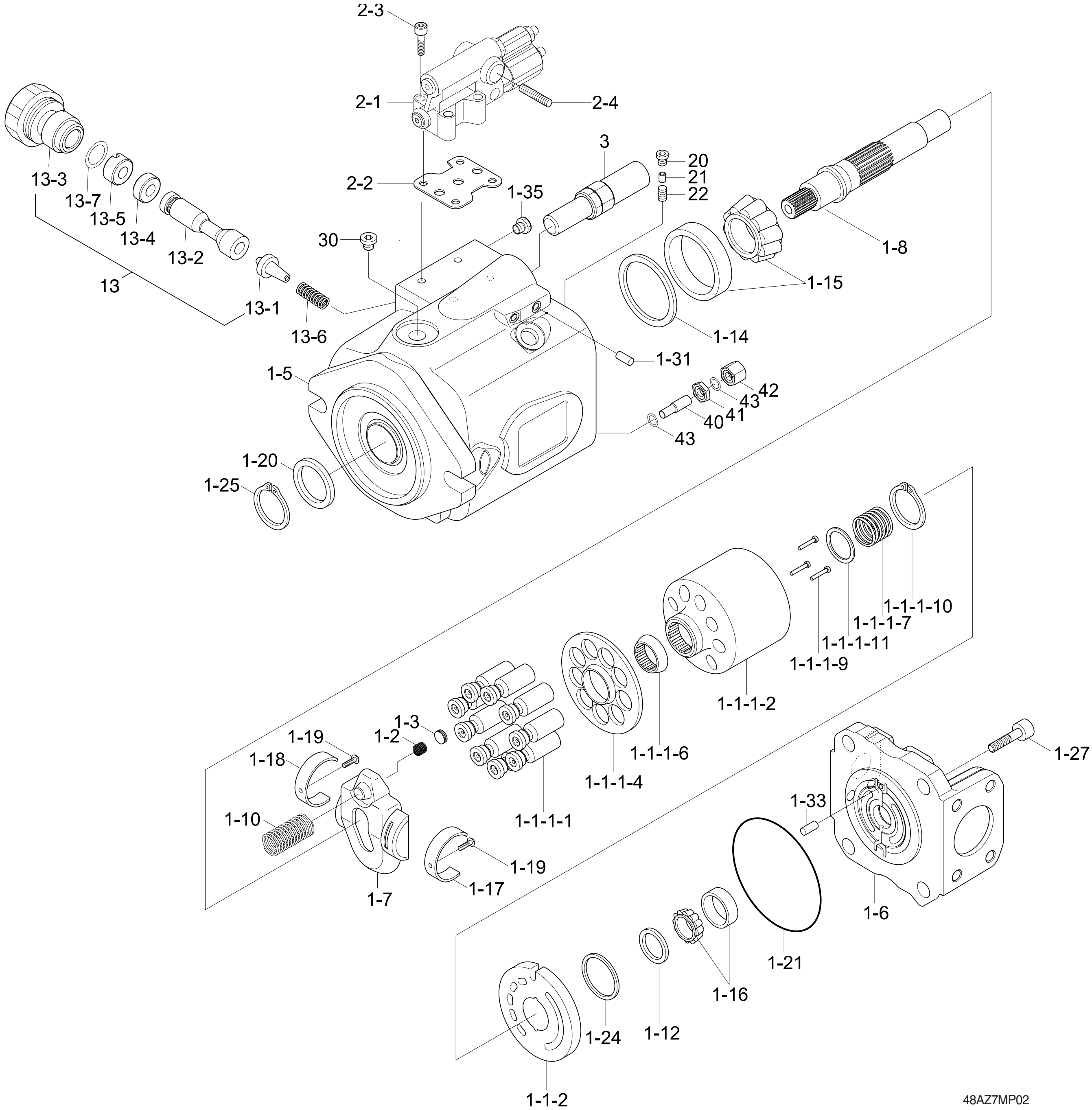
(5) After adding oil to the hydraulic tank to the specified level.

(6) Bleed the air from the hydraulic pump.
① Remove the air vent plug (1EA).
② Tighten plug lightly.
③ Start the engine, run at low idling, and check oil come out from plug.
④ Tighten plug.

(7) Start the engine, run at low idling (3~5 minutes) to circulate the oil through the system.

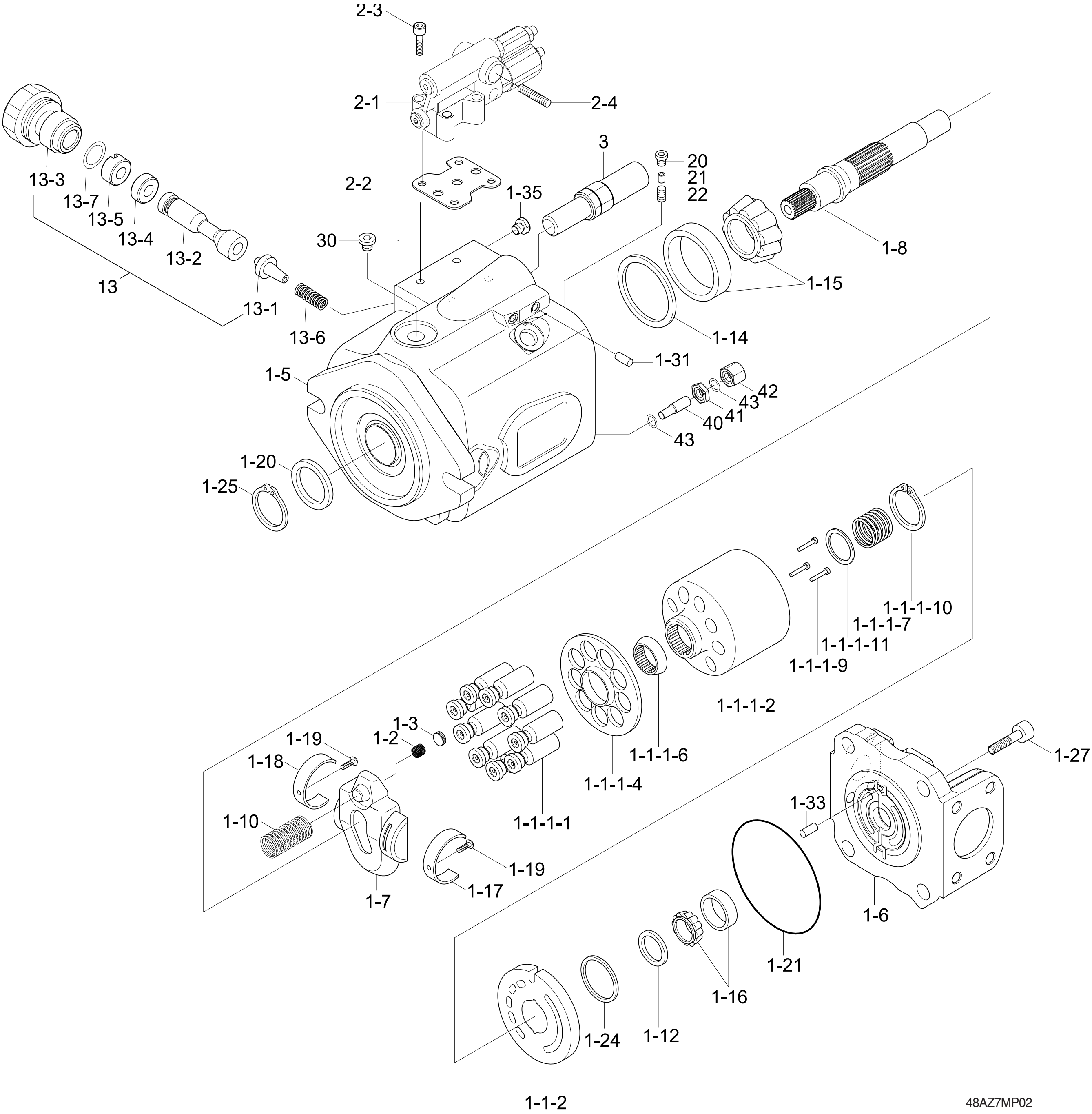
(8) Confirm the hydraulic oil level and check the hydraulic oil leak or not.

2. STRUCTURE (1/2)



1-1-1	Rotary assy	1-1-2	Control plate	1-14	Stop ring
1-1-1-1	Piston and shoe	1-2	Pressure spring	1-15	Taper roller bearing
1-1-1-2	Block	1-3	Stopper	1-16	Taper roller bearing
1-1-1-4	Retaining plate	1-5	Pump housing	1-17	Liner bearing
1-1-1-6	Retainer ball	1-6	Connection plate	1-18	Liner bearing
1-1-1-7	Spring	1-7	Swing cradle	1-19	Flat screw
1-1-1-9	Pressure pin	1-8	Drive shaft	1-20	Shaft seal
1-1-1-10	V ring	1-10	Spring	1-21	O-ring
1-1-1-11	Back up plate	1-12	Adjust shim	1-24	Seat

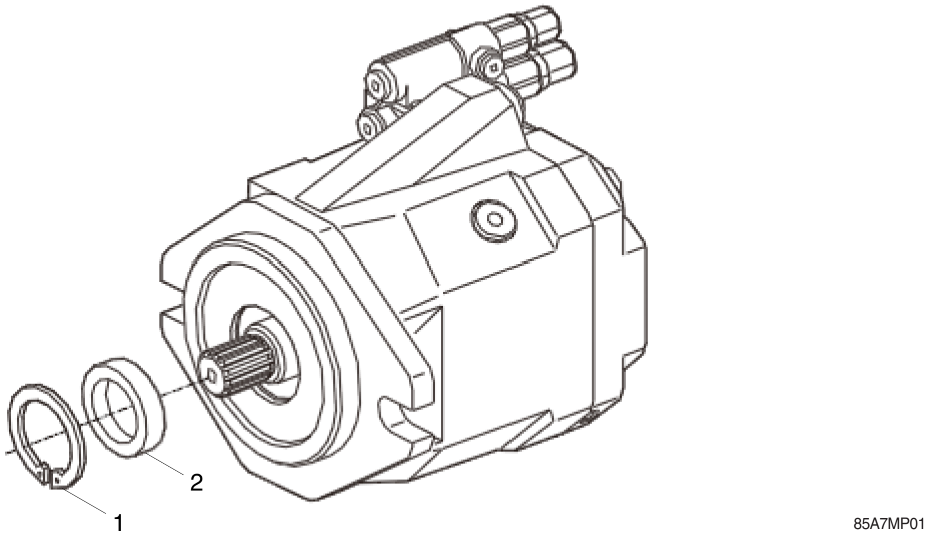
STRUCTURE (2/2)



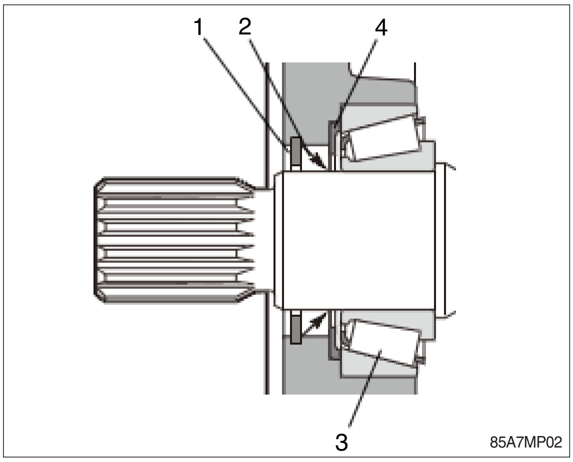
1-25	Retainer ring	3	Control valve	20	Throttle screw
1-27	Socket screw	13	Control valve	21	Throttle pin
1-31	Pin	13-1	Valve cone	22	Throttle screw
1-33	Straight pin	13-2	Valve seat	30	Lock screw
1-35	Lock screw	13-3	Screw plug	40	Stop screw
2-1	Control valve	13-4	Adjust screw	41	Nut
2-2	Gasket	13-5	Nut	42	Cap nut
2-3	Socket screw	13-6	Compression spring	43	O-ring
2-4	Lock screw	13-7	O-ring		

3. DISASSEMBLY AND ASSEMBLY

1) SEALING OF THE DRIVE SHAFT

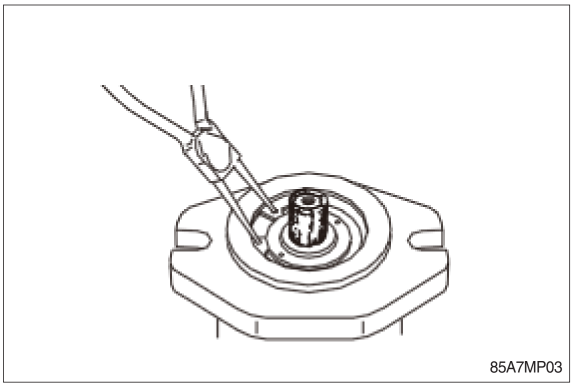


(1) Components



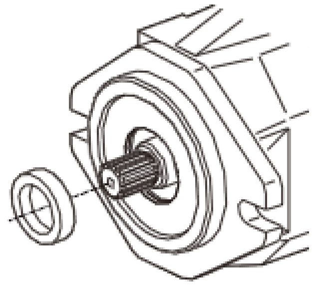
① Circlip
② 2 Shaft seal
③ 3 Bearing
④ 4 Stop ring

(2) Protect the drive shaft.
(3) Remove the circlip.
(4) Remove shaft seal to front.



※ Change the shaft seal and check its sliding surface (drive shaft) and housing and grease the sealing ring.

※ Visual check shaft seal and housing.



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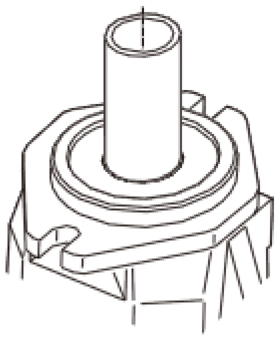
(5) Assembling of the sealing ring carefully down to the distance ring.



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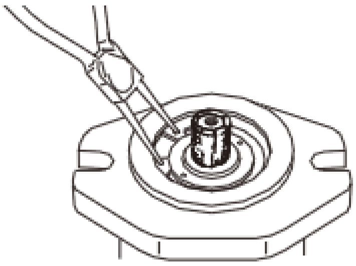
(6) Assemble the snap ring.



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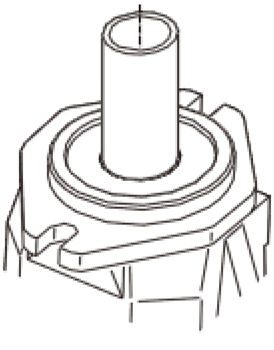
※ Visual check to ensure that the circlip is correctly located in the groove.



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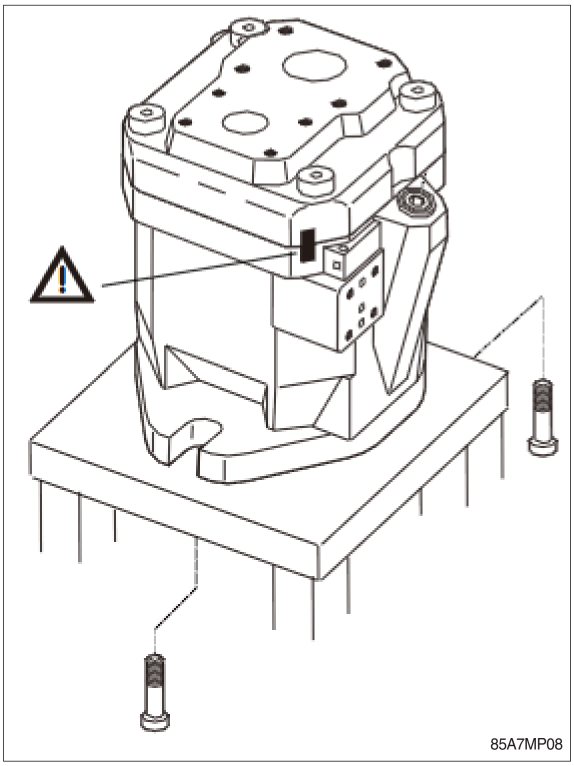
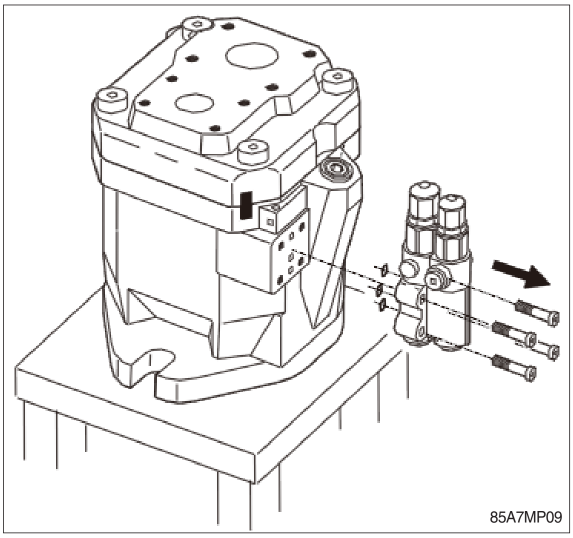
2) DISSAMBLE THE PUMP

※ Disassembly position
Mark the location of the connection plate on the housing of pump.



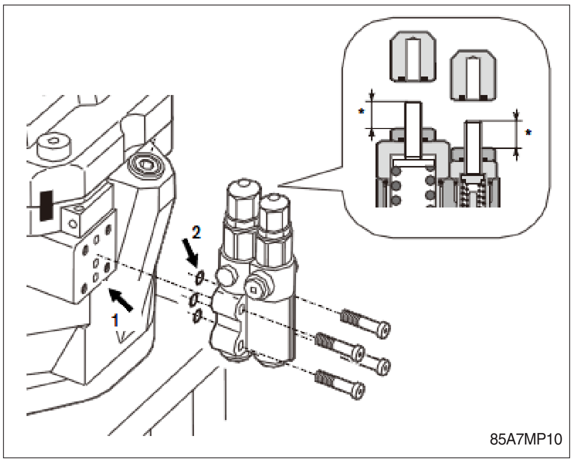
(1) Remove the control valve.



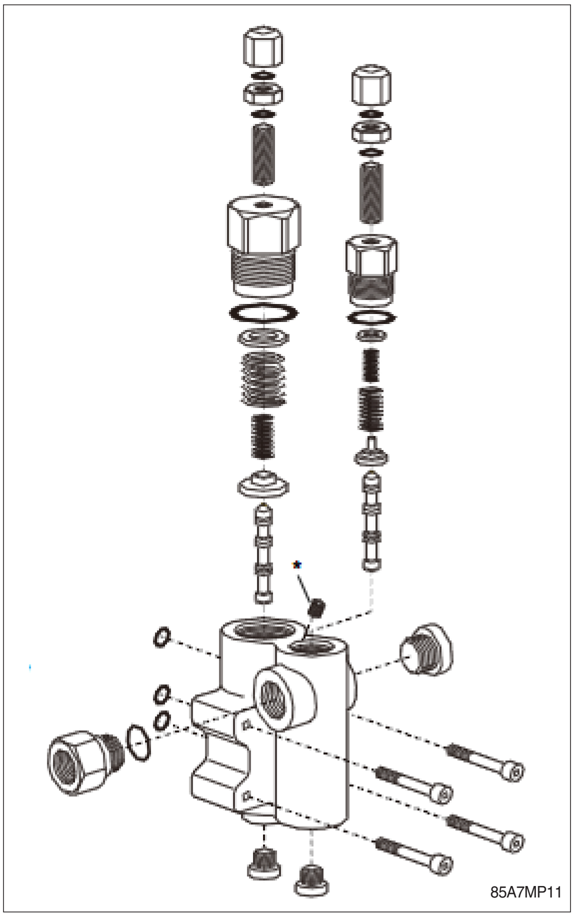
(2) Remove the control valve

※ Measure dimension * and note down.

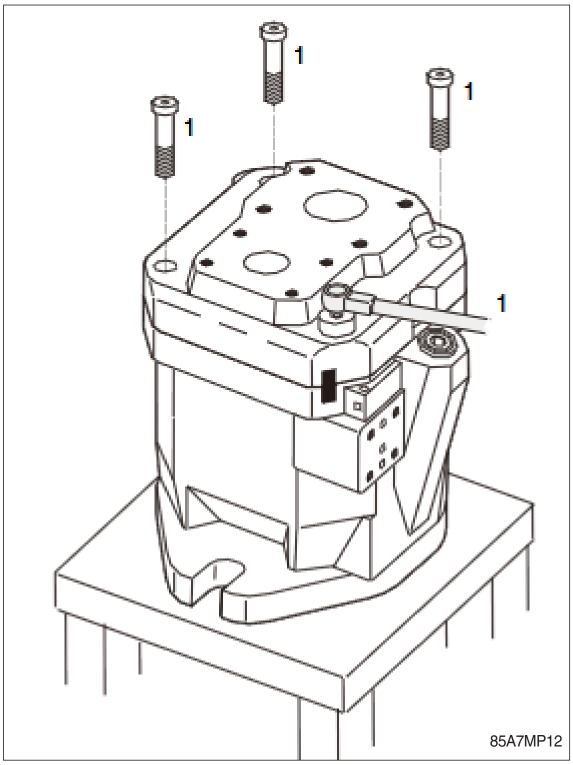
※ Check sealing surface (1) and O-rings (2).



※ Only DFR with orifice

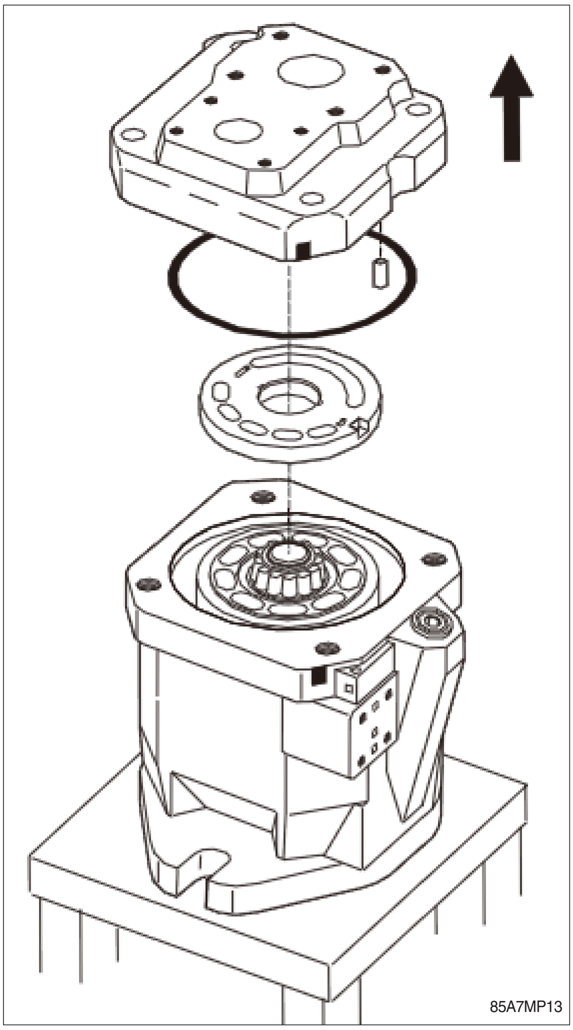


(3) Remove the socket screws (1).

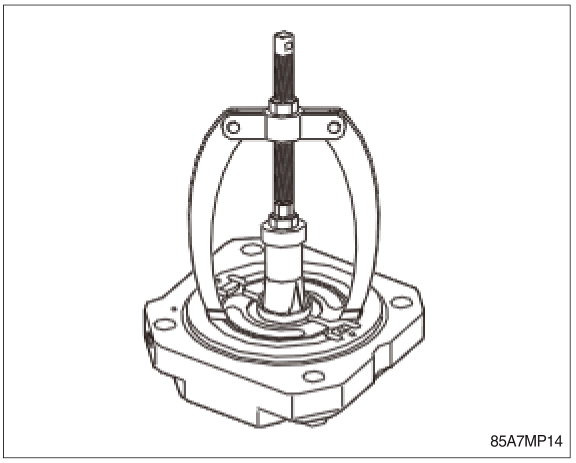


(4) Remove connection plate.

※ Control plate can drop down - keep tight while removing connection plate.



(5) Pull bearing of the connection plate out using a bearing puller.
※ Do not damage the sealing surface.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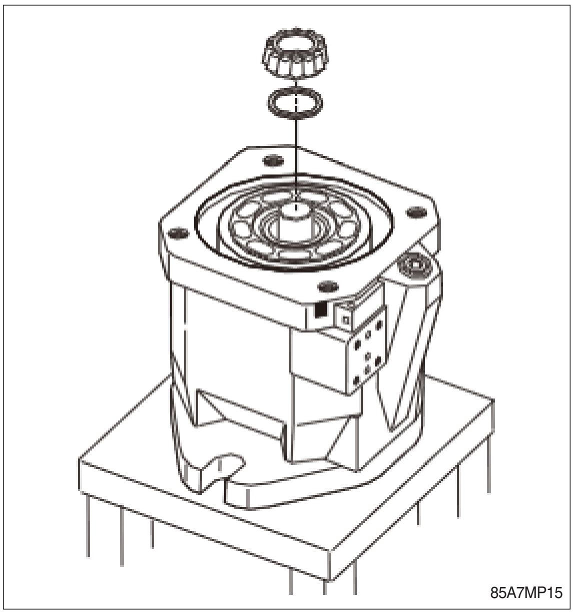
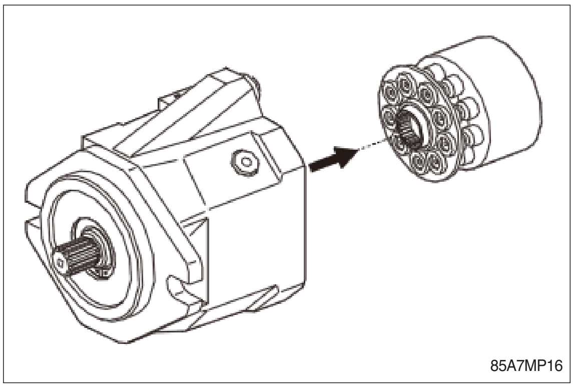
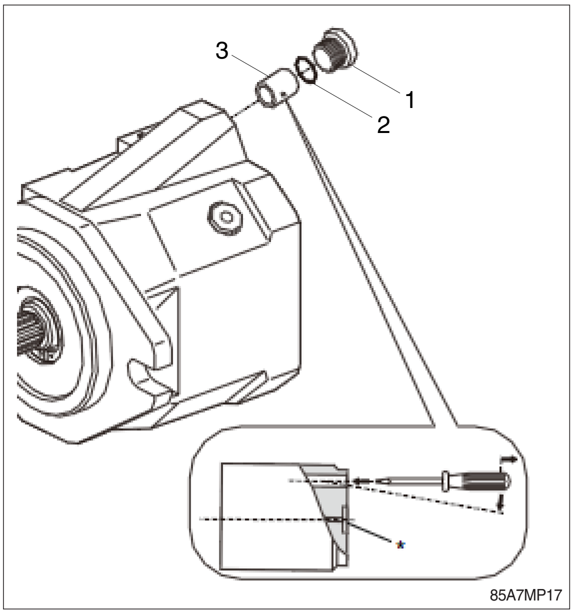
(6) Remove bearing and shim.
※ Do not damage the sealing surface.


85A7MP15

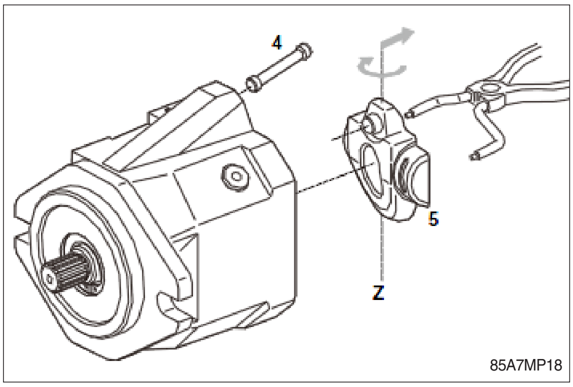
(7) Remove the rotary group in a horizontal position.


85A7MP16

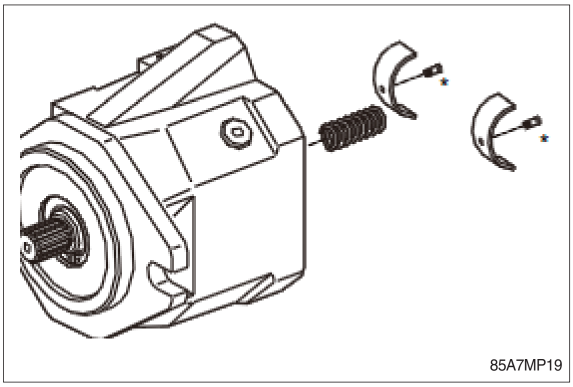
(8) Remove plug (1) with seal (2).
(9) Pull out control piston (3) (- flat surface *-) with tool.



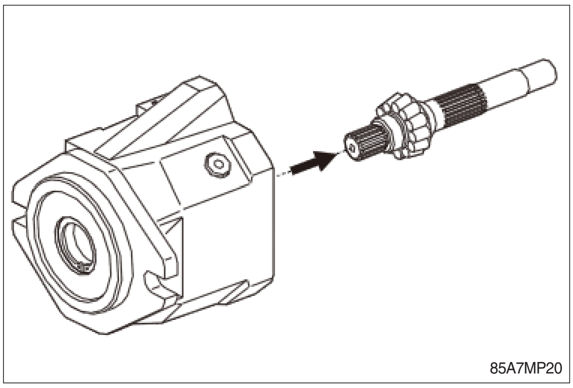
(10) Remove piston rod and swash plate.
Turn swash plate (5) inside of the housing slightly along Z-axis with tool. Remove piston rod (4). Remove swash plate (5).
Do not damage the piston rod and swash plate.



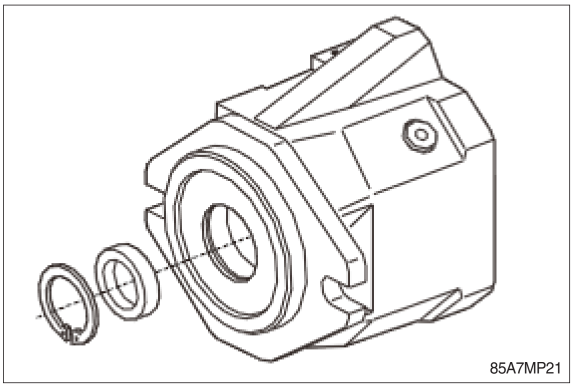
(11) Remove bearing shells and bearing.
※ Attention for position.
Only size 60~85



(12) Remove drive shaft with bearing.



(13) Remove circlip and shaft seal.

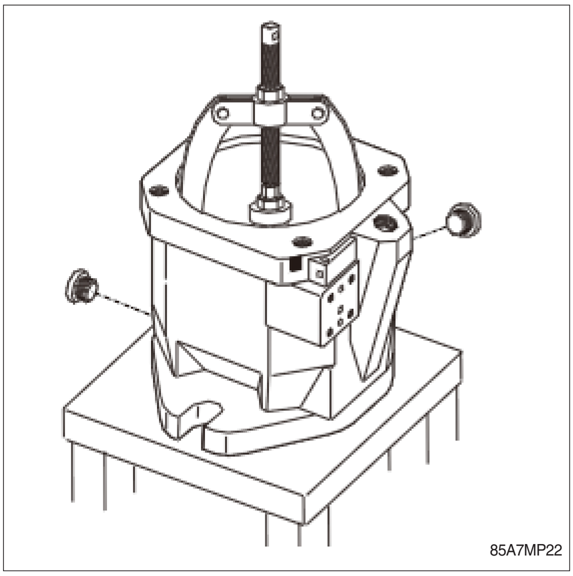


(14) Pull out outer race of tapered bearing out of housing press seat.

※ Use bearing puller.

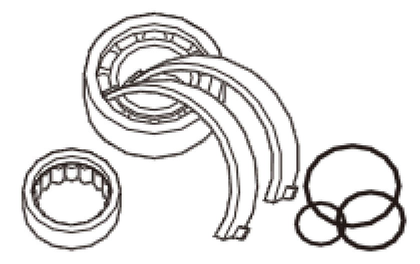
(15) Remove all plugs.

(16) Remove stop ring.



3) INSPECTION

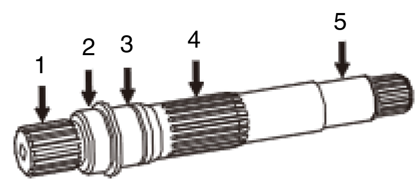
(1) Renew all bearings and seals.



85A7MP23

(2) Check below items

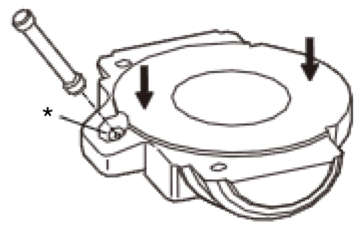
① Wear on slines, fretting
② Drive shaft seal wear grooves
③ Bearing seat
④ Splines for cylinder drive
⑤ Bearing seat



85A7MP24

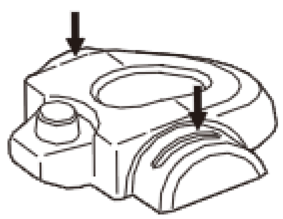
(3) Sliding surface free of grooves.

* Check for freedom of piston rod movem-ent.



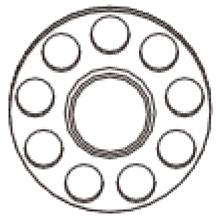
85A7MP25

(4) Bearing surfaces



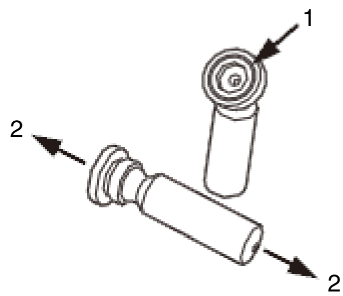
85A7MP26

(5) That the retaining plate is free of grooves and that there is no wear in the slipper pad area.



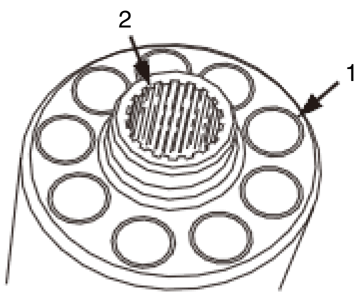
85A7MP27

(6) Check to see that there are no scratches or metal deposits on the sliding surface (1), and that there is no axial play (2), (pistons must only be replaced as a set).



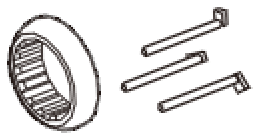
85A7MP28

(7) Cylinder bores (1), splines (2).



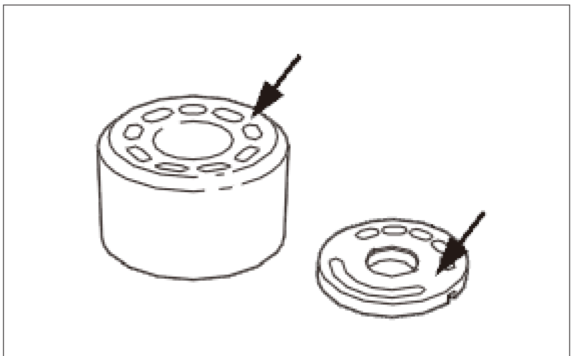
85A7MP29

(8) Free of grooves, no signs of wear.

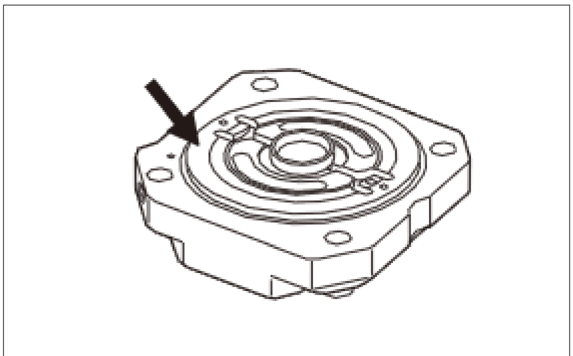


85A7MP30

(9) Cylinder sliding surface free of grooves, no wear, no embedded foreign particles. That there are no scratches on the control plate. (Only replace them as a set).

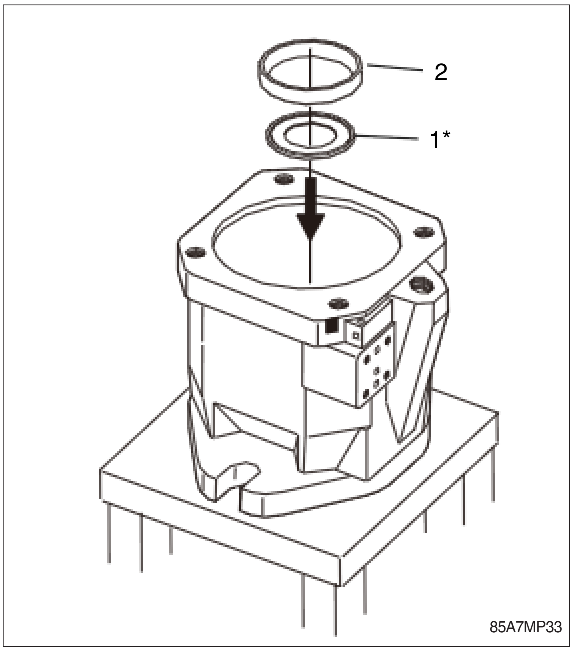

85A7MP31

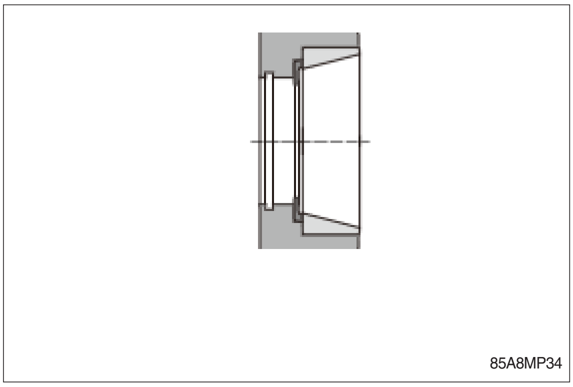
(10) Mounting surface - control plate undamaged


85A7MP32

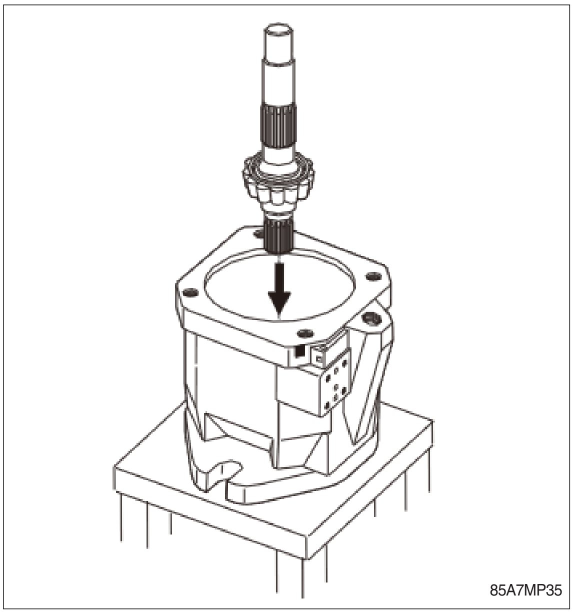
4) ASSEMBLY

(1) Assemble stop ring (1, * see also below spare part list).
(2) Press-in distance ring (2) with tool.

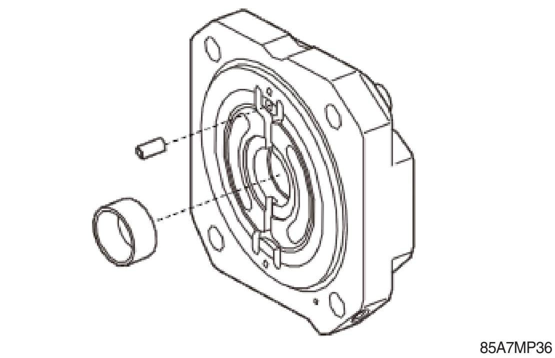




(3) Assemble shaft in correct position.
※ Do not cut shaft seal.

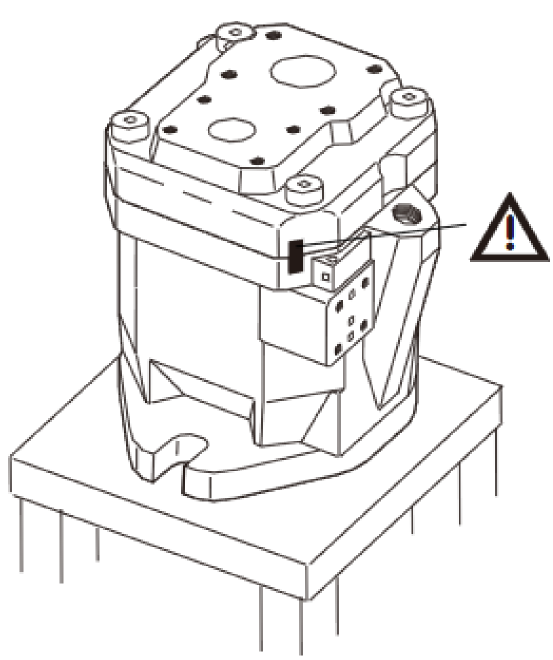


(4) Press-in outer racer of rear bearing into connection plate.



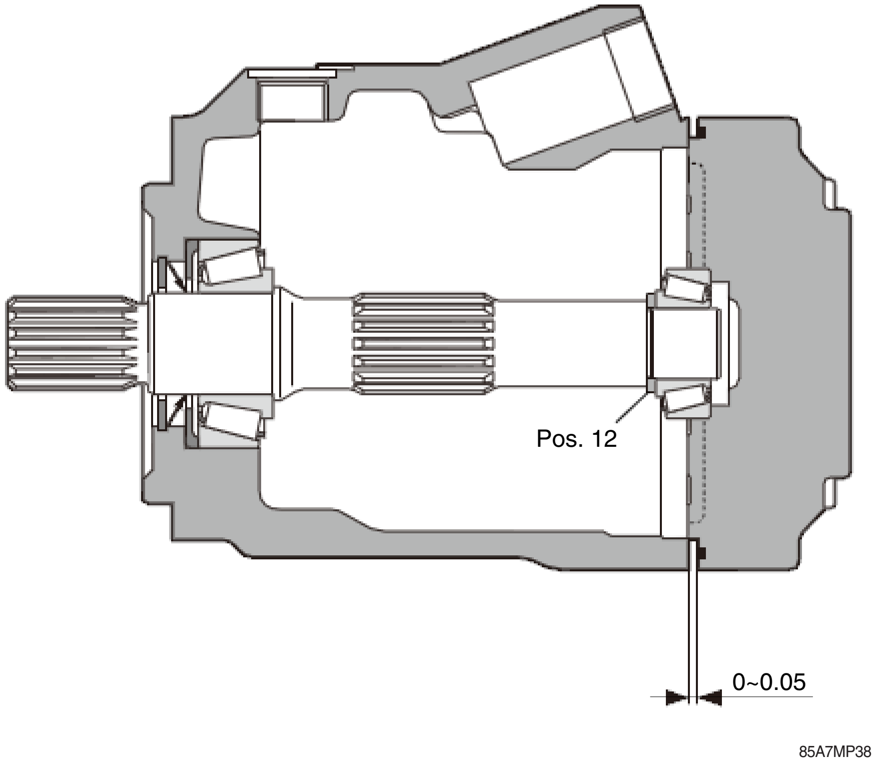
85A7MP36

(5) Assemble connection plate to pump acc. sign.
(6) Tighten the 4 socket screws.
(7) Adjustment of taper roller bearing
① Disassemble connection plate.



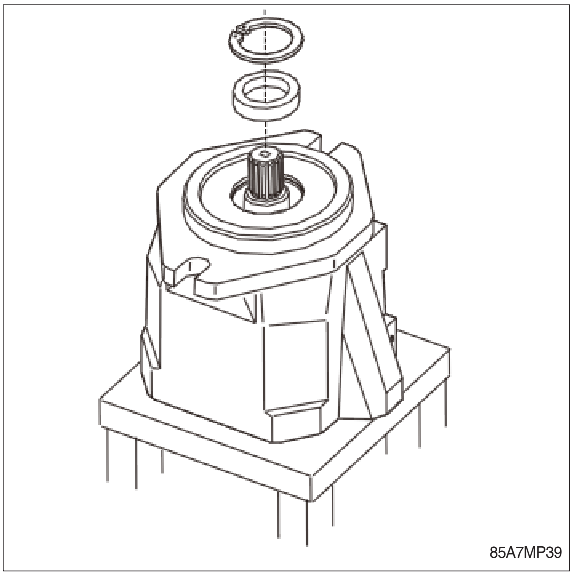
85A7MP37

② Taper roller bearing initial tension



※ Adjustment of taper roller bearing set
Cast iron housing must have initial tension of the bearings :
0~0,05 mm, grind position 12 if necessary.

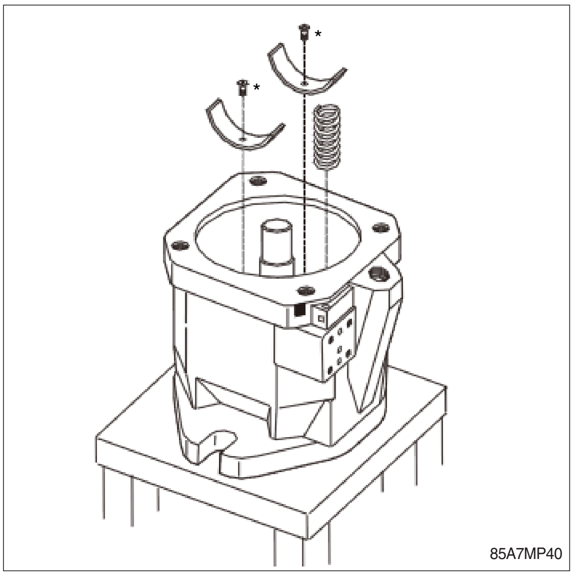
(8) Assembly instruction shaft seal see page 6.



(9) Fit in bearing shells and spring.

※ Fix with grease.

* Only size 60~85

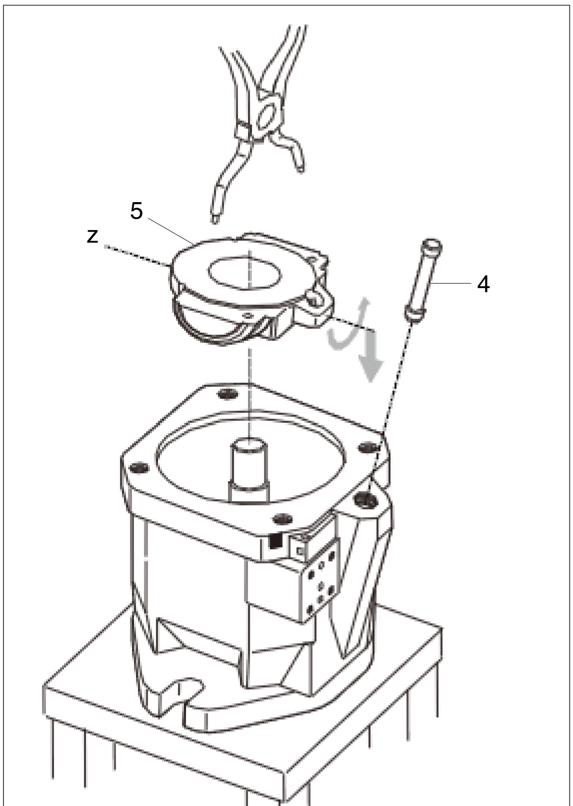


(10) Assemble swash plate (5) and piston rod (4) into pump.

※ Spring guide pin in correct position.

※ Check correct position of the spring.

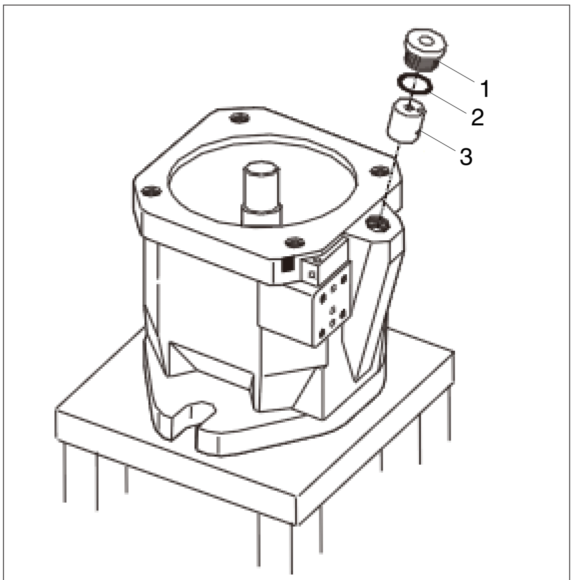
(11) Assemble piston rod (4), control piston (3), seal (2), and plug (1).



85A7MP41

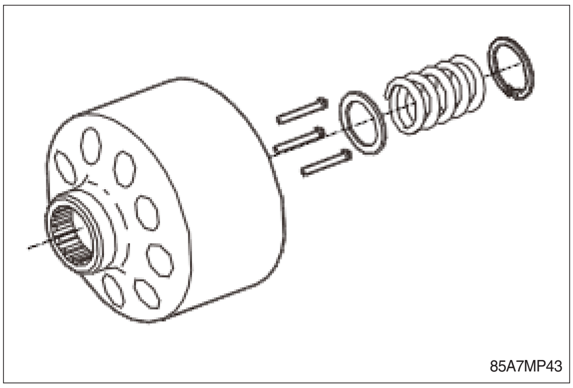
(12) Assemble piston rod (4), control piston (3),seal (2) and plug (1).

※ Plug tighten torque.
- Size 28, 45, 60
  19.4±2.0 kgf·m (140+14.5 lbf·ft)
- Size 85
  32.6±2.0 kgf·m (236+14.5 lbf·ft)

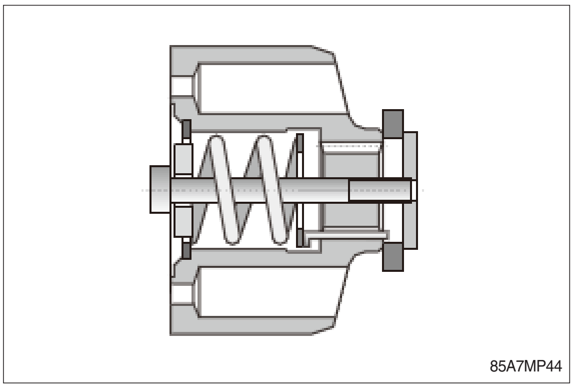


85A7MP42

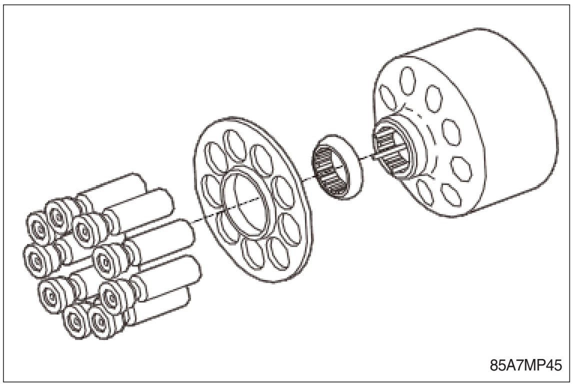
(13) Fit pressure pins using an assembly aid.



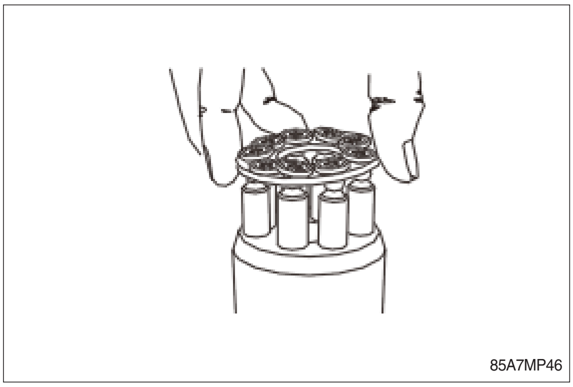
(14) Pre-tension the spring using a suitable device.



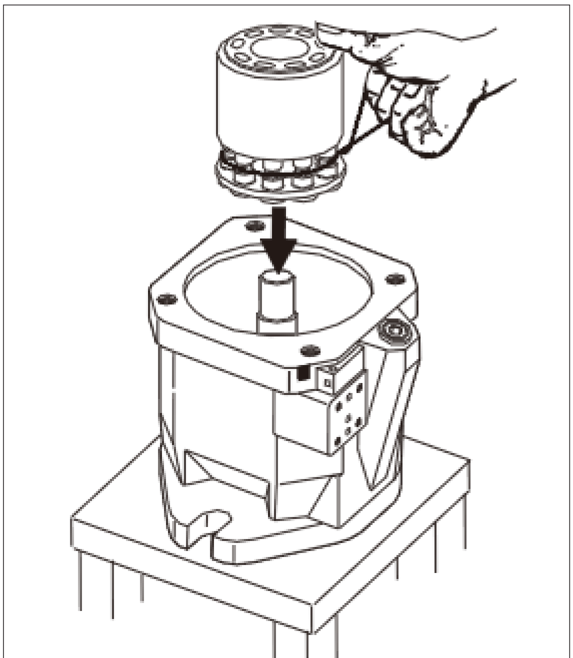
(15) Assemble piston with retaining plate.
※ Oil piston and slipper pad.



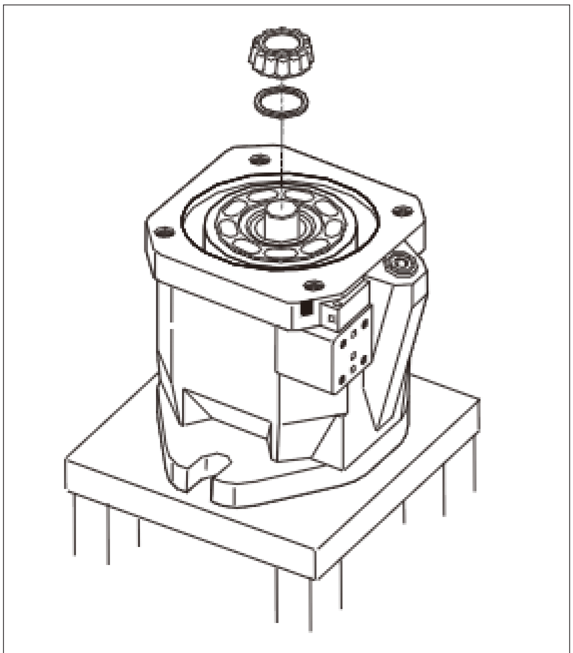
(16) Assemble piston with retaining plate.



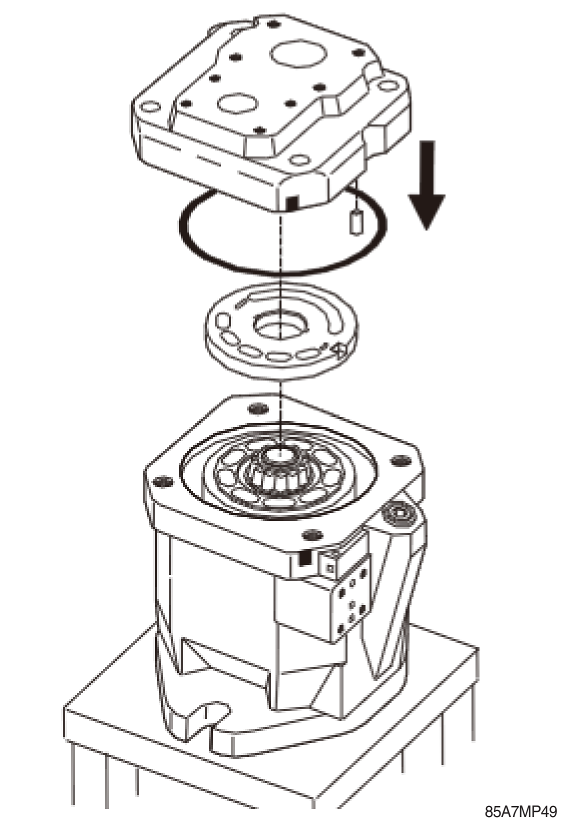
(17) Fit rotary group
※ Assembly aid
Hold the pistons by using an O-ring.


85A7MP47

(18) Assemble bearing and adjustment shim to shaft.

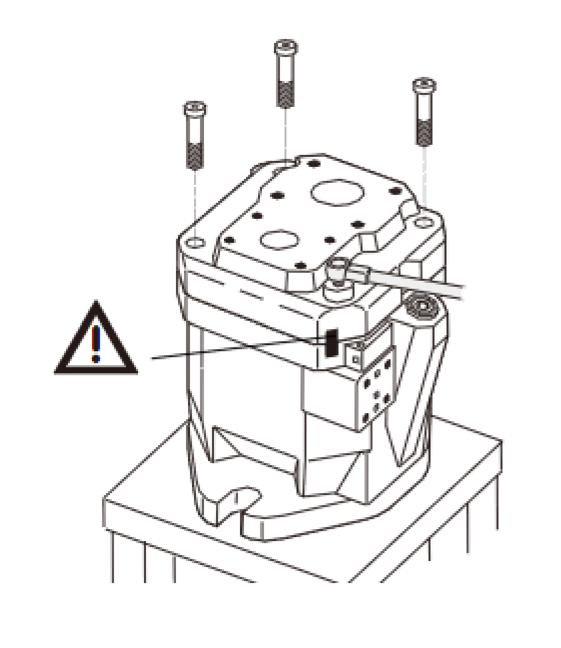

85A7MP48

(19) Fit O-ring.
※ Fix with grease.
(20) Fit control plate.
※ Fix with grease.
※ Check correct position to pin.



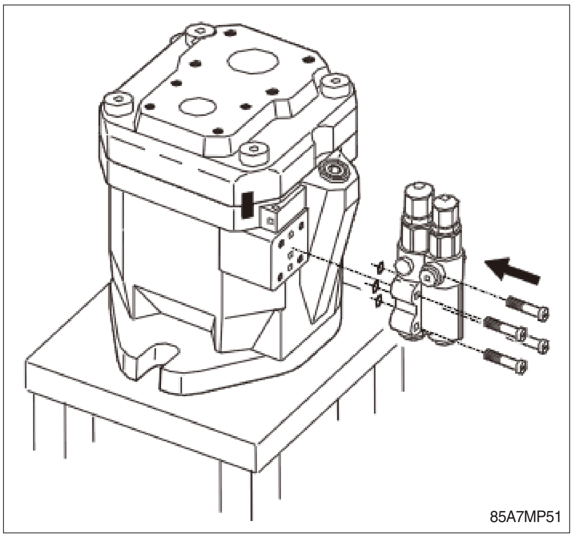
85A7MP49

(21) Assemble connection plate.
※ Check the correct position to housing.



85A7MP50

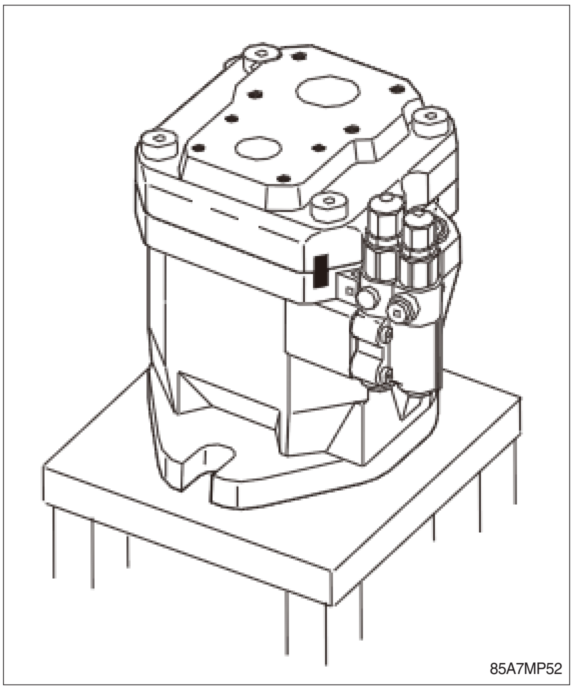
(22) Assemble control valve.



85A7MP51

(23) Final pump assembly

※ Double check of the housing signs.



85A7MP52

GROUP 4 MAIN CONTROL VALVE

1. REMOVAL AND INSTALL OF MOTOR

1) REMOVAL

(1) Lower the work equipment to the ground and stop the engine.

(2) Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping.

(3) Loosen the breather slowly to release the pressure inside the hydraulic tank.

⚠ Escaping fluid under pressure can penetrate the skin causing serious injury.

※ When pipes and hoses are disconnected, the oil inside the piping will flow out, so catch it in oil pan.

(4) Disconnect hydraulic hose.

(5) Disconnect pilot line hoses.

(6) Sling the control valve assembly and remove the control valve mounting bolt.

· Weight : 55 kg (121 lb)

· Tightening torque : 6.9±1.4 kgf·m (50±10.0 lbf·ft)

(7) Remove the control valve assembly.
When removing the control valve assembly, check that all the piping have been disconnected.

2) INSTALL

(1) Carry out installation in the reverse order to removal.

(2) Bleed the air from below items.

① Cylinder (boom, arm, bucket)
② Swing motor
③ Travel motor
※ See each item removal and install.

(3) Confirm the hydraulic oil level and recheck the hydraulic oil leak or not.

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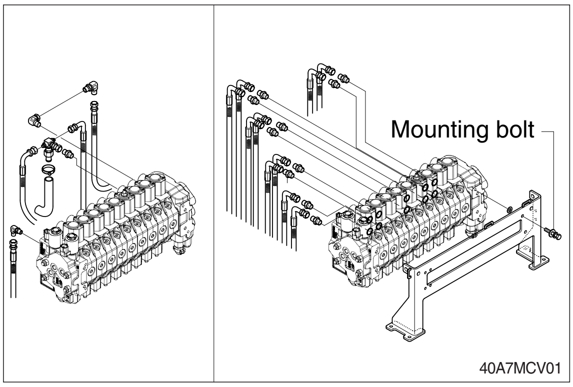
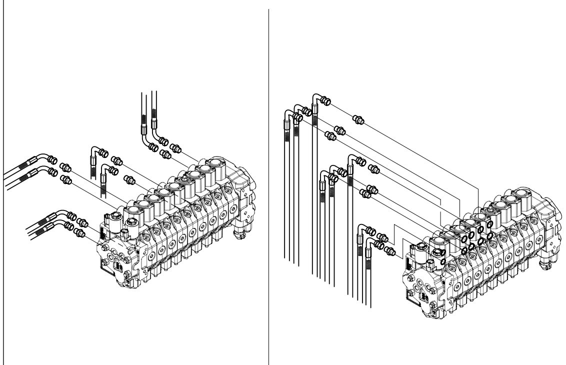
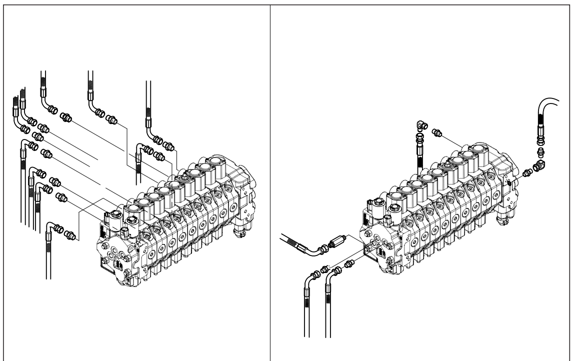


40A7MCV01

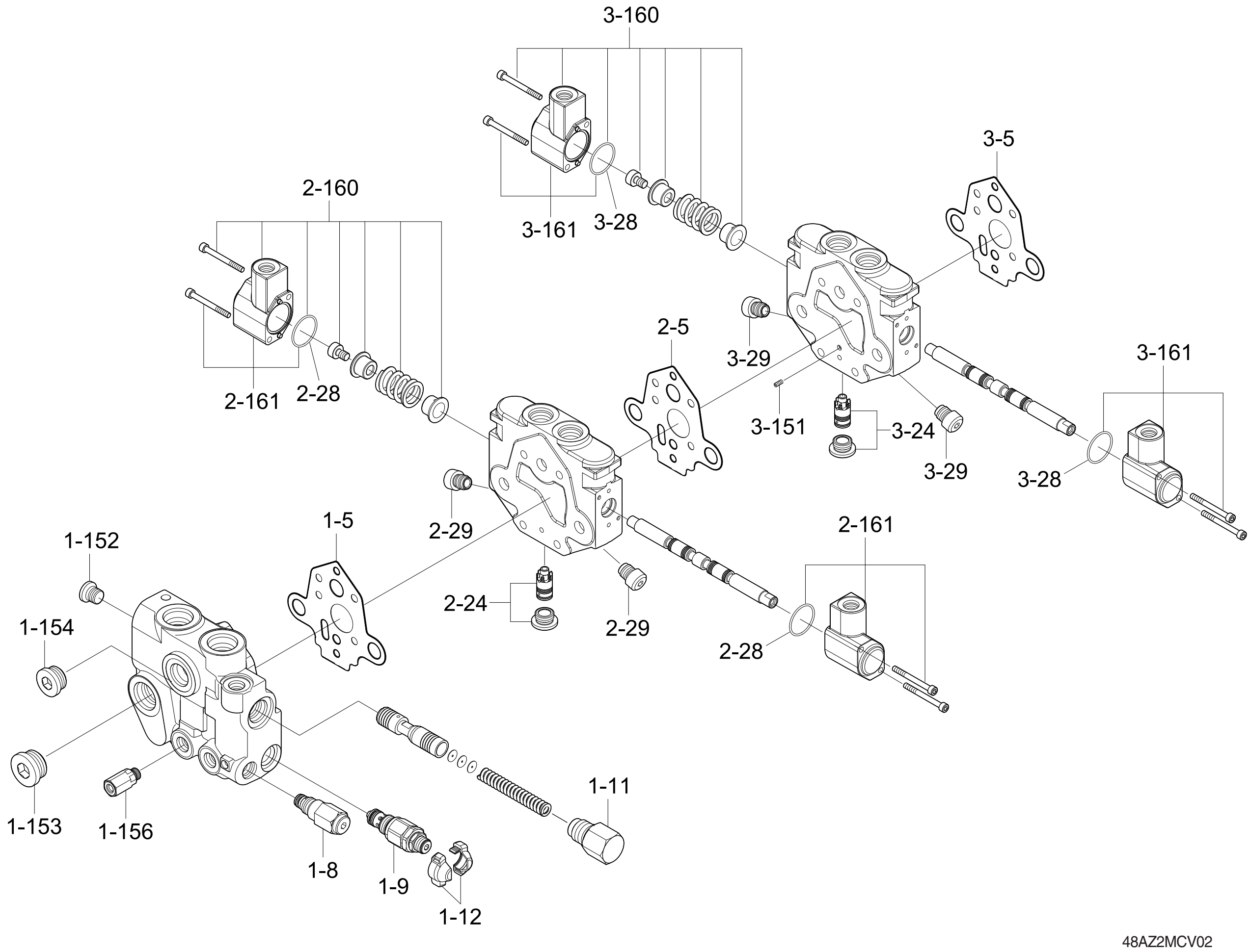


40A7MCV02



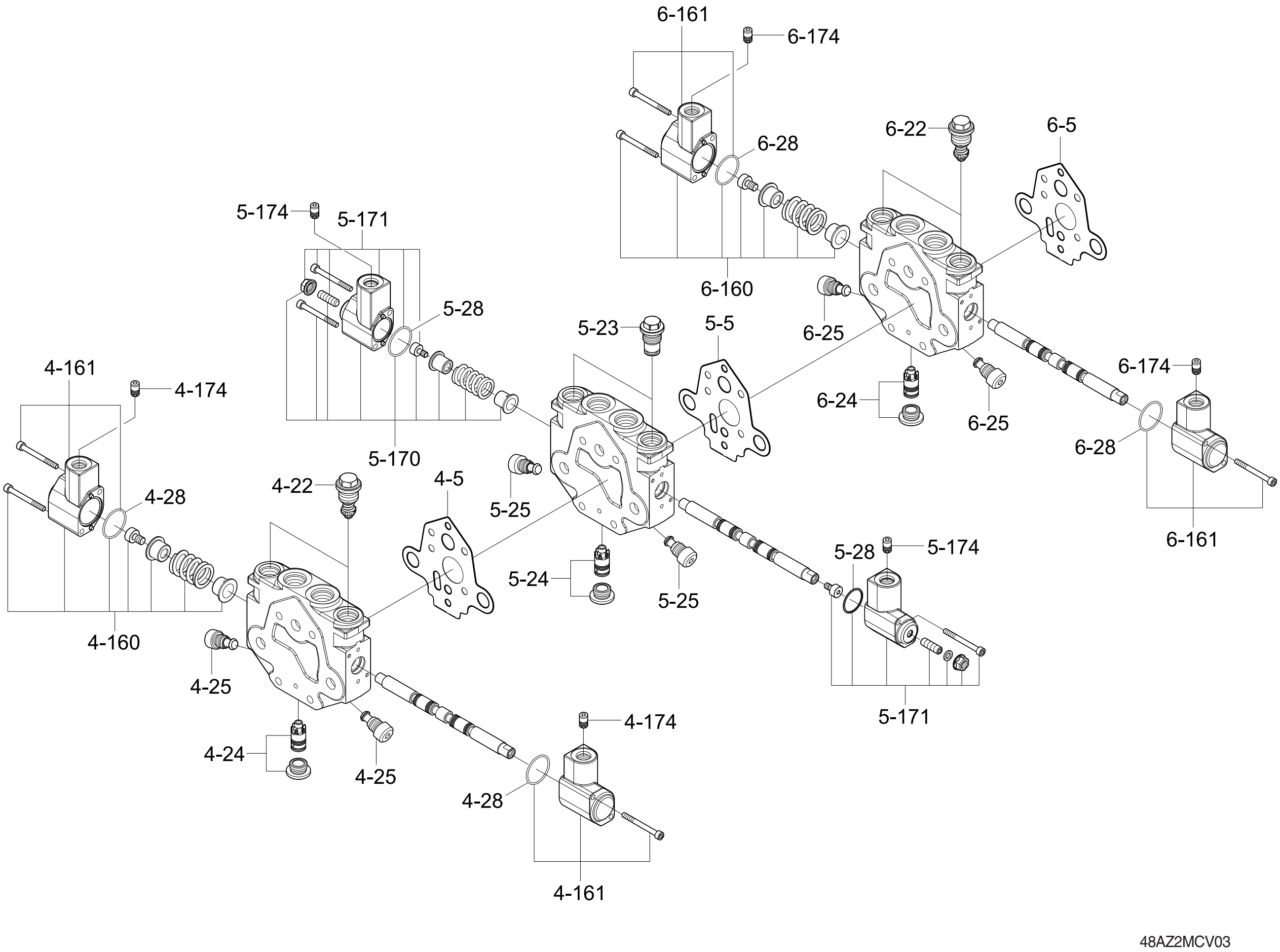
40A7MCV03

2. STRUCTURE (1/4)



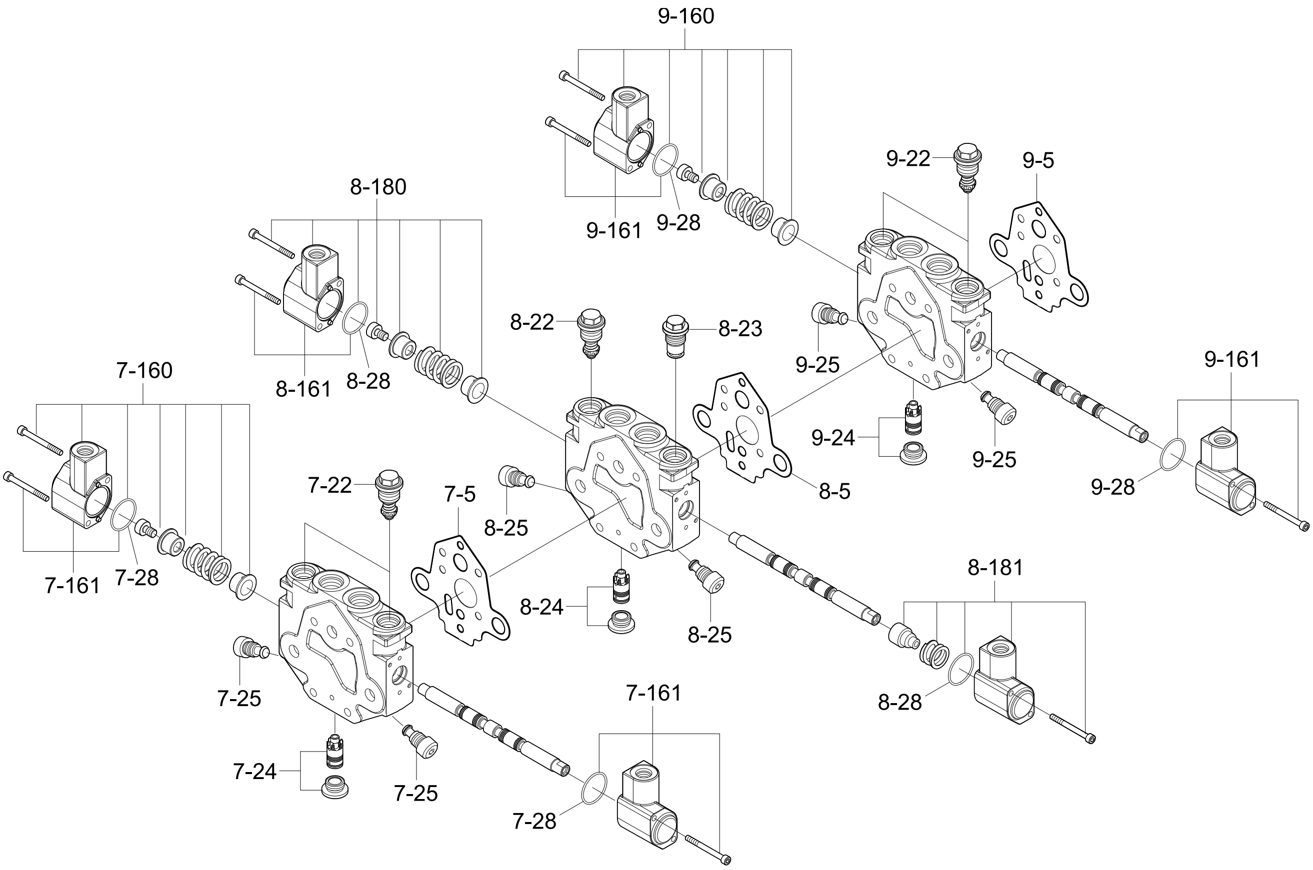
1	Inlet block assy	1-154	Sealing plug	3	Travel block assy
1-5	Plate seal	1-156	Shuttle valve	3-5	Plate seal
1-8	Flow regulator	2	Travel block assy	3-24	Compensator kit
1-9	Relief valve	2-5	Plate seal	3-28	Seal kit
1-11	Plug	2-24	Compensator kit	3-29	Orifice plug
1-12	Locking cover	2-28	Seal kit	3-151	Throttle screw
1-12	Locking cover	2-29	Orifice plug	3-160	W/spool cover kit
1-152	Sealing plug	2-160	W/spool cover kit	3-161	Cover kit
1-153	Sealing plug	2-161	Cover kit		

STRUCTURE (2/4)



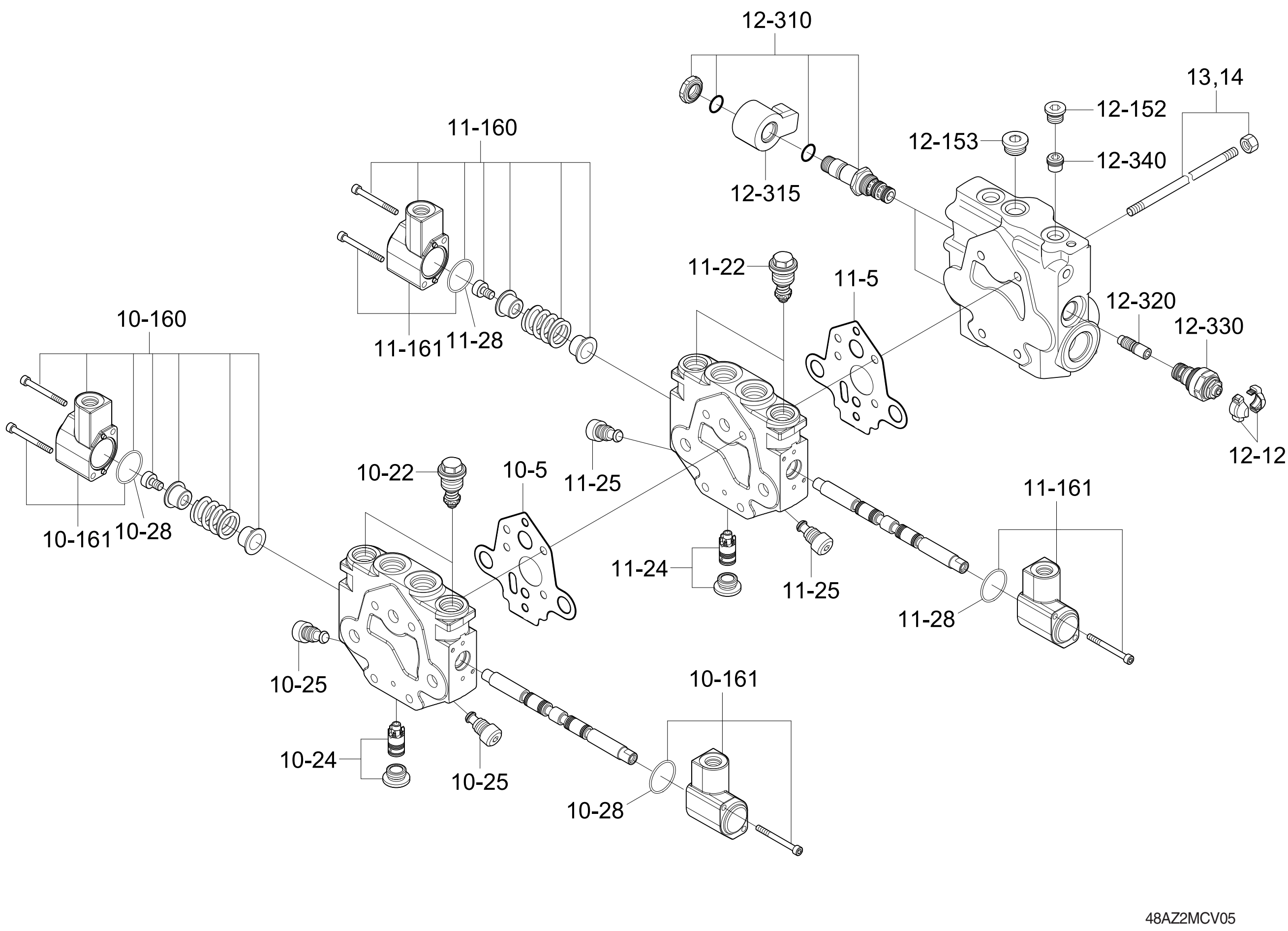
4	Boom block assy	5	Swing block assy	6	Arm block assy
4-5	Plate seal	5-5	Plate seal	6-5	Plate seal
4-22	Relief valve	5-23	Plug	6-22	Relief valve
4-24	Compensator kit	5-24	Compensator kit	6-24	Compensator kit
4-25	Check valve	5-25	Check valve	6-25	Check valve
4-28	Seal kit	5-28	Seal kit	6-28	Seal kit
4-160	W/spool cover kit	5-170	W/spool cover kit	6-160	W/spool cover kit
4-161	Cover kit	5-171	Cover kit	6-161	Cover kit
4-174	Snubber	5-174	Snubber	6-174	Snubber

STRUCTURE (3/4)



7	Bucket block assy	8-5	Plate seal	9	Boom swing block assy
7-5	Plate seal	8-22	Anticavitation valve	9-5	Plate seal
7-22	Relief valve	8-23	Plug	9-22	Relief valve
7-24	Compensator kit	8-24	Compensator kit	9-24	Compensator kit
7-25	Check valve	8-25	Check valve	9-25	Check valve
7-28	Seal kit	8-28	Seal kit	9-28	Seal kit
7-160	W/spool cover kit	8-161	Cover kit	9-160	W/spool cover kit
7-161	Cover kit	8-180	W/spool cover kit	9-161	Cover kit
8	Dozer block assy	8-181	W/spool cover kit		

STRUCTURE (4/4)

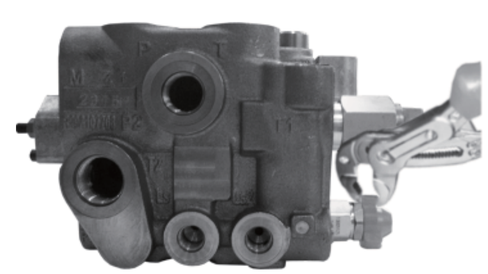


10	Aux 1 block assy	11-5	Plate seal	12-152	Sealing plug
10-5	Plate seal	11-22	Relief valve	12-153	Sealing plug
10-22	Relief valve	11-24	Compensator kit	12-310	Valve kit
10-24	Compensator kit	11-25	Check valve	12-315	Solenoid
10-25	Check valve	11-28	Seal kit	12-320	Shuttle
10-28	Seal kit	11-160	W/spool cover kit	12-330	Pressure relief valve
10-160	W/spool cover kit	11-161	Cover kit	12-340	Filter
10-161	Cover kit	12	Outlet block assy	13	Tie rod
11	Aux 1 block assy	12-12	Locking cover	14	Tie rod

3. DISASSEMBLY AND ASSEMBLY

1) STARTING, MAXIMAL PRESSURE SET UP

(1) Break the locking cover with a pair of pliers.
Decalibrate the LS pressure relief valve (17 mm open end spanner on counternut ; 6 mm socket wrench) before starting the machine.
Maintain one of the control block spool valve in action before the linked hydraulic receiver is at the end of stroke.



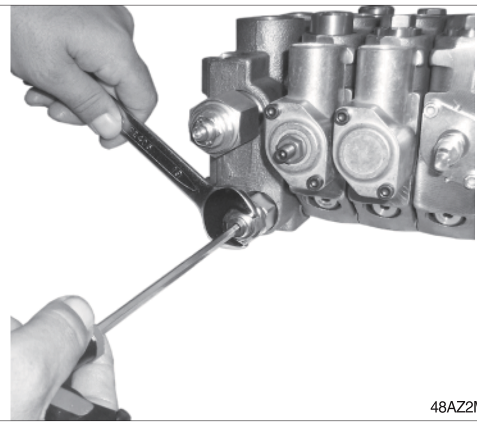
48AZ2MCV10

※ On the spool valve, the value of the secondary valve pressure must be greater than that of the LS pressure relief valve to adjust.

(2) Adjust the maximum pressure measured in M using the LS pressure relief valve (17 mm open end spanner on counternut ; 6 mm socket wrench.

Tighten the counternut of the adjusting screw to the torque :
- 2.0±0.2 kgf · m (14.8±1.5 lbf·ft)

Protect the setting by putting a new locking cover.
Fit together two half covers.



48AZ2MCV11

2) LS PRESSURE RELIEF VALVE REPLACEMENT

The control block does not need to be removed from the machine to perform this operation.

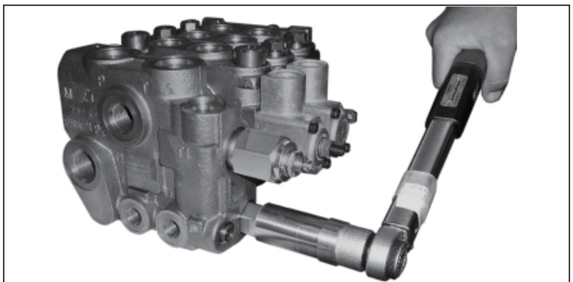
⚠ Place all of the machine's actuators connected to the control block in neutral position. Release stored pressure by operating all the spools.

(1) On the inlet element, unscrew the LS pressure relief valve (24 mm open end spanner).

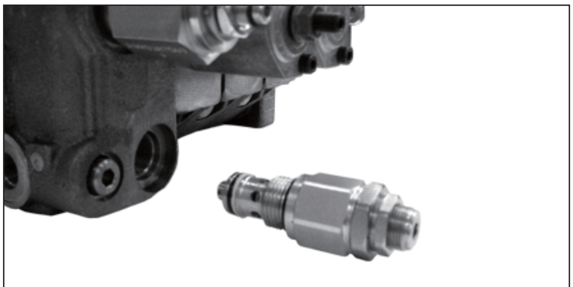
※ Reassembly
Install the LS pressure relief valve on the inlet element.
- Torque :
4.1±0.4 kgf · m (29.5±3.0 lbf·ft)

Set the LS pressure relief valve to the specified value

Fit a new appropriate locking cover



48AZ2MCV12



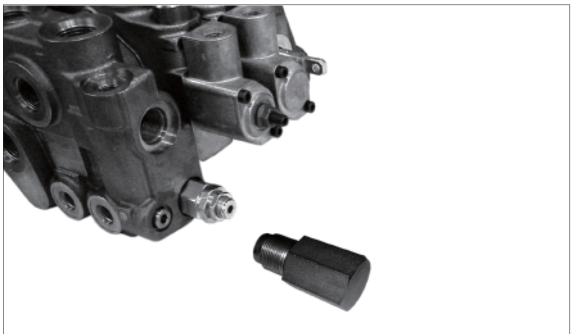
48AZ2MCV13

3) REGULATING UNIT REPLACEMENT

(1) Unscrew the plug (27 mm socket wrench).

※ Reassembly
Install the plug on the inlet element.
- Torque :
10.5±1.1 kgf · m (76.0±7.6 lbf·ft)

48AZ2MCV14

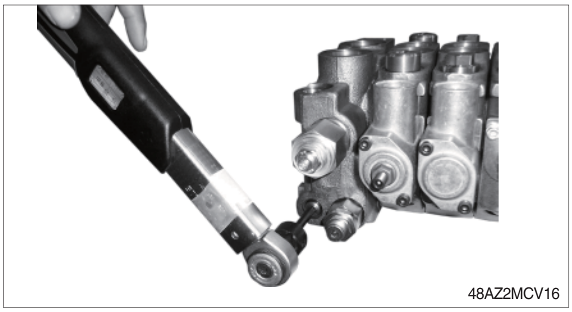


48AZ2MCV15

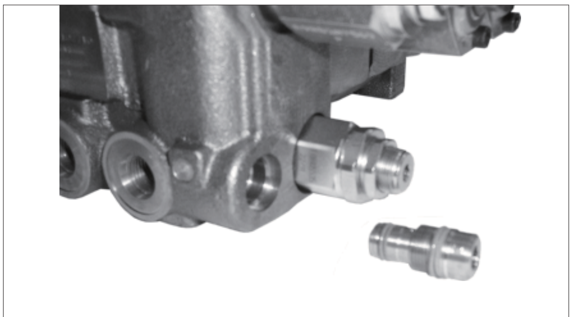
4) FLOW REGULATOR REPLACEMENT

(1) Unscrew the flow regulator (6 mm socket wrench).

※ Reassembly
Install the flow regulator on the inlet element.
- Torque :
2.3±0.2 kgf · m (16.6±1.7 lbf·ft)



48AZ2MCV16



48AZ2MCV17

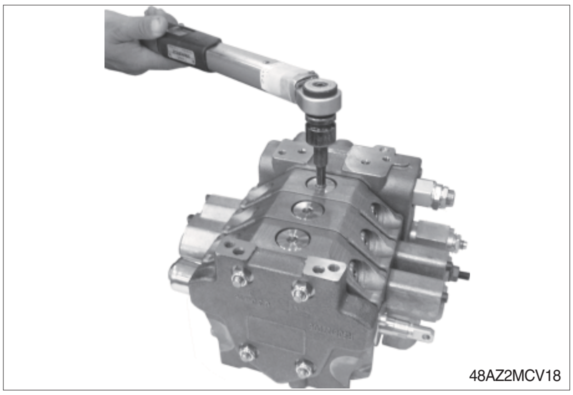
5) PRESSURE COMPENSATOR REPLACEMENT

(1) Unscrew the compensator plug (8 mm socket wrench).

(2) Remove the compensator piston using a magnet to extract it from its bore.

※ Clean parts to remove any attracted metal particle.
Do not use magnet for reassembly.

※ Reassembly
Reassemble parts in reverse order.
- Torque :
5.1±0.5 kgf · m (36.9±3.7 lbf·ft)



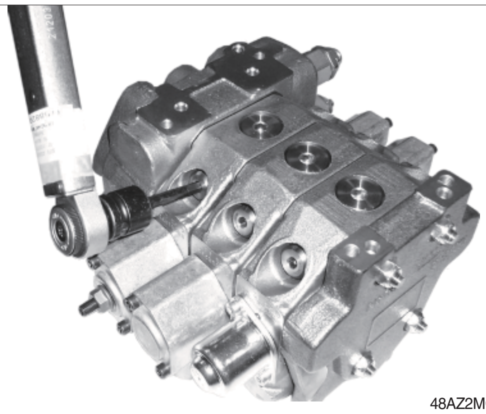
48AZ2MCV18

48AZ2MCV19

6) CHECK VALVE REPLACEMENT

(1) Unscrew one of the check valves (6 mm socket wrench).

※ Reassembly
Install the check valve on the distribution element.
- Torque :
4.1±0.4 kgf · m (29.5±3.0 lbf·ft)



48AZ2MCV20

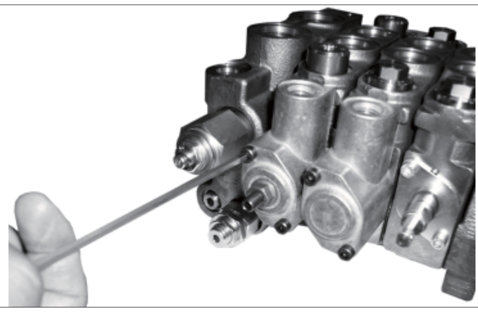
48AZ2MCV21

7) REMOVAL OF THE HYDRAULIC COVER

(1) Remove the 2 mounting screws (4 mm socket wrench).

(2) Remove the cover and O-ring.

※ Reassembly
Replace the cover O-ring.
Reassemble parts in reverse order.
Torque for the 2 mounting screws.
- Torque :
0.5±0.05 kgf · m (3.7±0.4 lbf·ft)



48AZ2MCV22

48AZ2MCV23

8) COMPLET CONTROL BLOCK DISASSEMBLY/ASSEMBLY

(1) Remove the control block from the machine.
Remove the 4 nuts (13 mm ring wrench).

48AZ2MCV24

(2) Remove the outlet element.
Separate the distribution elements with the seal plates from the inlet element.

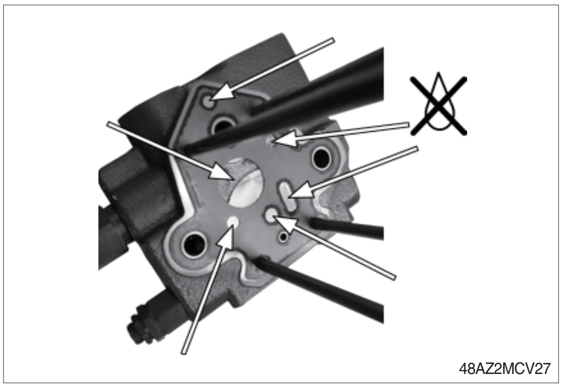
48AZ2MCV25

(3) Reassembly
- Replace the seal plates between distribution elements, initial element and outlet element.
- Check the cleanliness of the element faces.

※ When reassembling, make sure the seals plates are correctly positioned so that seals location fit with the canals.
- Carefully wipe oil traces of no-opening cavities between element face and seal plate.
- Torque for the 4 tie rods :
  3.1±0.3 kgf · m (22.1±0.2 lbf·ft)
- Reassemble elements in reverse order
  Place the control block horizontally on an even support area to tight the nuts.
- Torque for the 4 nuts :
  2.7±0.3 kgf · m (19.2±0.2 lbf·ft)

※ Make sure the elements are correctly positioned (engravings A and B downward)

48AZ2MCV26



48AZ2MCV27

GROUP 5 SWING DEVICE

1. REMOVAL AND INSTALL OF MOTOR

1) REMOVAL

(1) Lower the work equipment to the ground and stop the engine.

(2) Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping.

(3) Loosen the breather slowly to release the pressure inside the hydraulic tank.

⚠ **Escaping fluid under pressure can penetrate the skin causing serious injury.**

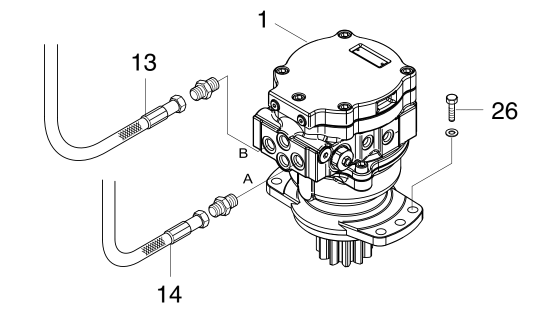
※ When pipes and hoses are disconnected, the oil inside the piping will flow out, so catch it in oil pan.

13031GE18

(4) Disconnect hose assembly (13, 14, 30, 33).

(5) Disconnect pilot line hoses (17, 23).

(6) Sling the swing motor assembly (1) and remove the swing motor mounting bolts (26).



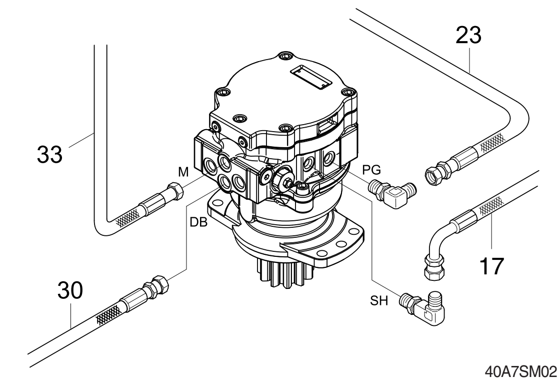
40A7SM01

※ Motor device weight : 39 kg (86 lb)

· Tightening torque : 19.6±2.9 kgf·m (142±21.0 lbf·ft)

(7) Remove the swing motor assembly.

※ When removing the swing motor assembly, check that all the piping have been disconnected.



40A7SM02

2) INSTALL

(1) Carry out installation in the reverse order to removal.

(2) Bleed the air from the swing motor.

① Remove the air vent plug.

② Pour in hydraulic oil until it overflows from the port.

③ Tighten plug lightly.

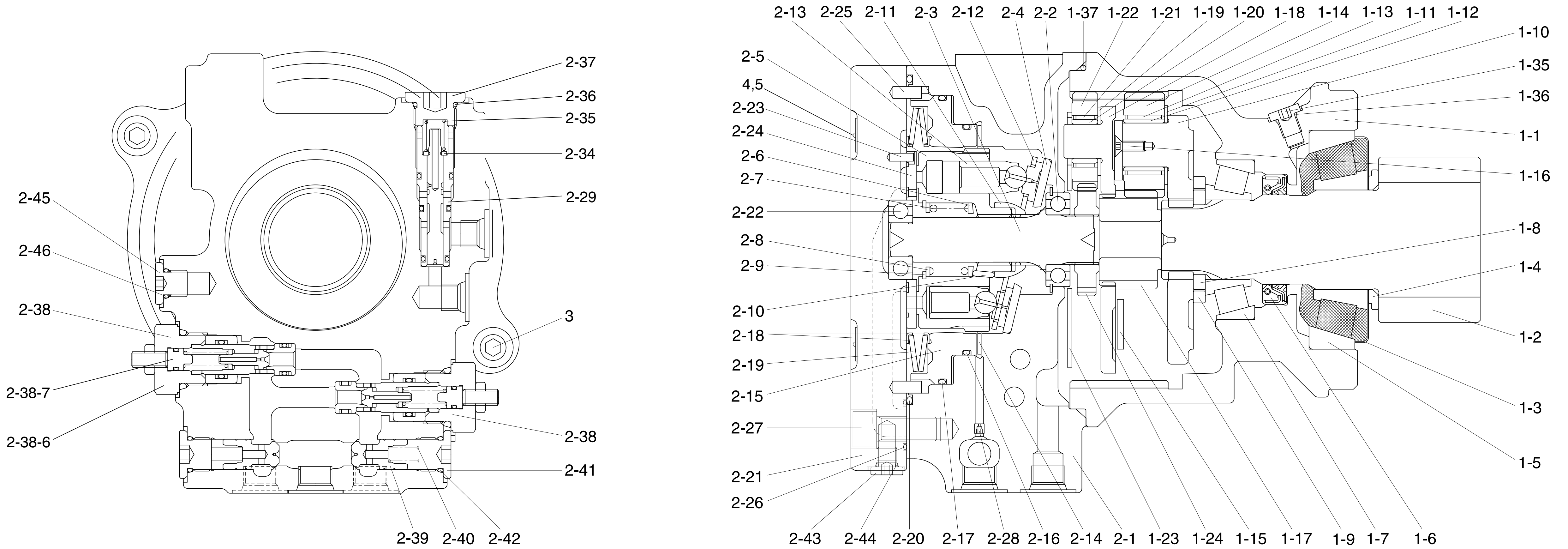
④ Start the engine, run at low idling and check oil come out from plug.

⑤ Tighten plug fully.

(3) Confirm the hydraulic oil level and check the hydraulic oil leak or not.

2. DISASSEMBLY AND ASSEMBLY OF SWING MOTOR

1) STRUCTURE



40A2SM02

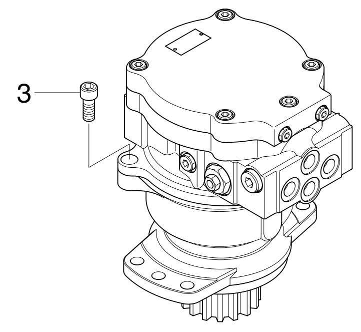
1 Gear box
1-1 Housing
1-2 Pinion shaft
1-3 Plate
1-4 Collar
1-5 Tapper roller bearing
1-6 Oil seal
1-7 Tapper roller bearing
1-8 Plate
1-9 Collar
1-10 Holder
1-11 Thrust washer
1-12 Inner race
1-13 Needle bearing
1-14 Planetary gear B
1-15 Thrust plate
1-16 Screw
1-17 Sun gear B
1-18 Holder
1-19 Thrust washer
1-20 Inner race
1-21 Needle bearing
1-22 Planetary gear
1-23 Thrust plate
1-24 Drive gear
1-35 Plug
1-36 O-ring
1-37 O-ring
2 Axial piston motor
2-1 Case
2-2 Ball bearing
2-3 Shaft
2-4 Thrust plate
2-5 Cylinder block
2-6 Collar
2-7 Spring
2-8 Washer
2-9 Ring-snap
2-10 Pin
2-11 Retainer holder
2-12 Retainer plate
2-13 Piston assy
2-14 Disc
2-15 Brake piston
2-16 O-ring
2-17 O-ring
2-18 Spring seat
2-19 Spring
2-20 O-ring
2-21 Cover
2-22 Ball bearing
2-23 Pin
2-24 Valve plate
2-25 Pin
2-26 O-ring
2-27 Socket head bolt
2-28 Orifice
2-29 Valve assy
2-34 Washer
2-35 Spring
2-36 O-ring
2-37 Plug
2-38 Relief valve assy
2-38-6 Plug
2-38-7 Adjust kit
2-39 Check valve
2-40 Spring
2-41 Plug
2-42 O-ring
2-43 Plug
2-44 O-ring
2-45 Plug
2-46 O-ring
3 Socket head bolt
4 Name plate
5 Screw

2) DISASSEMBLY

Disassemble the parts by the following procedure.

(1) Separating the motor and the reduction gear

Secure the motor assembly in a vice and remove the socket head bolt (3).

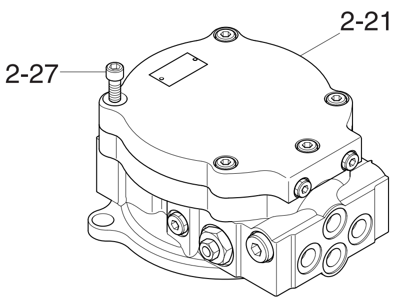


R35Z77SM01

(2) Disassembling the motor

① Secure the motor assembly in a vice. Remove the socket head bolts (2-27) and separate the cover (2-21).

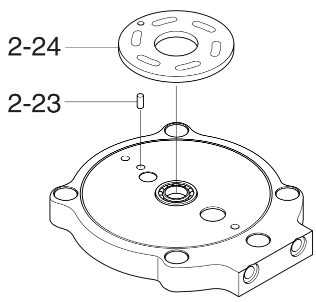
※ When separating the cover (2-21), be careful not to drop the valve plate (2-24).



R35Z77SM02

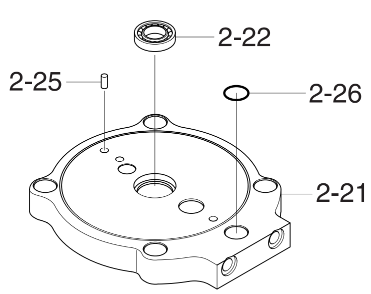
② Remove the valve plate (2-24) and the pin (2-23).

※ The valve plate (2-24) may remain on the motor side.



R35Z77SM03

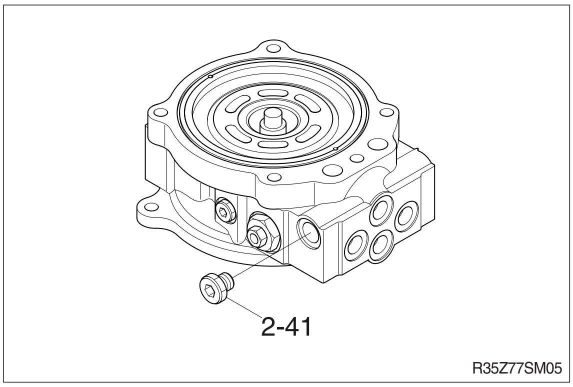
③ Remove the bearing (2-22). Remove the O-ring (2-26).



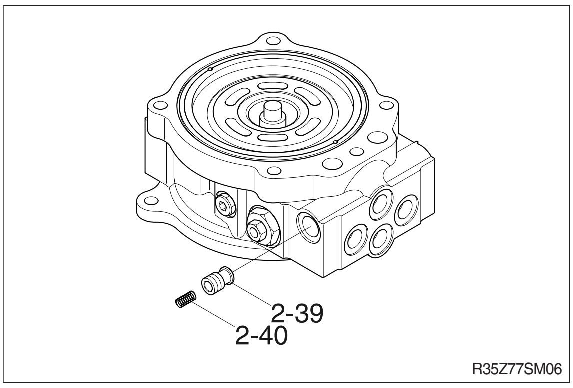
R35Z77SM04

④ Disassemble the check valve.

a. Loosen to remove the plug (2-41).



b. Remove the spring (2-40) and the check valve (2-39).

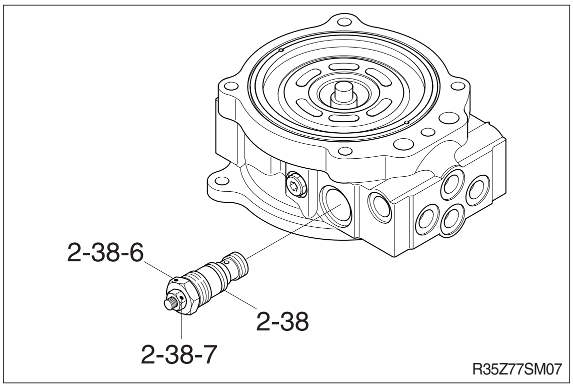


⑤ Remove the relief valve.

a. Loosen the plug (2-38-6) to remove the relief valve assembly (2-38).

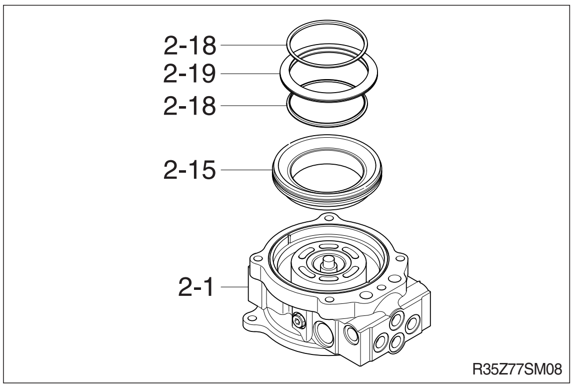
※ Do not move the adjuster kit (2-38-7). Otherwise, the set pressure will change.

※ Do not disassemble the relief valve assembly (2-38) because it is a functional component.



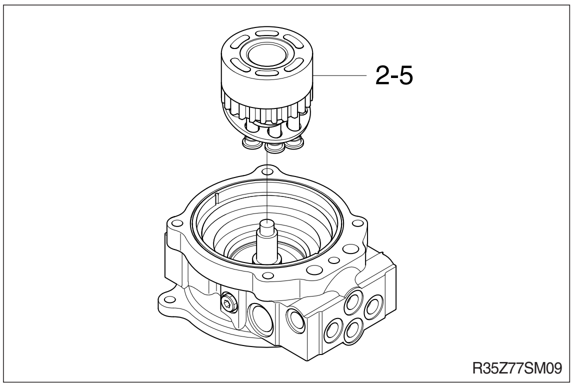
⑥ Remove the disc spring assembly (2-19) and the spring seat (2-18), and utilizing the gage port of the case (2-1), remove the parking brake piston (2-15).

※ The piston may be ejected by the air pressure. Exercise sufficient care during removal. At the beginning of the work, set a lower air pressure and adjust it while checking the piston for ejection.

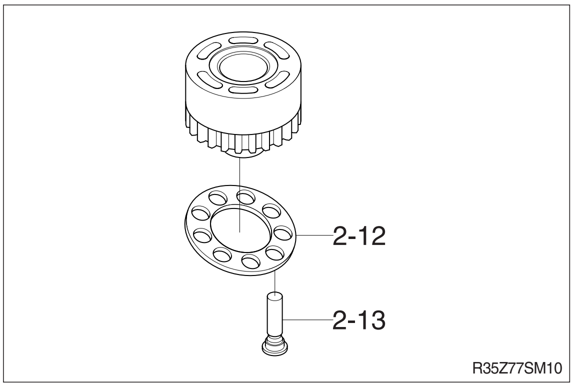


⑦ Remove the cylinder block and other associated parts.

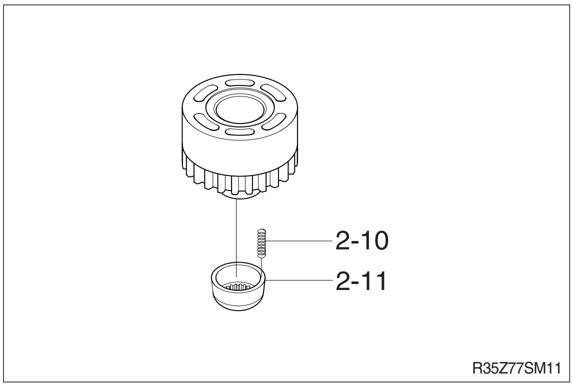
(2-5) Cylinder block
(2-6) Collar
(2-7) Spring
(2-8) Washer
(2-9) Snap ring
(2-10) Pin
(2-11) Retainer holder
(2-12) Retainer plate
(2-13) Piston assembly
(2-14) Disc (parking brake spec. only)



⑧ Remove the retainer plate (2-12) and the piston assembly (2-13).

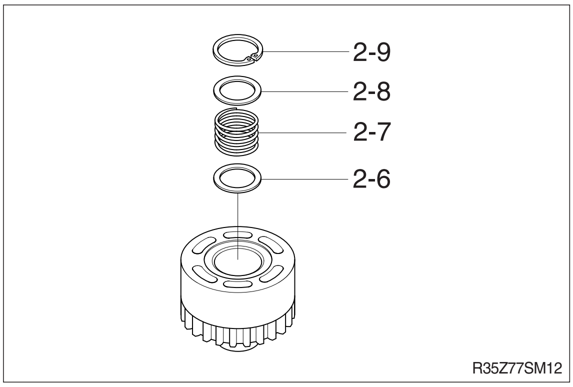


⑨ Remove the pin (2-10) and the retainer holder (2-11).

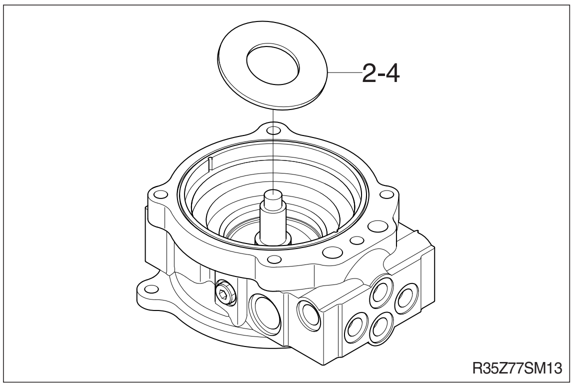


⑩ While pushing the washer (2-8), remove the snap ring (2-9).

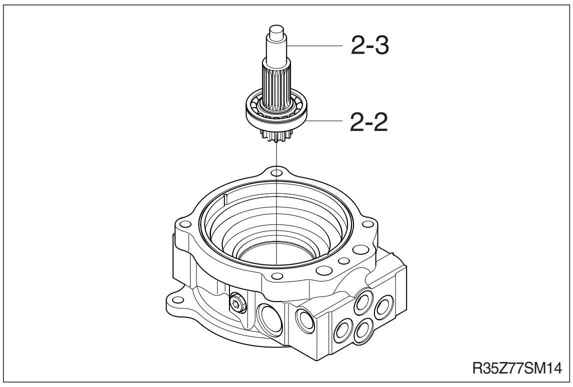
⑪ Remove the collar (2-6), the spring (2-7) and the washer (2-8).



⑫ Remove the thrust plate (2-4).

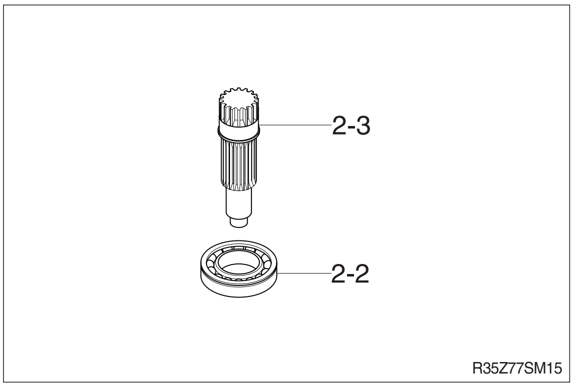


⑬ Lightly strike the end of the shaft (2-3) with a plastic hammer to remove the shaft.



⑭ Disassemble the ball bearing (2-2) and the shaft (2-3).

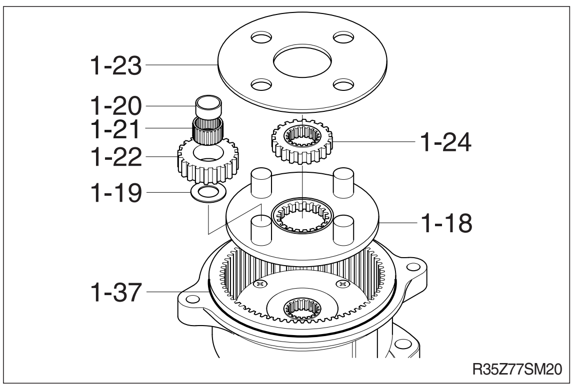
※ The disassembled bearing must not be used.



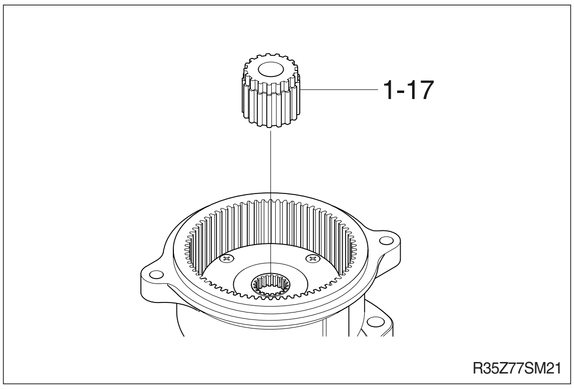
(3) Disassembling the reduction gear

① Remove the following parts.

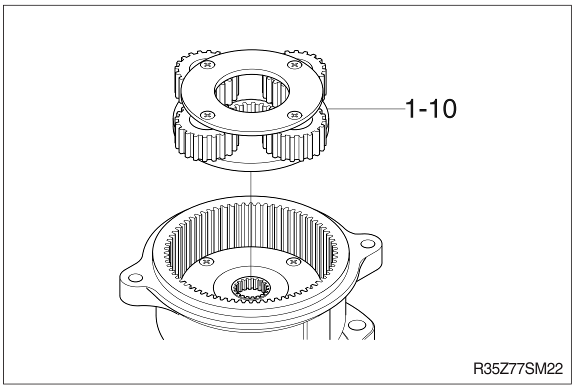
(1-37) O-ring
(1-24) Drive gear
(1-23) Thrust plate
(1-22) Planetary gear
(1-21) Needle bearing
(1-20) Inner race
(1-19) Thrust washer
(1-18) Holder



② Remove the sun gear (1-17).



③ Remove the holder (1-10) and other associated parts.

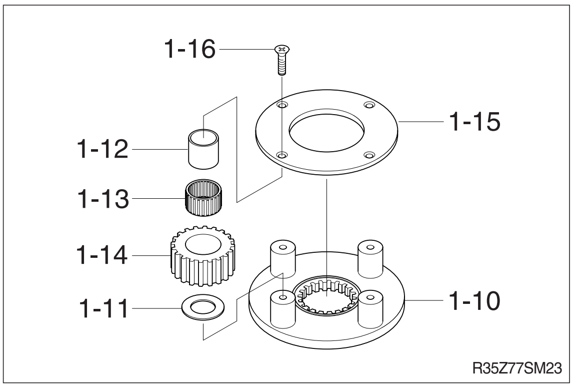


④ Secure the holder (1-10) in a vice and loosen the screw (1-16) to remove the thrust plate (1-15).

※ The screw is hard to remove because loctite was used during assembly. To facilitate the removal of the screw, warm the screw with a drier.

⑤ Remove the following parts.

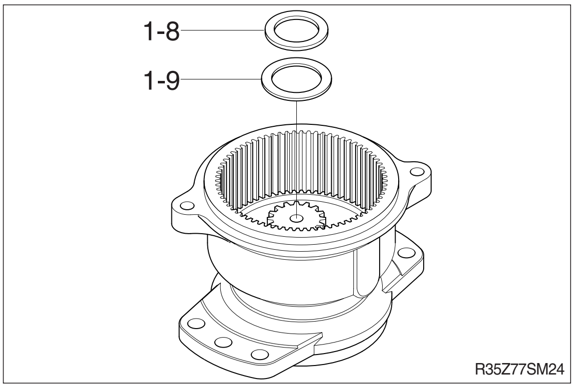
(1-14) Planetary gear
(1-13) Needle bearing
(1-12) Inner race



※ When replacing the taper roller bearings (1-5) and (1-7), the collar (1-9) and the plate (1-8), they are to be replaced by the body assembly.

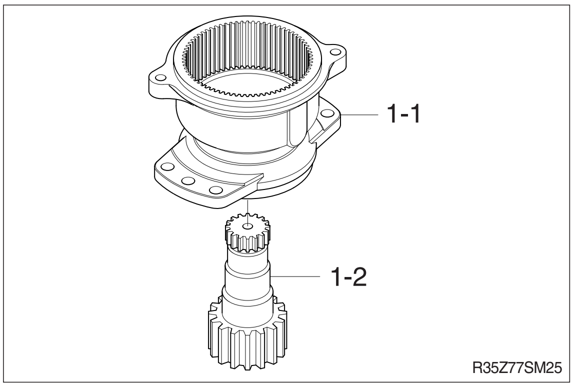
⑥ Remove the following parts.

(1-8) Plate
(1-9) Collar

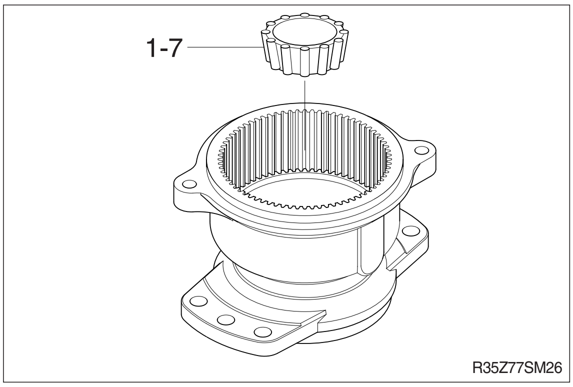


⑦ Remove the pinion shaft (1-2)

※ When removing the shaft, be careful not to drop it. If it is hard to remove, lightly strike it with a plastic hammer.

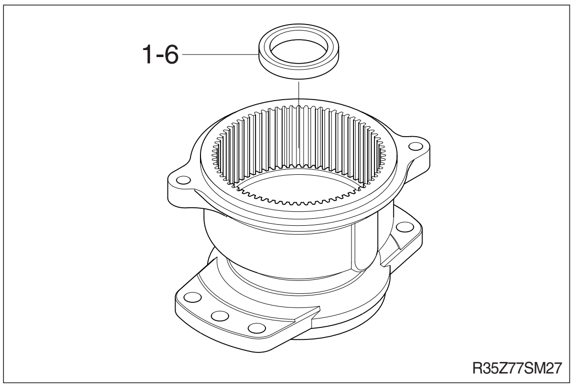


⑧ Remove the inner race of the taper roller bearing (1-7).

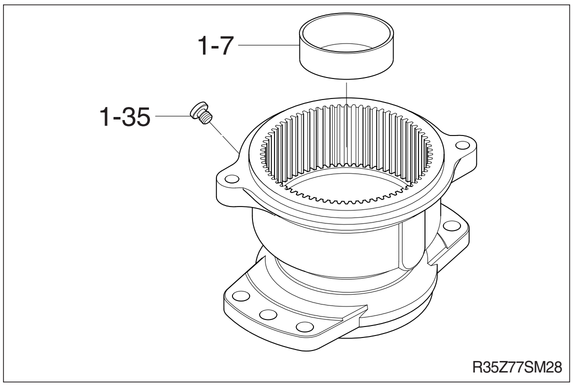


⑨ Break the oil seal (1-6) to remove it.

※ The removed oil seal must not be used again.
When removing it, exercise care to prevent damage to the outer races of the taper roller bearing (1-8) and (1-6).



⑩ Remove the outer race of the taper roller bearing (1-7) and the plug (1-35).



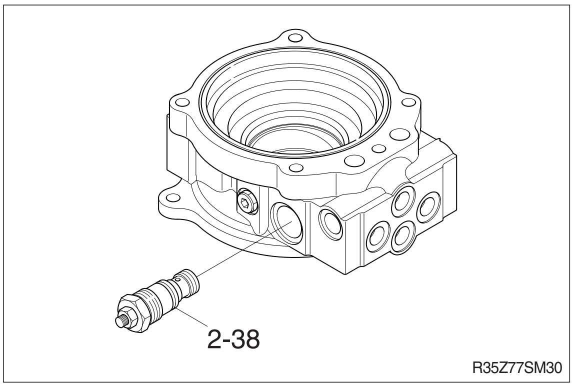
3) ASSEMBLY

Assemble the parts by the following procedure.

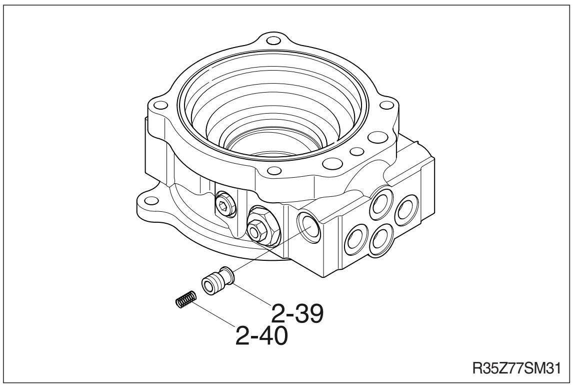
(1) Assembling the motor

① Install the relief valve assembly (2-38).

· Tightening torque : 16.0±1.0 kgf·m
116±7.4 lbf·ft

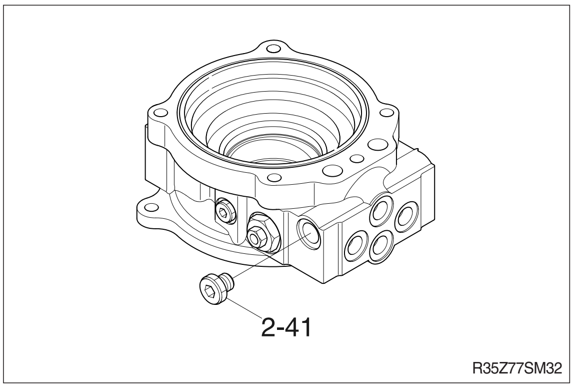


② Assemble the check valve (2-39) and the spring (2-40).



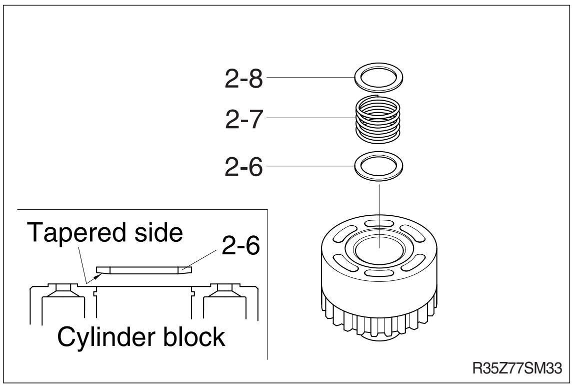
③ Install the plug (2-41).

· Tightening torque : 4.0±0.2 kgf · m
(28.9±1.5 lbf·ft)

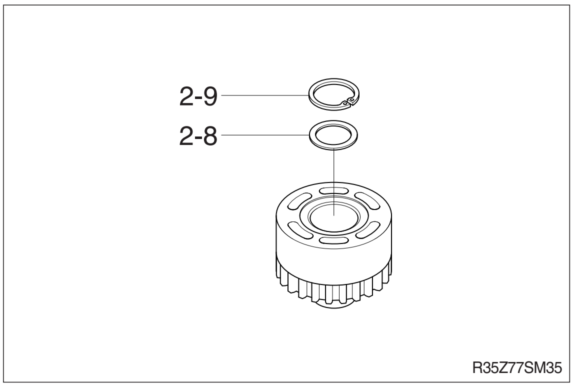


④ Assemble the collar (2-6), the spring (2-7) and the washer (2-8) in the cylinder block (2-5).

※ Be sure to assemble the collar (2-6) in the correct direction.

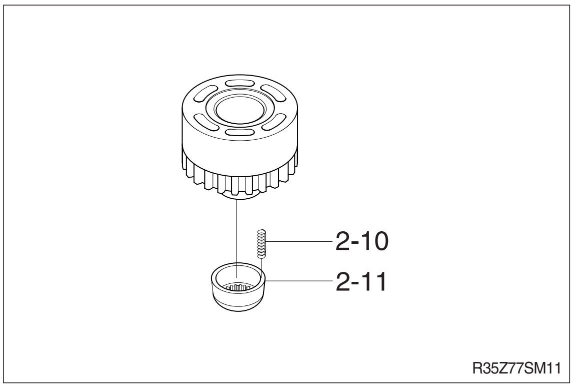


⑤ While pushing the washer (2-8), assemble the snap ring (2-9).



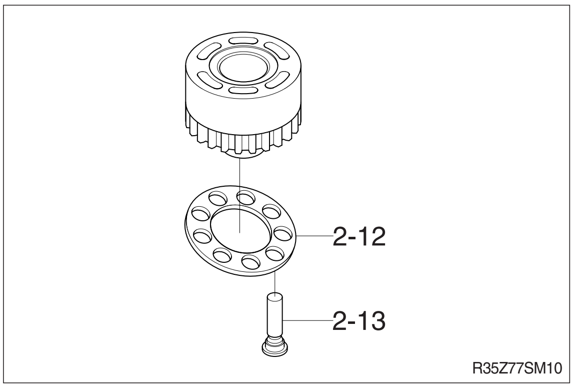
⑥ Apply grease to the pin (2-10) and assemble it in the cylinder block (2-5).

⑦ Assemble the retainer holder (2-11).



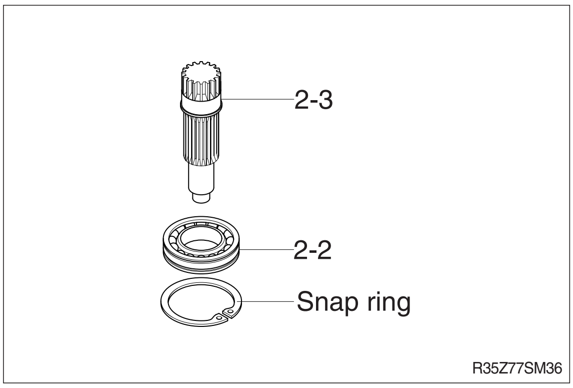
⑧ Set the piston assembly (2-13) on the retainer plate (2-12) and assemble it in the cylinder block (2-5).

※ Apply an ample amount of hydraulic fluid to the sliding part before assembly.

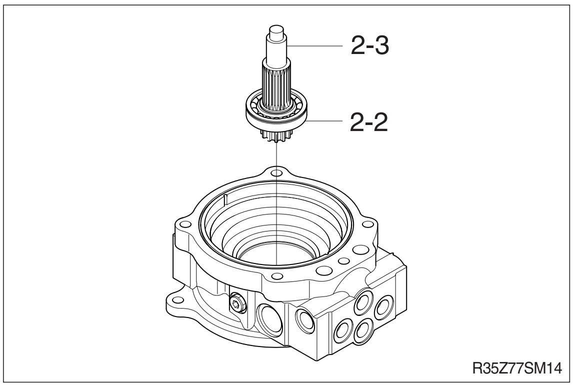


⑨ Press-fit the ball bearing (2-2) on the shaft (2-3).

※ Press-fit the ball bearing (2-2) with the attached snap ring facing as shown in the figure.

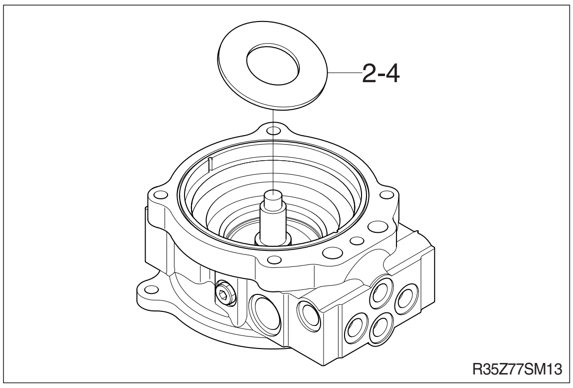


⑩ Press-fit the shaft (2-3) and the ball bearing (2-2) in the case (2-1).



⑪ Apply grease to the back side of the thrust plate (2-4) and assemble it.

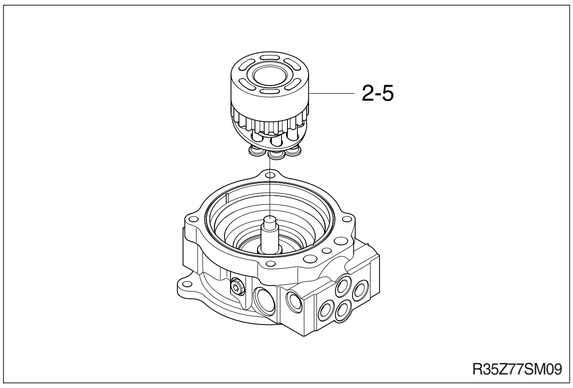
※ The thrust plate must be assembled in the correct direction.



⑫ Assemble the cylinder block (2-5) and other associated parts.

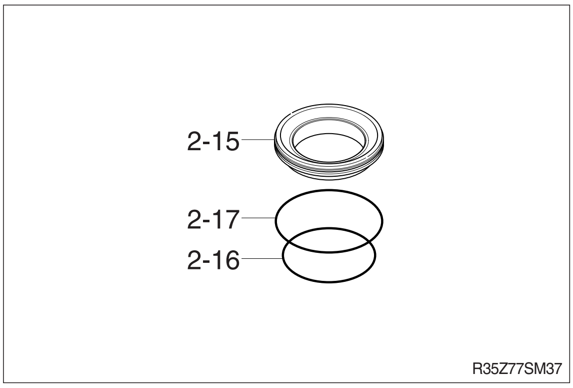
※ During assembly, be sure that the pin (2-10) will not come out.

※ The disc (2-14) is assembled only for the parking brake spec only.

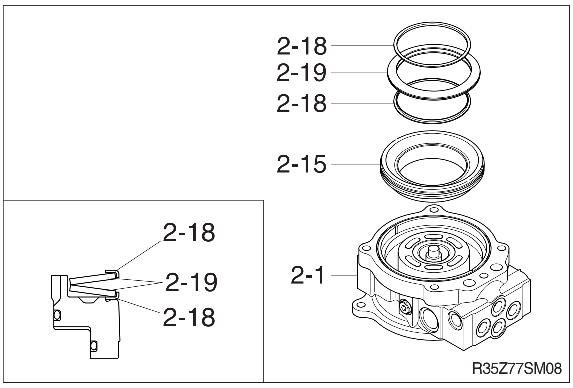


⑬ Apply grease to the O-ring (2-16) and the O-ring (2-17) and assemble them on the brake piston (2-15).

⑭ While paying attention to the location of the hole of the pin (2-25), assemble the brake piston (2-15) in the case (2-1).

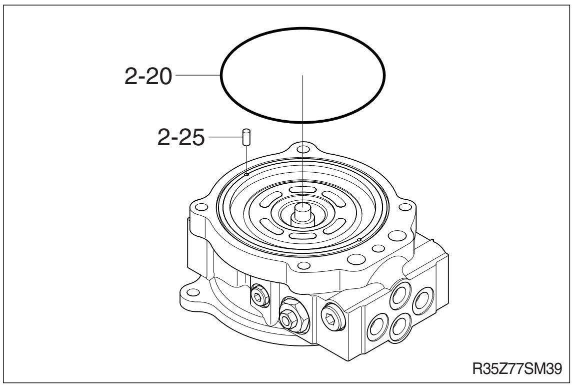


⑮ Assemble the spring seat (2-18) and the disc spring (2-19) in the correct direction.

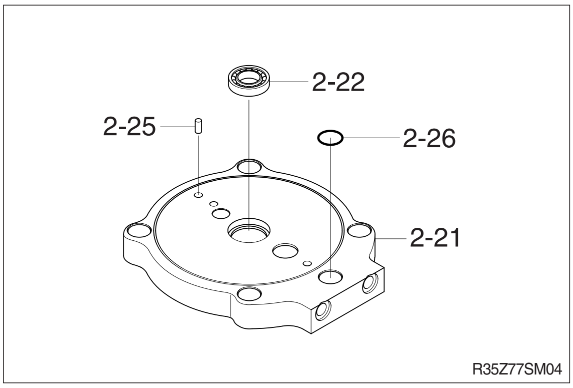


⑯ Apply grease to the O-ring (2-20) and assemble it in the case (2-1).
Check to see if the pin (2-25) can be assembled in the brake piston and case hole. If not, remove the brake piston (2-15) and re-orient it, then reassemble.

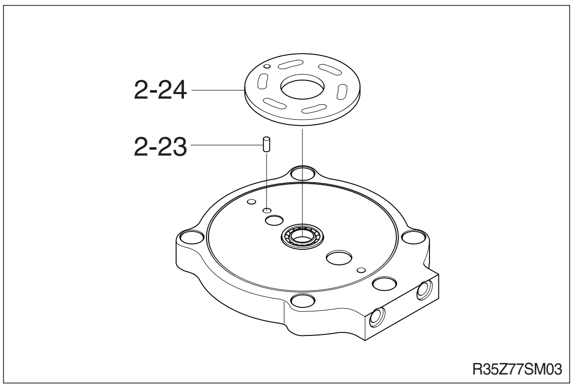
※ Assemble the pin (2-25) while being attached on the cover.



⑰ Apply grease to the O-ring (2-26) and the pin (2-25), then assemble them in the cover (2-21).
Press-fit the ball bearing (2-22).

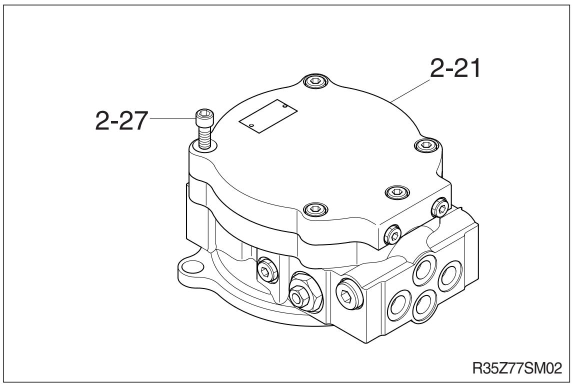


⑱ Install the pin (2-23), then install the valve plate (2-24).
To prevent it from falling, apply grease to the back side.



⑲ While paying attention to the location of the pin (2-25), install the cover (2-21) and other associated parts to the case (2-1).

※ Exercise care so that the pin (2-25) and the valve plate (2-24) will not fall.



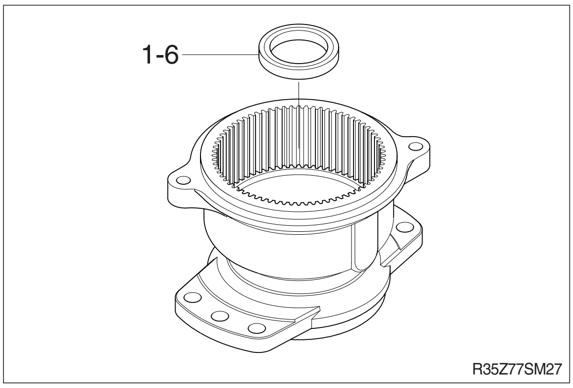
⑳ Loosely tighten the socket head bolts (2-27), then using a torque wrench, tighten them to the specified torque.

· Tightening torque : 13±0.7 kgf · m
(94.4±5 lbf · ft)

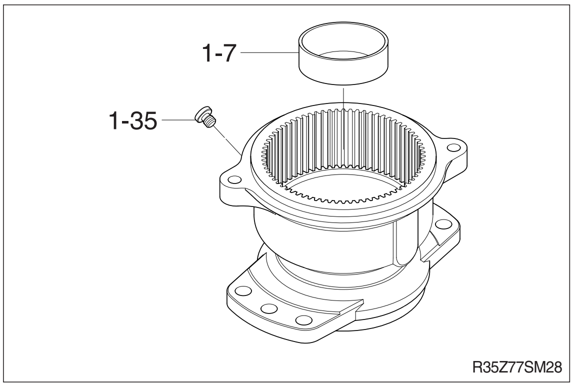
(2) Assembling the reduction gear

① Press-fit the oil seal (1-6).

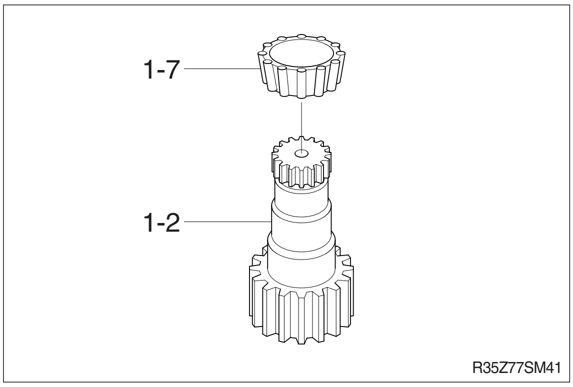
※ Prior to press-fit, apply grease to the oil seal mounting area of the housing and the periphery of the oil seal.



② Press-fit the taper roller bearing (1-7) and install the plug (1-35).

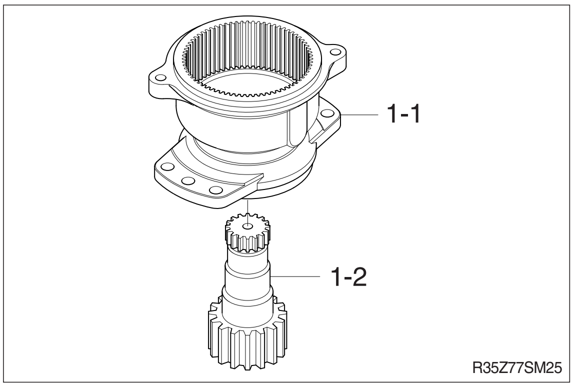


③ Apply grease to the inner race of the taper roller bearing (1-7) assembled on the pinion shaft (1-2).

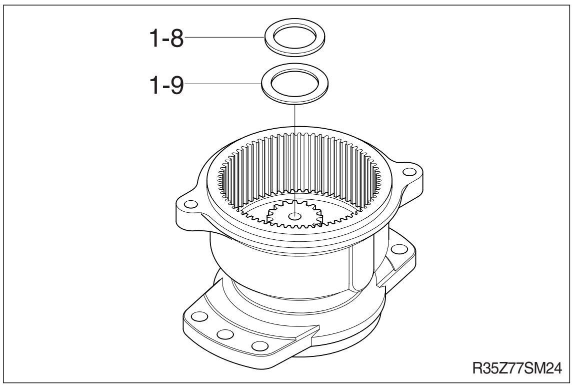


④ Install the pinion shaft (1-2) and other associated parts. Install the taper roller bearing inner race (1-7).

※ Prior to assembling the pinion shaft (1-2), etc. apply grease to the lip of the oil seal (1-6).

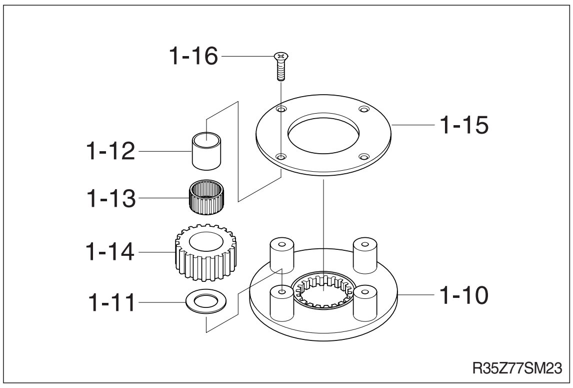


⑤ Install the collar (1-9) and the plate (1-8).



⑥ Install the following parts on the holder.

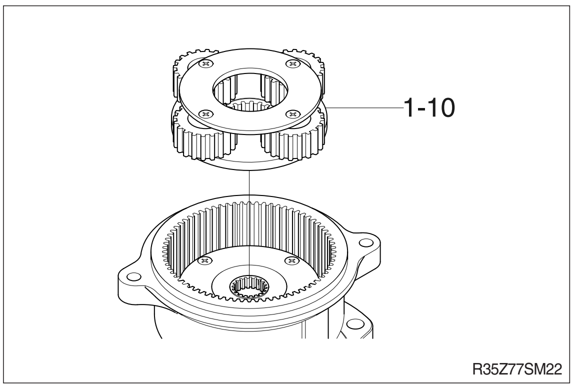
(1-10) Holder
(1-11) Thrust washer
(1-12) Inner race
(1-13) Needle bearing
(1-14) Planetary gear B
(1-15) Thrust plate
(1-16) Screw



※ Apply loctite 242 to the screw prior to tightening it.

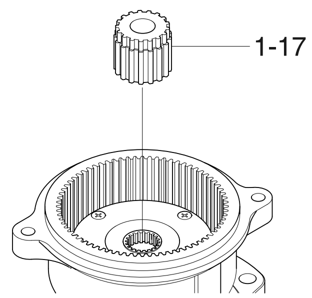
· Tightening torque : 0.4±0.05 kgf · m
(2.9±0.3 lbf · ft)

⑦ Install the holder (1-10) and other associated parts.



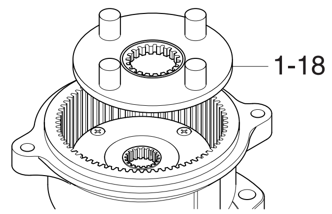
⑧ Install the sun gear (1-17).

※ Install the sun gear (1-17) with the snap ring facing as shown in the figure.



R35Z77SM21

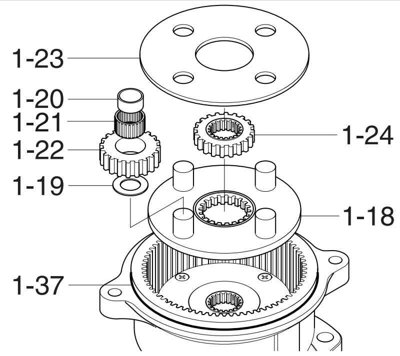
⑨ Install the holder (1-18).



R35Z77SM42

⑩ Install the following parts.

(1-19) Thrust washer
(1-20) Inner race
(1-21) Needle bearing
(1-22) Planetary gear A
(1-23) Thrust plate
(1-24) Drive gear
(1-37) O-ring



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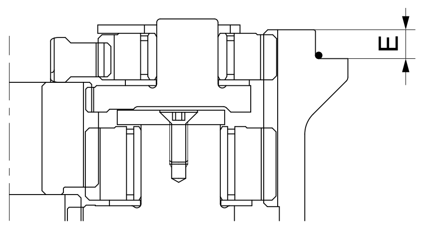
※ Selection for thrust plate (1-15).
When any consisting parts of reduction unit were changed, select and install thrust plate corresponding to the measured value "E" referring to the below table.

E dimension (measured value)	Less than 6.6	6.6~7.2	More than 7.2
Part no. of thrust plate 1-23 (plate thickness)	XJBV-00129 (3.2 mm)	XJBV-00130 (2.8 mm)	XJBV-00131 (2.3 mm)

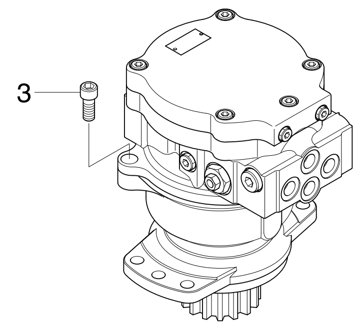


R35Z77SM43

(3) Assembling the whole motor assembly

Place the reduction gear assembly on the motor assembly and loosely tighten the socket head bolt (3), then tighten it to the specified torque.

· Tightening torque : 13±0.7 kgf · m
(94.4±5 lbf · ft)



R35Z77SM01

GROUP 6 TRAVEL DEVICE

1. REMOVAL AND INSTALL

1) REMOVAL

(1) Swing the work equipment 90 °and lower it completely to the ground.

(2) Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping.

(3) Loosen the breather slowly to release the pressure inside the hydraulic tank.

⚠ **Escaping fluid under pressure can penetrate the skin causing serious injury.**

※ When pipes and hoses are disconnected, the oil inside the piping will flow out, so catch it in oil pan.

13031GE18

(4) Remove the track shoe assembly.
For details, see **removal of track shoe assembly.**

(5) Remove the cover.

(6) Remove the hose.

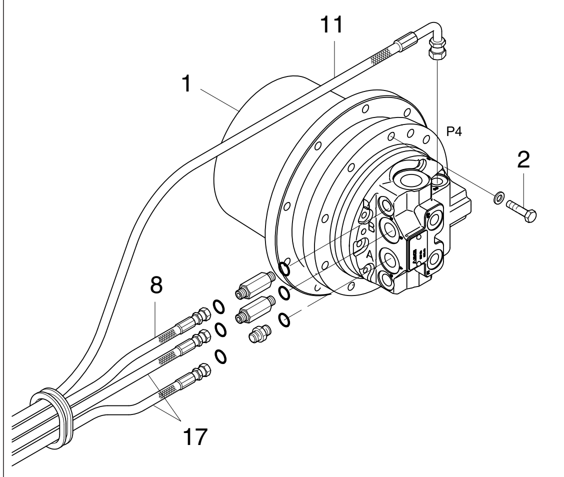
※ Fit blind plugs to the disconnected hoses (8, 11, 17).

(7) Remove the bolts and the sprocket.

(8) Sling travel device assembly (1).

(9) Remove the mounting bolts (2), then remove the travel device assembly.

· Weight : 37 kg (82 lb)
· Tightening torque : 14.4±2.1 kgf·m (104±15.2 lbf·ft)



40A7TM01

2) INSTALL

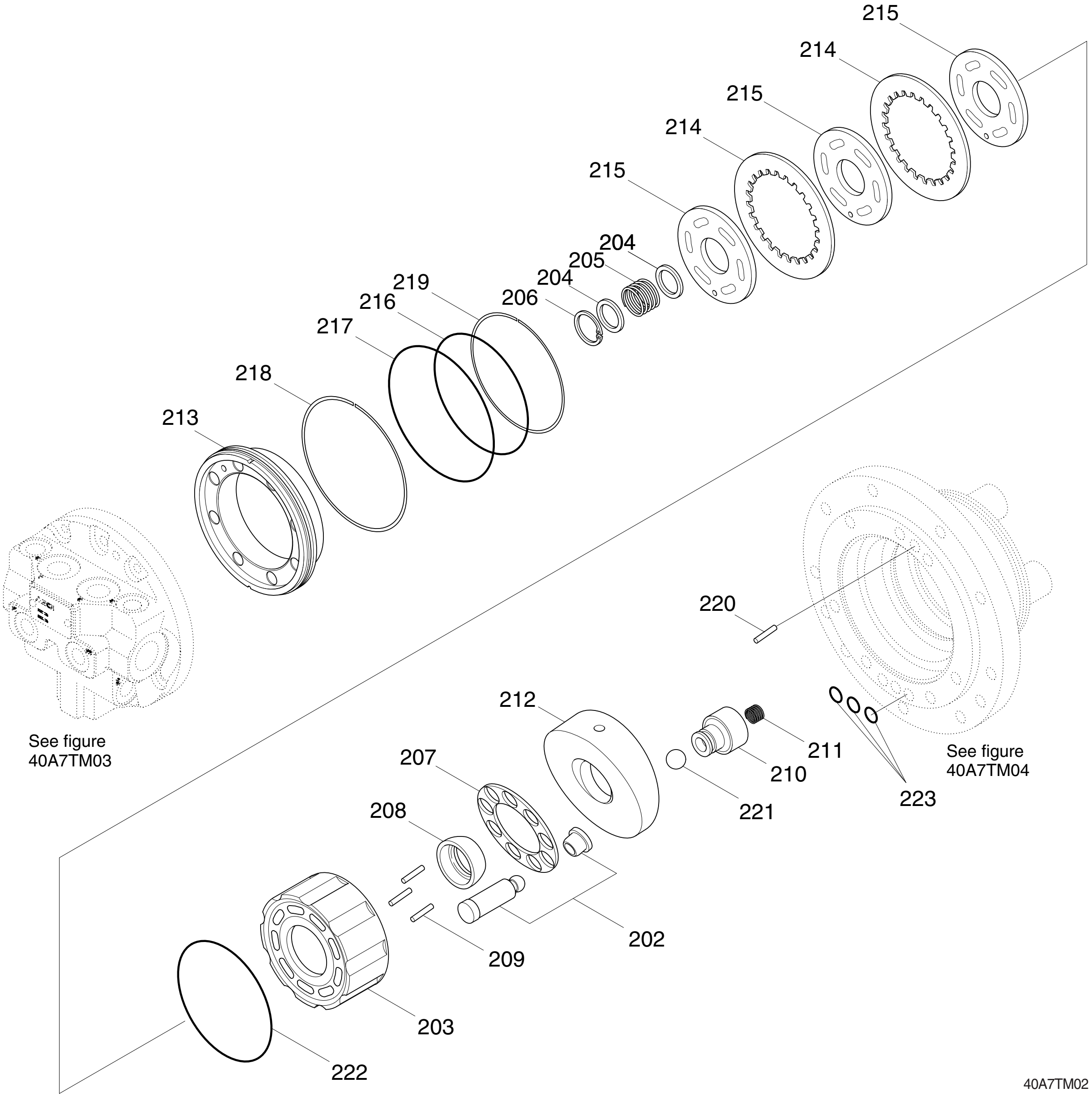
(1) Carry out installation in the reverse order to removal.

(2) Bleed the air from the travel motor.

① Remove the air vent plug.
② Pour in hydraulic oil until it overflows from the port.
③ Tighten plug lightly.
④ Start the engine, run at low idling, and check oil come out from plug.
⑤ Tighten plug fully.

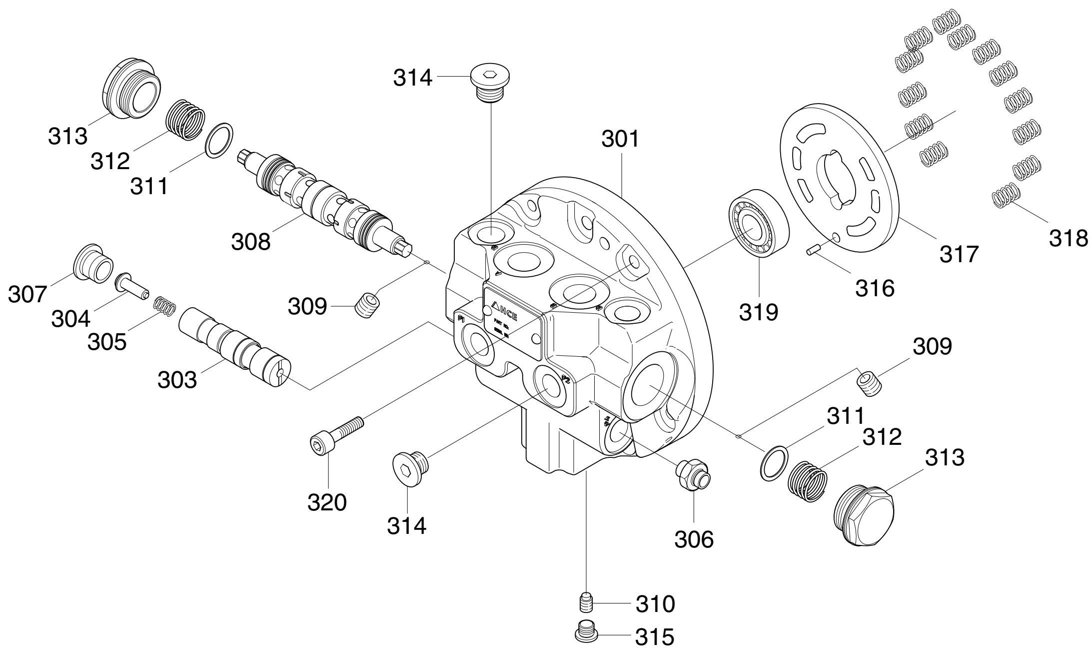
(3) Confirm the hydraulic oil level and check the hydraulic oil leak or not.

2. STRUCTURE (1/3)



202	Piston assy	210	Piston assy	217	O-ring
203	Cylinder block	211	Spring	218	Back up ring
204	Washer	212	Swash plate	219	Back up ring
205	Spring	213	Parking piston	220	Parallel pin
206	Snap ring	214	Friction plate	221	Steel ball
207	Retainer plate	215	Separation plate	222	O-ring
208	Thrust ball	216	O-ring	223	O-ring
209	Roller				

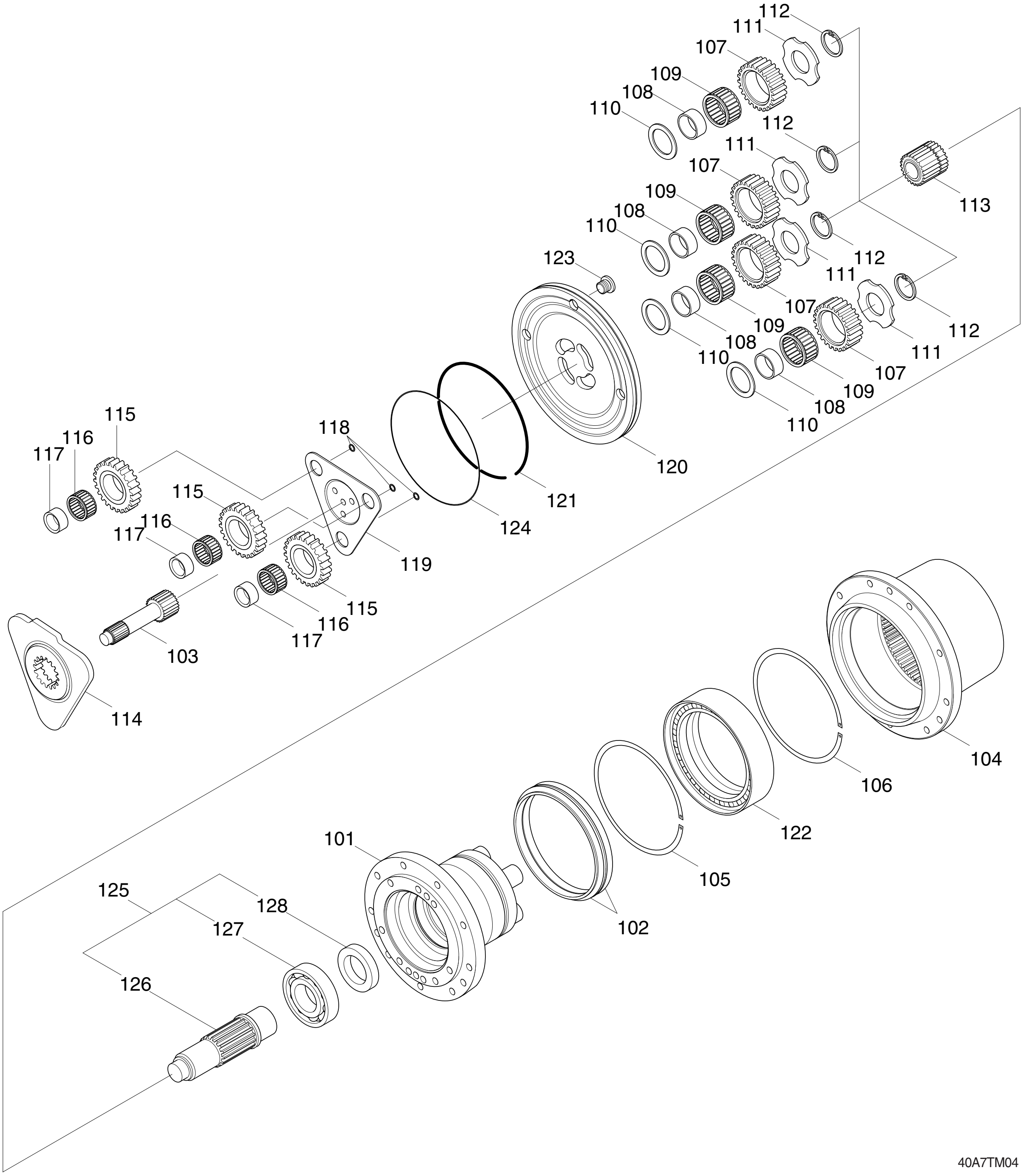
STRUCTURE (2/3)



40A7TM03

301	Valve casing	309	Orifice	316	Parallel pin
303	2-speed spool	310	Orifice	317	Timing plate
304	2-speed spool guide	311	Washer	318	Spring
305	Spring	312	Spring	319	Ball bearing
306	Plug assy	313	Main plug assy	320	Socket bolt
307	Plug assy	314	Plug assy		
308	CB spool assy	315	Plug assy		

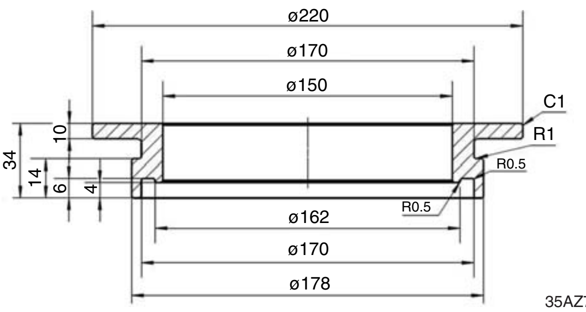
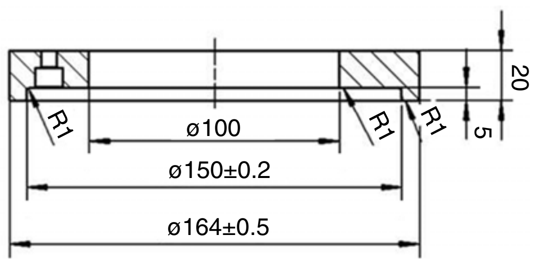
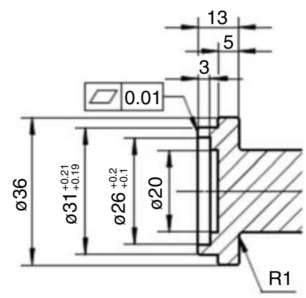
STRUCTURE (3/3)



101	Spindle	111	Thrust washer	121	Clip
102	Floating seal	112	Snap ring	122	Ball bearing
103	Sun gear No.1	113	Sun gear No.2	123	Plug
104	Hub	114	1st carrier	124	O-Ring
105	Snap ring	115	Planet gear No.1	125	Drive shaft
106	Shim plate	116	Needle bearing	126	Drive shaft
107	Planet gear No.2	117	Inner race	127	Ball bearing
108	Inner race	118	Snap ring	128	Oil seal
109	Needle bearing	119	Thrust plate No.1		
110	Washer	120	Cover		

3. DISASSEMBLY AND ASSEMBLY

1) REQUIRED TOOLS

Tool name	Tool number	Specification
Torque wrench	T1	3~36 kgf·m (21.7~260 lbf·ft)
Hex bit	T2	6 mm
	T3	8 mm
Hex socket	T4	22 mm
	T5	36 mm
Plastic hammer	T6	Head material : Soft plastic
Plier	T7	Snap ring, general type, tip thickness Ø1.3, length 25 mm
	T8	Snap ring, gear type tip thickness Ø3.8, length 165 mm
Driver	T9	Flat-head, small
	T10	Flat-head, large (2 EA)
Round bar	T11	O.D. Ø25, length 130 mm
Air gun	T12	Nozzle type
Eye bolt	T13	M14×1.5 (2 EA)
Ball bearing disassembly/ press-fit jig	T14	O.D. Ø27, I.D. Ø24, length 110 mm hollow cylinder
Guide pin	T15	M10×1.5×50
Floating seal assembly jig	T16	 35AZ7TM06
Augular bearing press-fit jig	T17	 35AZ7TM07
Shaft seal press-fit jig	T18	 35AZ7TM08

2) TIGHTENING TORQUE

Item no.	Size	Tightening torque	
		kgf·m	lbf·ft
24	M14 x 1.5	4.0±0.5	28.9±3.6
57	M 5 x 0.8	0.18±0.02	1.3±0.14
60	M30 x 1.5	36.0±4.0	260±28.9
62	PF 3/8	6.0±1.0	43.4±7.2
67	PF 3/8	6.0±1.0	43.4±7.2
71	M 6 x 1.0	0.28±0.02	2.0±0.14
72	PF 1/8	1.9±0.2	13.7±1.15
74	PF 1/4	4.3±0.3	31.1±2.17
78	M10 x 1.5	5.9±1.0	42.7±7.2
82	PF 1/4	3.0±0.5	21.7±3.6

3) PRECATIONS

(1) Be careful not to damage the seal contact surface of the floating seal, O-ring, shaft seal, etc. and the contact surface of the gear, pin, bearing.

(2) When disassembling after mounted on the equipment, make sure no foreign substances enter the equipment.

(3) Clean each part with oil sufficiently and dry it with the compressed air before assembly.

(4) When using oil absorbent or oil mop, be careful not to scratch the parts. Clean it thoroughly with lint-free cloths before assembly.

(5) When tightening the bolt and plug, use a torque wrench and tighten the bolt and plug to the specified tightening torque.

(6) Use a plastic hammer to tap the non-functional parts.

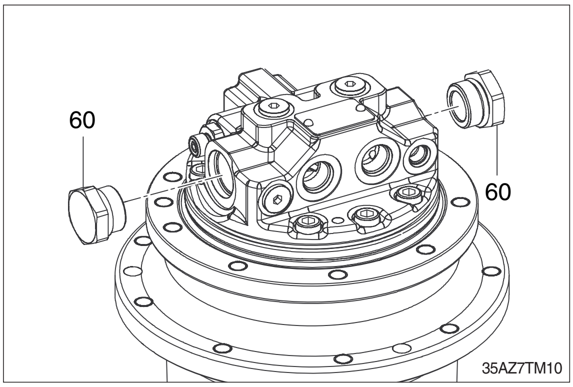
(7) Replace the floating seal, O-ring, shaft seal with a new one when disassembly.

(8) For the assembly of bearing preload, floating seal, please contact us for the detailed assembly method.

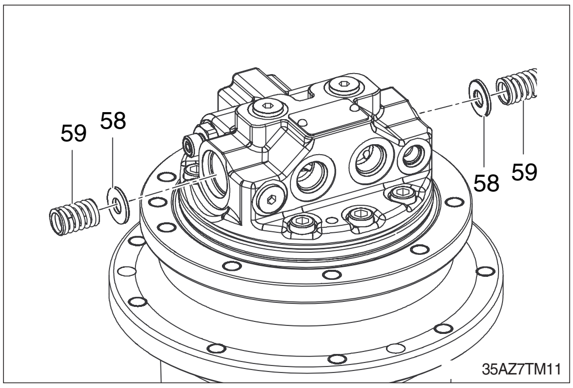
4) DISASSEMBLY PROCEDURES

(1) Diassemble plug (60).

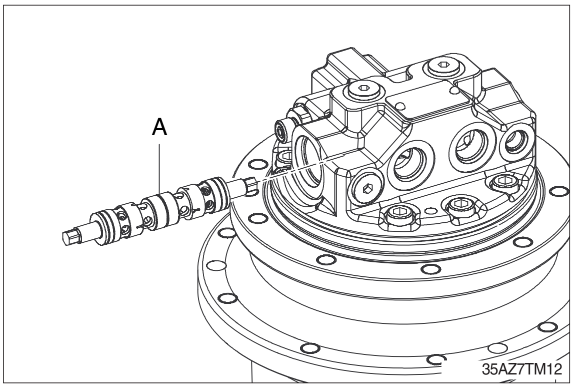
※ Required tools :
Troque wrench (T1), hex. socket (T5).



(2) Diassemble spring (59) and washer (58).

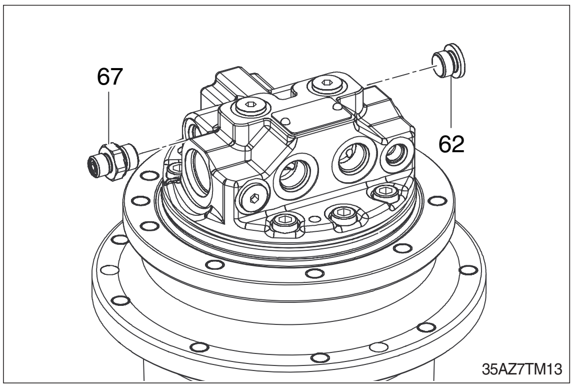


(3) Turn the spool assembly (A) slowly to disassemble. Be careful not to damage the spool O.D.

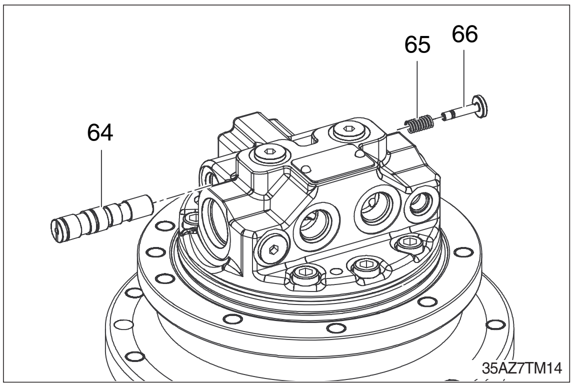


(4) Disassemble plug (62), (67).

※ Required tools :
Troque wrench (T1), hex. socket (T4), hex bit (T3).

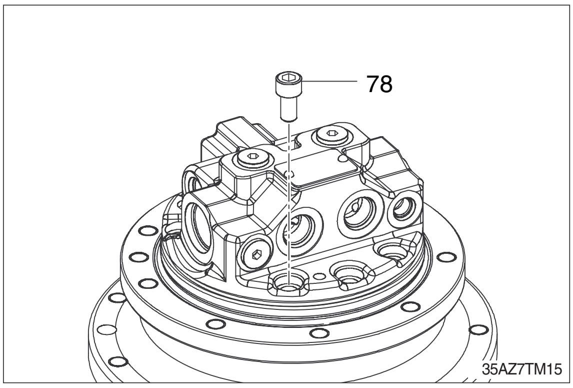


(5) Disassembly spool (64), spring (65), and guide (66). Be careful not to damage the surface of the spool and guide.

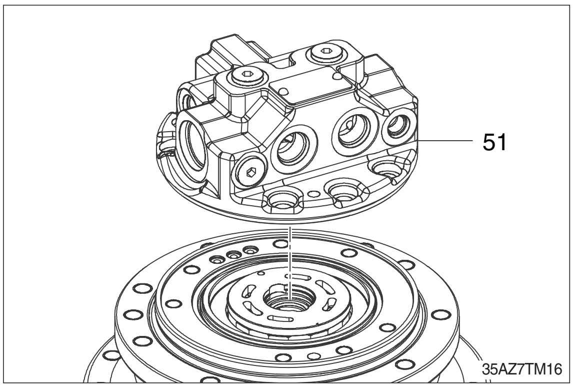


(6) Loosen each socket bolt (78) evenly to disassemble.

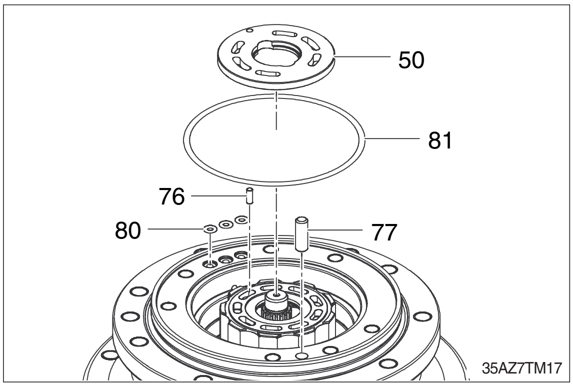
※ Required tools :
Troque wrench (T1), hex. bit (T3).



(7) Disassemble valve casing (51).

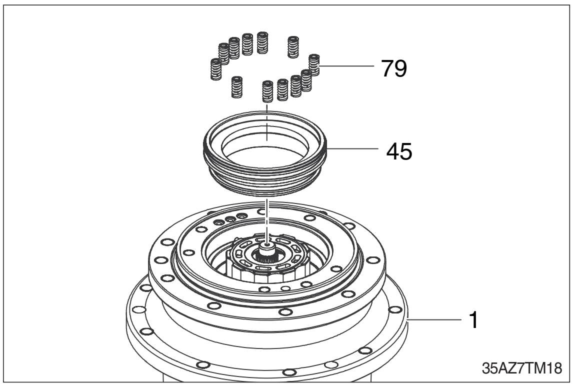


(8) Disassemble pin (76), (77), O-ring (80), (81) and valve plate (50).

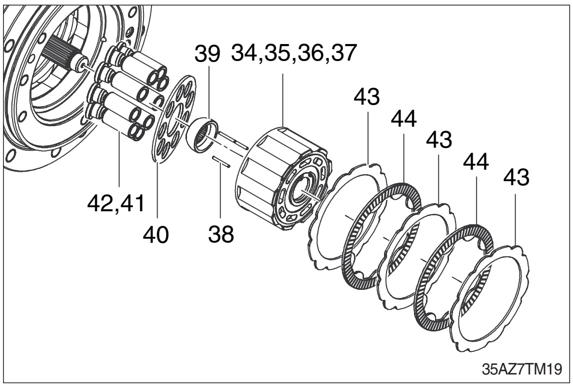


(9) Disassemble spring (79). Cover the top of a motor with cloths and disassemble the brake piston (45) by blowing compressed air into the brake releasing line of the motor casing (1).

※ Required tools :
Compressed air, air gun (T12).

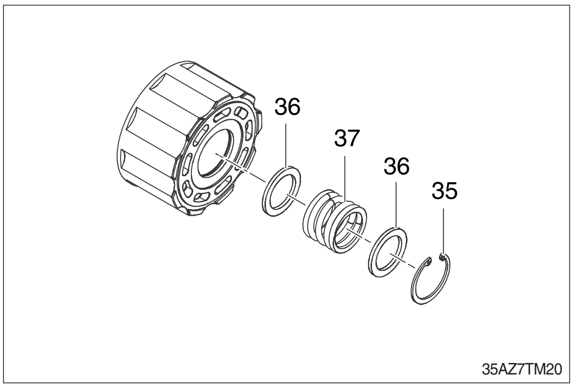


(10) Disassemble cylinder block assembly (34)~(37), roller (38), thrust ball (39), retainer plate (40), piston assembly (41)~(42), separation plate (43), and friction plate (44).

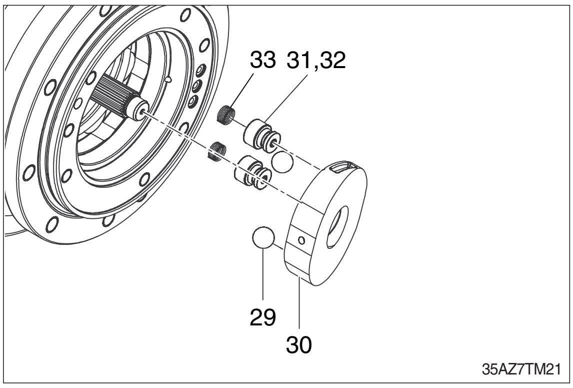


(11) Disassemble snap ring (35), washer (36) and spring (37).

※ Required tools : Plier (T7)

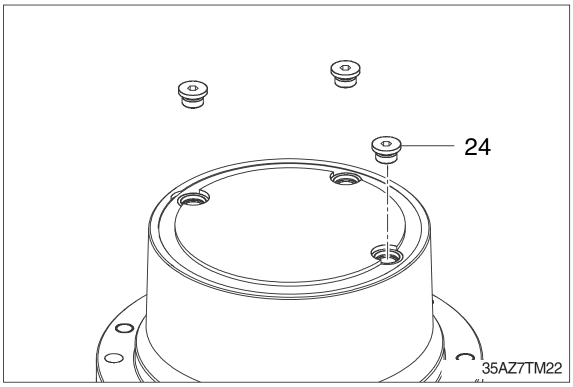


(12) Disassemble swash plate (30), steel ball (29), transmission piston assembly (31)~(32), and spring (33).



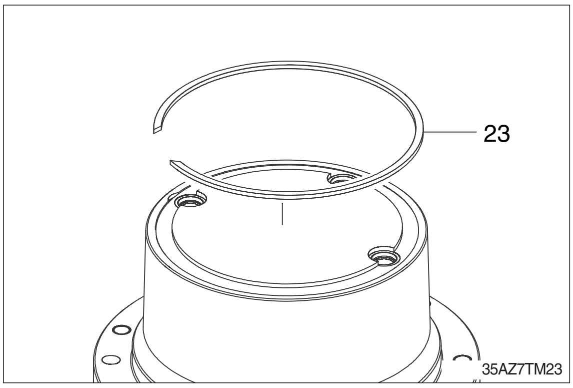
(13) Disassemble plug (24) and discharge the reduction gear oil.

※ Required tools :
Torque wrench (T1), hex bit (T12).



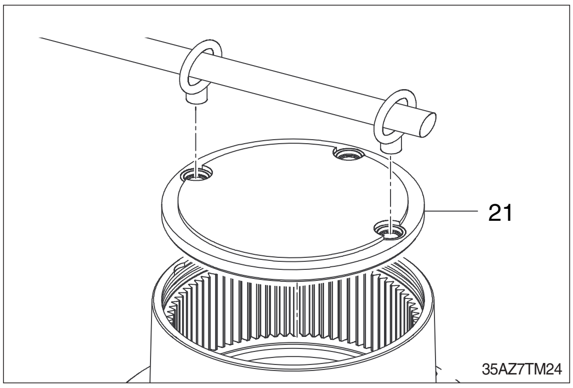
(14) Disassemble clip (23).

※ Required tools : Screwdriver (T9).



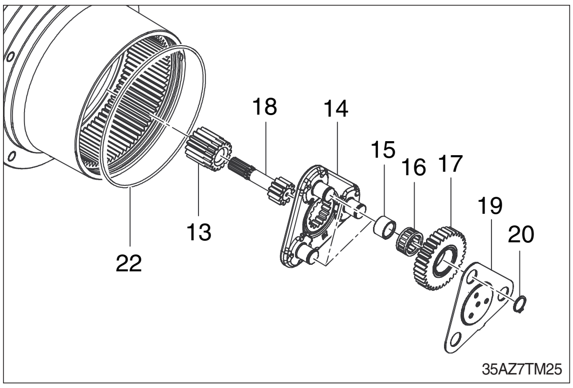
(15) Assemble two eye bolts into the plug hole in the opposite direction and hang the round bar to disassemble the cover (21).

※ Required tools :
Eye bolt (T13), round bar (T11).



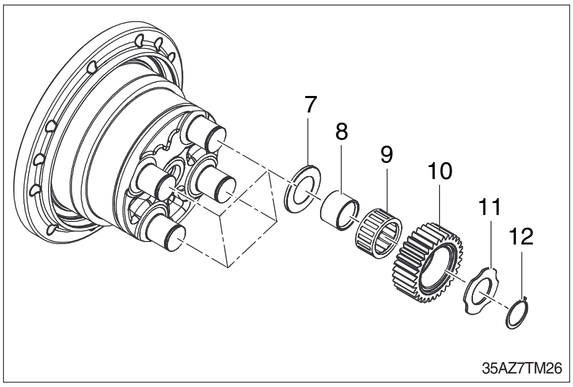
(16) Disassemble O-ring (22), the first stage sun gear (18), the first stage carrier (14), snap ring (20), thrust plate (19), the first stage planet gear (17), needle bearing (16), inner race (15), and the second stage sun gear (13).

※ Required tools : Plier (T7).



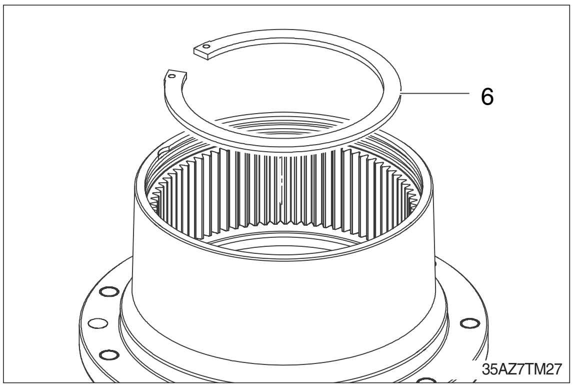
(17) Disassemble snap ring (12), washer (11), the second stage planet gear (10), needle bearing (9), inner race (8), and washer (7).

※ Required tools : Plier (T7).

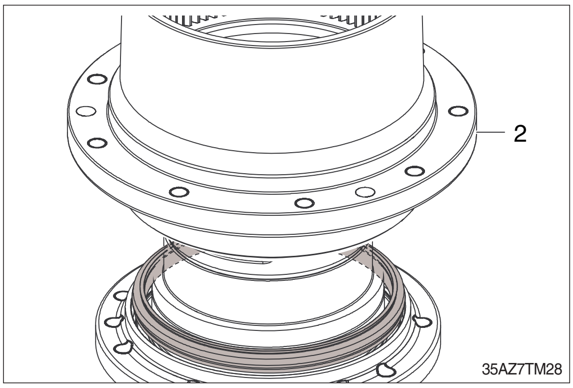


(18) Disassemble the shim plate (6).

※ Required tools : Plier (T8).

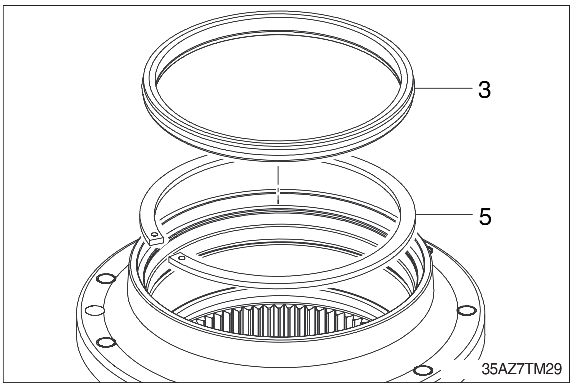


(19) Disassemble the hub (2).



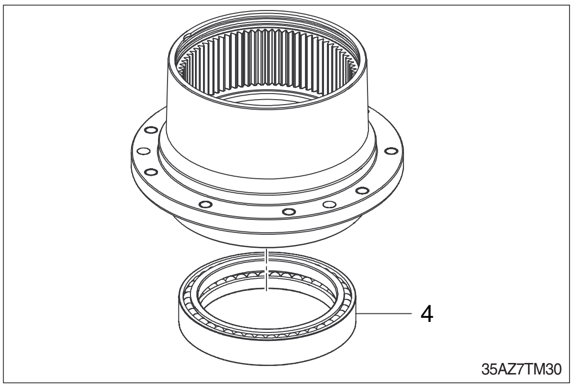
(20) Disassemble the floating seat (3) and snap ring (5). Be careful not to damage the contact surface of the floating seal.

※ Required tools :
Screwdriver (10), plier (T8).



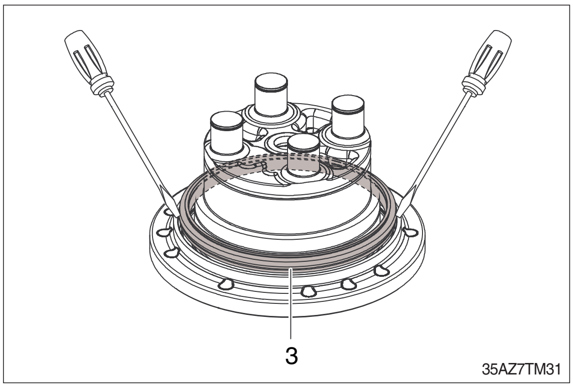
(21) Disassemble the angular ball bearing (4) by tapping the inner ring of the bearing with a plastic hammer and a bar.

※ Required tools :
Round bar (T11), plastic hammer (T6).



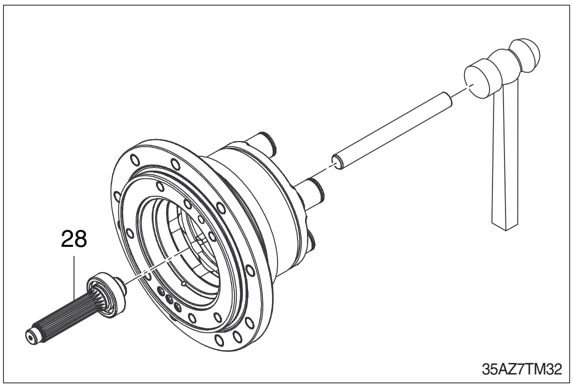
(22) Disassemble floating seal (3).

※ Required tools : Screwdriver (T10).



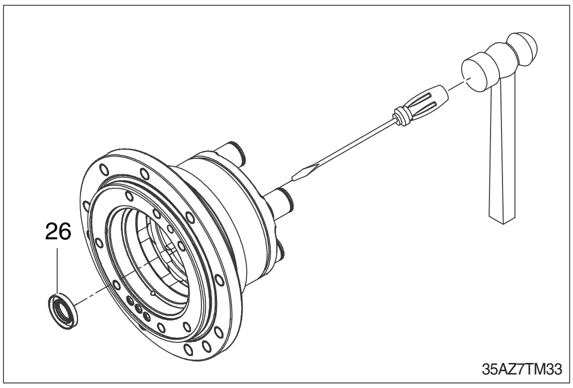
(23) Disassemble drive shaft (28) by tapping the spline hole with a bar and a plastic hammer.

※ Required tools :
Round bar (T11), plastic hammer (T6).



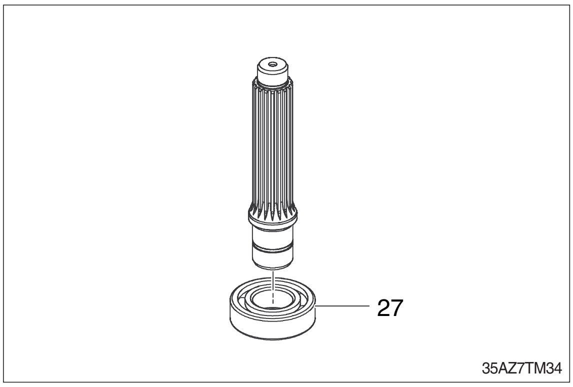
(24) Disassemble shaft seal (26).

※ Required tools :
Screwdriver (T9), plastic hammer (T6).



(25) Disassemble ball bearing (27).

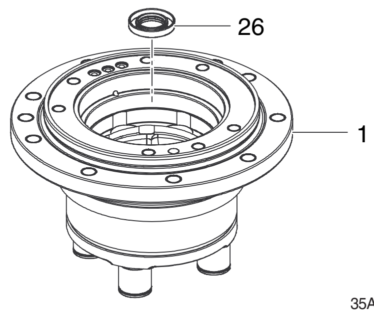
※ Required tools :
Ball bearing disassembly, press-fit jig (T14).



5) ASSEMBLY PROCEDURES

(1) Apply a small amount of hydraulic fluid to the outer diameter of the shaft seal (26) and assemble it to the motor casing (1).

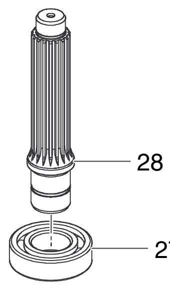
※ Required tools :
Shaft seal press-fit jig (T18).



35AZ7TM40

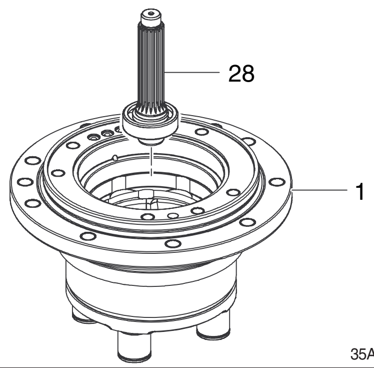
(2) Assemble the ball bearing (27) to the drive shaft (28).

※ Required tools :
Ball bearing disassembly, press-fit jig (T14).



35AZ7TM41

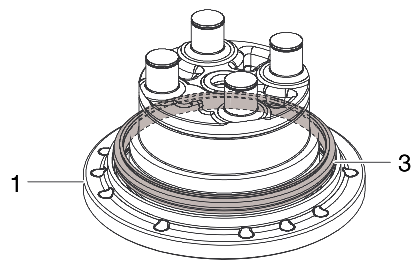
(3) Assemble the drive shaft (28) to the motor casing (1).



35AZ7TM42

(4) Apply vaporizing lubricant to the O-ring outside of the floating seal (3) and assemble it to the motor casing (1) so that the parallelism can be 0.5 mm or less. After assembly, apply a small amount of hydraulic fluid to the polishing surface.

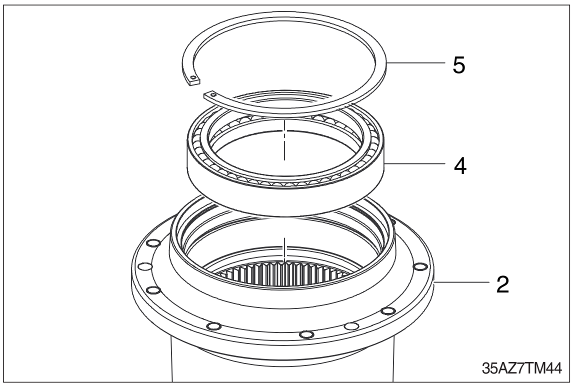
※ Required tools :
Floating seal assembly jig (T16).



35AZ7TM43

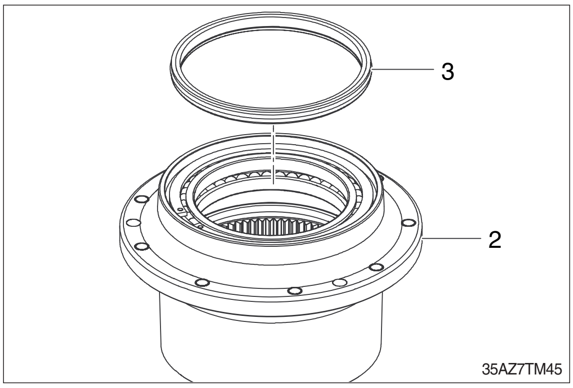
(5) Insert angular ball bearing (4) into the hub (2) and then secure with a snap ring (5).

※ Required tools :
Angular gearing, press-fit jig (T17), Plier (T8).

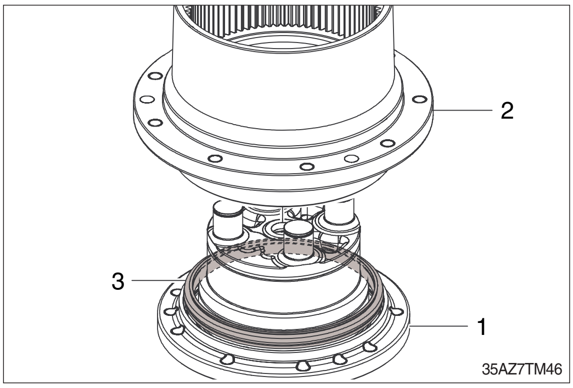


(6) Apply vaporizing lubricant to the O-ring outside of the floating seal (3) and assemble it to the hub (1) so that the parallelism can be 0.5 ㎜ or less. After assembly, apply a small amount of hydraulic fluid to the polishing surface.

※ Required tools :
Floating seal assembly jig (T16).

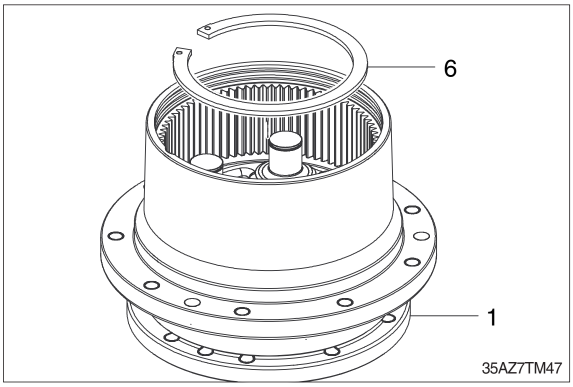


(7) Assemble a hub (2) to motor casing (1). Be careful not to impact the floating seal (3).



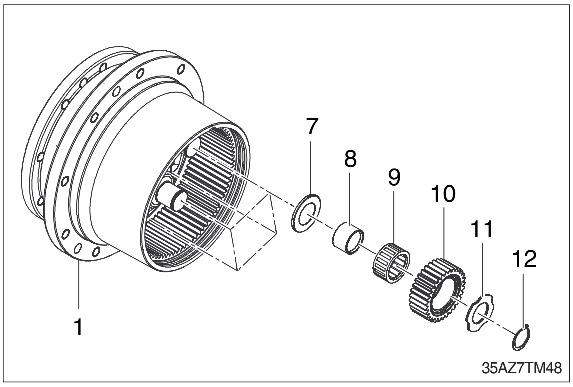
(8) Assemble shim plate (6) to motor casing (1).

※ Required tools : Plier (T8).



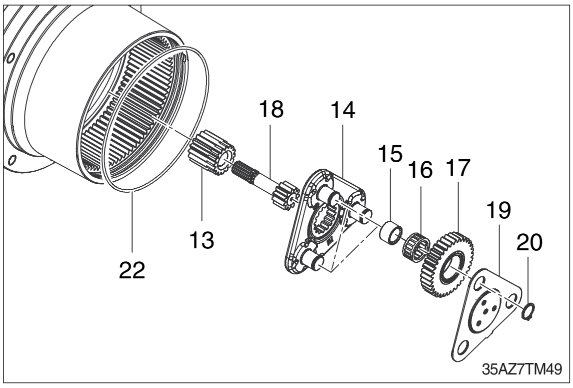
(9) Assemble washer (7), inner race (8), needle bearing (9), the second stage planet gear (10), washer (11), and snap ring (12) to motor casing (1).

※ Required tools : Plier (T7).



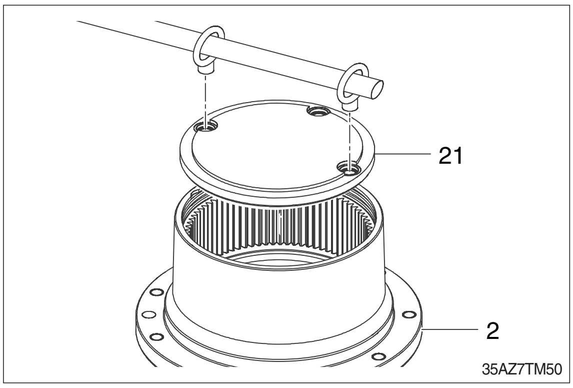
(10) Assemble in the order of the second stage sun gear (13), the first stage carrier (14), inner race (15), needle bearing (16), the first stage planet gear (17), the first stage sun gear (18), thrust plate (19), snap ring (20), and O-ring (22).

※ Required tools : Plier (T7).

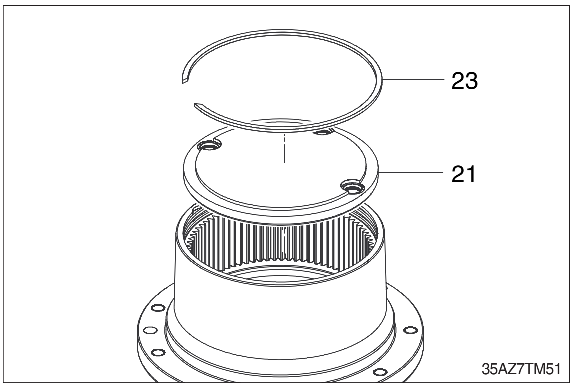


(11) Assemble cover (21) to hub (2).

※ Required tools :
Eye bolt (T13), round bar (T11).

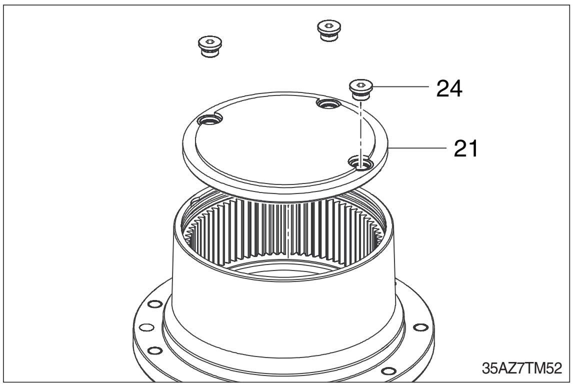


(12) Secure the cover (21) with clip (23).

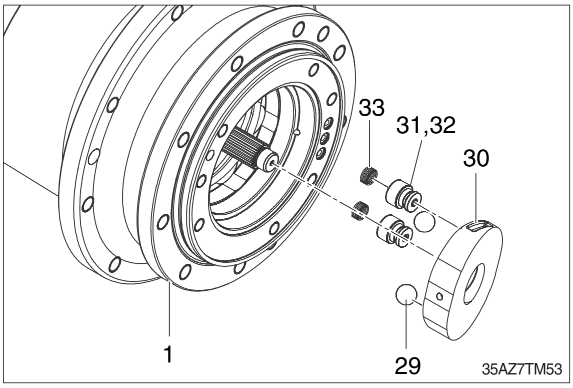


(13) Fill reduction gear oil of 0.6 liter and assemble plug (24) to cover (21).

※ Required tools :
Torque wrench (T1), hex bit (T2).

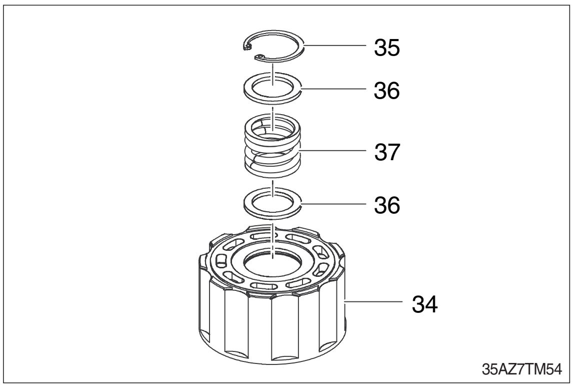


(14) Apply hydraulic fluid to the transmission piston outer diameter (31) and swash plate (30) polishing surface. Apply grease to spring (33) and assemble it to transmission piston assembly (31)~(32) and then to motor casing (1). Assemble steel ball (29) and swash plate (30) to motor casing (1).

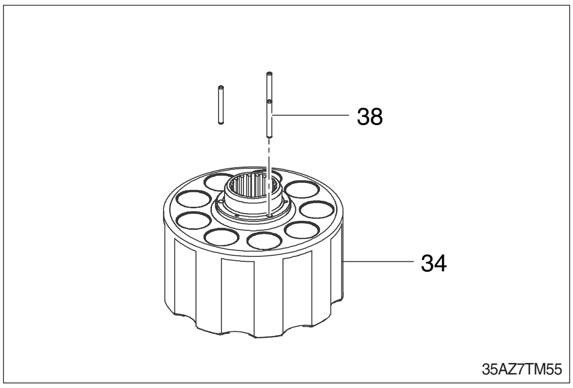


(15) Assemble washer (36), spring (37), snap ring (35) to cylinder block (34).

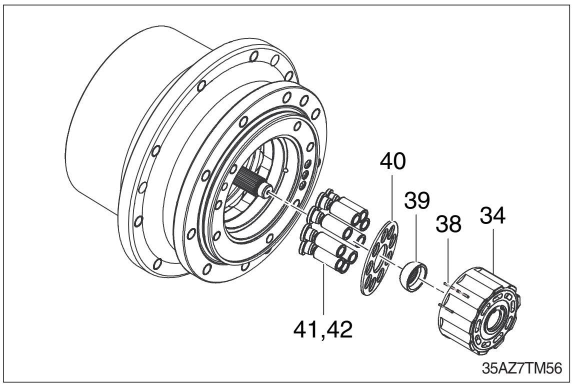
※ Required tools : Plier (T7).



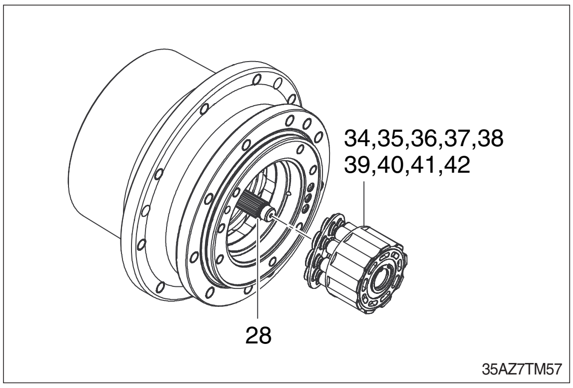
(16) Apply grease to roller (38) and assemble it to cylinder block (34).



(17) Assemble thrust ball (39) to roller (38) and piston (41), shoe (42) to retainer plate (40) and then assemble them to cylinder block (34). Apply hydraulic fluid to the shoe (42).

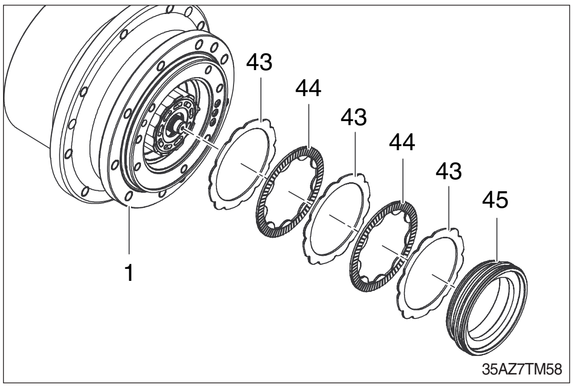


(18) Assemble the cylinder block assembly (34)~(42) to drive shaft (28). Apply hydraulic fluid to cylinder block (34) polishing surface.

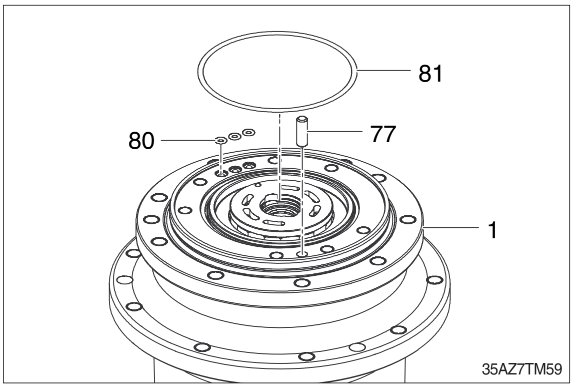


(19) Assemble separation plate (43) and friction plate (44) to motor casing (1) in turn and then assemble brake piston (45) to a motor casing. Tap brake piston (45) evenly with a plastic hammer and check if it is assembled completely.

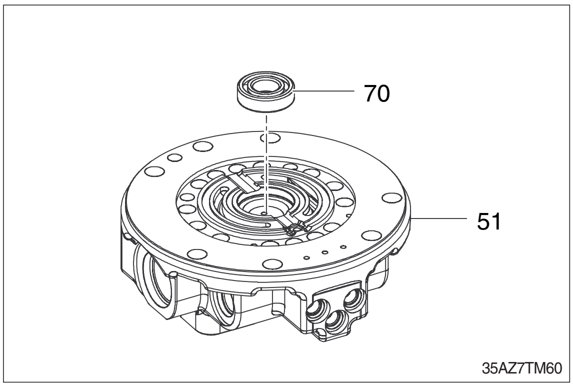
※ Required tools : Plastic hammer (T6).



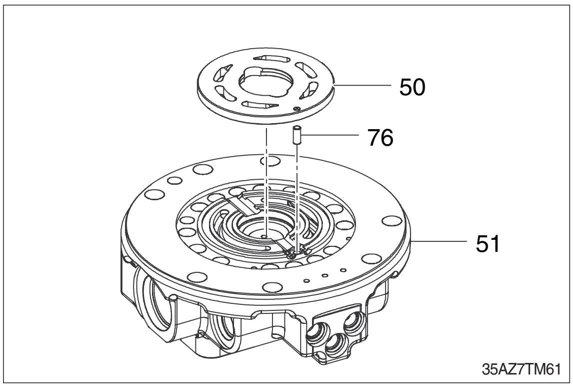
(20) Assemble pin (77) and O-ring (80), (81) to motor casing (1).



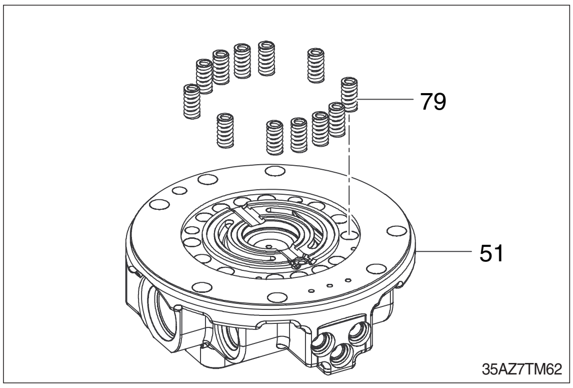
(21) Assemble ball bearing (70) to valve casing (51). Apply grease to the inner race of ball bearing (70).



(22) Apply grease to the other side of the valve plate (50) and assemble a valve plate (50) and pin (76) to valve casing (51).

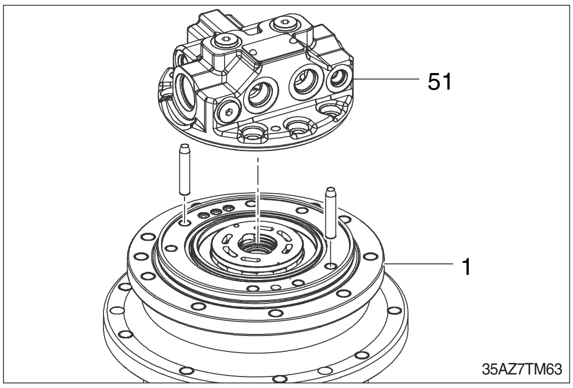


(23) Apply grease to spring (79) and assemble it to valve casing (51).



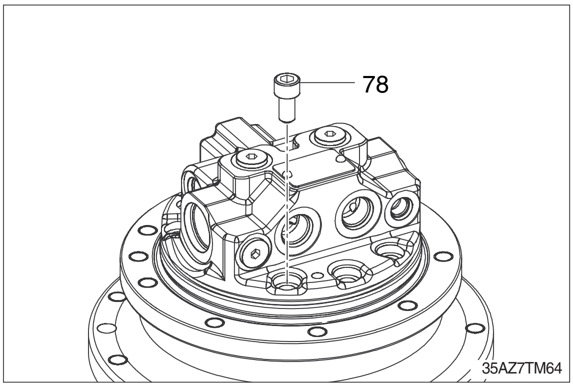
(24) Assemble valve casing (51) to motor casing (1).

※ Required tools : Guide pin (T15).

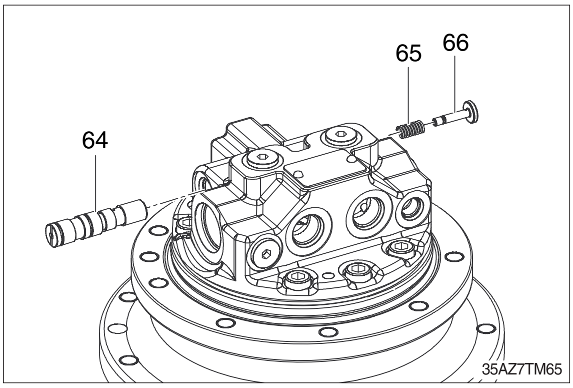


(25) Tighten each socket bolt (78) evenly to assemble.

※ Required tools :
Torque wrench (T1), hex bit (T3).

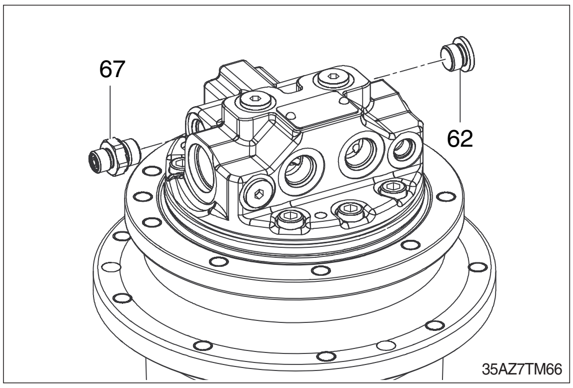


(26) Apply hydraulic fluid to spool (64) and the guide (66) outer diameter and assemble spool (64), spring (65), and guide (66). Be careful not to damage the surface of the spool and guide.

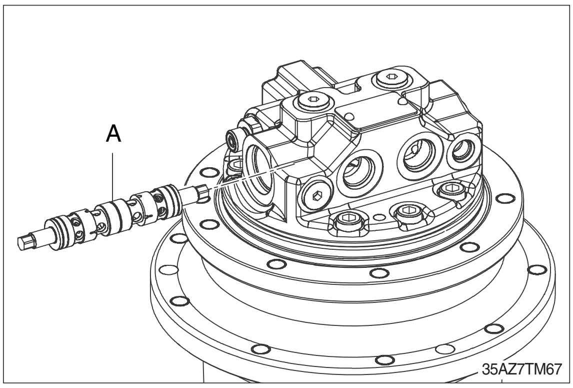


(27) Assemble plug (62), (67).

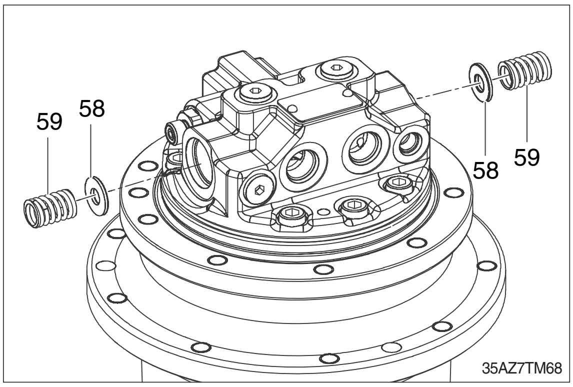
※ Required tools :
Torque wrench (T1), hex socket (T22), hex bit (T3).



(28) Apply hydraulic fluid to spool (52) outer diameter and turn the spool assembly (A) slowly to assemble.
Be careful not to damage the outer diameter of the spool.

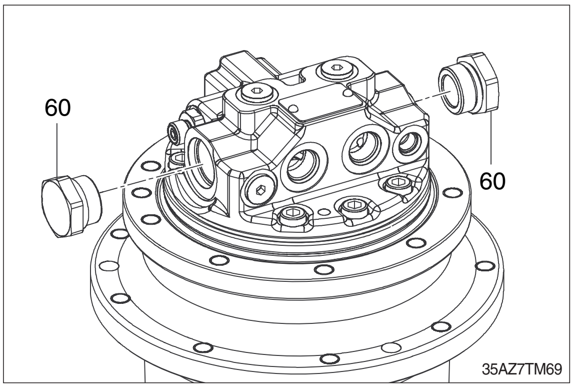


(29) Assemble spring (59) and washer (58).



(30) Assemble plug (60).

※ Required tools : Torque wrench (T1), hex. socket (T5).



GROUP 7 RCV LEVER

1. REMOVAL AND INSTALL

1) REMOVAL

(1) Lower the work equipment to the ground and stop the engine.

(2) Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping.

(3) Loosen the breather slowly to release the pressure inside the hydraulic tank.

⚠ **Escaping fluid under pressure can penetrate the skin causing serious injury.**


13031GE18

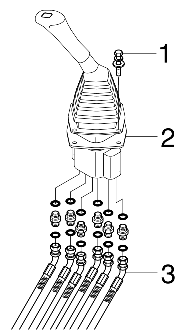
(4) Loosen the socket bolt(1).

(5) Remove the cover of the console box.

(6) Disconnect pilot line hoses(3).

(7) Remove the pilot valve assembly(2).

※ When removing the pilot valve assembly, check that all the hoses have been disconnected.



R25Z9AK8DA06

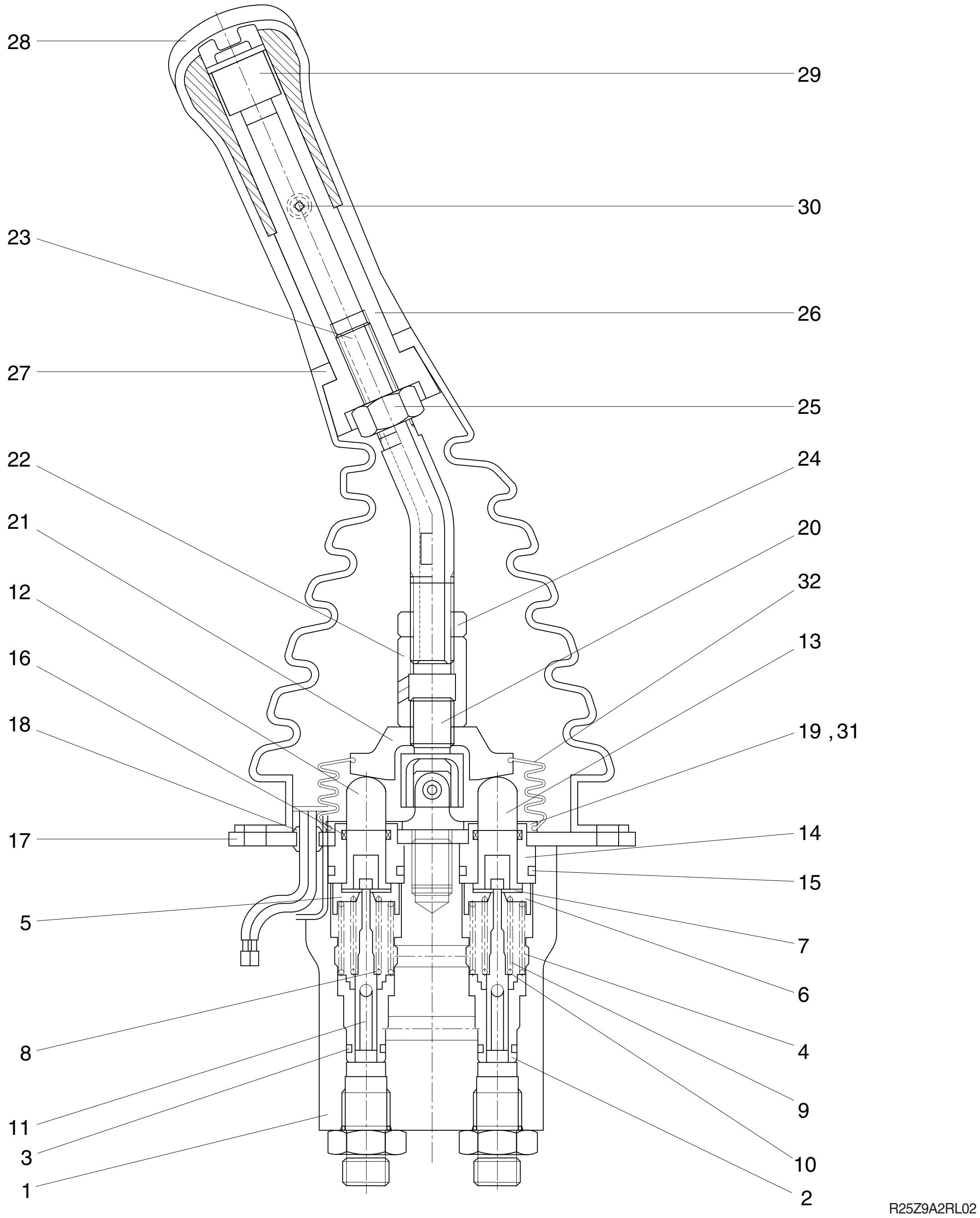
2) INSTALL

(1) Carry out installation in the reverse order to removal.

(2) Confirm the hydraulic oil level and check the hydraulic oil leak or not.

2. DISASSEMBLY AND ASSEMBLY (Type 1)

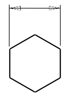
1) STRUCTURE



1	Case	12	Push rod (1, 3)	23	Connector
2	Plug	13	Push rod (2, 4)	24	Nut
3	O-ring	14	Plug	25	Nut
4	Spring	15	O-ring	26	Insert
5	Spring seat (1, 3)	16	Rod seal	27	Boot
6	Spring seat (2, 4)	17	Plate (A)	28	Handle
7	Stopper	18	Bushing	29	Switch assembly
8	Spring (1, 3)	19	Machine screw	30	Screw
9	Spring (2, 4)	20	Joint assembly	31	Plate
10	Spring seat	21	Swash plate	32	Boot
11	Spool	22	Hex nut		

2) TOOLS AND TIGHTENING TORQUE

(1) Tools

Tool name	Remark	
(L) Hexagonal wrench	10	B 
Spanner	22	
	27	
(+) Driver	Length 150	
(-) Driver	Width 4~5	
Torque wrench	Capable of tightening with the specified torques	

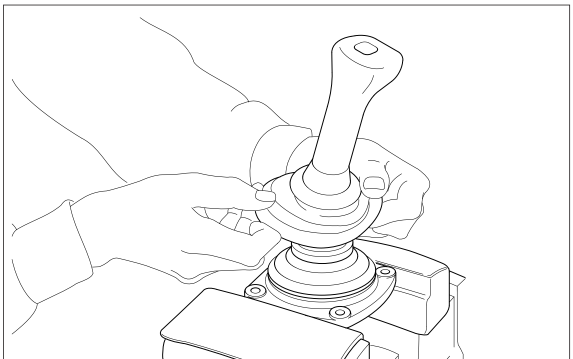
3) DISASSEMBLY

(1) Clean pilot valve with kerosene.

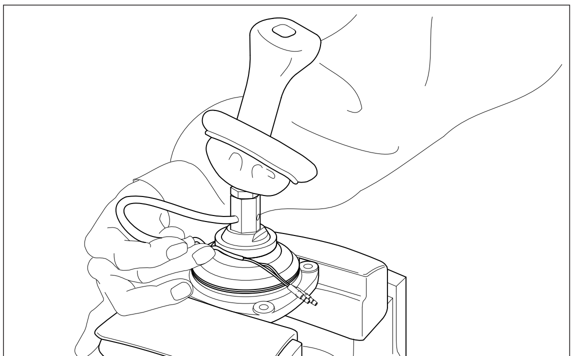
※ Put blind plugs into all ports.

(2) Fix pilot valve in a vise with copper (or lead) sheets.

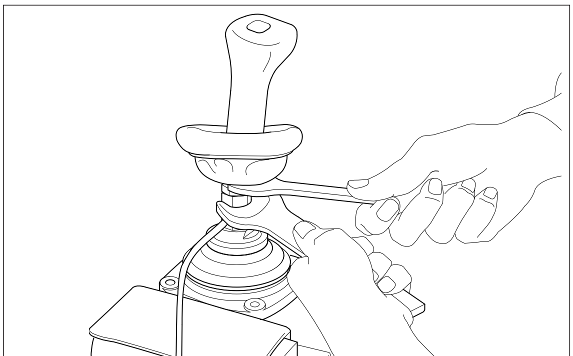
(3) Remove end of boot (32) from case (1) and take it out upwards.


1408DA62

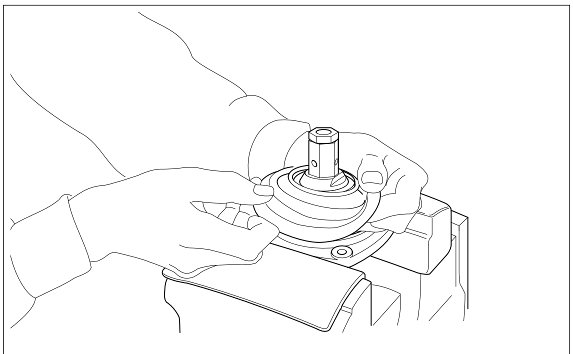
※ For valve with switch, remove cord also through hole of casing.


1408DA63

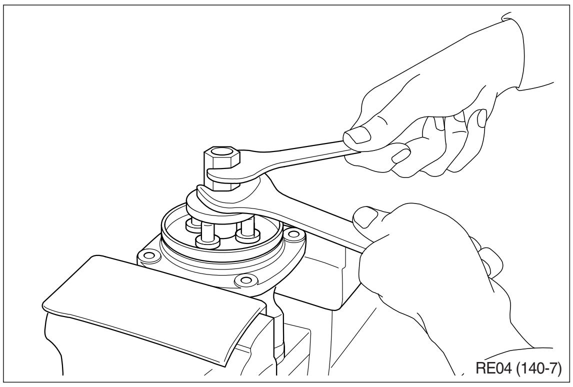
(4) Loosen lock nut (24) and adjusting nut (22) with spanners on them respectively, and take out handle section as one body.


1408DA64

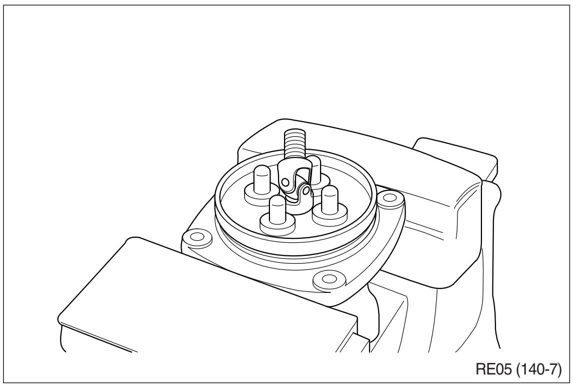
(5) Remove the boot (32).


1408DA61

(6) Loosen adjusting nut(22) and plate(31) with spanners on them respectively, and remove them.



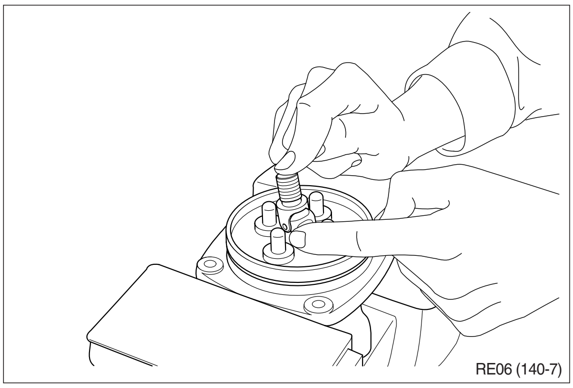
RE04 (140-7)



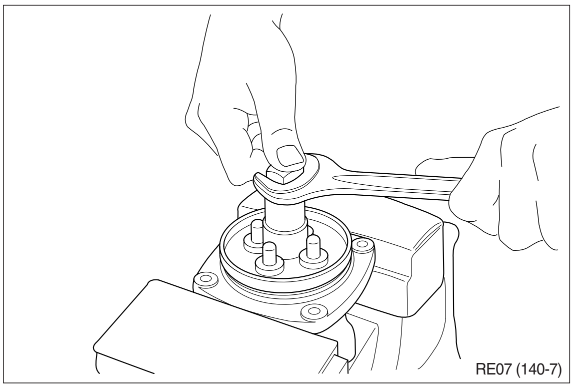
RE05 (140-7)

(7) Turn joint anticlockwise to loosen it, utilizing jig (special tool).

※ When return spring(8, 9) is strong in force, plate(31), plug(14) and push rod(12, 13) will come up on loosening joint.
Pay attention to this.

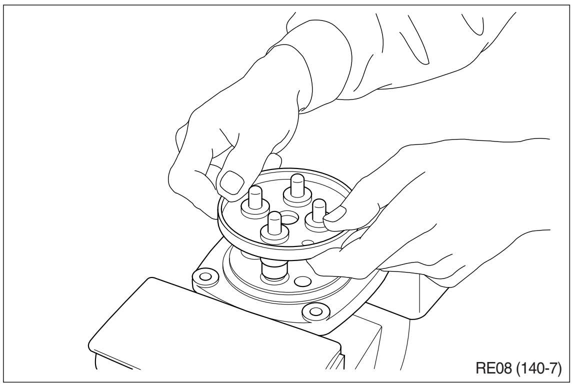


RE06 (140-7)



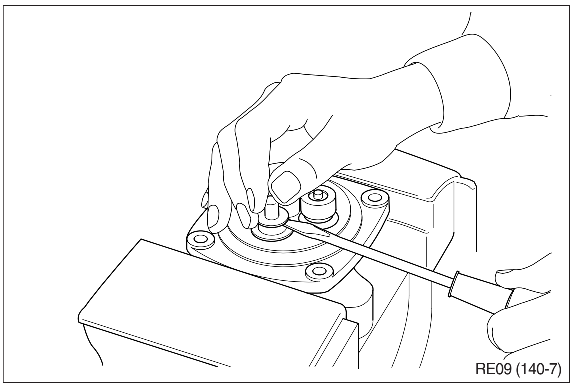
RE07 (140-7)

(8) Remove plate (31).



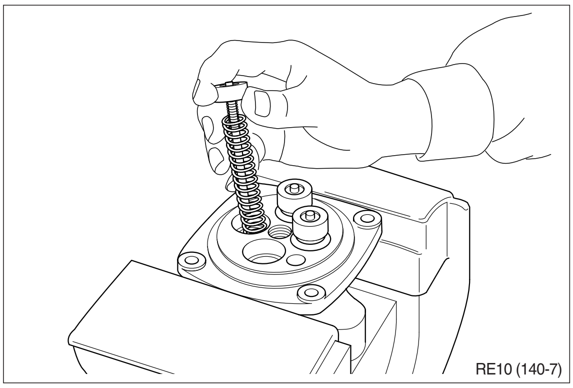
RE08 (140-7)

(9) When return spring (8, 9) is weak in force, plug (14) stays in casing because of sliding resistance of O-ring.
※ Take it out with minus screwdriver.
Take it out, utilizing external periphery groove of plug and paying attention not to damage it by partial loading.
※ During taking out, plug may jump up due to return spring (8, 9) force.
Pay attention to this.



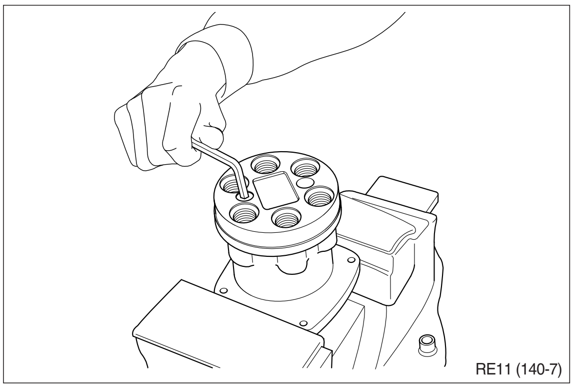
RE09 (140-7)

(10) Remove reducing valve subassembly and return spring (8, 9) out of casing.
※ Record relative position of reducing valve subassembly and return springs.



RE10 (140-7)

(11) Loosen hexagon socket head plug (2) with hexagon socket screw key.



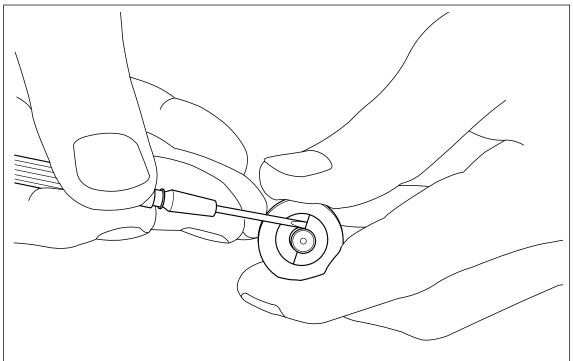
RE11 (140-7)

(12) For disassembling reducing valve section, stand it vertically with spool (11) bottom placed on flat workbench. Push down spring seat (5, 6) and remove two pieces of semicircular stopper (7) with tip of small minus screwdriver.

※ Pay attention not to damage spool surface.

※ Record original position of spring seat (5, 6).

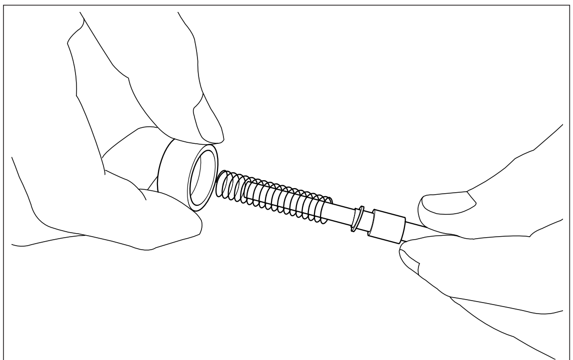
※ Do not push down spring seat more than 6 mm.



RE14 (140-7)

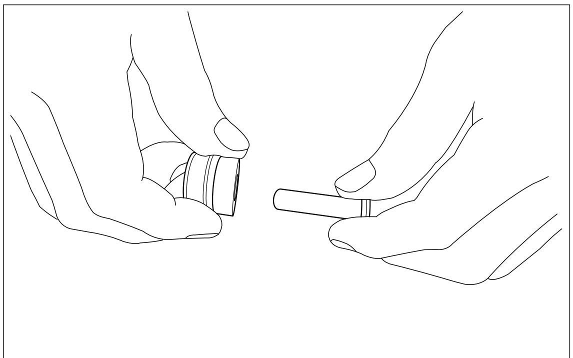
(13) Separate spool (11), spring seat (5, 6), spring (8, 9) and spring seat (10) individually.

※ Until being assembled, they should be handled as one subassembly group.



RE15 (140-7)

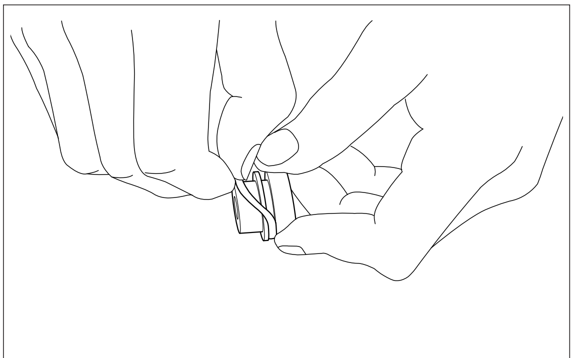
(14) Take push rod (12, 13) out of plug (14).



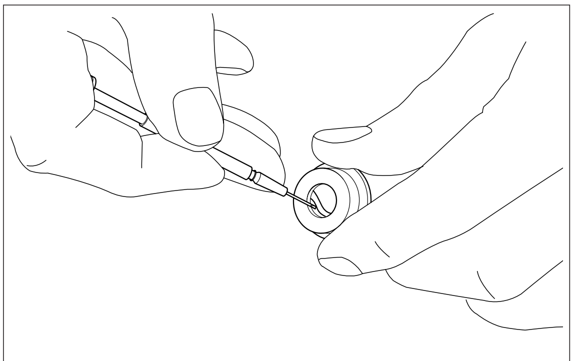
RE16 (140-7)

(15) Remove O-ring (15) and seal (16) from plug (14).

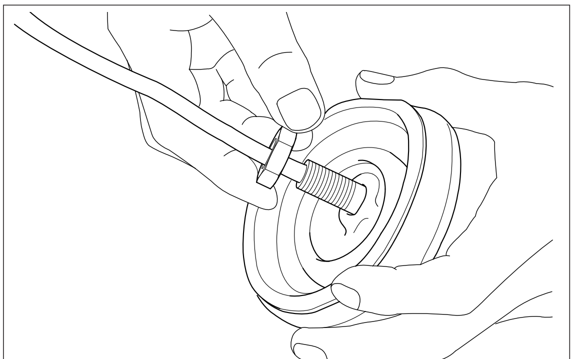
Use small minus screwdriver or so on to remove this seal.

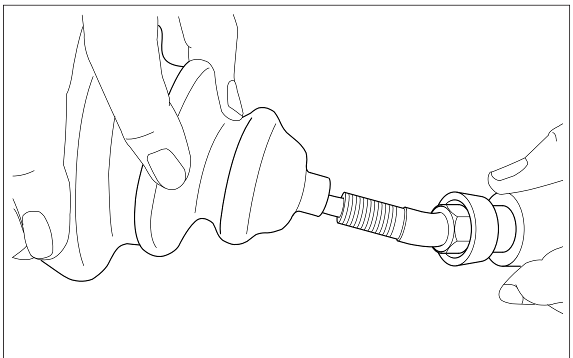


RE17 (140-7)


RE18 (140-7)

(16) Remove lock nut (24) and then boot (27).


RE19 (140-7)


25038RL02(4)

(17) Cleaning of parts

① Put all parts in rough cleaning vessel filled with kerosene and clean them (rough cleaning).

※ If dirty part is cleaned with kerosene just after putting it in vessel, it may be damaged. Leave it in kerosene for a while to loosen dust and dirty oil.

※ If this kerosene is polluted, parts will be damaged and functions of reassembled valve will be degraded.
Therefore, control cleanliness of kerosene fully.

② Put parts in final cleaning vessel filled with kerosene, turning it slowly to clean them even to their insides (finish cleaning).

※ Do not dry parts with compressed air, since they will be damaged and/or rusted by dust and moisture in air.

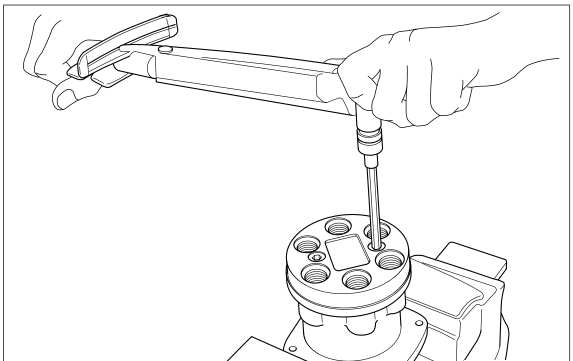
(18) Rust prevention of parts.
Apply rust-preventives to all parts.

※ If left as they after being cleaned, they will be rusted and will not display their functions fully after being reassembled.

4) ASSEMBLY

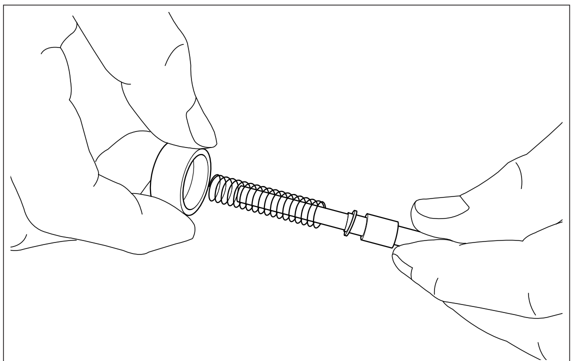
(1) Tighten hexagon socket head plug (2) to the specified torque.

※ Tighten two bolts alternately and slowly.



RE29 (140-7)

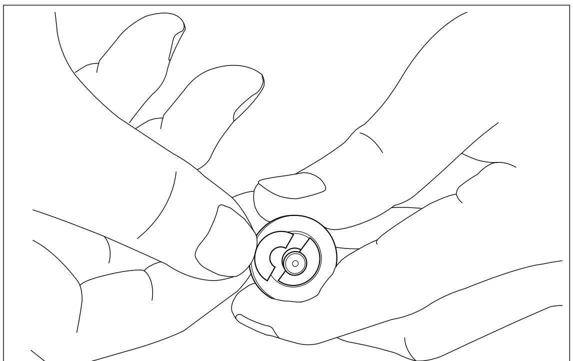
(2) Put spring seat (10), springs (8, 9) and spring seat (5, 6) onto spool (11) in this order.



RE30 (140-7)

(3) Stand spool vertically with its bottom placed on flat workbench, and with spring seat pushed down, put two pieces of semicircular stopper (7) on spring seat without piling them on.

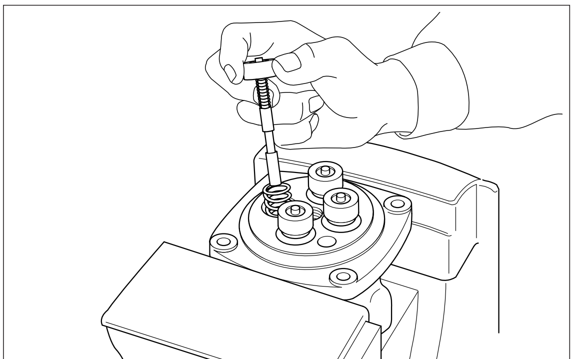
※ Assemble stopper (7) so that its sharp edge side will be caught by head of spool. Do not push down spring seat more than 6 mm.



RE31 (140-7)

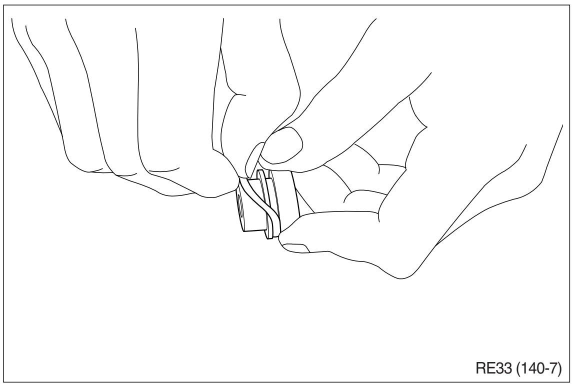
(4) Assemble spring (8, 9) into casing. Assemble reducing valve subassembly into casing.

※ Assemble them to their original positions.



RE32 (140-7)

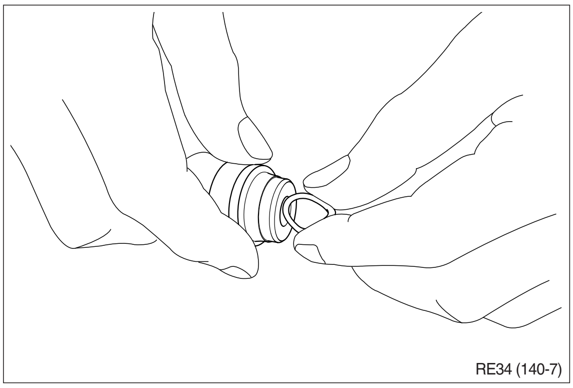
(5) Assemble O-ring (15) onto plug (14).



RE33 (140-7)

(6) Assemble seal (16) to plug (14).

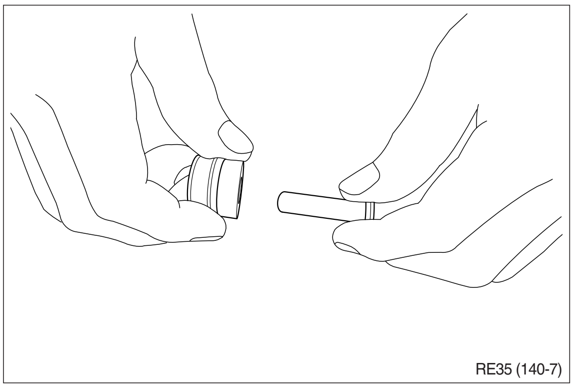
※ Assemble seal in such lip direction as shown below.



RE34 (140-7)

(7) Assemble push rod (12, 13) to plug (14).

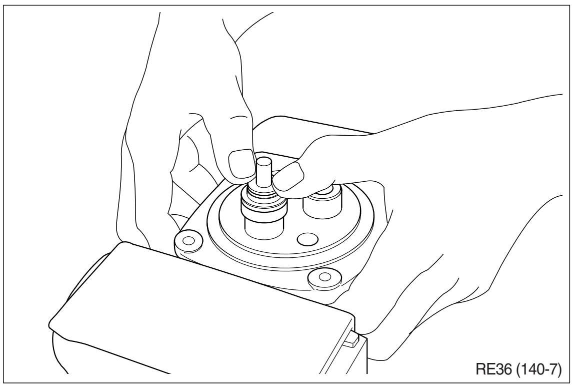
※ Apply working oil on push-rod surface.



RE35 (140-7)

(8) Assemble plug subassembly to casing.

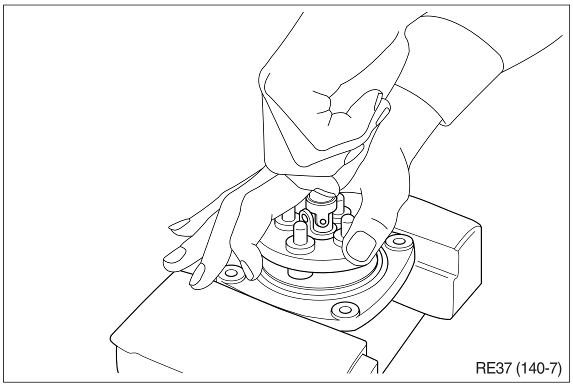
※ When return spring is weak in force, subassembly stops due to resistance of O-ring.



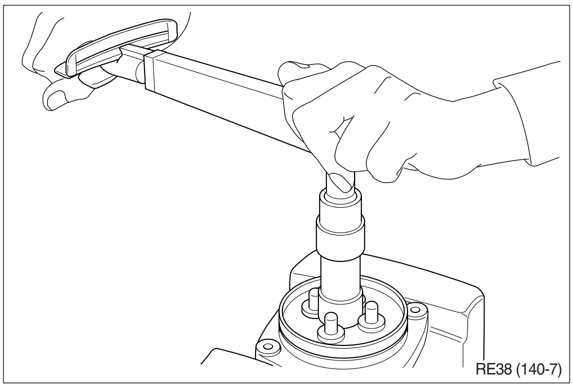
RE36 (140-7)

(9) When return spring is strong in force, assemble 4 sets at the same time, utilizing plate (31), and tighten joint (20) temporarily.

(10) Fit plate (31).


RE37 (140-7)

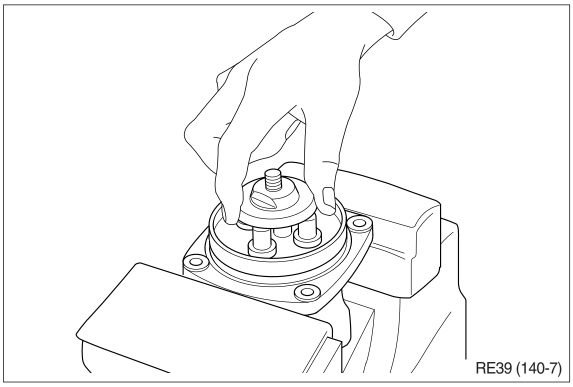
(11) Tighten joint (20) with the specified torque to casing, utilizing jig.


RE38 (140-7)

(12) Assemble plate (21) to joint (20).

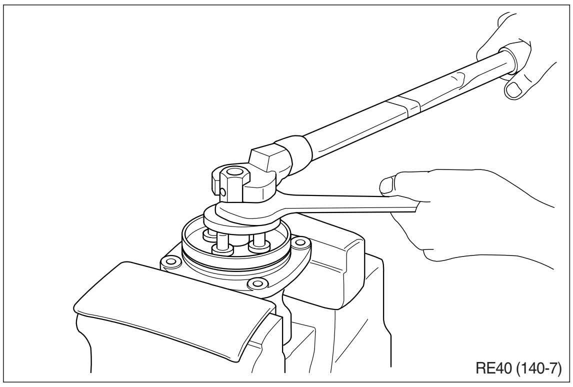
※ Screw it to position that it contacts with 4 push rods evenly.

※ Do not screw it over.

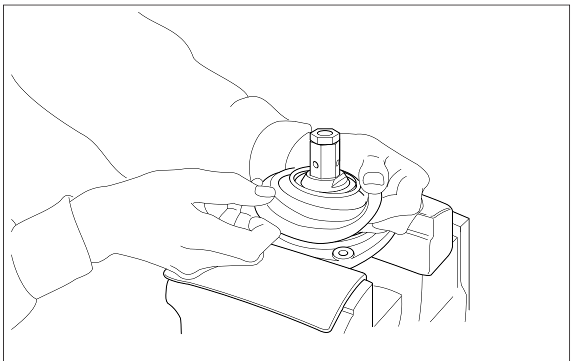

RE39 (140-7)

(13) Assemble adjusting nut (22), apply spanner to width across flat of plate (21) to fix it, and tighten adjusting nut to the specified torque.

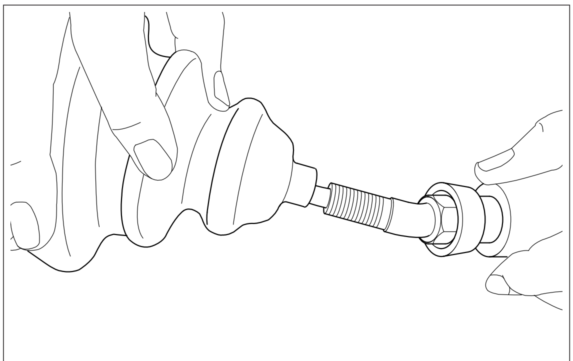
※ During tightening, do not change position of disk.


RE40 (140-7)

(14) Fit boot (32) to plate.


1408DA61

(15) Fit boot (27) and lock nut (24), and handle subassembly is assembled completely.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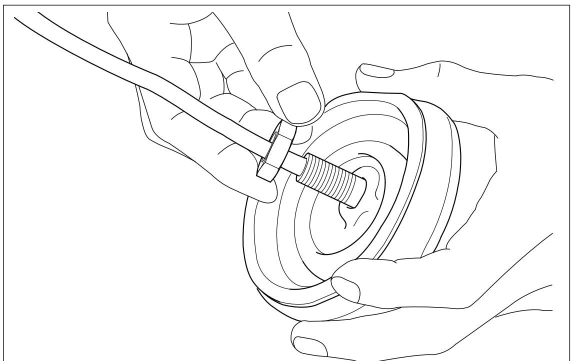
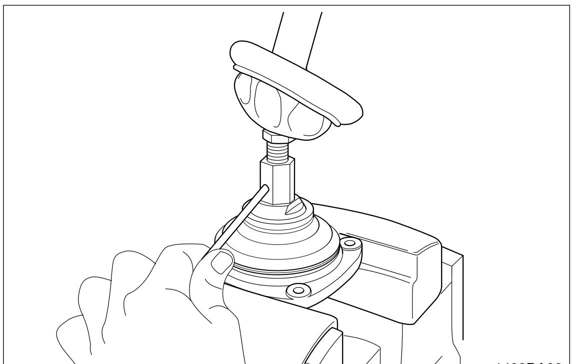
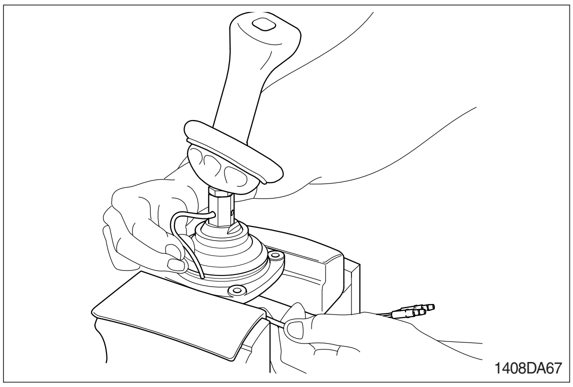

RE48 (140-7)

(16) Pull out cord and tube through adjusting nut hole provided in direction 60° to 120° from casing hole.


1408DA66

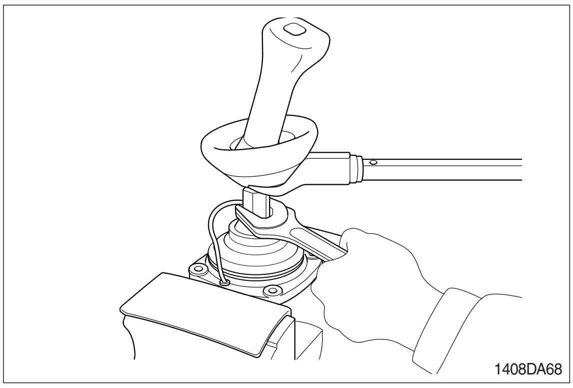
(17) Assemble bushing (18) to plate and pass cord and tube through it.

※ Provide margin necessary to operation.



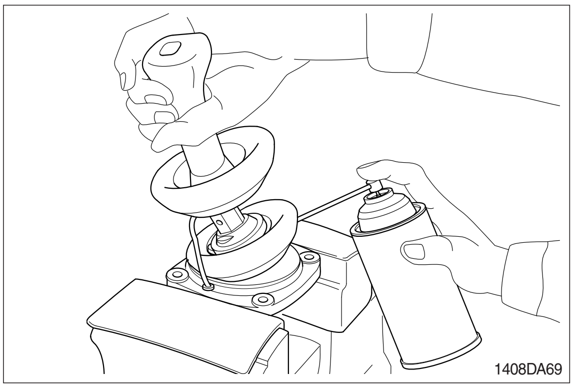
1408DA67

(18) Determine handle direction, tighten lock nut (21) to specified torque to fix handle.



1408DA68

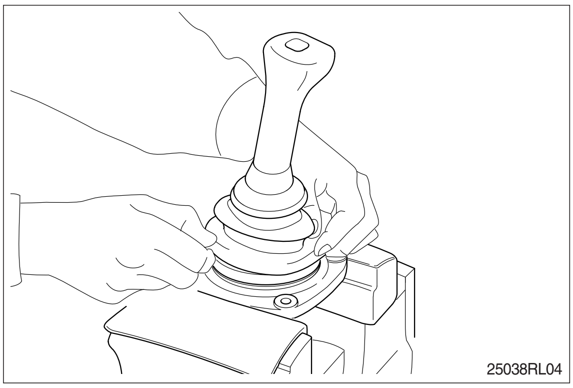
(19) Apply grease to rotating section of joint and contacting faces of disk and push rod.



1408DA69

(20) Assemble lower end of bellows to casing.

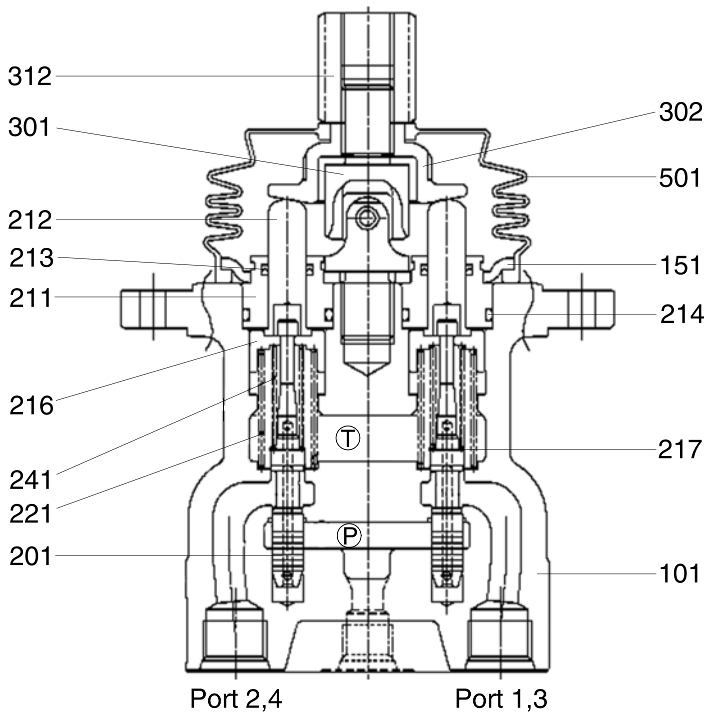
(21) Inject volatile rust-preventives through all ports and then put blind plugs in ports.



25038RL04

3. DISASSEMBLY AND ASSEMBLY (Type 2)

1) STRUCTURE



17Z9A7RCV50

101	Casing	213	Seal	241	Spring
151	Plate	214	O-ring	301	Joint
201	Spool	216	Spring seat	302	Disc
211	Plug	217	Washer	312	Nut
212	Push rod	221	Spring	501	Bellows

2) DISASSEMBLY AND ASSEMBLY

(1) Rinse the pilot valve in paraffin.

※ Place blind plug in all ports.

(2) Secure the pilot valve in a vice using a copper or aluminium faced jaws.

(3) Detach the bellows (501) (If outer bellows is attached, then this bellows may not be attached).

※ Take care not to damage the bellows (501).

(4) Use a spanner applied to both the adjustment nut (312) and disc (302) and loosen and then remove them.

⚠ Items under tension. The return spring (221), plate (151) and push-rod (212) will rise as joint (301) is loosened. Make sure the items do not fly out and damage personnel in the vicinity.

(5) Using the jig, turn the joint (301) counter-clockwise to loosen it.
The right illustration shows the jig attached.


17Z9A7RCV05


17Z9A7RCV06

(6) Remove the plate (151).
- When the return spring (221) is strong


17Z9A7RCV07

- When the return spring (221) is weak


17Z9A7RCV08

⚠ Items under tension. The return spring (221) tension will be released when plug (211) is removed. Make sure the item does not fly out and damage personnel in the vicinity.

(7) When the return spring (221) is weak, the plug (211) is held in the casing (101) by the friction of the O-ring. Remove this using a screwdriver.

※ Use the groove around the plug and take care to apply force evenly to avoid damage.

17Z9A7RCV09

(8) Remove the push-rod (212), plug (211), reduction valve assembly and return spring (221) from the casing (101).

※ The location in relationship with the casing aperture.

17Z9A7RCV10

※ The surface of the spool (201) and the spring seat (216) can be damaged by mis-handling. Take care not to damage the surface of the spool during removal and do not push the spring seat down more than 6 mm.

(9) The reduction valve is disassembled by pressing down the spring seat (216) and flexing the secondary pressure spring (241), sliding the spring seat (216) sideways and removing it from the spool (201) via the larger aperture.

※ Take care not to damage the surface of the spool (201).

17Z9A7RCV11

(10) Take the spool (201), spring seat (216), secondary pressure spring (241) and washer #2 (217) apart.

※ Take care not to damage the surface of the spool (201).

※ Keep these parts together until reassembly.


17Z9A7RCV12

(11) Extract the push-rod (212) from the plug (211).


17Z9A7RCV14

(12) Detach the O-ring (214) and seal (213) from the plug (211). Detach the seal (213) using a small screwdriver.


17Z9A7RCV15


17Z9A7RCV16

(13) CLEANING OF PARTS

① Wash the parts by placing in an initial bath containing paraffin oil (or similar cleaning fluid).

※ To reduce the risk of damage if dirty parts are initially washed in oil. To remove the dirt and oil, soak thoroughly so that dirt and oil float to the surface.

※ Dirty paraffin could result in damage to the parts, and deterioration in performance after reassembly. Ensure the contamination of the paraffin is thoroughly monitored and controlled.

② Place the parts in a finish wash container, rotate this slowly until even the inner areas of the parts are clean (Finish wash).
Wipe of the paraffin oil on the parts using clean cloth.

※ If compressed air is used for drying, dust and moisture in the compressed air may damage the parts and make corrosion more likely.

(14) PREVENTION OF CORROSION OF PARTS
Coat the parts with the anti-corrosion preparation.

※ If the parts are left to stand for some time after cleaning, they may start to corrode and the performance after reassembly will be impaired.

3) ASSEMBLY

※ The surface of the spool (201) and the spring seat (216) can be damaged by mis-handling. Take care not to damage the surface of the spool during assembly and do not push the spring seat down more that 6 mm.

(1) Insert, in this order, the washer #2 (217), secondary spring (241) and spring seat (216) onto the spool (201).

(2) Press down the spring seat (216) to flex the secondary pressure spring (241) while sliding the spring sideways through the larger aperture to attach it to the spool (201).
Fit the return spring (221) into the casing (101).

※ Do not press the spring seat down more than 6mm.

(3) Fit the reduction valve assembly into the casing (101).

※ Fit in the locations noted in step 8 of the disassembly procedure.

(4) Fit the O-ring (214) into the plug (221).


17Z9A7RCV20

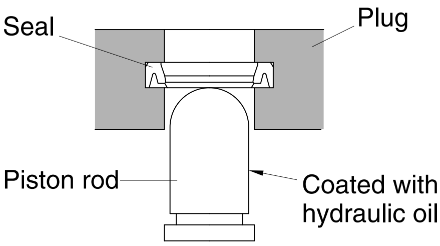
(5) Fit the seal (213) into the plug (211).

※ Fit the lip of the seal (213) as shown right.


17Z9A7RCV21

(6) Fit the push-rod (212) into the plug (211).

※ Apply hydraulic oil to the surface of the push rod.



Push rod, plug & seals

17Z9A7RCV32


17Z9A7RCV22


17Z9A7RCV23

⚠ Items under tension. The plug assembly and plate (151) have to be assembled against spring tension. Make sure the item does not fly out and damage personnel in the vicinity.

※ The surface of the spool (201) and aperture (101) can be damaged by mis-handling. Take care not to damage the surface of either during assembly.


17Z9A7RCV24

(7) Fit the plug assembly into the casing (101). When the return spring (221) is weak, it is held in place by the friction of the O-ring (214).
When the return spring (221) is strong, use the plate (151) to insert all four simultaneously and temporarily secure them with the joint (301).

(8) Attach the plate (151).


17Z9A7RCV25

(9) Tighten the joint (301) to the casing (101) to the specified torque using the special jig.

※ The right figure shows the jig attached. Screw down to a position where the four push rods (212) are in contact equally.


17Z9A7RCV26


17Z9A7RCV27

※ Excessive tightening or wrong positioning of the disc can cause the valve to malfunction.

(10) Attach the disc (302) onto the joint (301).

17Z9A7RCV28

(11) Install the adjustment nut (312), tighten up the discs (302) with a spanner on both and tighten the adjustment nut to the specified torque.

※ Do not allow the position of the disc (302) to shift during tightening.

17Z9A7RCV29

(12) Apply grease to the rotating part of the joint (301) and end of the push-rod (212).

17Z9A7RCV30

(13) Attach the bellows (501).
If outer bellows is attached, then this bellows may not be attached.

※ Take care not to tear the bellows.

(14) Fit the handle assembly into the valve.

(15) Spray anti-corrosion preparation into each port and insert blind plugs.

17Z9A7RCV29

GROUP 8 TURNING JOINT

1. REMOVAL AND INSTALL

1) REMOVAL

(1) Lower the work equipment to the ground and stop the engine.

(2) Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping.

(3) Loosen the breather slowly to release the pressure inside the hydraulic tank.

⚠ Escaping fluid under pressure can penetrate the skin causing serious injury.

※ When pipes and hoses are disconnected, the oil inside the piping will flow out, so catch it in oil pan.

(4) Disconnect all hoses (8, 9, 10, 11, 12, 16, 17, 18, 20, 26).

(5) Sling the turning joint assembly (1) and remove the mounting bolt (2).

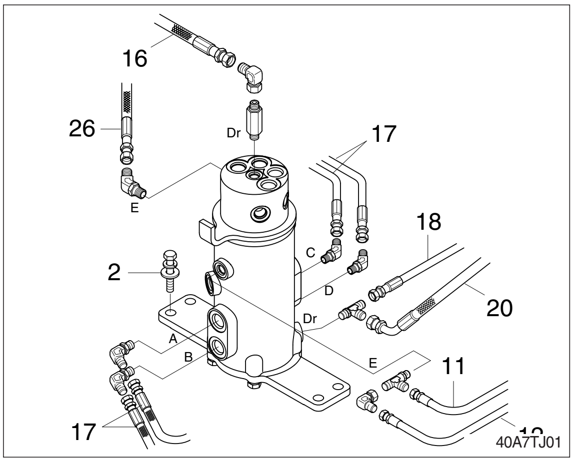
· Weight : 26 kg (57 lb)

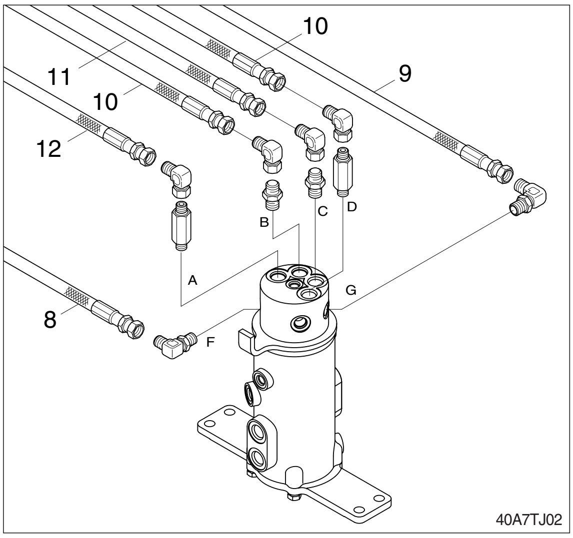
· Tightening torque : 6.9 ± 1.4 kgf · m (49.9 ± 10.1 lbf · ft)

Remove the turning joint assembly.

(6) When removing the turning joint, check

※ that all the hoses have been disconnected.





2) INSTALL

(1) Carry out installation in the reverse order to removal.

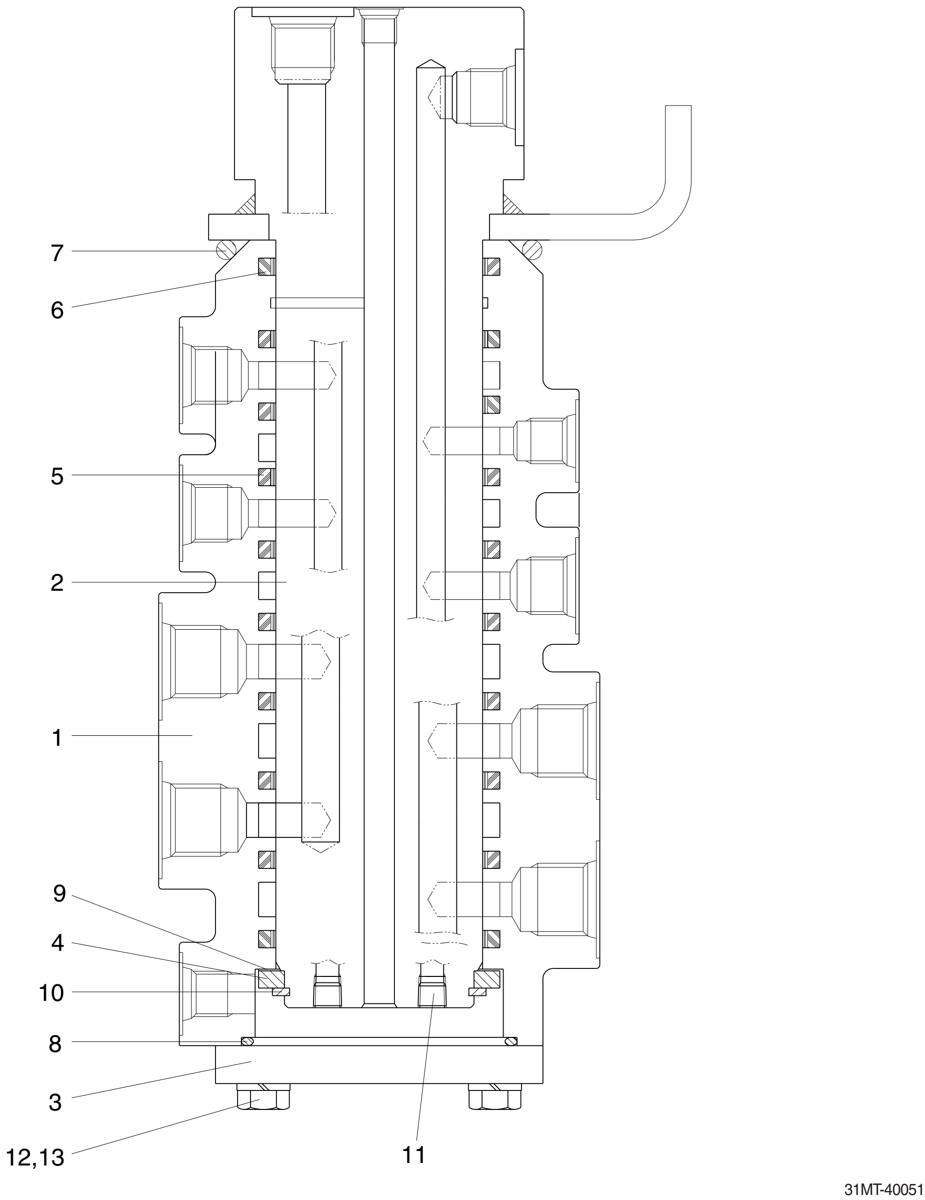
※ Take care of turning joint direction.

※ Assemble hoses to their original positions.

※ Confirm the hydraulic oil level and check the hydraulic oil leak or not.

2. DISASSEMBLY AND ASSEMBLY

1) STRUCTURE

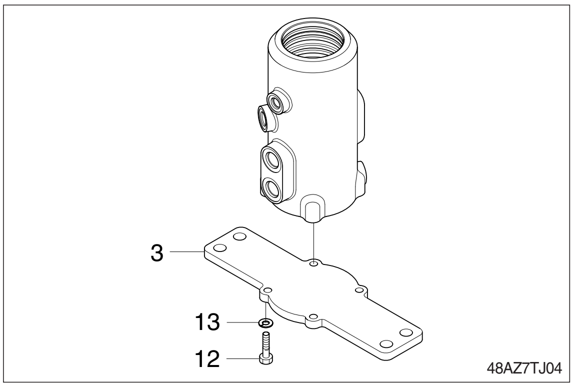


1	Hub	6	O-ring	11	Plug
2	Shaft	7	O-ring	12	Hexagon bolt
3	Cover	8	O-ring	13	Spring washer
4	Ring	9	Shim		
5	Slipper seal	10	Retainer ring		

2) DISASSEMBLY

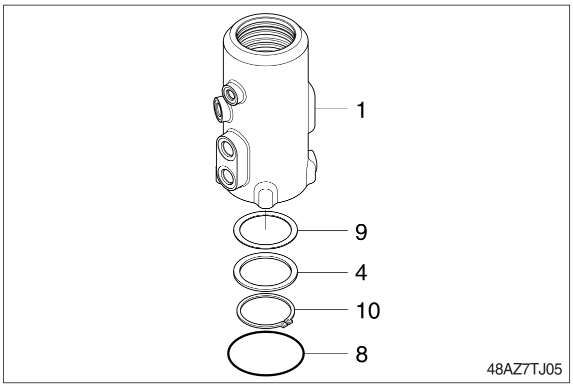
※ Before the disassembly, clean the turning joint.

(1) Remove bolts (12), washer (13) and cover (3).



(2) Remove O-ring (8).

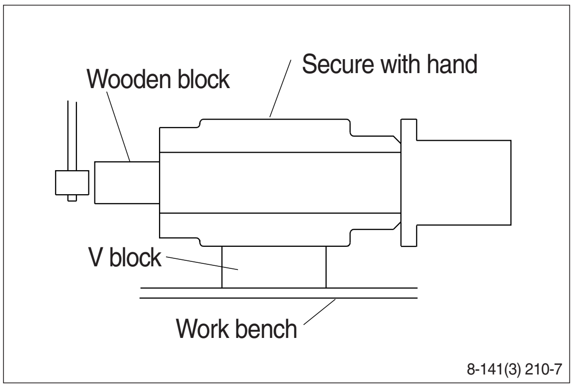
(3) Remove retainer ring (10), ring (4) and shim (9).



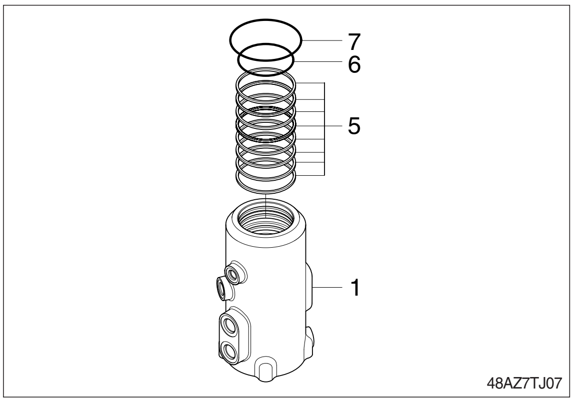
(4) Place hub (1) on a V-block and by using a wood buffer at the shaft end, hit out shaft (2) to about 1/2 from the body with a hammer.

※ Take care not to damage the shaft (2) when remove hub (1) or rest it sideway.

※ Put a fitting mark on hub (1) and shaft (2).



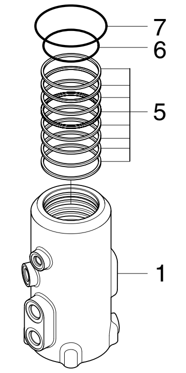
(5) Remove eight slipper seals (5) and O-ring (6, 7) from hub (1).



3) ASSEMBLY

※ Clean all parts.
※ As a general rule, replace oil seals and O-ring.
※ Coat the sliding surfaces of all parts with engine oil or grease before installing.

(1) Fix eight slipper seal (5) and O-ring (6, 7) to hub (1).



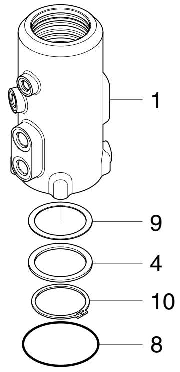
48AZ7TJ07

(2) Set hub (1) on block, install shaft (2) into hub (1) by hand.

48AZ7TJ08

(3) Fit ring (4), shim (9) and retainer ring (10) to shaft (2).

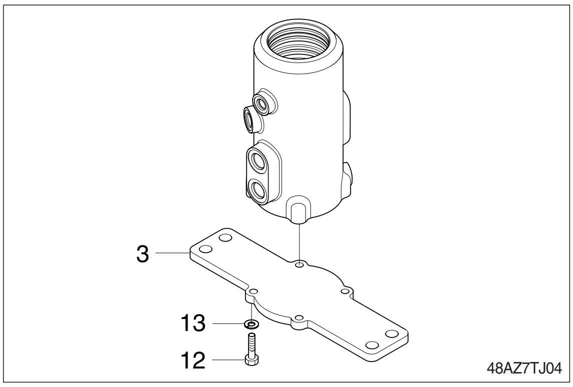
(4) Fit O-ring (8) to hub (1).



48AZ7TJ05

(5) Install cover (3) to hub and tighten bolts (12).

· Tightening torque : 5~6 kgf·m (36.2~43.4 lbf·ft)



GROUP 9 BOOM, ARM AND BUCKET CYLINDERS

1. REMOVAL AND INSTALL

1) BUCKET CYLINDER

(1) Removal

※ Expand the arm and bucket fully, lower the work equipment to the ground and stop the engine.

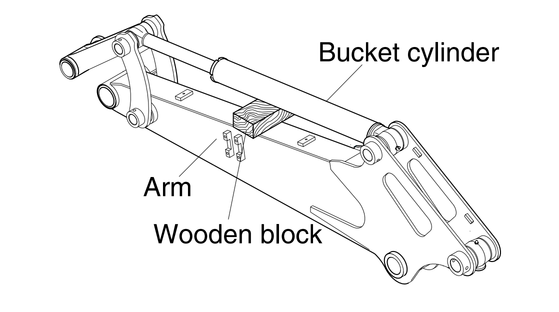
※ Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping.

13031GE18

⚠ Loosen the breather slowly to release the pressure inside the hydraulic tank. Escaping fluid under pressure can penetrate the skin causing serious injury.

※ Fit blind plugs in the hoses after disconnecting them, to prevent dirt or dust from entering.

① Set block between bucket cylinder and arm.

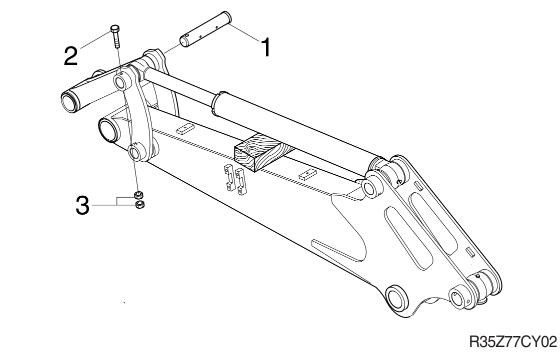


R35Z77CY03

② Remove bolt (2), nut (3) and pull out pin (1).

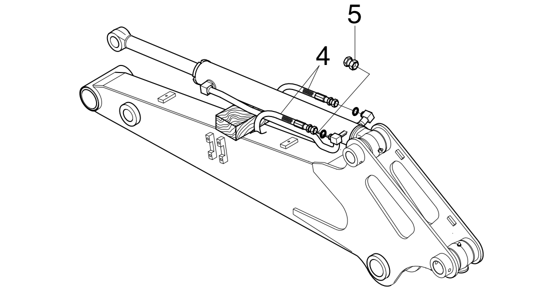
· Tightening torque : 12.8±3.0 kgf·m (92.6±21.7 lbf·ft)

※ Tie the rod with wire to prevent it from coming out.



R35Z77CY02

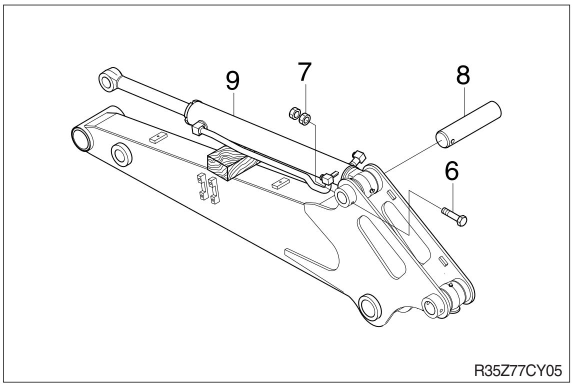
③ Disconnect bucket cylinder hoses (4) and put plugs (5) on cylinder pipe.



R35Z77CY04

④ Sling bucket cylinder assembly (9) and remove bolt (6) and nut (7) then pull out pin (8).
· Tightening torque : 12.8±3.0 kgf·m (92.6±21.7 lbf·ft)

⑤ Remove bucket cylinder assembly (9).
· Weight : 24 kg (53 lb)



(2) Install

① Carry out installation in the reverse order to removal.

⚠ **When aligning the mounting position of the pin, do not insert your fingers in the pin hole.**

※ Bleed the air from the bucket cylinder.

※ Confirm the hydraulic oil level and check the hydraulic oil leak or not.

2) ARM CYLINDER

(1) Removal

※ Expand the arm and bucket fully, lower the work equipment to the ground and stop the engine.

※ Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping.

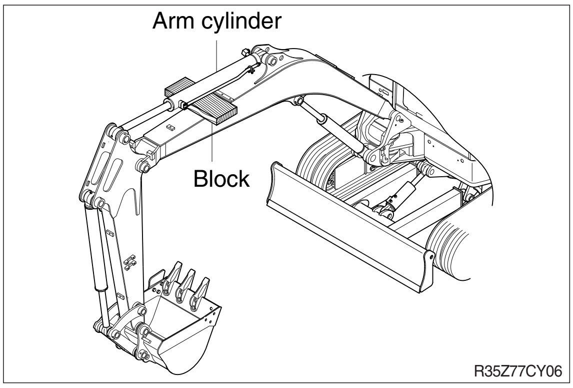
13031GE18

⚠ Loosen the breather slowly to release the pressure inside the hydraulic tank.

⚠ Escaping fluid under pressure can penetrate the skin causing serious injury.

※ Fit blind plugs in the hoses after disconnecting them, to prevent dirt or dust from entering.

① Set block between arm cylinder and boom.

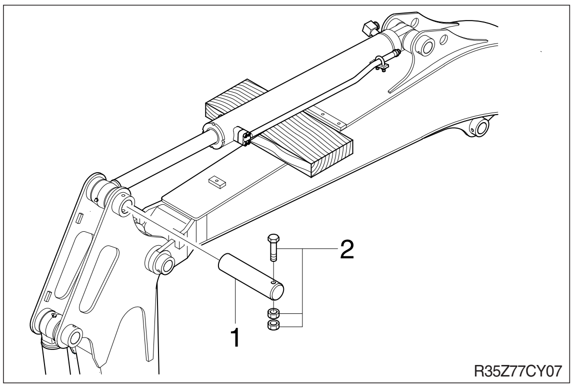


R35Z77CY06

② Remove bolt and nut (2) and pull out pin (1).

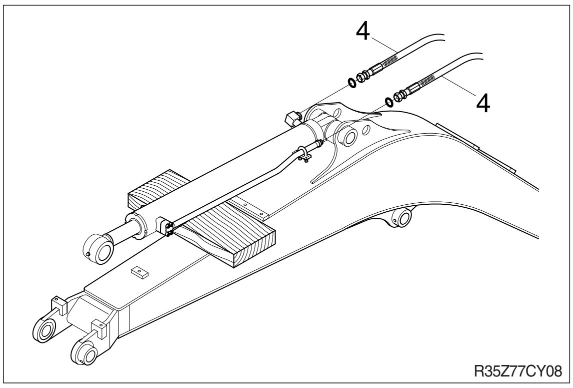
· Tightening torque : 12.8±3.0 kgf·m (92.6±21.7 lbf·ft)

※ Tie the rod with wire to prevent it from coming out.



R35Z77CY07

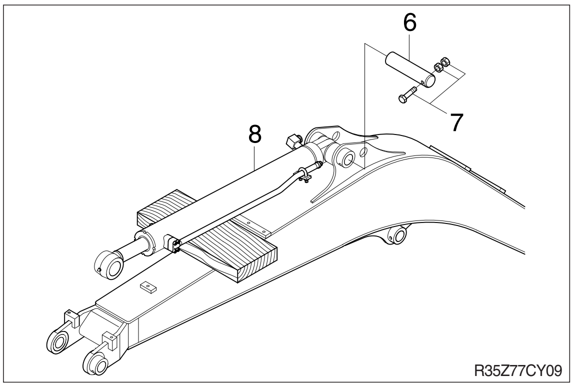
③ Disconnect arm cylinder hoses (4) and put plugs on cylinder pipe.



R35Z77CY08

⑤ Sling arm assembly (8) and remove bolt and nut (7) then pull out pin (6).
  · Tightening torque : 12.8±3.0 kgf·m
    (92.6±21.7 lbf·ft)

⑥ Remove arm cylinder assembly (8).
  · Weight : 45 kg (99 lb)



(2) Install

① Carry out installation in the reverse order to removal.

⚠ **When aligning the mounting position of the pin, do not insert your fingers in the pin hole.**

※ Bleed the air from the arm cylinder.

※ Confirm the hydraulic oil level and check the hydraulic oil leak or not.

3) BOOM CYLINDER

(1) Removal

※ Expand the arm and bucket fully, lower the work equipment to the ground and stop the engine.

※ Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping.

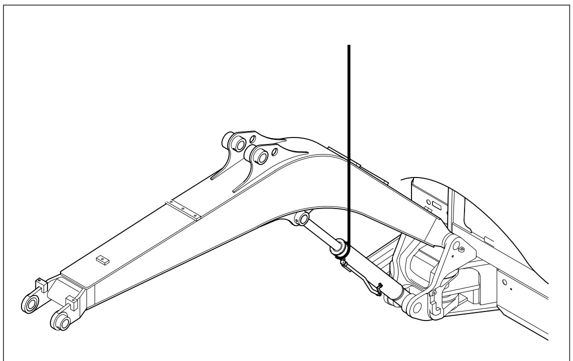
13031GE18

⚠ Loosen the breather slowly to release the pressure inside the hydraulic tank.

⚠ Escaping fluid under pressure can penetrate the skin causing serious injury.

※ Fit blind plugs in the hoses after disconnecting them, to prevent dirt or dust from entering.

① Sling boom cylinder assembly.

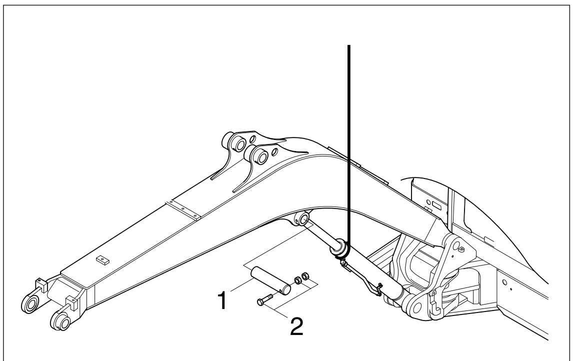


R35Z77CY10

③ Remove bolt and nut (2) and pull out pin (1).

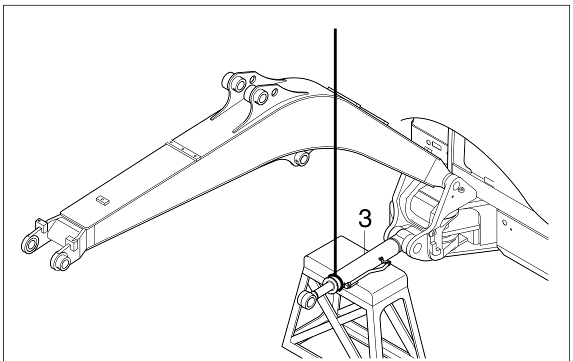
· Tightening torque : 12.8±3.0 kgf·m (92.6±21.7 lbf·ft)

※ Tie the rod with wire to prevent it from coming out.



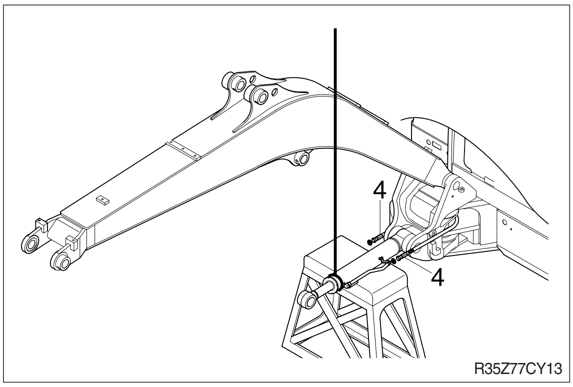
R35Z77CY11

④ Lower the boom cylinder assembly (3) on a stand.



R35Z77CY12

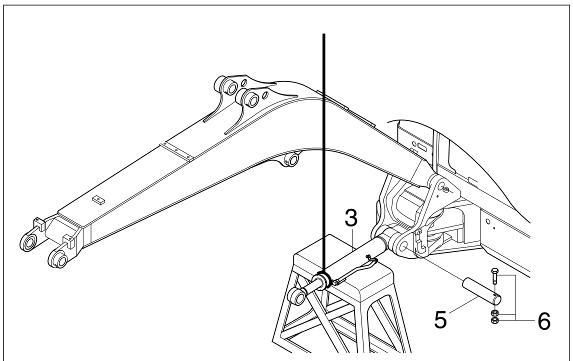
⑤ Disconnect boom cylinder hoses(4) and put plugs on cylinder pipe.



R35Z77CY13

⑥ Remove bolt (6) and pull out pin (5).
· Tightening torque : 6.9±1.4 kgf·m (49.9±10.1 lbf·ft)

⑦ Remove boom cylinder assembly (3).
· Weight : 52 kg (115 lb)



R35Z77CY14

(2) Install

① Carry out installation in the reverse order to removal.

⚠ **When aligning the mounting position of the pin, do not insert your fingers in the pin hole.**

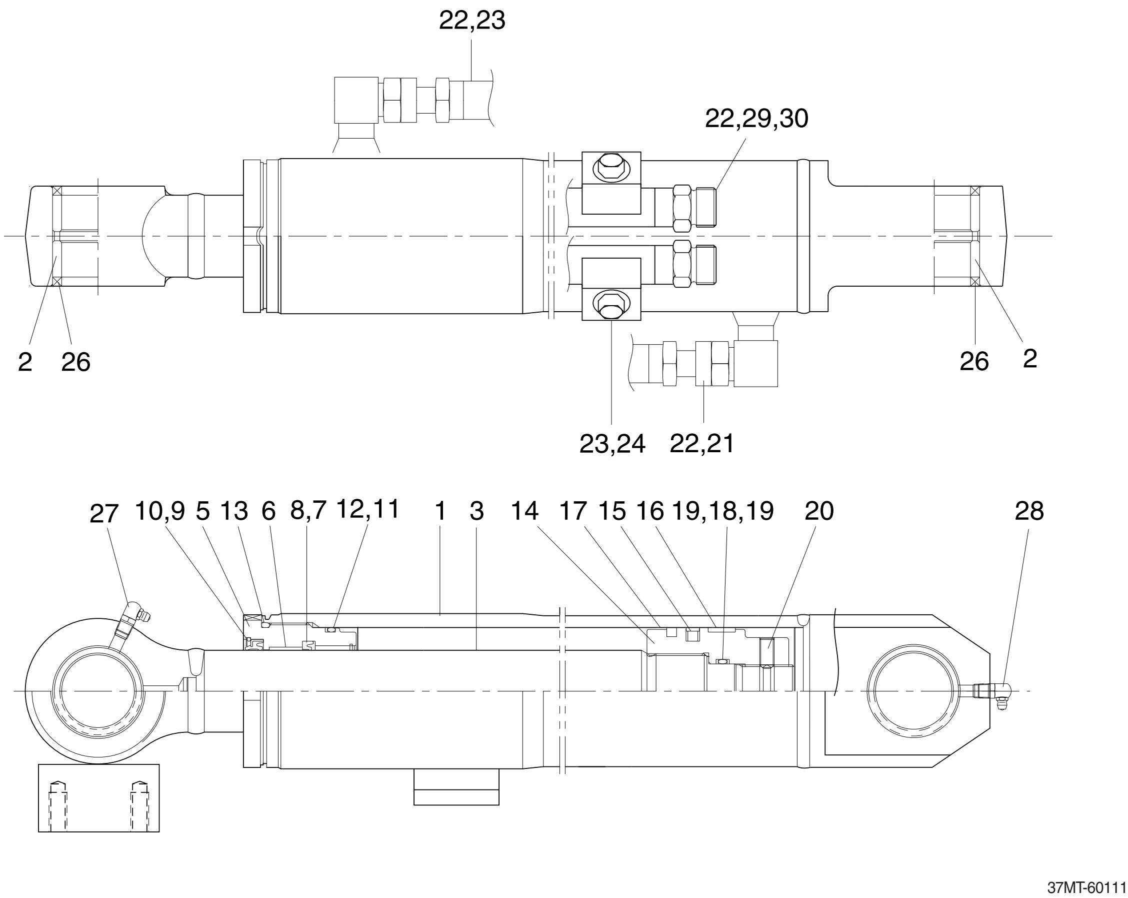
※ Bleed the air from the boom cylinder.

※ Conformed the hydraulic oil level and check the hydraulic oil leak or not.

2. DISASSEMBLY AND ASSEMBLY

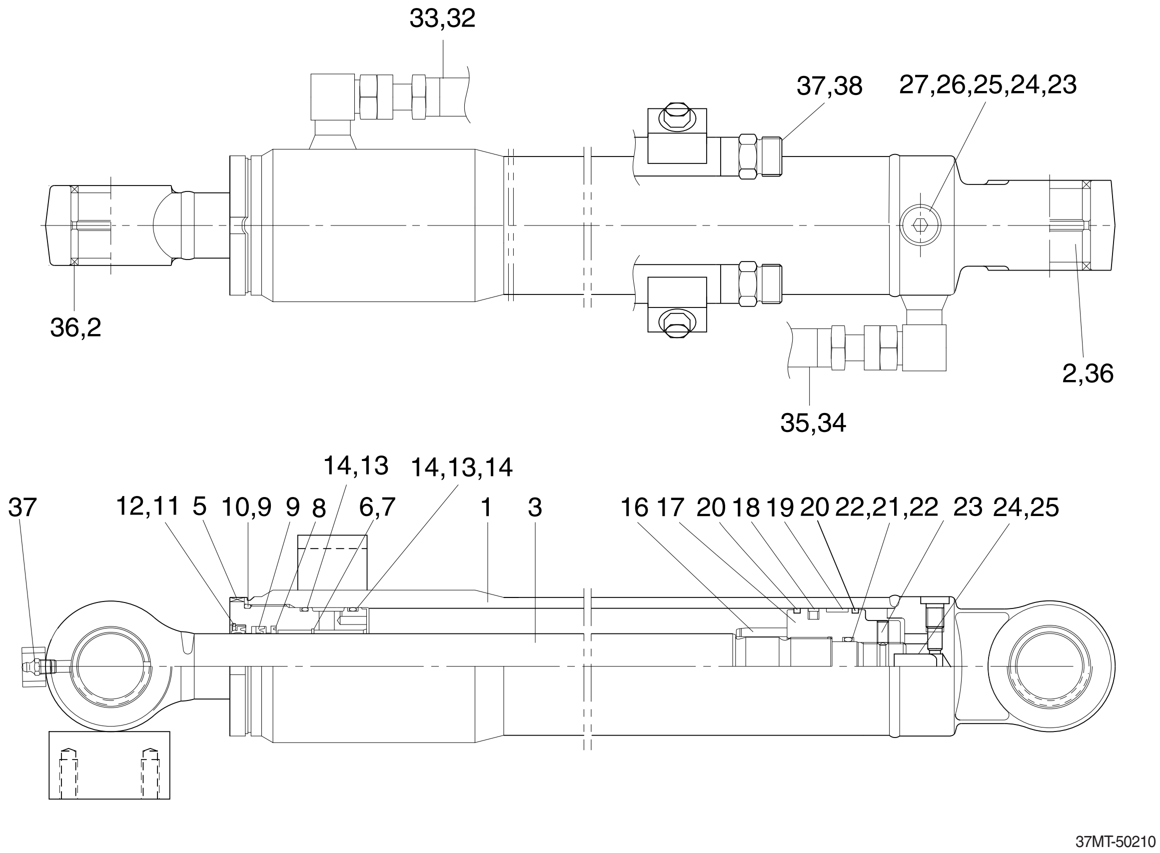
1) STRUCTURE

(1) Bucket cylinder



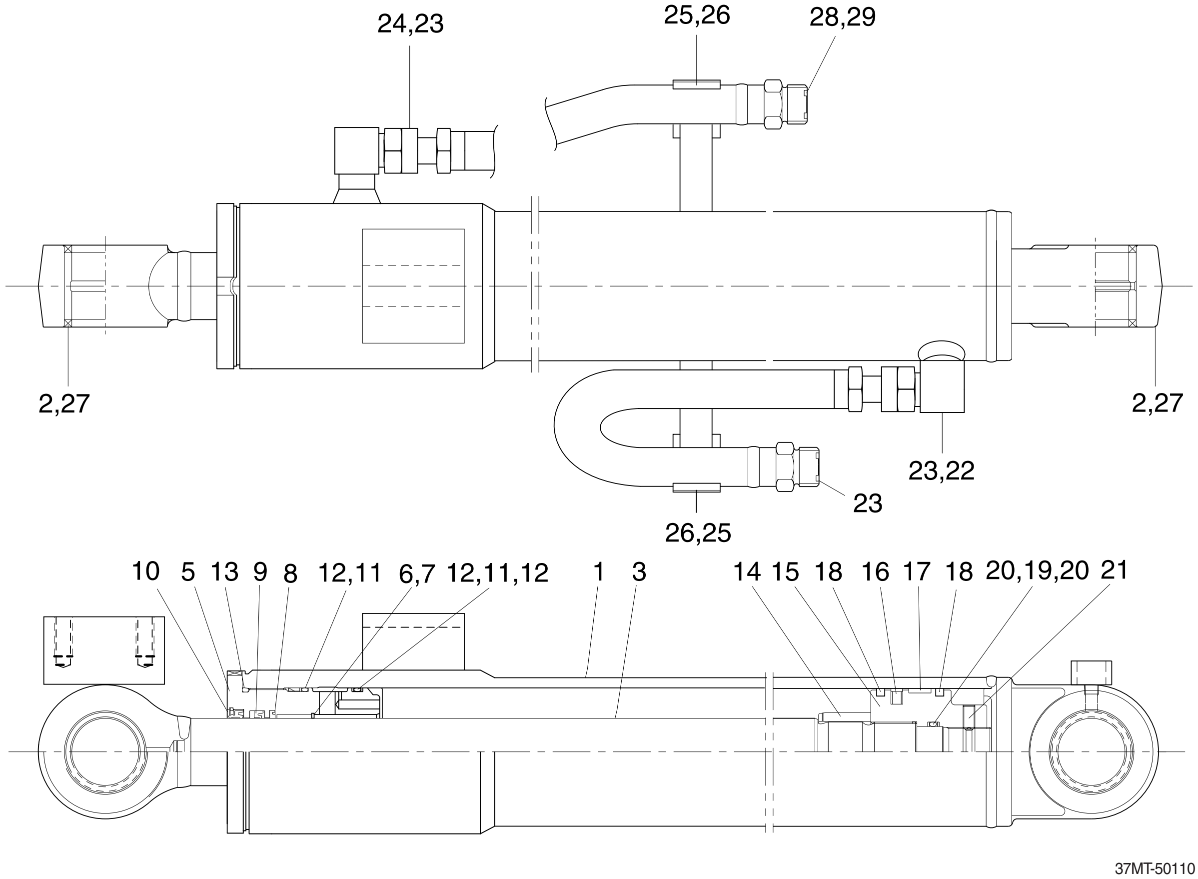
1	Tube assembly	12	Back up ring	22	O-ring
2	Pin bushing	13	O-ring	23	Pipe assy
3	Rod assembly	14	Piston	24	Washer
5	Rod cover	15	Piston seal	25	Hex bolt
6	Rod bushing	16	Wear ring	26	Pin wiper
7	U-packing	17	Dust ring	27	Grease nipple
8	Back up ring	18	O-ring	28	Grease nipple
9	Dust wiper	19	Back up ring	29	O-ring
10	Retainer ring	20	Set screw	30	Dust cap
11	O-ring	21	Pipe assy		

(2) Arm cylinder



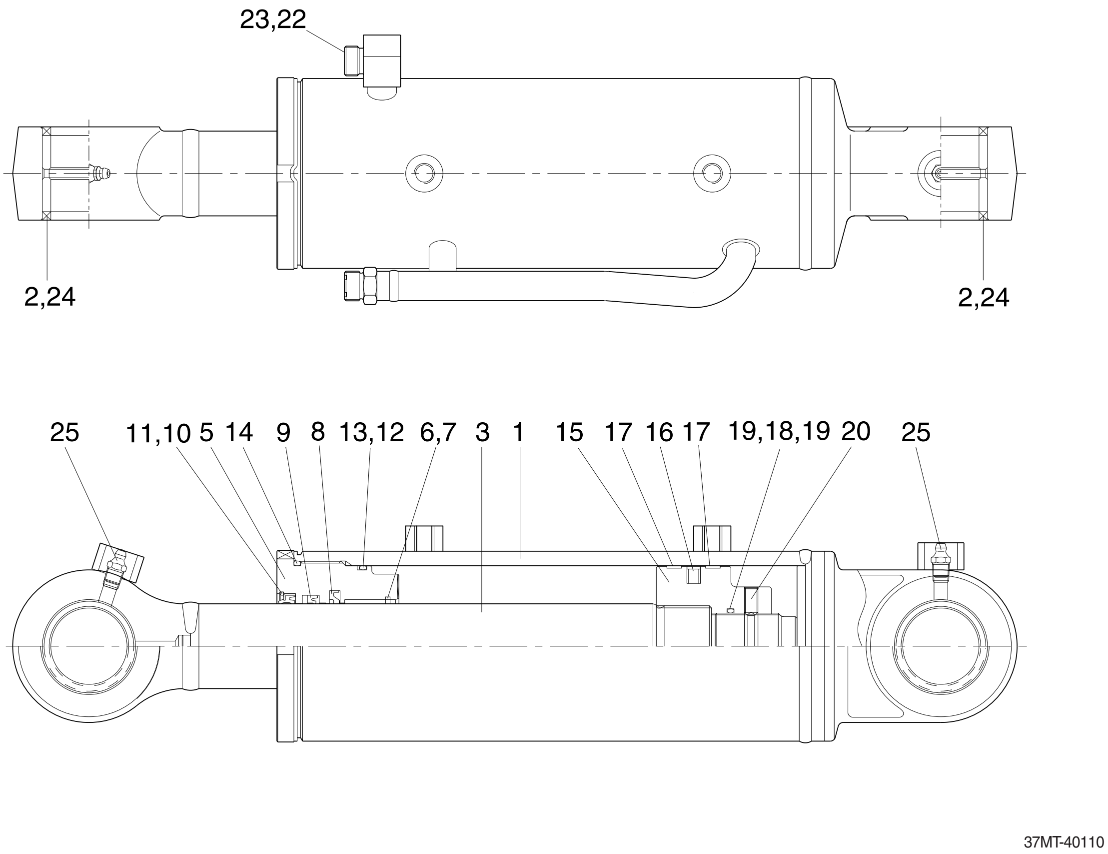
1	Tube assembly	15	O-ring	28	Support ring
2	Pin bushing	16	Cushion ring	29	O-ring
3	Rod assembly	17	Piston	30	Plug
5	Rod cover	18	Piston seal	31	Pipe assy
6	Rod bushing	19	Wear ring	32	O-ring
7	Retainer ring	20	Dust ring	33	Pipe assy
8	Buffer ring	21	O-ring	34	Washer
9	U-packing	22	Back up ring	35	Hex bolt
10	Back up ring	23	Set screw	36	Dust wiper
11	Wiper ring	24	Cushion plunger	37	O-ring
12	Retainer ring	25	Stop ring	38	Dust cap
13	O-ring	26	Check valve		
14	Back up ring	27	Spring		

(3) Boom cylinder



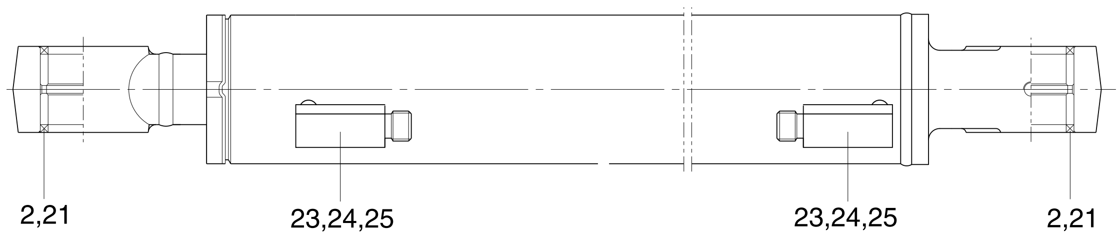
1	Tube assembly	12	Back up ring	21	Set screw
2	Pin bushing	13	O-ring	22	Pipe assy
3	Rod assembly	14	Cushion ring	23	O-ring
5	Rod cover	15	Piston	24	Pipe assy
6	Rod bushing	16	Piston seal	25	Washer
7	Retainer ring	17	Wear ring	26	Hex bolt
8	Buffer seal	18	Dust ring	27	Dust wiper
9	U-packing	19	O-ring	28	O-ring
10	Wiper ring	20	Back up ring	29	Dust cap
11	O-ring				

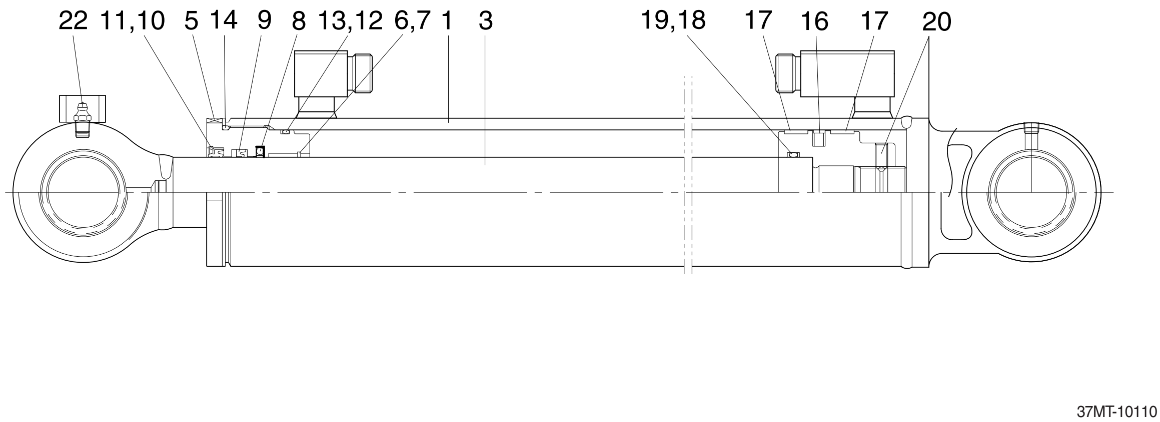
(4) Dozer cylinder



1	Tube assembly	10	Dust seal	18	O-ring
2	Pin bushing	11	Retainer ring	19	Back up ring
3	Rod assembly	12	O-ring	20	Set screw
5	Rod cover	13	Back up ring	21	O-ring
6	Rod bushing	14	O-ring	22	Dust cap
7	Retainer ring	15	Piston	23	O-ring
8	Buffer seal	16	Piston seal	24	Dust wiper
9	U-packing	17	Wear ring	25	Grease nipple

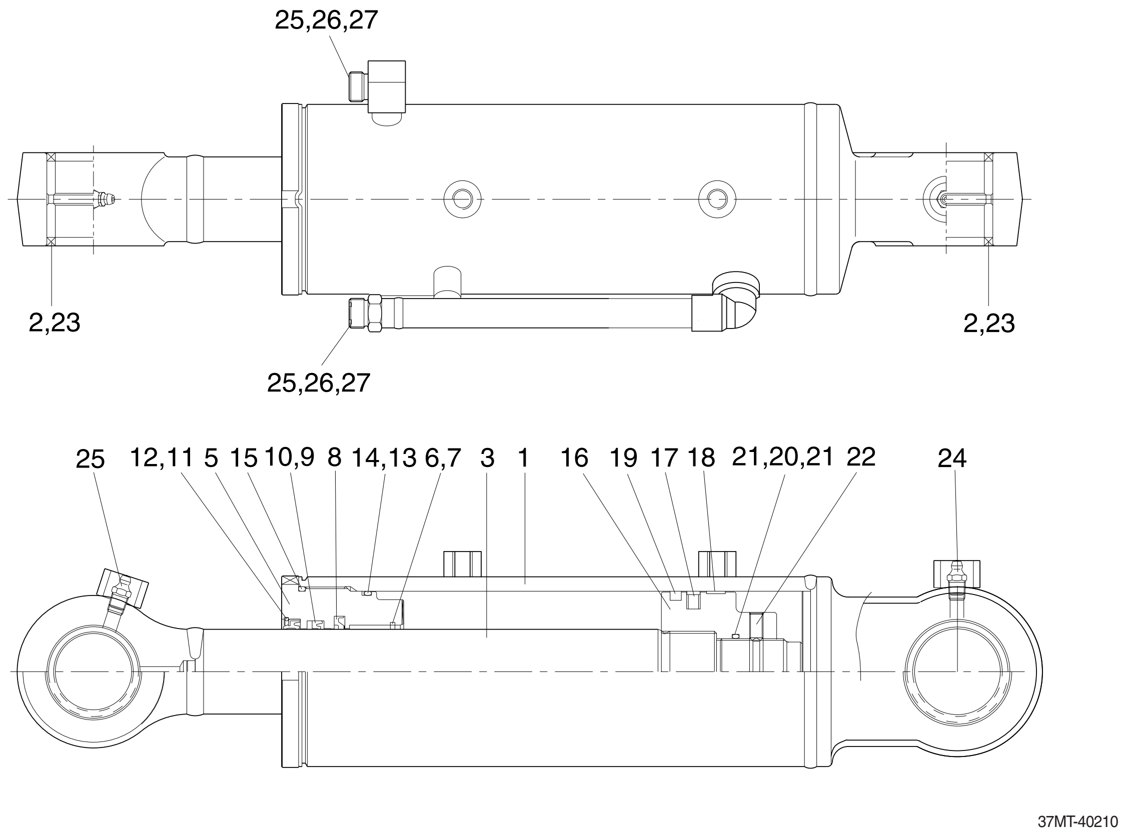
(5) Boom swing cylinder





1	Tube assembly	10	Wiper ring	18	O-ring
2	Dimple bushing	11	Retainer ring	19	Back up ring
3	Rod assembly	12	O-ring	20	Set screw
5	Rod cover	13	Back up ring	21	Dust wiper
6	Rod bushing	14	O-ring	22	Grease nipple
7	Retainer ring	15	Piston	23	Dust cap
8	Buffer ring	16	Piston seal	24	O-ring
9	U-packing	17	Wear ring	25	O-ring

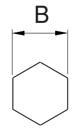
(6) Angle dozer cylinder



1	Tube assembly	11	Dust seal	20	O-ring
2	Pin bushing	12	Retainer ring	21	Back up ring
3	Rod assembly	13	O-ring	22	Set screw
5	Rod cover	14	Back up ring	23	Dust wiper
6	Pin bushing	15	O-ring	24	Grease nipple
7	Retainer ring	16	Piston	25	Dust cap
8	Buffer seal	17	Piston seal	26	O-ring
9	U-packing	18	Wear ring	27	O-ring
10	Back up ring	19	Dust ring		

2) TOOLS AND TIGHTENING TORQUE

(1) Tools

Tool name	Remark	
Allen wrench	8	
	3	
Spanner	22	
Hook spanner	Suitable size (80~120 mm)	
(-) Driver	Small and large sizes	
Torque wrench	Capable of tightening with the specified torques	

(2) Tightening torque

Part name		Item	Size	Torque	
				kgf · m	lbf · ft
Gland	Boom cylinder	5	M95	75±7.5	542±54.2
	Arm cylinder	5	M90	75±7.5	542±54.2
	Bucket cylinder	5	M85	75±7.5	542±54.2
	Dozer cylinder	5	M100	70±7.0	506±50.6
	Boom swing cylinder	5	M85	70±7.0	506±50.6
	Angle dozer cylinder	5	M105	75±7.5	542±54.2
Piston	Boom cylinder	15	M42	120±12	868±86.8
	Arm cylinder	17	M42	120±12	868±86.8
	Bucket cylinder	14	M38	80±8.0	579±57.9
	Dozer cylinder	15	M48	75±7.5	542±54.2
	Boom swing cylinder	15	M48	160±16	1157±116
	Angle dozer cylinder	16	M52	180±18	1302±130
Set screw	Boom cylinder	21	M12	5.0	362
	Arm cylinder	23	M12	5.0	362
	Bucket cylinder	20	M10	3~3.5	21.7~25.3
	Dozer cylinder	20	M12	4~5	28.9~36.2
	Boom swing cylinder	20	M12	5.0	36.2
	Angle dozer cylinder	22	M12	5.0	36.2

3) DISASSEMBLY

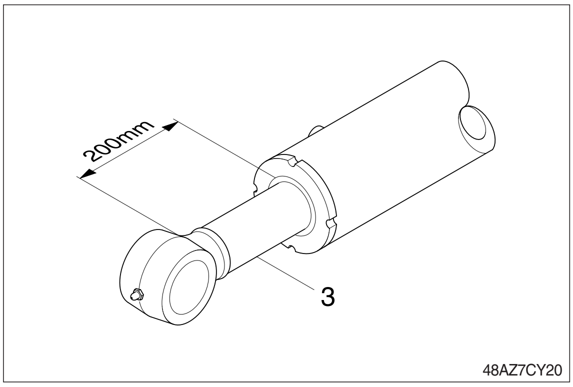
※ Procedures are based on the boom cylinder.

(1) Remove cylinder head and piston rod

① Hold the clevis section of the tube in a vise.

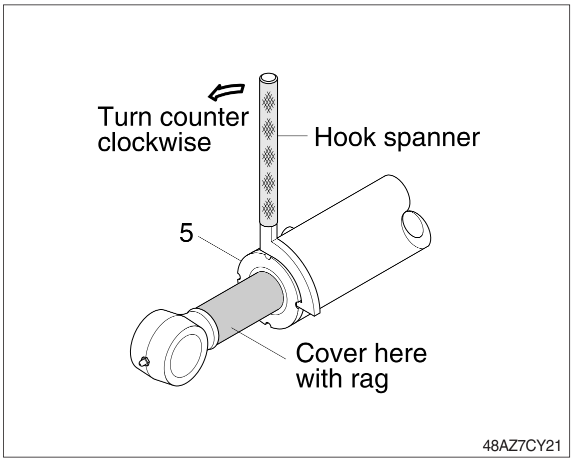
※ Use mouth pieces so as not to damage the machined surface of the cylinder tube. Do not make use of the outside piping as a locking means.

② Pull out rod assembly (3) about 200 mm (7.1 in). Because the rod assembly is rather heavy, finish extending it with air pressure after the oil draining operation.



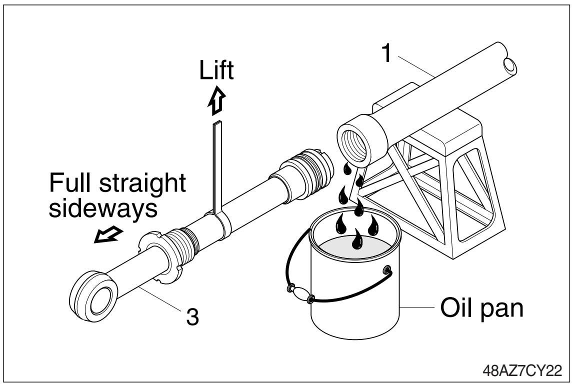
③ Loosen and remove the rod cover (5) by hook spanner.

※ Cover the extracted rod assembly (3) with rag to prevent it from being accidentally damaged during operation.



④ Draw out cylinder head and rod assembly together from tube assembly (1).

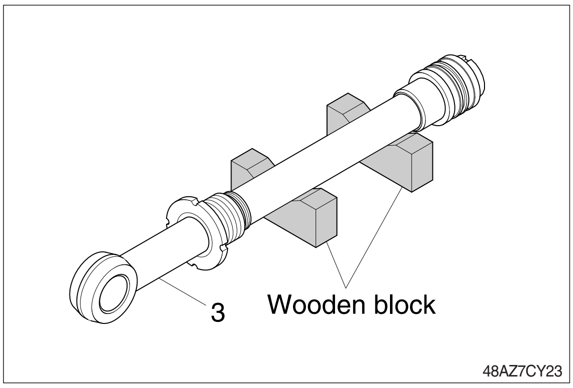
※ Since the rod assembly is heavy in this case, lift the tip of the rod assembly (3) with a crane or some means and draw it out. However, when rod assembly (3) has been drawn out to approximately two thirds of its length, lift it in its center to draw it completely.



Note that the plated surface of rod assembly (3) is to be lifted. For this reason, do not use a wire sling and others that may damage it, but use a strong cloth belt or a rope.

⑤ Place the removed rod assembly on a wooden V-block that is set level.

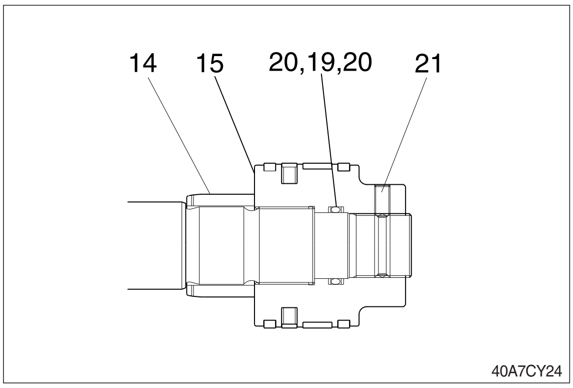
※ Cover a V-block with soft rag.



(2) Remove piston and rod cover

① Remove set screw (21)

② Remove piston assembly (15), back up ring (20), O-ring (19) and cushion ring (14).

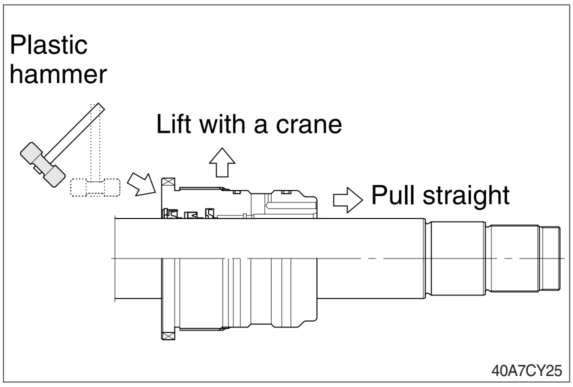


③ Remove the rod cover assembly from rod assembly (3).

※ If it is too heavy to move, move it by striking the flanged part of rod cover with a plastic hammer.

※ Pull it straight with rod cover assembly lifted with a crane.

Exercise care so as not to damage the lip of rod bushing (6) and packing (8, 9, 10) by the threads of rod assembly (2).

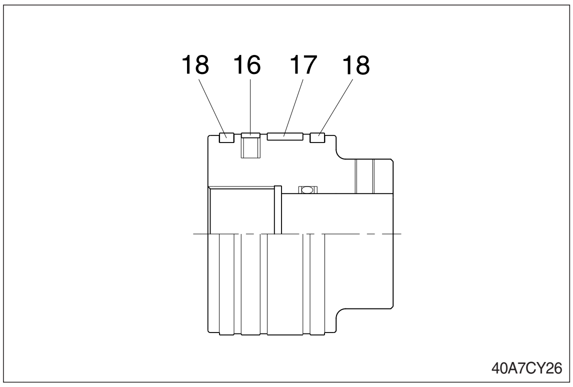


(3) Disassemble the piston assembly

① Remove wear ring (17) and dust ring (18).

② Remove piston seal (16).

※ Exercise care in this operation not to damage the grooves.



(4) Disassemble rod cover assembly

① Remove back up ring (12) and O-ring (11).

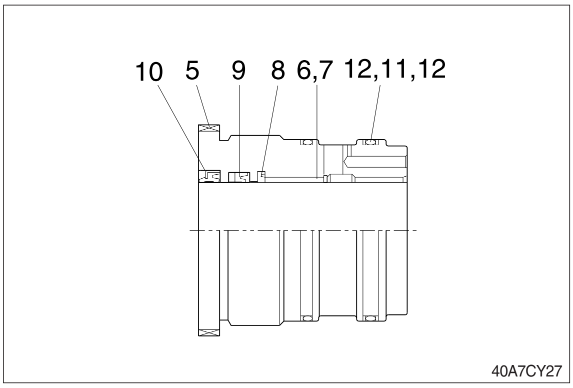
② Remove wiper ring (10)

③ Remove U-packing (9).

④ Remove back up ring (7) and rod bushing (6).

※ Exercise care in this operation not to damage the grooves.

※ Do not remove seal and ring, if does not damaged.

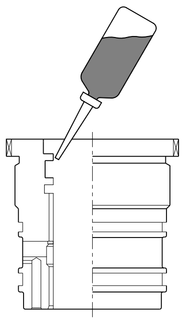


4) ASSEMBLY

(1) Assemble cylinder head assembly

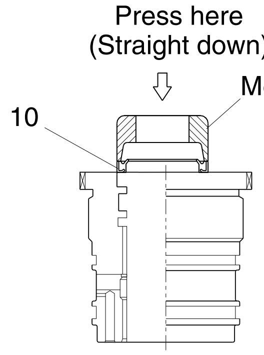
※ Check for scratches or rough surfaces if found smooth with an oil stone.

① Coat the inner face of rod cover (5) with hydraulic oil.



40A7CY28

② Coat dust seal (10) with grease and fit wiper ring (10) to the bottom of the hole of wiper ring.
At this time, press a pad metal to the metal ring of wiper ring (10).

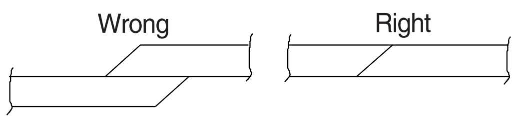


40A7CY29

③ Fit U-packing (9) to the groove..

※ Coat each packing with hydraulic oil before fitting it.

※ Insert the backup ring until one side of it is inserted into groove.



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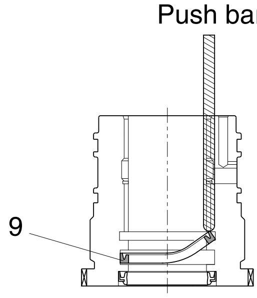
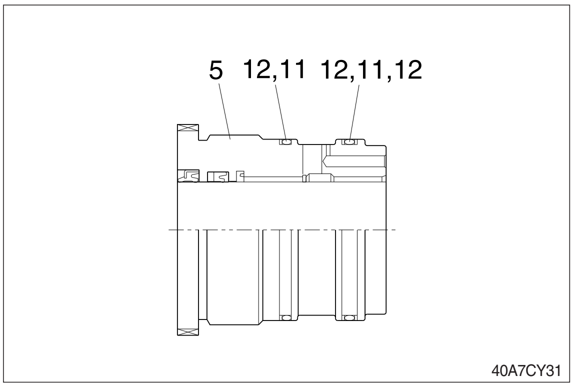
※ U-packing (9) has its own fitting direction. Therefore, confirm it before fitting them.

※ Fitting U-packing (9) upside down may damage its lip. Therefore check the correct direction that is shown in fig.



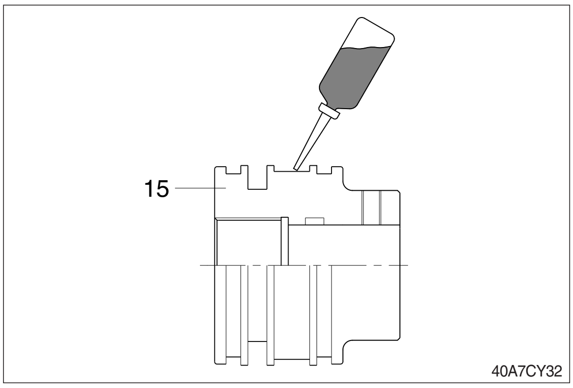
40A7CY30

④ Fit back up ring (12) to rod cover (5).
※ Put the backup ring in the warm water of 30~50°C .
⑤ Fit O-ring (11) to rod cover (5).

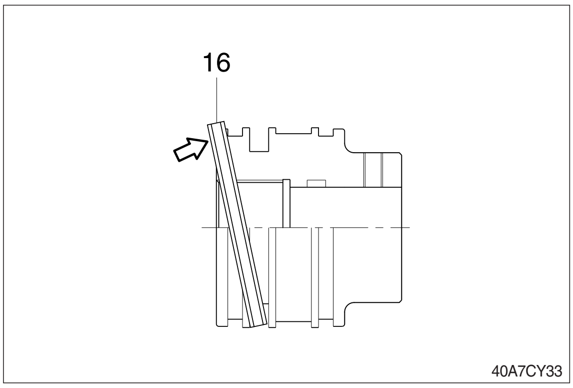


(2) Assemble piston assembly

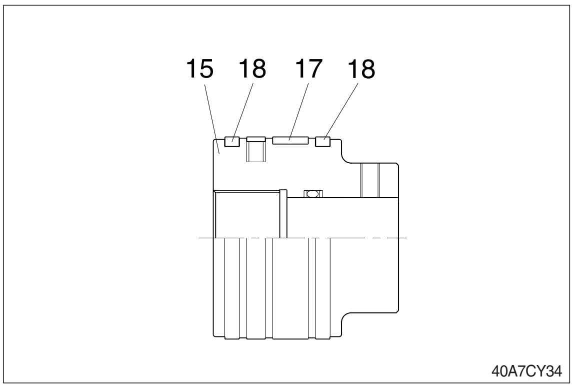
※ Check for scratches or rough surfaces. If found smooth with an oil stone.
① Coat the outer face of piston (15) with hydraulic oil.



② Fit piston seal (16) to piston.
※ Put the piston seal in the warm water of 60~100°C for more than 5 minutes.
※ After assembling the piston seal, press its outer diameter to fit in.



③ Fit wear ring (17) and dust ring (18) to piston (15).

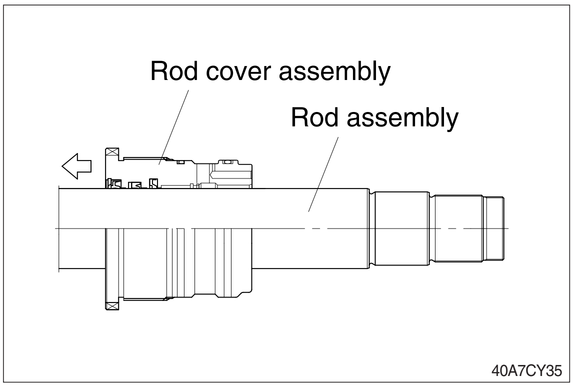


(3) Install piston and cylinder head

① Fix the rod assembly to the work bench.

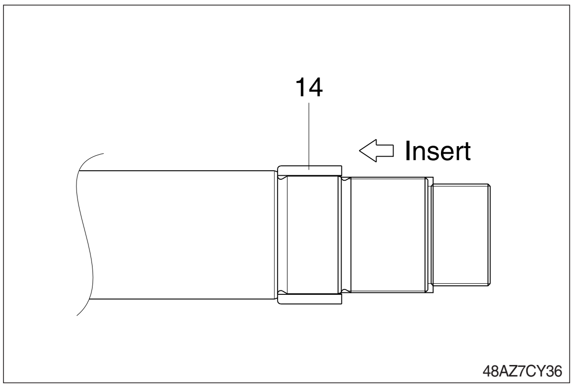
② Apply hydraulic oil to the outer surface of rod assembly (3), the inner surface of piston and gland.

③ Insert rod cover assembly to rod assembly.



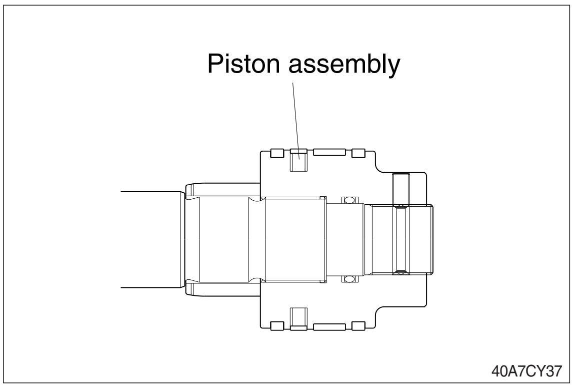
④ Insert cushion ring (14) to rod assembly.

※ Note that cushion ring (14) has a direction in which it should be fitted.



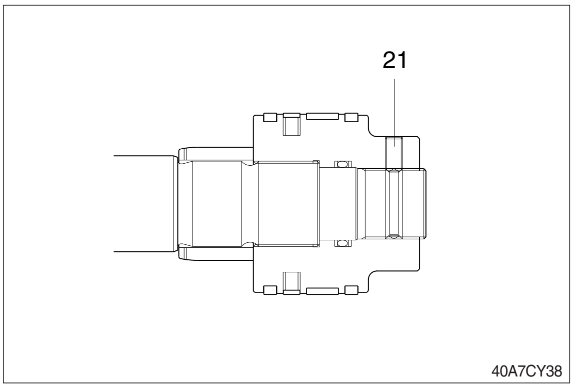
⑤ Fit piston assembly to rod assembly.

※ Tightening torque : refer to page 7-119



⑥ Tighten set screw (21).

· Tightening torque : refer to page 7-119

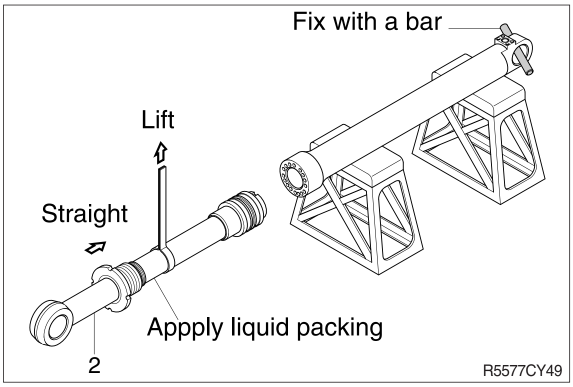


(3) Overall assemble

① Place a V-block on a rigid work bench. Mount the tube assembly (1) on it and fix the assembly by passing a bar through the clevis pin hole to lock the assembly.

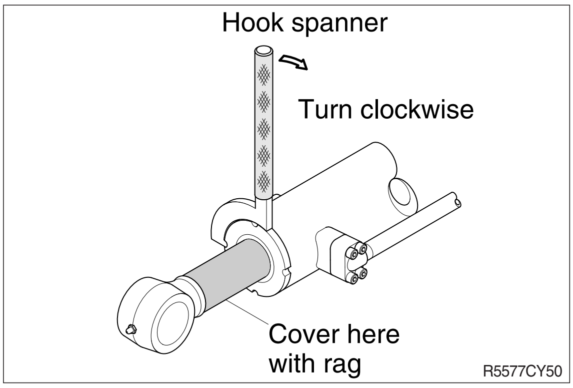
② Insert the rod assembly in to the tube assembly, while lifting and moving the rod assembly with a crane.

※ Be careful not to damage piston seal by thread of tube assembly.



③ Match the bolt holes in the cylinder head flange to the tapped holes in the tube assembly and tighten socket bolts to a specified torque.

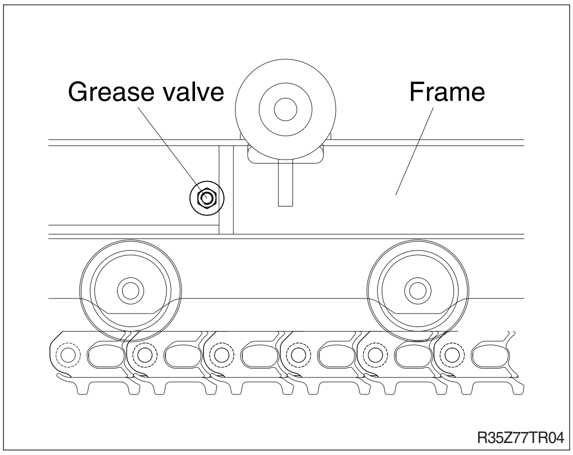
※ Refer to the table of tightening torque.



1. RUBBER TRACK

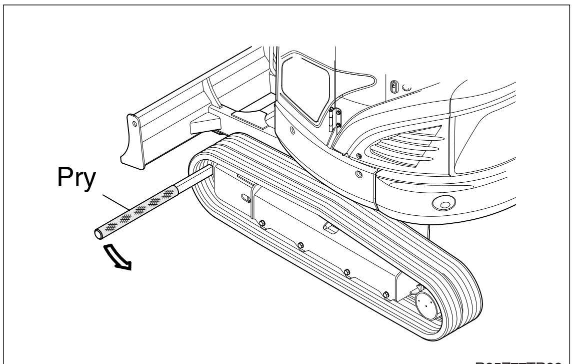
1) REMOVAL

(1) Loosen tension of the rubber track.
※ If track tension is not relieved when the grease valve is loosened, move the machine backwards and forwards.



R35Z77TR04

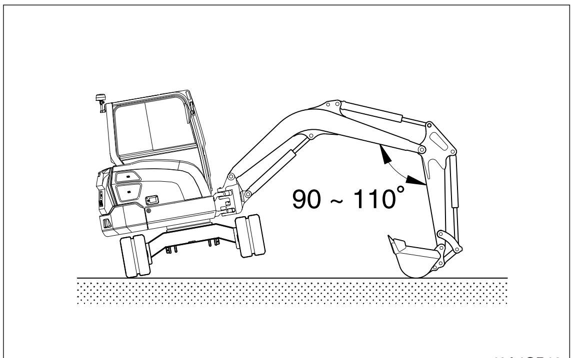
(2) Remove the rubber track from lower frame using pry.



R35Z77TR22

2) INSTALL

(1) Carry out installation in the reverse order to removal.
※ Adjust the tension of the rubber track.



40A4OP19

2. TRACK LINK

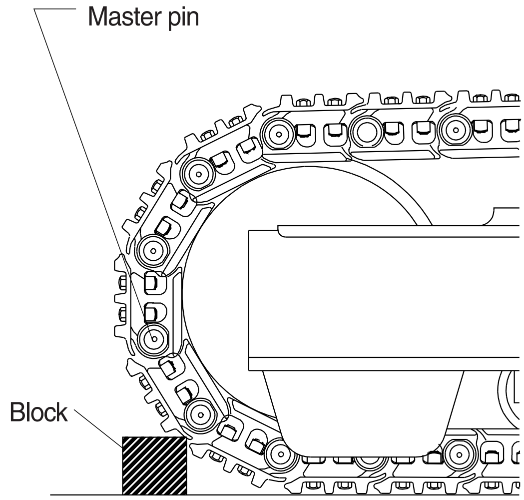
1) REMOVAL

(1) Move track link until master pin is over front idler in the position put wooden block as shown.

(2) Loosen tension of the track link.

※ If track tension is not relieved when the grease valve is loosened, move the machine backwards and forwards.

(3) Push out master pin by using a suitable tool.

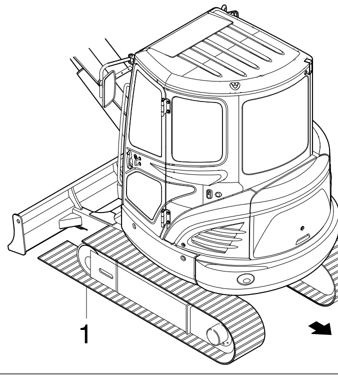


8-161(1) 140-7

(4) Move the machine slowly in reverse, and lay out track link assembly (1).

※ Jack up the machine and put wooden block under the machine.

※ Don't get close to the sprocket side as the track shoe plate may fall down on your feet.

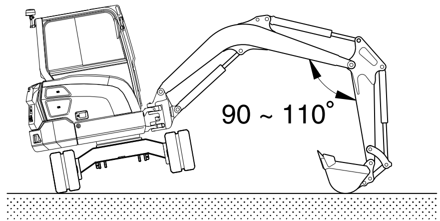


R35Z77TR01

2) INSTALL

(1) Carry out installation in the reverse order to removal.

※ Adjust the tension of the track link.

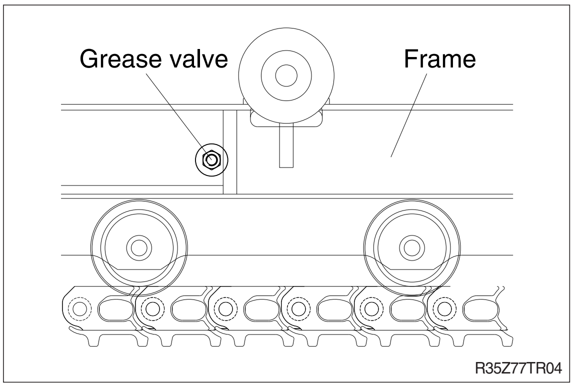


40A4OP19

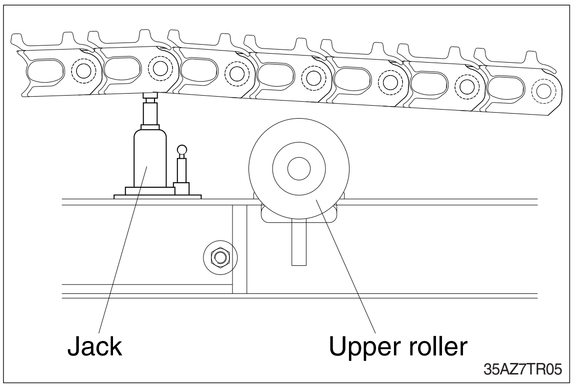
3. UPPER ROLLER

1) REMOVAL

(1) Loosen tension of the track link.

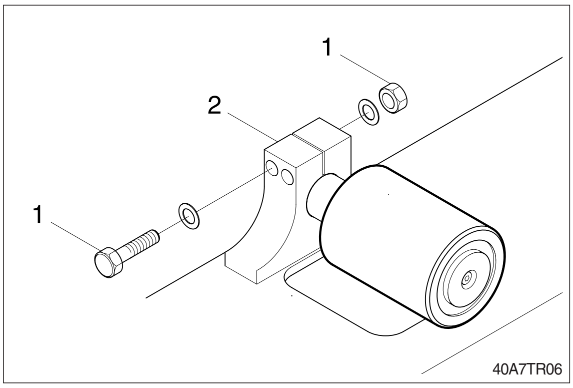


(2) Jack up the track link height enough to permit upper roller removal.



(3) Loosen the bolt and nut (1)
   · Tightening torque : 9.6±2.9 kgf·m
   (142±21.0 lbf·ft)

(4) Open bracket (2) with a screwdriver, push out from inside, and remove upper roller assembly.
   · Weight : 2.5 kg (5.0 lb)



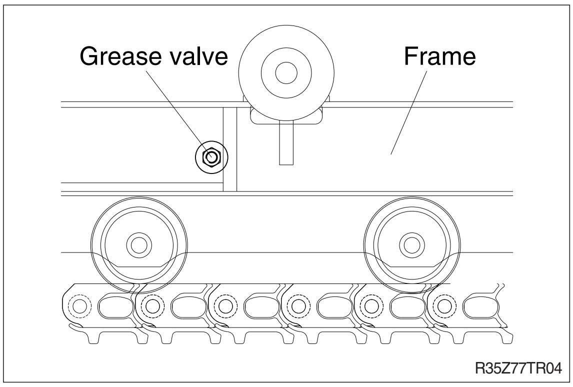
2) INSTALL

(1) Carry out installation in the reverse order to removal.

4. LOWER ROLLER

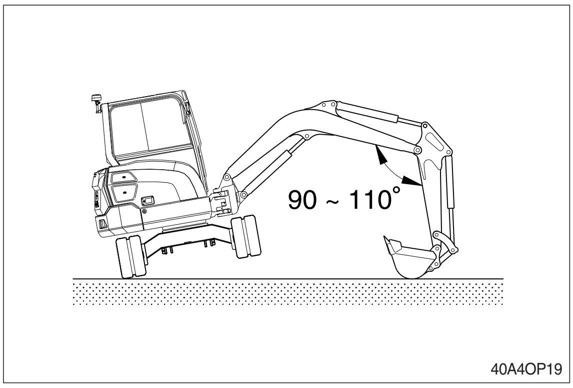
1) REMOVAL

(1) Loosen tension of the rubber track.



(2) Using the work equipment, push up track frame on side which is to be removed.

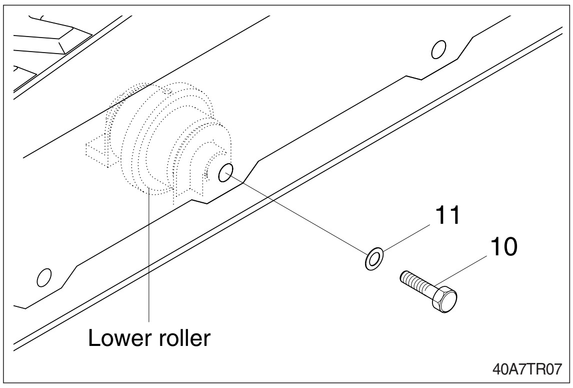
※ After jack up the machine, set a block under the unit.



(3) Remove the mounting bolt (1) and draw out the lower roller (2).

· Weight : 7.25 kg (15.9 lb)

· Tightening torque : 31.3±3.0 kgf·m (226±21.7 lbf·ft)



2) INSTALL

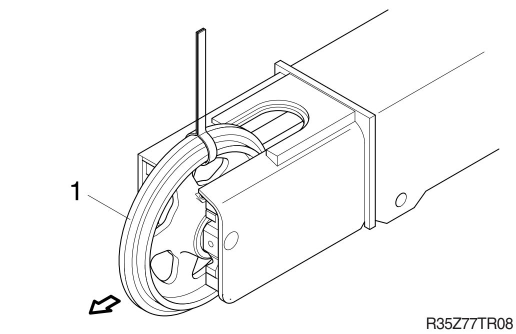
(1) Carry out installation in the reverse order to removal.

5. IDLER AND RECOIL SPRING

1) REMOVAL

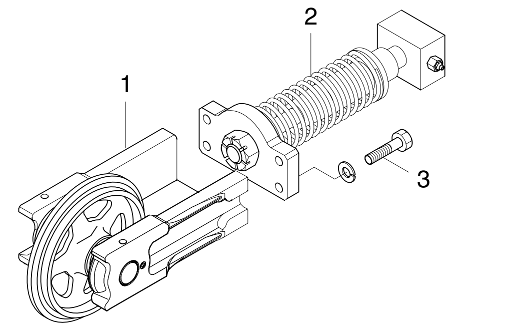
(1) Remove the track link.
For detail, see removal of track link.

(2) Sling the idler (1) and pull out idler and recoil spring assembly from track frame, using a pry.
· Weight : 28.5 kg (63 lb)



R35Z77TR08

(3) Loosen the hexagon bolt (3) and remove the idler (1) from the recoil spring assembly (3).
· Tightening torque : 11.3±1.1 kgf·m
(81.9±8.0 lbf·ft)

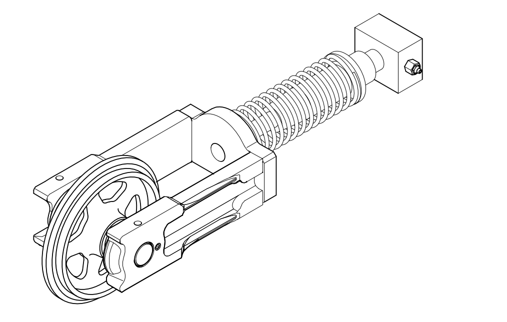


40A7TR09

2) INSTALL

(1) Carry out installation in the reverse order to removal.

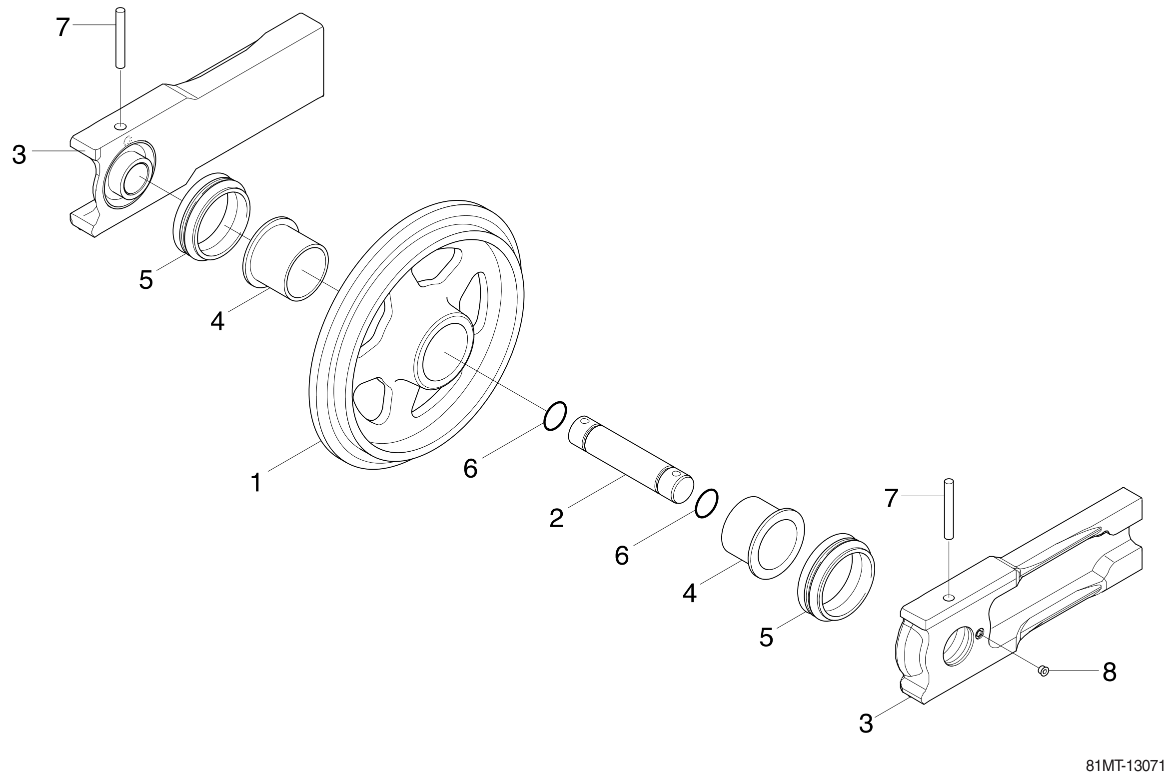
※ Make sure that the boss on the end face of the recoil cylinder rod is in the hole of the track frame.



35AZ7TR09

3) DISASSEMBLY AND ASSEMBLY OF IDLER

(1) Structure

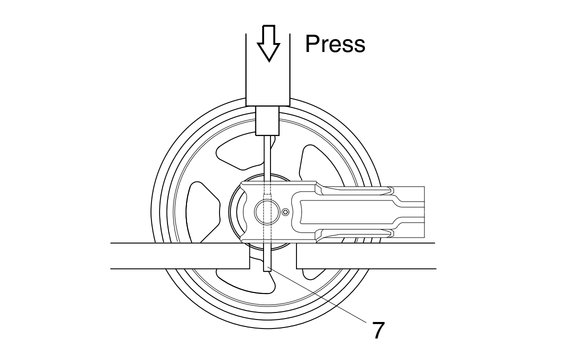


1	Idler shell	4	Bushing	7	Spring pin
2	Shaft	5	Floating seal	8	Plug
3	Bracket	6	O-ring		

(2) Disassembly

① Remove plug (8) and drain oil.

② Draw out the spring pin (7), using a press.

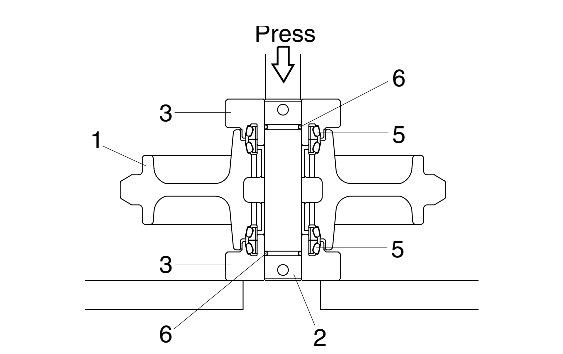


35AZ7TR30

③ Pull out the shaft (2) with a press.

④ Remove floating seal (5) from idler shell (1) and bracket (3).

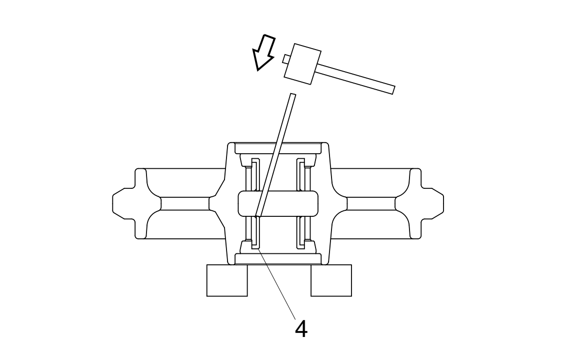
⑤ Remove O-ring (6) from shaft.



35AZ7TR31

⑥ Remove the bushing (4) from idler, using a special tool.

※ Only remove bushing if replacement is necessity.



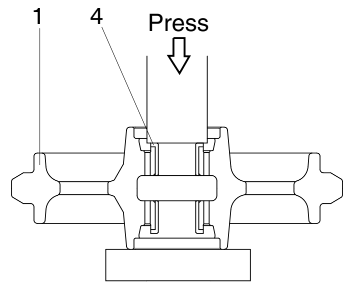
35AZ7TR32

(3) Assembly

※ Before assembly, clean the parts.

※ Coat the sliding surfaces of all parts with oil.

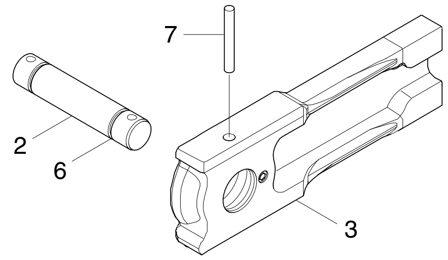
① Cool up bushing (4) fully by some dry ice and press it into idler shell (1).
Do not press it at the normal temperature, or not knock in with a hammer even after the cooling.



35AZ7TR33

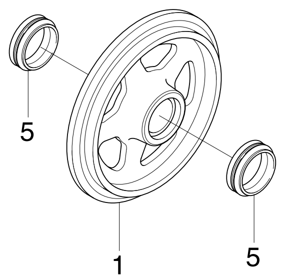
② Coat O-ring (6) with grease thinly, and install it to shaft (2).

③ Insert shaft (2) into brakcet (3) and drive in the spring pin (7).



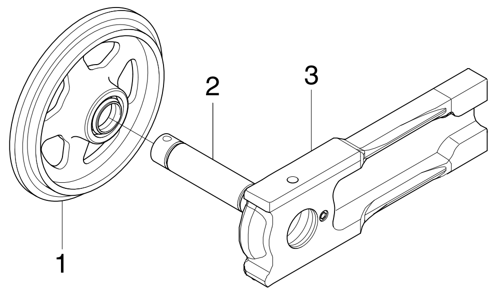
35AZ7TR34

④ Install floating seal (5) to idler shell (1).



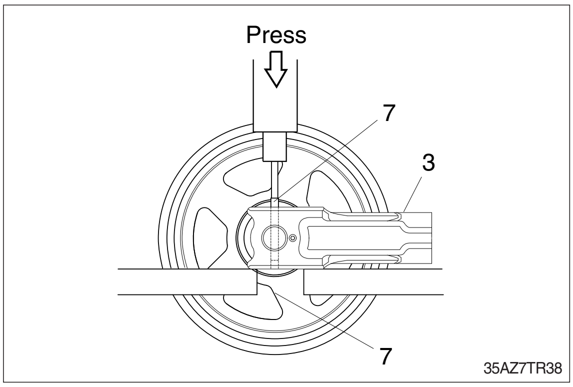
35AZ7TR35

⑤ Install shaft (2) and bracket (3) to idler shell (1).

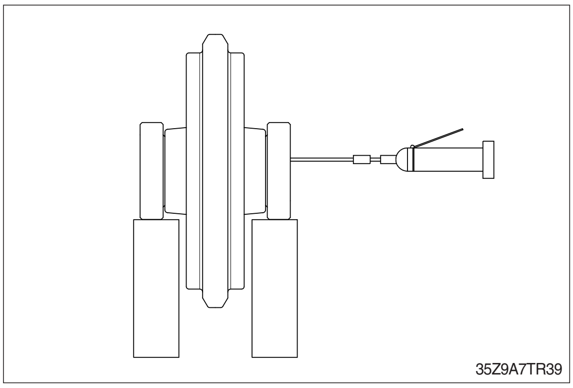


35AZ7TR36

⑥ Lay bracket (3) on its side. Knock in the spring pin (7) with a hammer.

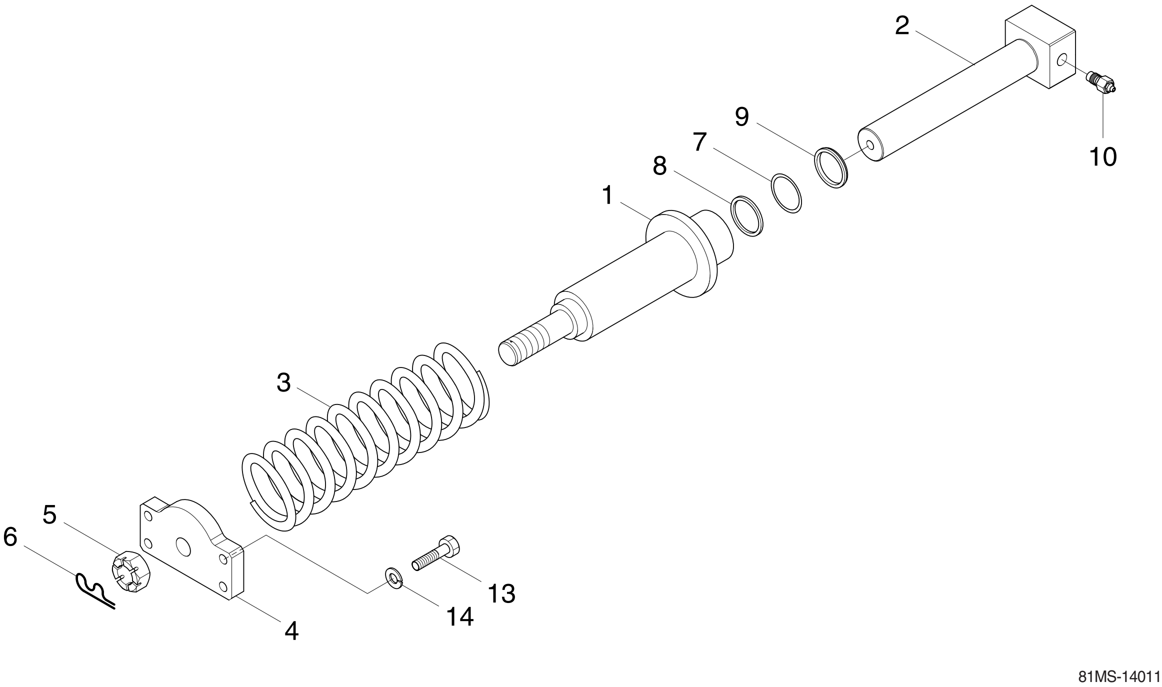


⑦ Supply engine oil to the specified level, and tighten plug.



4) DISASSEMBLY AND ASSEMBLY OF RECOIL SPRING

(1) Structure



1	Tension cylinder	5	Castle nut	9	Dust seal
2	Piston	6	Split pin	10	Grease
3	Tension spring	7	Rod seal	13	Hexagon bolt
4	Yoke plate	8	Back up ring	14	Spring washer

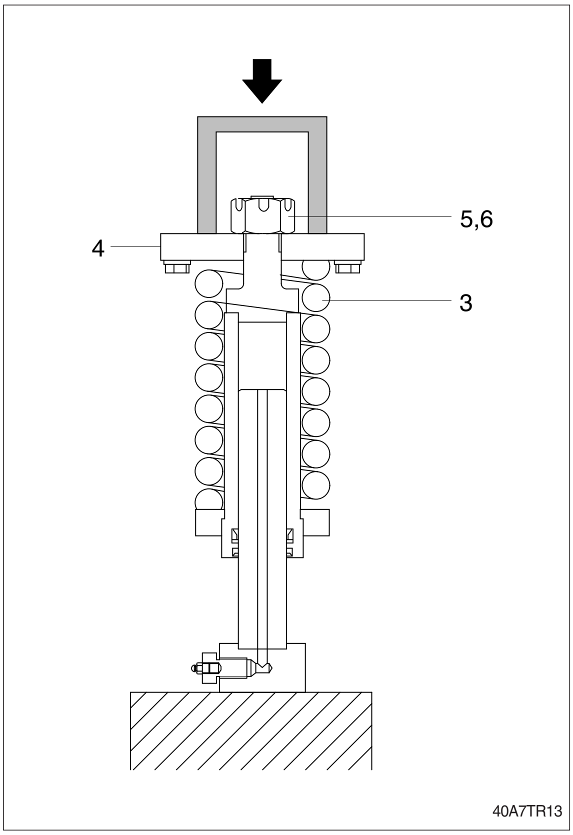
(2) Disassembly

① Apply pressure on yoke plate (4) with a press.

※ The spring is under a large installed load. This is dangerous, so be sure to set properly.

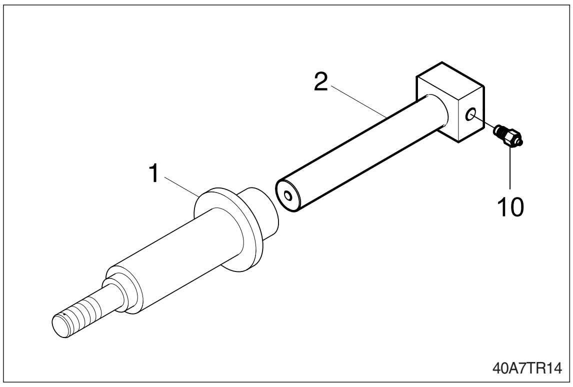
② Remove split pin (6) and castle nut (5). Take enough notice so that the press which pushes down the spring, should not be slipped out in its operation.

③ Lighten the press load slowly and remove yoke plate (4) and spring (3).

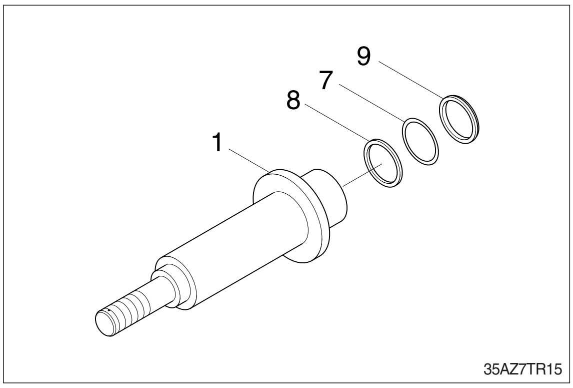


⑤ Remove piston (2) from tension cylinder (1).

⑥ Remove grease valve (10) from piston (3).

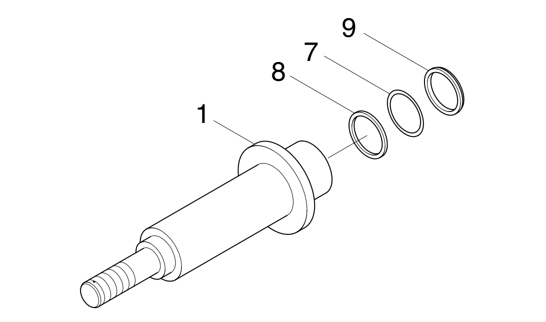


⑦ Remove dust seal (9), rod seal (8) and snap ring (7) from tension cylinder (1).



(3) Assembly

① Install dust seal (9), rod seal (8) and snap ring (7) from tension cylinder (1).



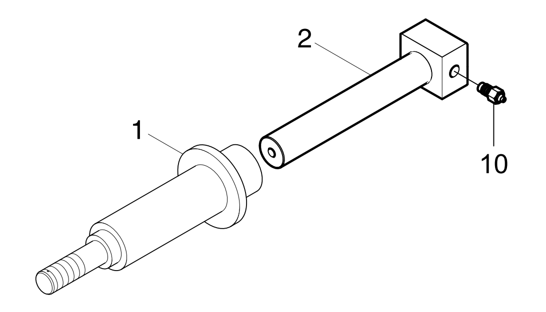
35AZ7TR15

② Pour grease into tension cylinder (1), then push in piston (2) by hand.
After take grease out of grease valve mounting hole, let air out.

※ If air letting is not sufficient, it may be difficult to adjust the tension of crawler.

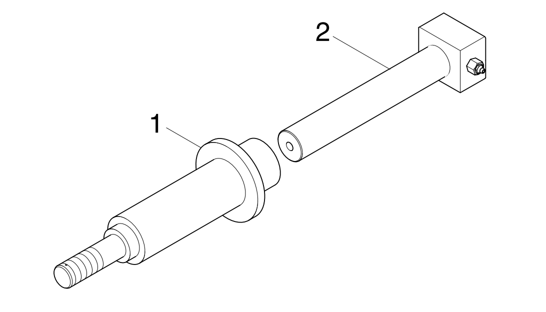
③ Fit grease valve (10) to piston (3).

· Tightening torque : 8 kgf · m (57.9 lbf · ft)



40A7TR14

④ Install piston (2) to tension cylinder (1).



40A7TR23

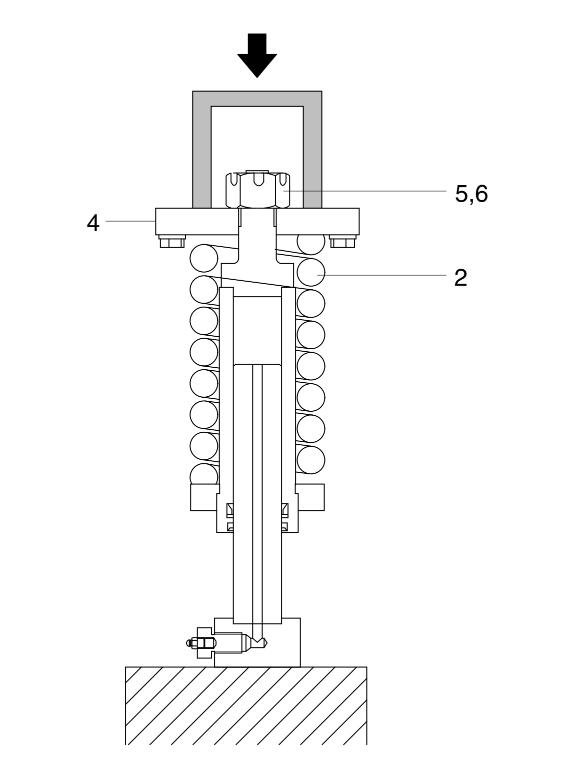
⑤ Install tension spring (3) and yoke plate (4) to tension cylinder (1).

⑥ Apply pressure to tension spring (3) with a press and tighten castle nut (5).

※ During the operation, pay attention specially to prevent the press from slipping out.

⑦ Tighten castle nut (5) and insert split pin (6).

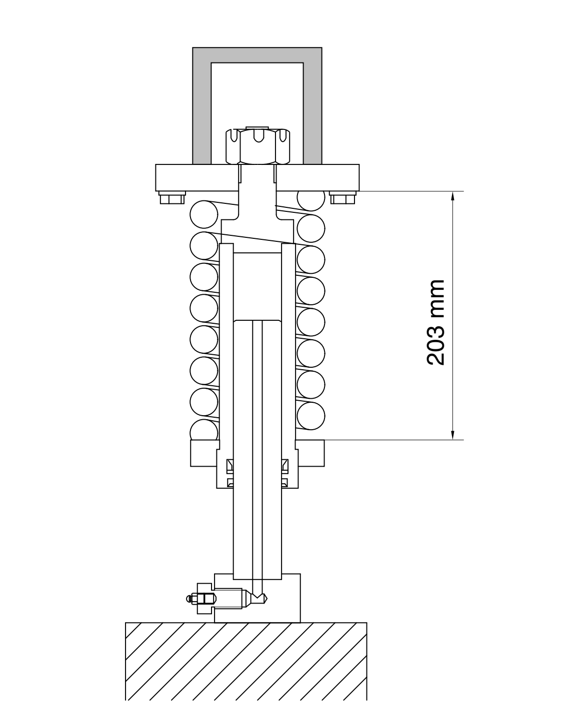
· Tightening torque : 10.3±1.1 kgf·m
(74.5±8.0 lbf·ft)



48AZ7TR13

⑧ Lighten the press load and confirm the set length of tension spring (3).

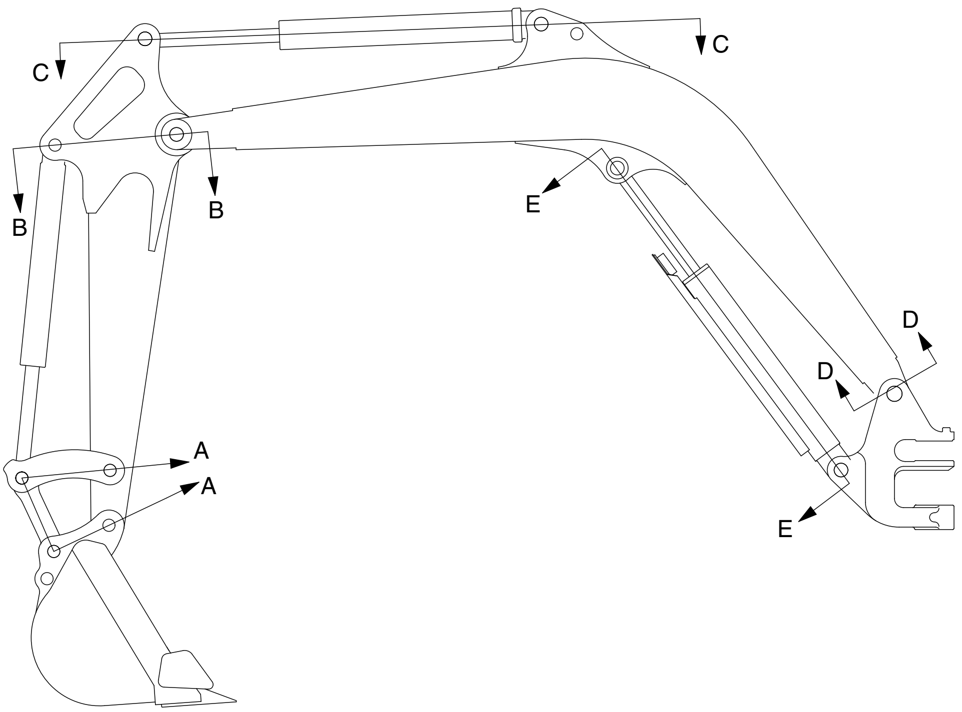
· Spring length : 203 mm

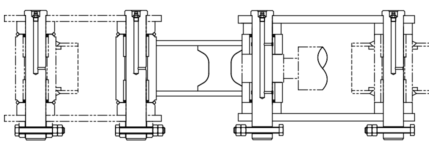


40A7TR16

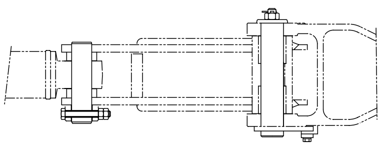
GROUP 11 WORK EQUIPMENT

1. STRUCTURE

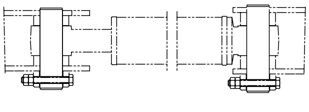




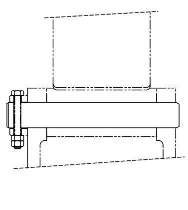
SECTION A-A



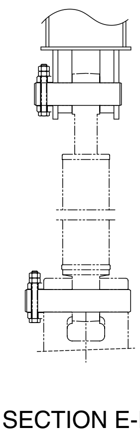
SECTION B-B



SECTION C-C



SECTION D-D



SECTION E-E

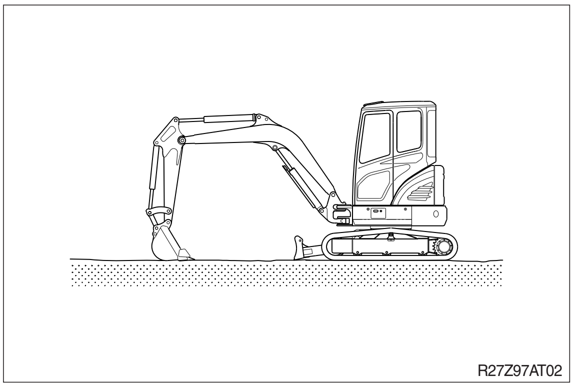
35Z9A7AT01

2. REMOVAL AND INSTALL

1) BUCKET ASSEMBLY

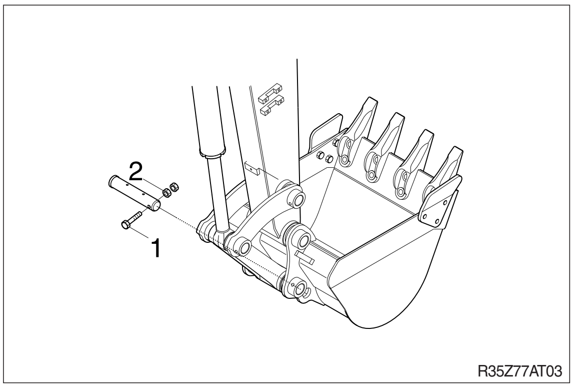
(1) Removal

① Lower the work equipment completely to ground with back of bucket facing down.



② Remove nut (1), bolt (2) and draw out the pin (4).

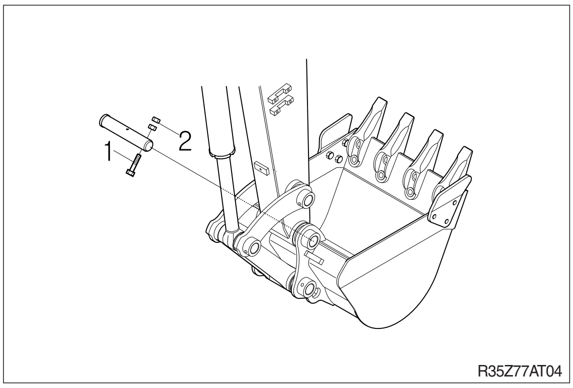
· Tightening torque : 12.8±3.0 kgf·m (92.6±21.7 lbf·ft)



③ Remove nut (1), bolt (2) and draw out the pin (3) then remove the bucket assembly (0.11 m^3).

· Weight : 134 kg (290 lb)

· Tightening torque : 12.8±3.0 kgf·m (92.6±21.7 lbf·ft)

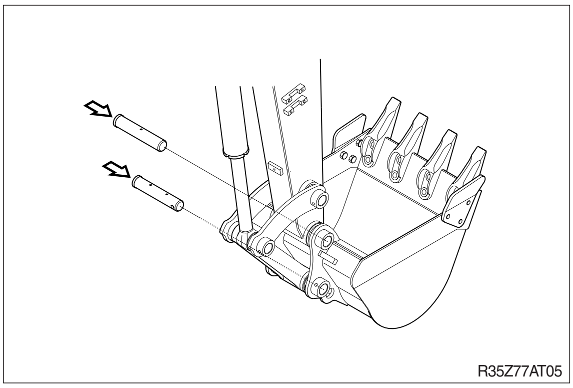


(2) Install

① Carry out installation in the reverse order to removal.

⚠ **When aligning the mounting position of the pin, do not insert your fingers in the pin hole.**

※ Adjust the bucket clearance.
For detail, see operator's manual.



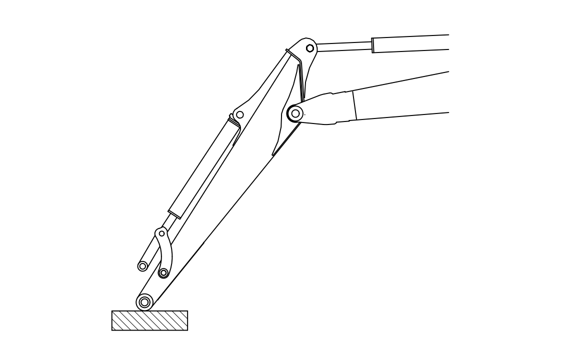
2) ARM ASSEMBLY

(1) Removal

※ Loosen the breather slowly to release the pressure inside the hydraulic tank.

⚠ **Escaping fluid under pressure can penetrated the skin causing serious injury.**

① Remove bucket assembly.
For details, see removal of bucket assembly.

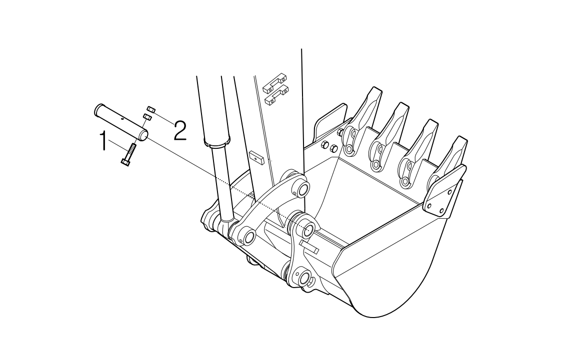


R5577AT06

② Disconnect bucket cylinder hose (4).

⚠ **Fit blind plugs (5) in the piping at the chassis end securely to prevent oil from spurting out when the engine is started.**

③ Sling arm cylinder assembly, remove spring, pin stopper and pull out pin.



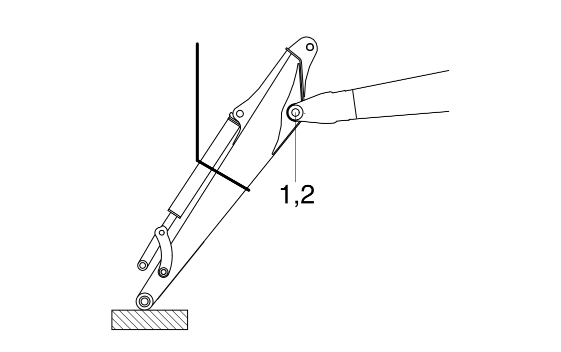
R35Z77AT04

※ Tie the rod with wire to prevent it from coming out.

④ For details, see removal of arm cylinder assembly.
Place a wooden block under the cylinder and bring the cylinder down to it.

⑤ Remove bolt (1) and pull out the pin (2) then remove the arm assembly (1.3 m).
- Weight : 132 kg (290 lb)
- Tightening torque : 12.8±3.0 kgf·m (92.6±21.7 lbf·ft)

※ When lifting the arm assembly, always lift the center of gravity.



R5577AT07

(2) Install

① Carry out installation in the reverse order to removal.

⚠ **When lifting the arm assembly, always lift the center of gravity.**

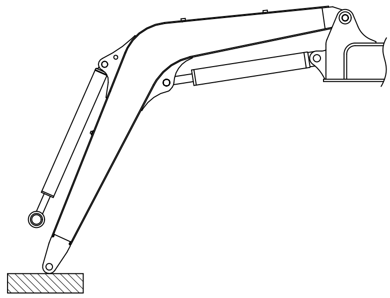
※ Bleed the air from the cylinder.

3) BOOM ASSEMBLY

(1) Removal

① Remove arm and bucket assembly.
For details, see removal of arm and bucket assembly.

② Remove boom cylinder assembly from boom.
For details, see removal of arm cylinder assembly.



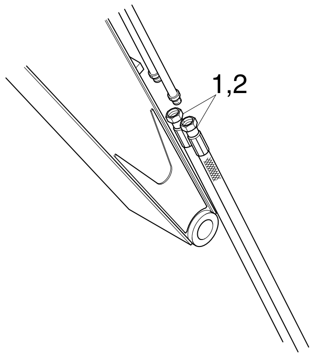
R5577AT08

③ Disconnect head lamp wiring.

④ Disconnect bucket cylinder hose (2) and arm cylinder hose (1).

※ When the hose are disconnected, oil may spurt out.

⑤ Sling boom assembly (3).

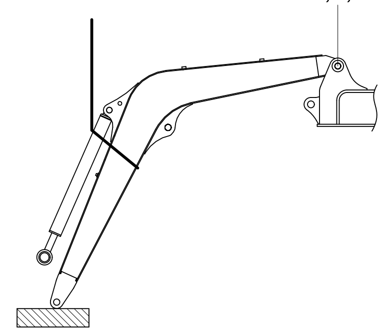


R5577AT10

⑥ Remove bolt (3), nut (4) and pull out the pin (5) then remove boom assembly (2.8 ㎜).

· Weight : 196 ㎏ (430 ㏐)
· Tightening torque : 12.8±3.0 kgf·m (92.6±21.7 lbf·ft)

※ When lifting the boom assembly always lift the center of gravity.



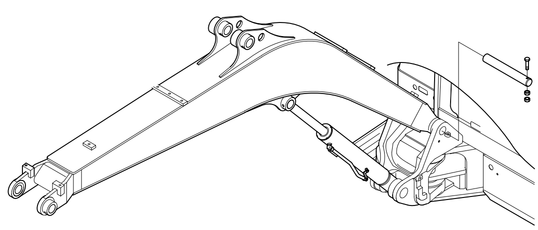
R5577AT09

(2) Install

① Carry out installation in the reverse order to removal.

⚠ **When lifting the arm assembly, always lift the center of gravity.**

※ Bleed the air from the cylinder.



R35Z77AT06