Larsen & Toubro
Product Development Centre

30/01/2014

SUB : WL 9020 MANUAL SHEETS
UPDATE NOTICE NO :- 002

Please find the enclosed SPARE PARTS MANUAL & OPERATORS AND MAINTENANCE MANUAL SHEETS

With Best Regards,
Aneesh Basheer M

Distribution :

PDC	KBL	CEB
GSN	SC	KRB
KNK	AND	VMN
MSK	AKP	
CAV	SD	
	SKN	
	SR	

Larsen & Toubro Product Development Centre	UPDATE NOTICE	NO : 002

Updated Sheet : ☑ New Issue : ☐ Revision : **10-Aug-2013 ~ 31-Dec-2013**

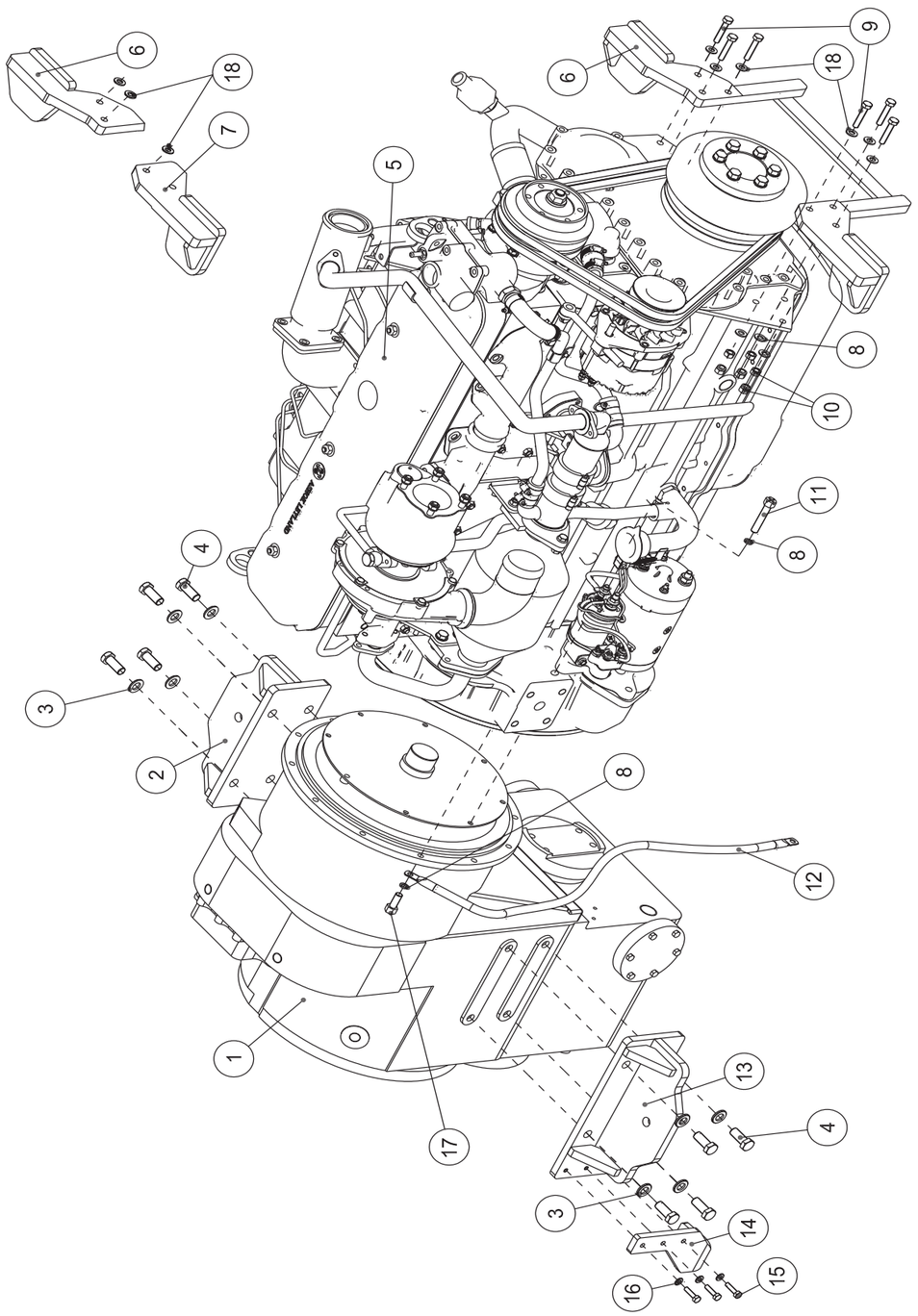
MODEL	SHEET No. *	INDEX	REMARK	ECN
WL 9020	P-2	B	Image & BOM are Updated	3131, 3151,
WL 9020	P-11	B	Image & BOM are Updated	3159, 3137
WL 9020	P-12	B	BOM is Updated	3181
WL 9020	P-34	B	BOM is Updated	3152
WL 9020	P-35	B	BOM is Updated	--
WL 9020	P-51	B	BOM is Updated	3156
WL 9020	P-73	C	BOM is Updated	3091 ,3159
WL 9020	P-74	B	BOM is Updated	3156
WL 9020	P-81	A	New sheet added	3228
WL 9020	P-88	A	New sheet added	3145
WL 9020	P-89	B	BOM is Updated	3152
WL 9020	P-92	C	Image & BOM are Updated	3190
WL 9020	P-117	B	Image & BOM are Updated	--
WL 9020	P-118	B	Image & BOM are Updated	--
WL9020	O-21	A	New Points&images are added in Chapter 1.4.7	--
WL 9020	O-30	A	New image is added in Chapter 2.2	--
WL9020	O-35	A	New Points added in Chapter 2.4.1	--
WL9020	O-39	A	NOTICE updated in Chapter 2.5.2	--
WL9020	O-48	A	NOTICE updated in Chapter 2.9.6	--
WL9020	O-55	A	Maintenance Table-1 is updated	--
WL9020	O-56	A	Maintenance Table-3 is updated	--
WL9020	O-57	A	Note is newly added	--
WL9020	O-58	A	Refill capacities table is updated	--
WL9020	O-59	A	Chapter 3.3.5 is updated	--
WL9020	O-62	A	New image is added in Chapter 3.4	--
WL9020	O-68	A	New Points & images are added in Chapter 3.5.16	--
WL9020	O-70	A	Few Points are added in chapter 3.5.20	--
WL9020	O-72	A	New chapters (3.5.28 & 3.5.29) are added	--
WL9020	O-80	A	Trouble Shooting Table is updated	--
WL9020	O-81	A	Trouble Shooting Table is updated	--
WL9020	O-82	A	Trouble Shooting Table is updated	--
WL9020	O-85	A	Chapter 4.1 is updated	--
WL9020	O-87	A	Image & Table is updated in 4.2	--

Prepared By	ABM/JPM	Reviewed By	KNK	Approved By	GSN	Sheet
Date	30-Jan-14	Date	30-Jan-14	Date	30-Jan-14	1 of 1

*P-Spare Parts Manual | O-Operation & Maintenance Manual | S-Shop Manual

1.1 ENGINE & TRANSMISSION ASSEMBLY

INDEX: B

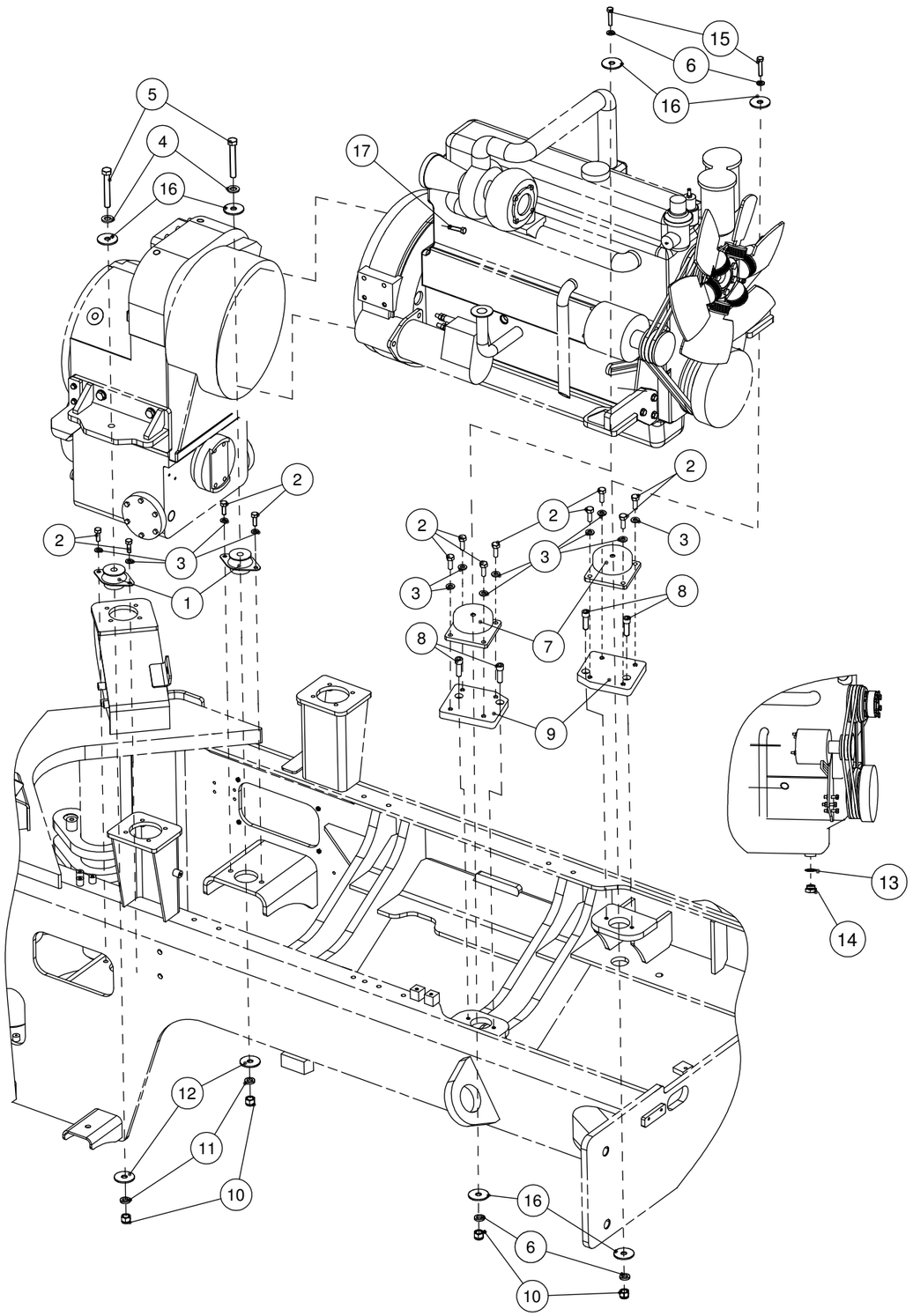


ITEM NO	PART NO	QTY	DESCRIPTION	M/c Serial No.
1	01 2976	1	TRANSMISSION (REFER CHAPTER NO: 8)	0000 ~
2	01 2907	1	BRACKET	0000 ~ 0115
	01 5170	1	BRACKET – RH	0116 ~
3	S260A A2 01008	8	WASHER	0000 ~
4	01 0877	8	SCREW	0000 ~
5	01 2977	1	ENGINE - BSII (REFER ENGINE MANUAL)	0000 ~ 0040
	01 3550	1	ENGINE - BSIII (REFER ENGINE MANUAL)	0041 ~ 0115
	01 4845	1	ENGINE -ALH6 (REFER ENGINE MANUAL)	0116 ~
6	01 3721	1	BRACKET	0000 ~ 0115
	01 5172	1	BRACKET – RH	0116 ~
7	01 5174	1	BRACKET – LH	0116 ~
8	01 0923	26	WASHER	0000 ~
9	S210A AD 00032	6	BOLT	0000 ~0115
	S230 AAD 22123	8	BOLT	0116 ~
10	S220A AN 02004	6	NUT	0000 ~
11	01 0874	8	BOLT	0000 ~
	01 3858	UQN	• LOCTITE 243	0000 ~
12	E0076	1	CABLE	0000 ~
13	01 2908	1	BRACKET	0000 ~ 0115
	01 5169	1	BRACKET – LH	0116 ~
14	01 2962	1	BRACKET	0000 ~
15	S230A AD 22064	3	SCREW	0000 ~
16	S260A AU 01004	3	WASHER	0000 ~
17	01 0985	12	BOLT	0000 ~
	01 3858	UQN	• LOCTITE 243	0000 ~
18	01 0923	6	WASHER	0000 ~ 0115
	01 3287	8	WASHER	0116 ~

* THIS MACHINE IS EQUIPPED WITH ASHOK LEYLAND DIESEL ENGINE. BY MUTUAL AGREEMENT WITH THE ENGINE MANUFACTURER, WE DO NOT SELL ENGINE PART(S). ENGINE PART(S) SHOULD BE PROCURED FROM THE NEAREST APPROPRIATE SALES AND SERVICE OUTLETS OF ASHOK LEYLAND. FOR DETAILS OF THE ENGINE SPARE PARTS, REFER THE SPARE PARTS MANUAL OF THE ENGINE MANUFACTURER.

1.9 ENGINE & TRANSMISSION INSTALLATION

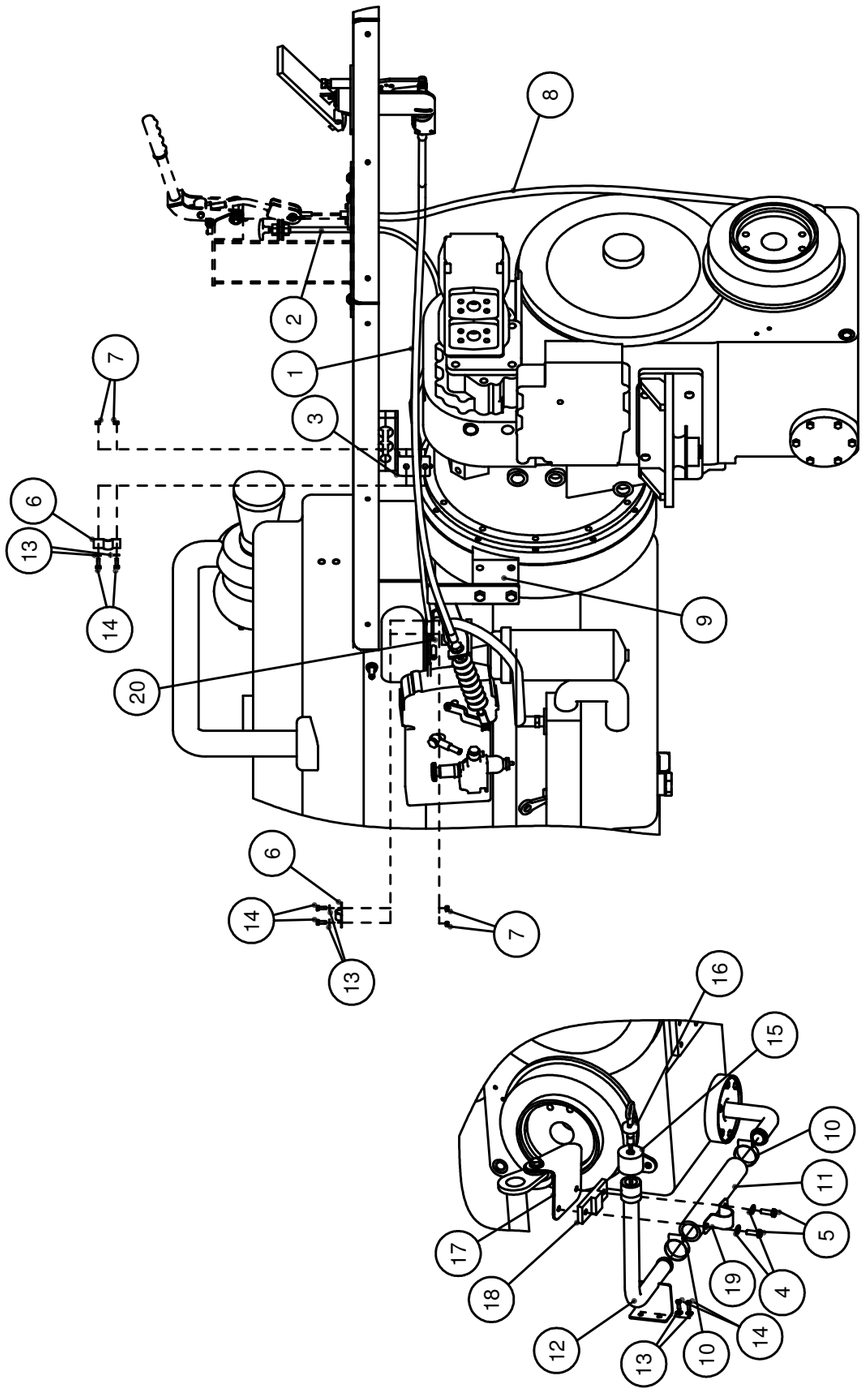
INDEX: B



ITEM NO	PART NO	QTY	DESCRIPTION	M/c Serial No.
1	01 2767	2	ANTI VIBRATION MOUNT	0000 ~ 0115
	01 5182	2	AVM - TRANS	0116 ~
2	S230A AD 22093	12	SCREW	0000 ~ 0115
3	S260A AU 01005	12	WASHER	0000 ~ 0115
4	S260A A2 01008	2	WASHER	0000 ~ 0115
	01 5260	2	WASHER	0116 ~
5	S210A AD 00076	2	BOLT	0000 ~ 0115
	S210 AAD 00137	2	BOLT	0116 ~
6	S260 AA2 01007	2	WASHER	0000 ~ 0115 ~
	01 5260	4	WASHER	0116 ~
7	01 0129	2	ANTI VIBRATION MOUNT	0000 ~ 0115
	01 5184	2	AVM - ENGINE	0116 ~
8	S230BAE22065	4	SCREW	0000 ~ 0055
9	01 3725	2	SPACER	0000 ~ 0055
10	S340C AN 33206	2	NUT	0000 ~ 0115
	S220 AAP 02008	4	NUT	0116 ~
11	01 2769	2	WASHER	0000 ~ 0115
	01 5260	2	WASHER	0116 ~
12	01 2768	2	WASHER	0000 ~ 0115
	01 2183	2	WASHER	0116 ~
13	01 4154	1	WASHER	0000 ~ 0115
	01 0923	1	WASHER	0116 ~
14	01 4153	1	DRAIN PLUG	0000 ~ 0115
	01 5017	1	DRAIN PLUG HOSE	0116 ~
15	S210 AAD 00137	2	BOLT	0116 ~
16	01 2183	6	WASHER	0116 ~
17	01 5380	8	BOLT	0116 ~

1.10 ENGINE & TRANSMISSION CONTROL

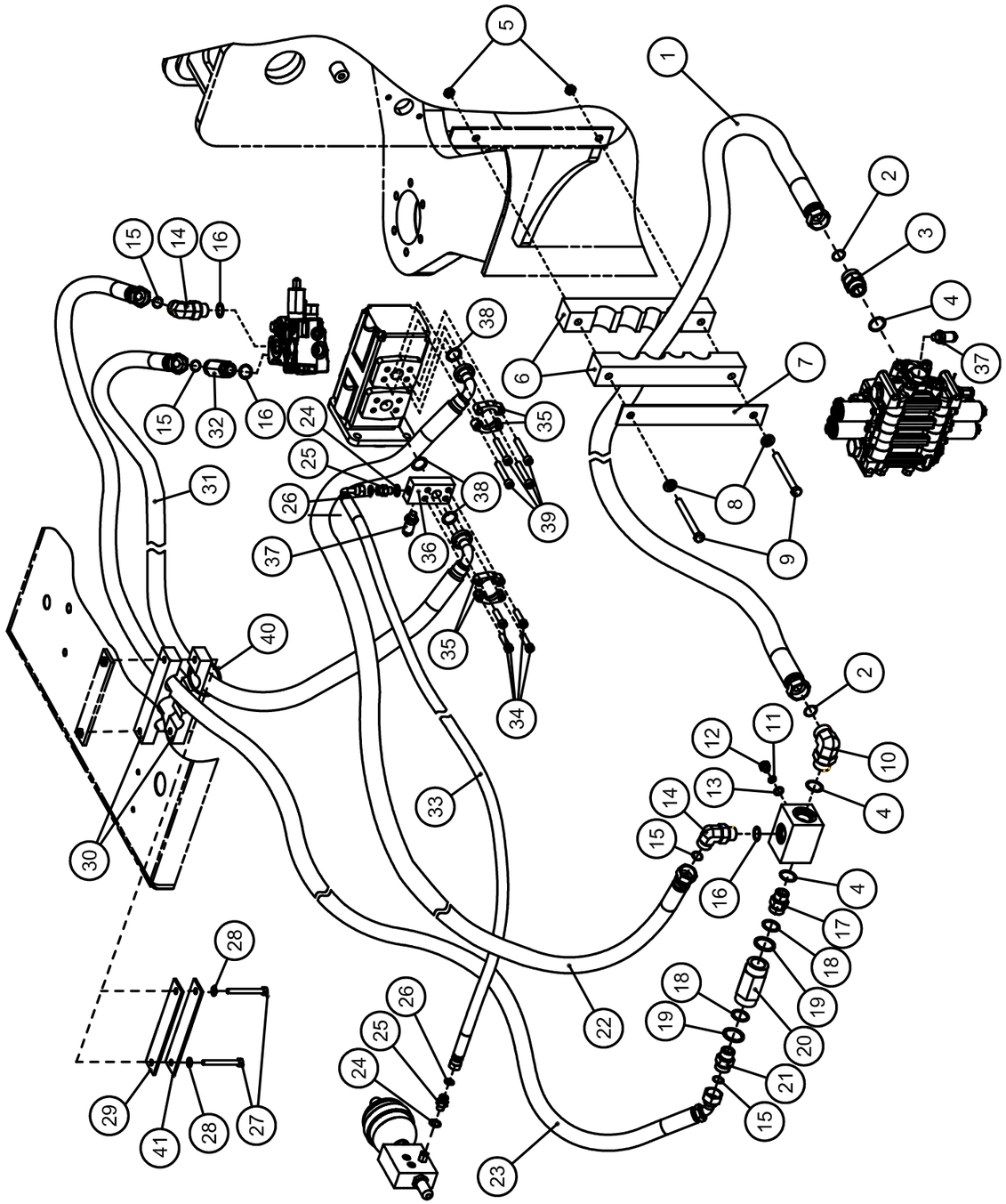
INDEX: B



ITEM NO	PART NO	QTY	DESCRIPTION	M/c Serial No.
1	01 2165	1	ACCELERATOR CABLE (REFER CHAPTER NO: 1.27)	0000 ~
2	01 2166	1	STOP CABLE	0000 ~
3	01 3961	1	BRACKET-STOP CABLE	0000 ~
4	S260A AQ 01004	2	WASHER	0000 ~
5	S230A AC 22062	2	SCREW	0000 ~
6	01 1284	2	C CLIP	0000 ~
7	01 2001	4	NUT	0000 ~
8	01 2185	1	PARKING BRAKE CABLE (REFER CHAPTER NO: 1.28)	0000 ~
9	01 3908	1	BRACKET-ACCELERATOR CABLE	0000 ~ 0040
	01 3791	1	BRACKET-ACCELERATOR CABLE	0041 ~
10	S340G AQ 33762	2	CLIP	0000 ~
11	01 3548	1	HOSE	0000 ~
12	01 3834	1	TUBE	0000 ~
13	S260A AQ 01006	6	WASHER	0000 ~
14	S230A AC 22023	6	SCREW	0000 ~
15	01 2364	1	ADAPTOR	0000 ~
16	01 3833	1	DIP STICK	0000 ~
17	01 3987	1	BEND PLATE ASSEMBLY	0000 ~ 0159
18	01 4965	1	RUBBER PAD	0000 ~
19	01 4968	1	C-CLAMP	0000 ~
20	01 1283	1	STOP CABLE BRACKET	0000 ~

2.2 PUMP DELIVERY CIRCUIT

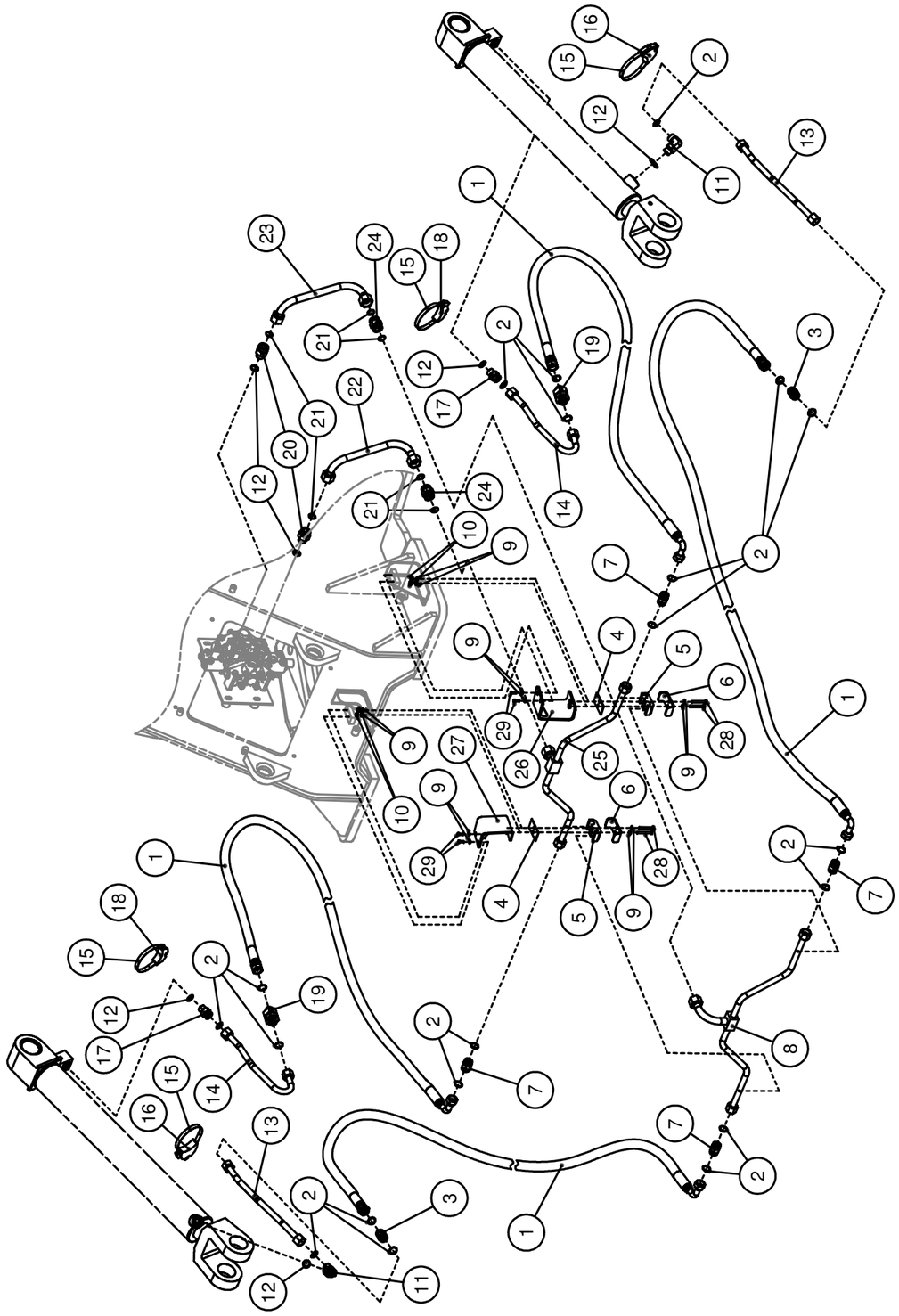
INDEX: B



ITEM NO	PART NO	QTY	DESCRIPTION	M/c Serial No.
1	01 3036	1	HOSE	0000 ~
2	S290AFA27006	2	O-RING	0000 ~
3	S150F AQ 17106	1	ADAPTER	0000 ~
4	S290AFA27056	3	O-RING	0000 ~
5	S220AAN02005	2	NUT	0000 ~
6	01 2832	2	CLAMP	0000 ~
7	01 2584	1	PLATE	0000 ~
8	WL10100C5232	2	SPECIAL WASHER	0000 ~
9	01 3516	2	BOLT	0000 ~
10	S150DAQ17066	1	ADAPTER	0000 ~
11	S290AFA27151	1	O-RING	0000 ~
12	S151QAQ17751	1	PLUG	0000 ~
13	S151RAQ17776	1	RETAINING RING	0000 ~
14	S150DAQ17065	2	ADAPTER	0000 ~
15	S290AFA27005	4	O-RING	0000 ~
16	S290AFA27055	3	O-RING	0000 ~
17	01 2774	1	ADAPTER	0000 ~
18	S290AFA27155	2	O-RING	0000 ~
19	S151RAQ17780	2	RETAINING RING	0000 ~
20	01 2576	1	CHECK VALVE	0000 ~
21	S151VAQ17863	1	ADAPTER	0000 ~
22	01 2243	1	HOSE	0000 ~
23	01 2244	1	HOSE	0000 ~
24	S290AFA27052	2	O-RING	0000 ~
25	S150FAQ17102	2	ADAPTER	0000 ~
26	S290AFA27002	2	O-RING	0000 ~
27	01 2973	2	BOLT	0000 ~
28	S260AAQ01003	2	WASHER	0000 ~
29	01 3072	1	PLATE	0000 ~
30	01 3071	2	GROMMET	0000 ~
31	01 2242	1	HOSE	0000 ~
32	S151N AQ17725	1	ADAPTER	0000 ~
33	01 2267	1	HOSE	0000 ~
34	S230BAE22070	4	SCREW	0000 ~
35	S151HAQ17677	4	FLANGE	0000 ~
36	01 2591	1	MANIFOLD	0000 ~
37	01 2833	2	TEST COUPLING	0000 ~
38	S290AFA27102	3	O-RING	0000 ~
39	S230BAE22065	4	SCREW	0000 ~
40	S320G GA 31005	1	TIE WRAP	0000 ~
41	01 3996	1	RUBBER SHEET	0000 ~

2.3 LIFT CIRCUIT

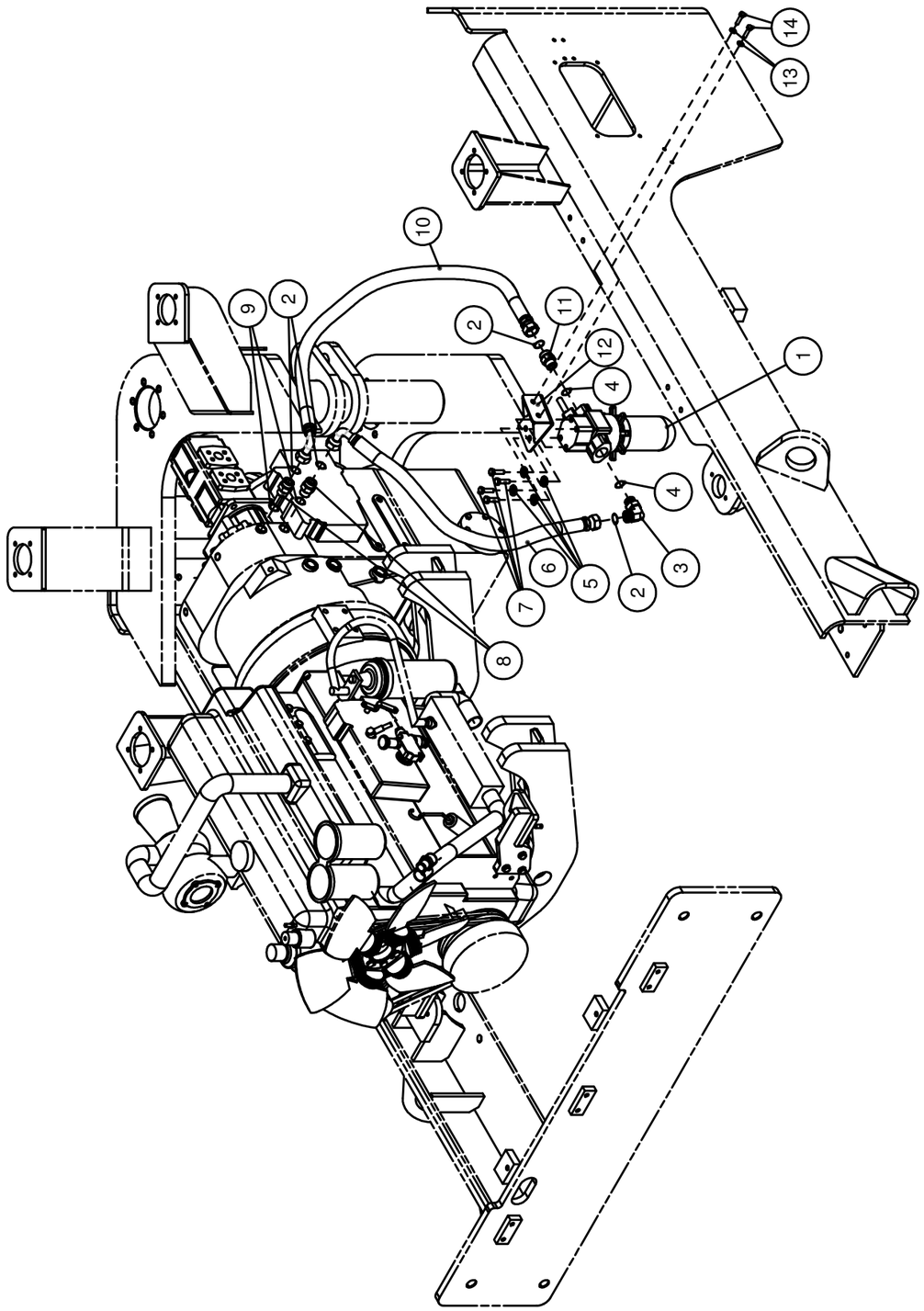
INDEX: B



ITEM NO	PART NO	QTY	DESCRIPTION	M/c SerialNo.
1	01 2621	2	HOSE	0000 ~ 0020
	01 2622	2	HOSE	0021 ~
2	S290AFA27005	20	O-RING	0000 ~
3	S150HAQ17145	6	UNION	0000 ~
4	01 4061	6	RUBBER SHEET	0000 ~
5	01 4060	2	GROMMET	0000 ~
6	014062	2	PLATE	0000 ~
7	01 4059	4	LONG UNION - 12	0000 ~
8	01 2288	1	TUBE	0000 ~
9	S260A AQ 01004	8	WASHER	0000 ~
10	S220A AN 02003	4	NUT	0041 ~
11	S150DAQ 17065	2	ADAPTER	0000 ~
12	S290AFA27055	6	O-RING	0000 ~
13	01 2607	2	TUBE	0000 ~
14	01 2615	2	TUBE	0000 ~
15	S340G AQ 33773	4	HOSE CLIP	0000 ~
16	01 2589	2	SADDLE	0000 ~
17	S150FAQ17105	2	ADAPTER	0000 ~
18	01 2590	2	SADDLE	0000 ~
19	01 3335	2	ORIFICE	0000 ~
20	S151 KAQ 17583	2	ADAPTER	0000 ~
21	S290 AFA 27006	6	O-RING	0000 ~
22	01 2582	1	TUBE	0000 ~
23	01 2585	2	TUBE	0000 ~
24	S150 HAQ 17146	2	UNION	0000 ~
25	01 2587	1	TUBE	0000 ~
26	01 4053	1	CLAMP	0000 ~ 0040
27	01 4054	1	CLAMP	0000 ~ 0040
28	S210 AAC 00026	4	BOLT	0000 ~ 0040
29	S230A AC 22063	4	BOLT	0000 ~ 0040
	S210A AC 00026	4	BOLT	0041 ~

3.8 TRANSMISSION OIL FILTER MOUNTING

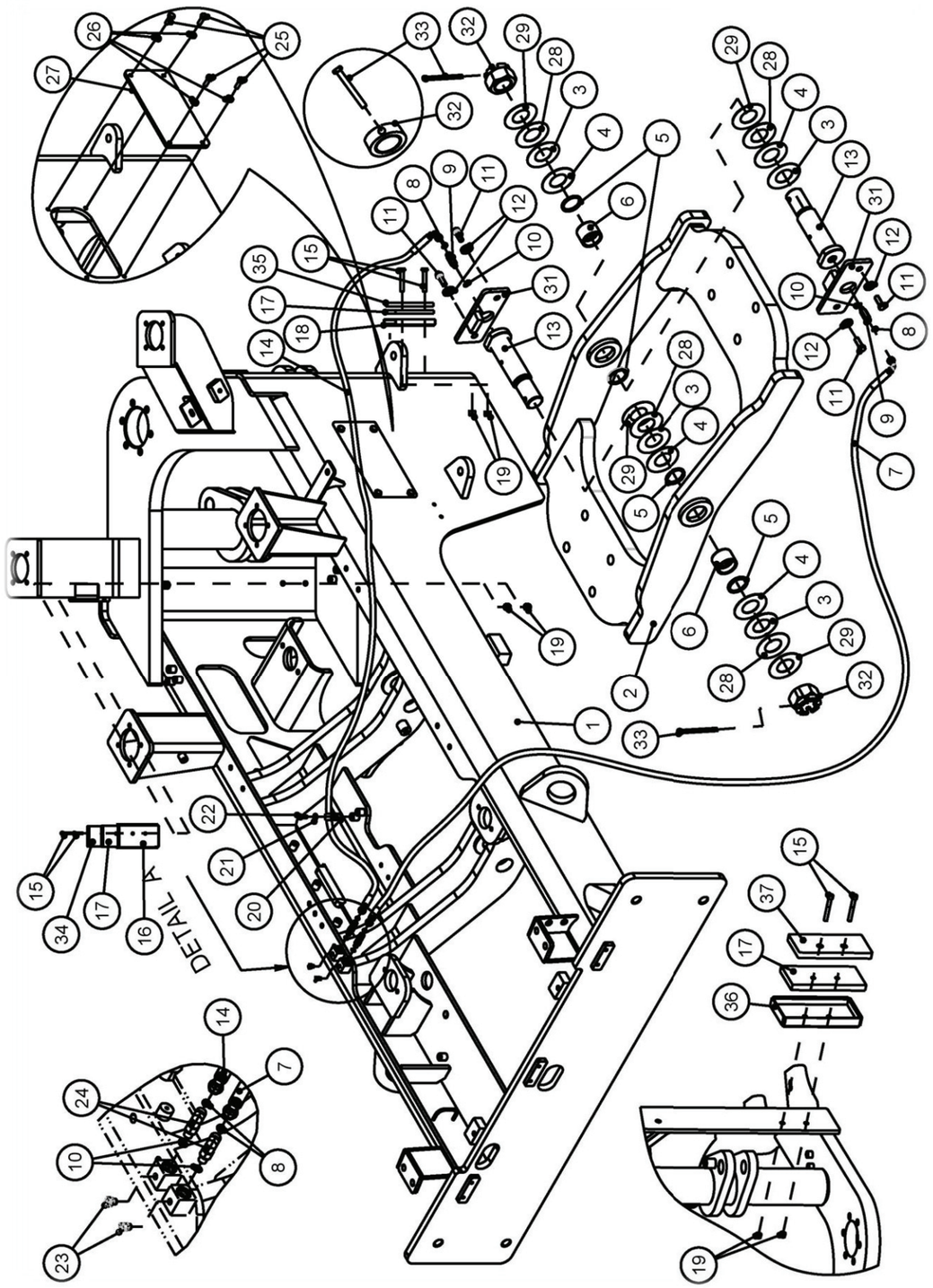
INDEX: B



ITEM NO	PART NO	QTY	DESCRIPTION	M/c Serial No.
1	01 2719	1	TRANSMISSION OIL FILTER(REFER CHAPTER NO:8.15)	0000 ~
2	S290A FA 27005	4	O RING	0000 ~
3	S150Y AQ 17417	1	ELBOW	0000 ~
4	S290A FA 27056	2	O RING	0000 ~
5	01 5232	4	SPECIAL WASHER	0000 ~
6	01 2551	1	HOSE	0000 ~
7	01 2438	4	SCREW	0000 ~
8	S150F AQ 17105	2	CONNECTOR	0000 ~
9	S290A FA 27055	2	O RING	0000 ~
10	01 2552	1	HOSE	0000 ~
11	S151M AQ 17653	1	CONNECTOR	0000 ~
12	01 2535	1	BRACKET	0000 ~
13	S260A AQ 01005	2	WASHER	0000 ~
14	S230A AC 22093	2	SCREW	0000 ~

5.2 REAR FRAME AND TRUNNION

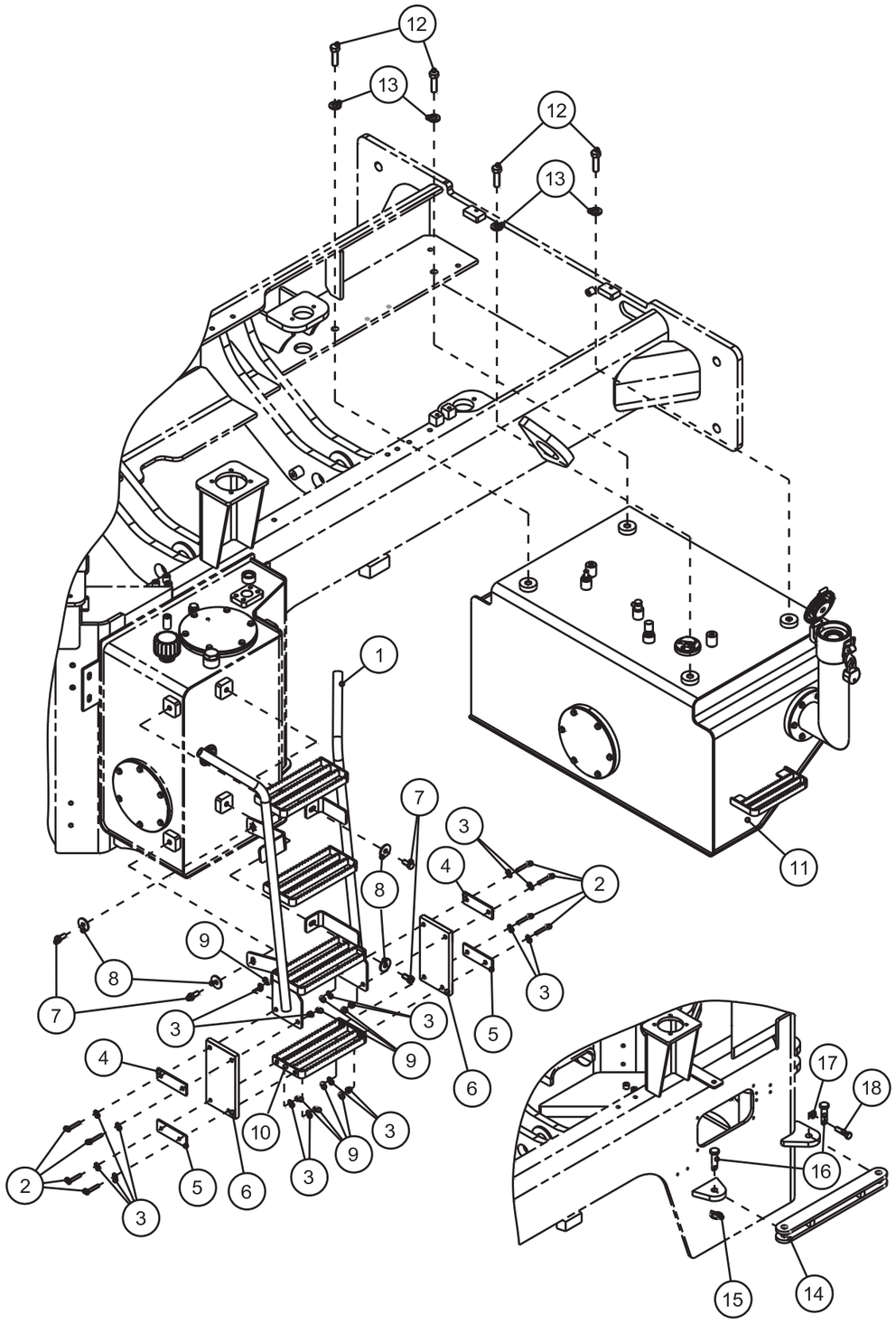
INDEX: C



ITEM NO	PART NO	QTY	DESCRIPTION	M/c Serial No.
1	01 3288	1	REAR FRAME	0000 ~ 0040
	01 3645	1	REAR FRAME	0041 ~ 0115
	01 5219	1	REAR FRAME	0116 ~
2	01 3109	1	CRADLE	0017 ~
3	01 2056	UQN	SHIM	0000 ~
4	01 2055	UQN	SHIM	0000 ~
5	01 2636	4	DUST SEAL	0000 ~
6	01 1999	2	BUSH	0000 ~
7	01 2346	1	HOSE	0000 ~
8	S290A FA 27001	4	O – RING	0000 ~
9	S151N AQ 17721	2	CONNECTOR	0000 ~
10	S290A FA 27051	4	O – RING	0000 ~
11	S230A AD 22123	4	SCREW	0000 ~
12	01 3966	6	WASHER-CRADLE	0000 ~
13	01 3965	2	PIN	0000 ~0125
	01 4123	2	PIN	0126~
14	01 2347	1	HOSE	0000 ~
15	S230B AF 22073	4	SCREW	0000 ~
	01 3858	UQN	• LOCTITE 243	0000 ~
16	01 4039	1	STOPPER PLATE ASSY-LH	0000 ~ 0040
17	01 2040	2	STOPPER PAD	0000 ~ 0040
	01 4245	2	RUBBER PAD	0041 ~
18	01 4040	1	STOPPER PLATE ASSY-RH	0000 ~
19	S340C AN 33203	4	NUT	0000 ~
20	S320H AQ 31028	1	PCLIP	0000 ~
21	S260A AQ 01004	1	WASHER	0000 ~
22	S230A AA 22062	1	SCREW	0000 ~
23	S340D AQ 33322	2	GREASE NIPPLE	0000 ~
24	S150D AQ 17061	2	CONNECTOR	0000 ~
25	S230A AC 22045	4	SCREW	0000 ~ 0040
	S230A AD 22044	4		0041 ~
26	S260A AU 01003	4	WASHER	0000 ~
27	01 2886	1	PLATE	0000 ~
28	01 3524	UQN	SHIM	0000 ~
29	01 3549	UQN	SHIM	0000 ~
30	S260A A2 01007	4	HARDENED WASHER	0000 ~
31	01 3962	2	PLATE ASSY	0000 ~
32	S220D A2 02086	2	CASTLE NUT	0000 ~0125
	01 4120	2	CRADLE PIN COLLAR	0126~
33	S340H A4 33821	2	SPLIT PIN	0000 ~0125
	S210AAC00038	2	BOLT M10 x 90	0126~
34	01 4041	1	STOPPER PLATE-LH	0000 ~ 0040
35	01 4042	1	STOPPER PLATE-RH	0000 ~ 0040
	01 5128	1	STOPPER PLATE-RH	0041 ~
36	01 4241	1	STOPPER PLATE-LH	0041 ~
37	01 4246	2	STOPPER ASSY OUTER	0041 ~

5.3 REAR FRAME ACCESSORIES

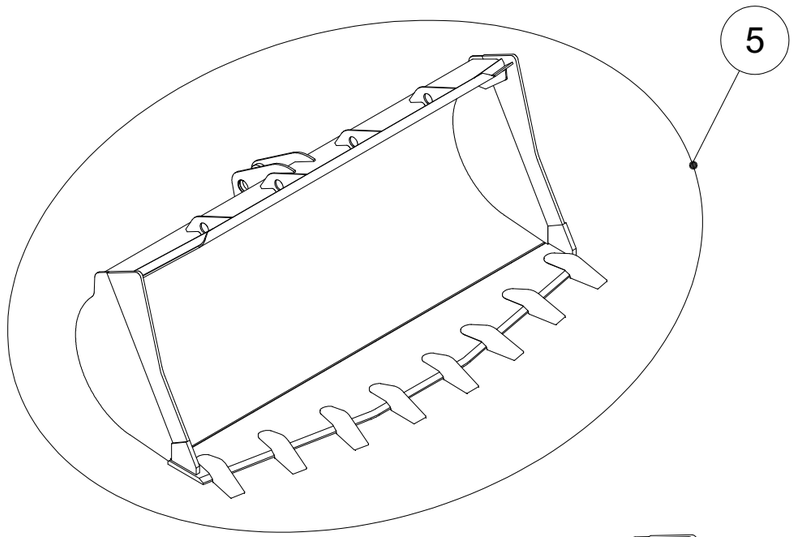
INDEX: B

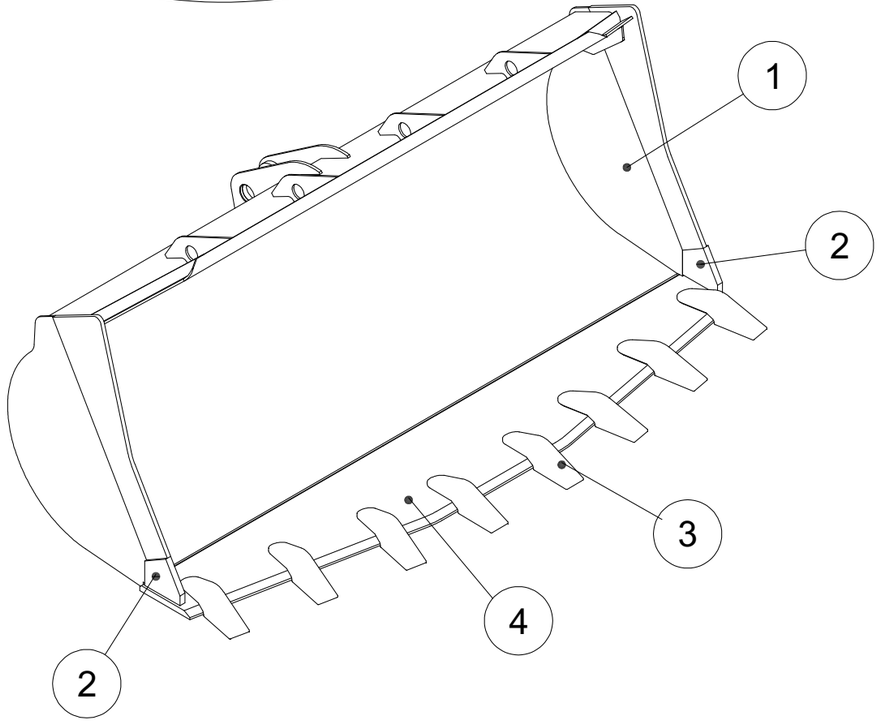


ITEM NO	PART NO	QTY	DESCRIPTION	M/c Serial No.
1	01 1510	1	LADDER	0000 ~
2	S230A AC 22065	8	SCREW	0000 ~
3	S260A AQ 01004	16	WASHER	0000 ~
4	01 2913	2	PLATE	0000 ~
5	01 2912	2	PLATE	0000 ~
6	01 2911	2	STRIP	0000 ~
7	S230A AC 22121	4	SCREW	0000 ~
8	S260A A1 01007	4	WASHER	0000 ~
9	S340C AN 33202	8	NUT	0000 ~
10	01 2877	1	STEP BOTTOM	0000 ~
11	01 1314	1	FUEL TANK (REFER CHAPTER NO: 1.8)	0000 ~
12	S230A AC 22156	4	SCREW	0000 ~
	01 3858	UQN	• LOCTITE 243	0000 ~
13	S260A A1 01008	4	WASHER	0000 ~
14	01 2048	1	BRACKET	0000 ~
15	01 0637	1	LINCH PIN	0000 ~
16	01 1822	2	HINGE PIN	0000 ~
17	S340C AN 33202	1	NUT	0000 ~
18	S230A AA 22063	1	SCREW	0000 ~

5.10 SPADE-NOSE BUCKET WITH WELD ON TOOTH – 2.0 CU.M

INDEX: A

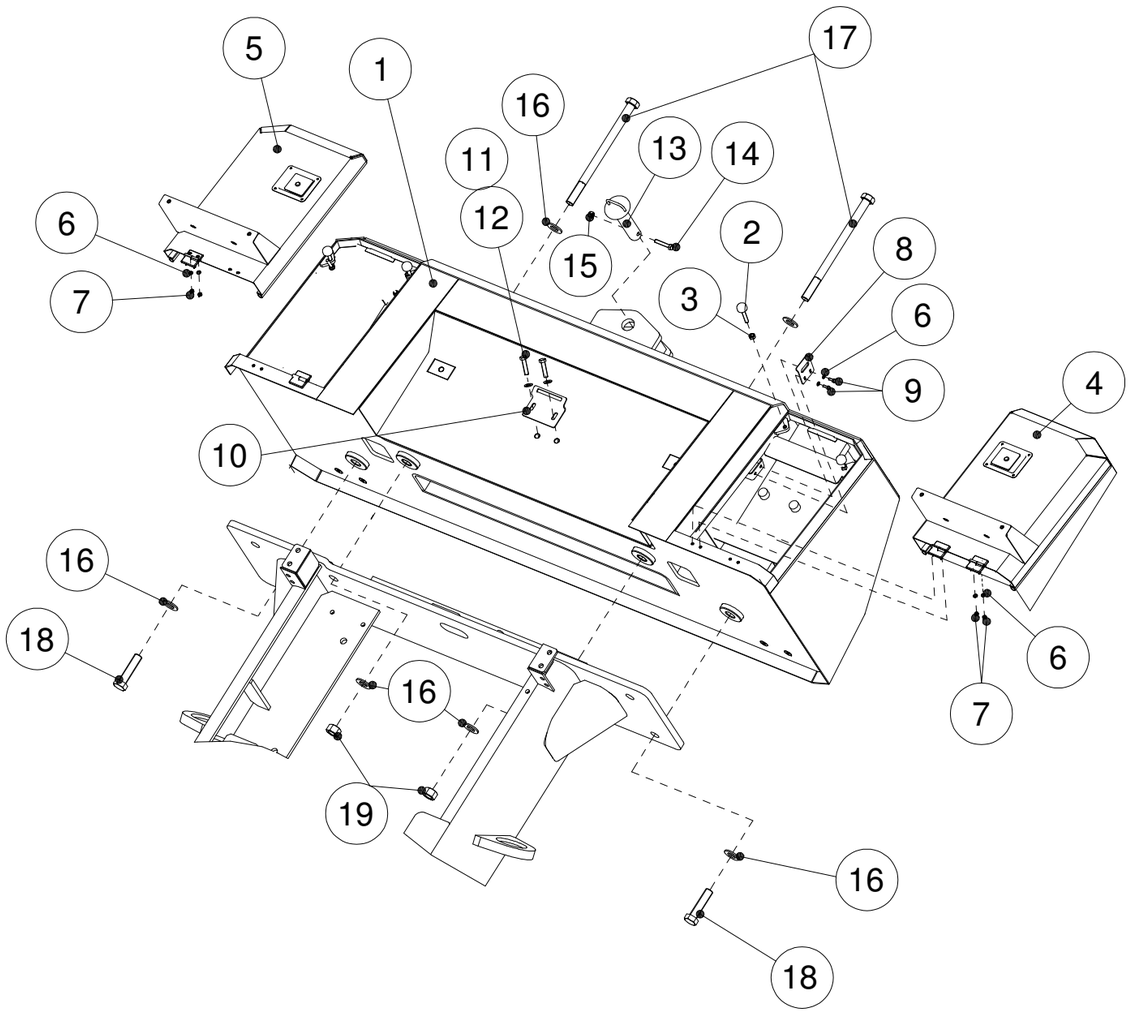




ITEM NO	PART NO	QTY	DESCRIPTION	M/c Serial No.
1	01 5372	1	BUCKET	0000 ~
2	01 2073	2	CUTTING EDGE	0000 ~
3	01 2830	8	TOOTH	0000 ~
4	01 5371	1	CUTTING EDGE	0000 ~
5	01 5374	1	SPADE BUCKET WITH WELD ON TOOTH – 2.0 CU.M	0000 ~

5.17 FILLED COUNTER WEIGHT

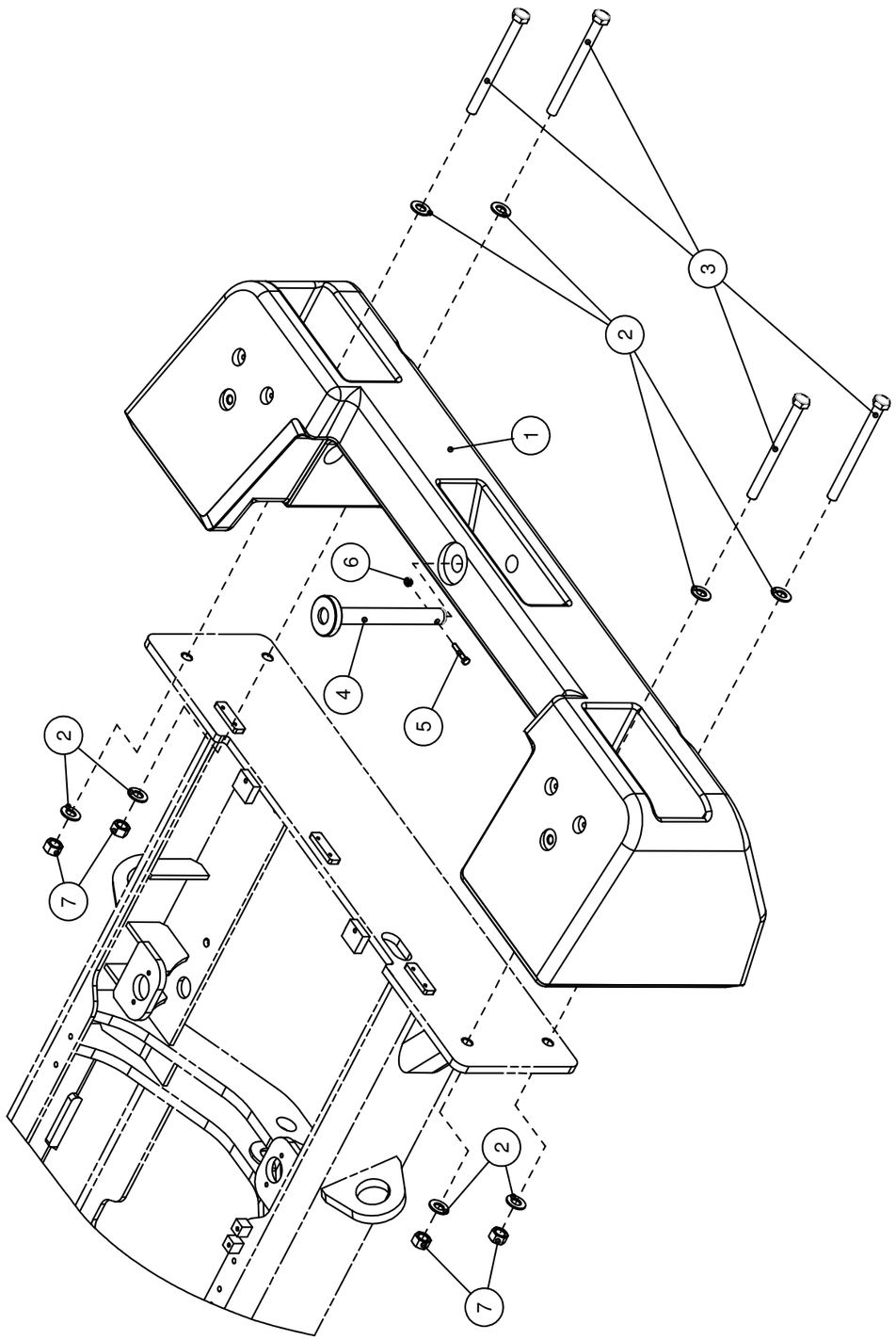
INDEX: A



ITEM NO	PART NO	QTY	DESCRIPTION	M/c Serial No.
1	01 4376	1	COUNTER WEIGHT	0060 & 0146 ~
2	01 4010	4	LEVELING PAD	0060 & 0146 ~
3	S220AAN02004	4	NUT	0060 & 0146 ~
4	01 4367	1	DOOR – LH	0060 & 0146 ~
5	01 4347	1	DOOR – RH	0060 & 0146 ~
6	S260AAQ01003	12	WASHER	0060 & 0146 ~
7	S230AAL02002	8	NUT	0060 & 0146 ~
8	01 4361	2	PLATE	0060 & 0146 ~
9	S230AA22042	4	SCREW	0060 & 0146 ~
10	01 4380	1	PLATE	0060 & 0146 ~
11	S260AAQ01004	2	WASHER	0060 & 0146 ~
12	S230AAA22062	2	SCREW	0060 & 0146 ~
13	01 4225	1	TOE BAR	0060 & 0146 ~
14	S210AAC00033	1	BOLT	0060 & 0146 ~
15	S340CAN33203	1	NUT	0060 & 0146 ~
16	S260AA201010	6	WASHER	0060 & 0146 ~
17	01 4381	2	BOLT	0060 & 0146 ~
18	S210AAB00112	2	BOLT	0060 & 0146 ~
19	01 0846	2	NUT	0060 & 0146 ~

5.18 COUNTER WEIGHT

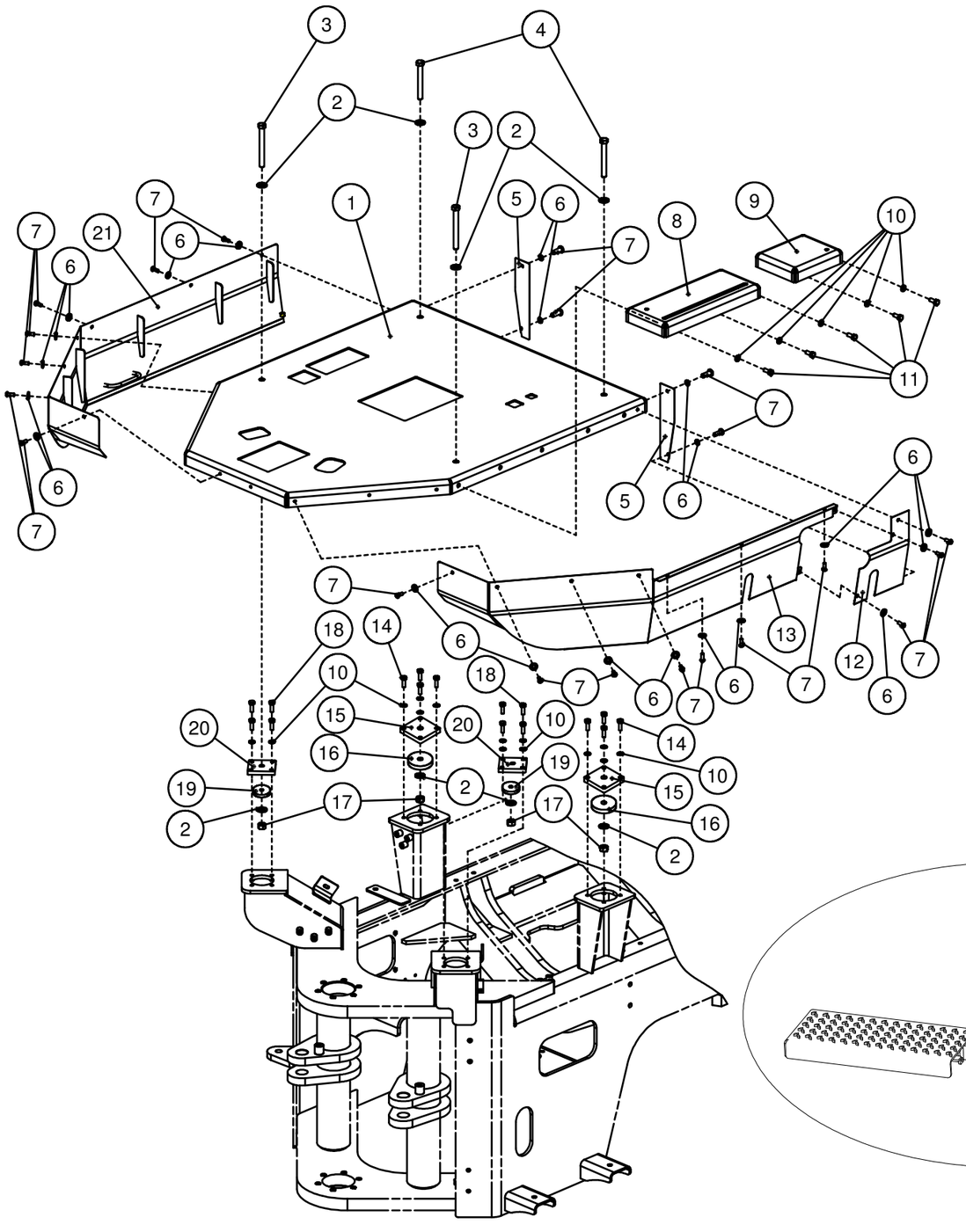
INDEX: B

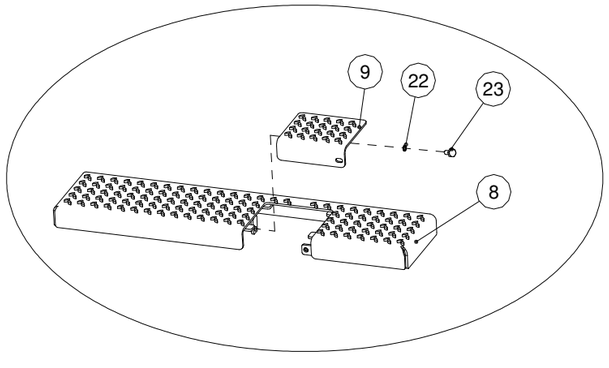


ITEM NO	PART NO	QTY	DESCRIPTION	M/c Serial No.
1	01 2058	1	COUNTER WEIGHT	0000 ~ 0059
				0061 ~ 0145
2	01 2654	8	WASHER	0000 ~ 0059
				0061 ~ 0145
3	01 2121	4	BOLT	0000 ~ 0059
				0061 ~ 0145
	01 3858	UQN	• LOCTITE 243	0000 ~ 0059
			•	0061 ~ 0145
4	01 2560	1	TOE BAR	0000 ~ 0059
				0061 ~ 0145
5	S210A AB 00033	1	BOLT	0000 ~ 0059
				0061 ~ 0145
6	S340C AN 33203	1	NUT	0000 ~ 0059
	01 3858	UQN	• LOCTITE 243	0000 ~ 0059
			•	0061 ~ 0145
7	S220A AP 02008	4	NUT	0000 ~ 0059
				0061 ~ 0145

6.1 FLOOR PLATE

INDEX: C





ITEM NO	PART NO	QTY	DESCRIPTION	M/c Serial No.
1	01 1298	1	FLOOR PLATE	0000 ~
2	S260AA101008	8	WASHER	0000 ~
3	S210AAC00080	2	BOLT	0000 ~
	01 3858	UQN	• LOCTITE 243	0000 ~
4	S210AAC 00076	2	BOLT	0000 ~
	01 3858	UQN	• LOCTITE 243	0000 ~
5	01 3061	2	PLATE	0000 ~
6	S260AAQ01003	21	WASHER	0000 ~
7	S230A AC 22042	21	SCREW	0000 ~
8	01 1519	1	PLATFORM	0000 ~ 0100
	01 5038	1	PLATFORM	0101 ~
9	01 3015	1	PLATFORM	0000 ~ 0100
	01 5039	1	PLATFORM	0101 ~
10	S260AAQ01005	21	WASHER	0000 ~
11	S230AAC22092	5	SCREW	0000 ~
12	01 3059	1	COVER	0000 ~
13	01 2893	1	COVER	0000 ~
14	S230AAC 22095	8	SCREW	0000 ~
15	01 3823	2	PLATE	0000 ~
16	01 3824	2	PLATE	0000 ~
17	S220AAN02006	4	NUT	0000 ~
18	S230A AC 22093	8	SCREW	0000 ~
19	01 3910	2	PLATE	0000 ~
20	01 3909	2	PLATE	0000 ~
21	01 2890	1	COVER	0000 ~
22	S260AAQ01004	1	WASHER	0101 ~
23	S230AAC22023	1	SCREW	0101 ~

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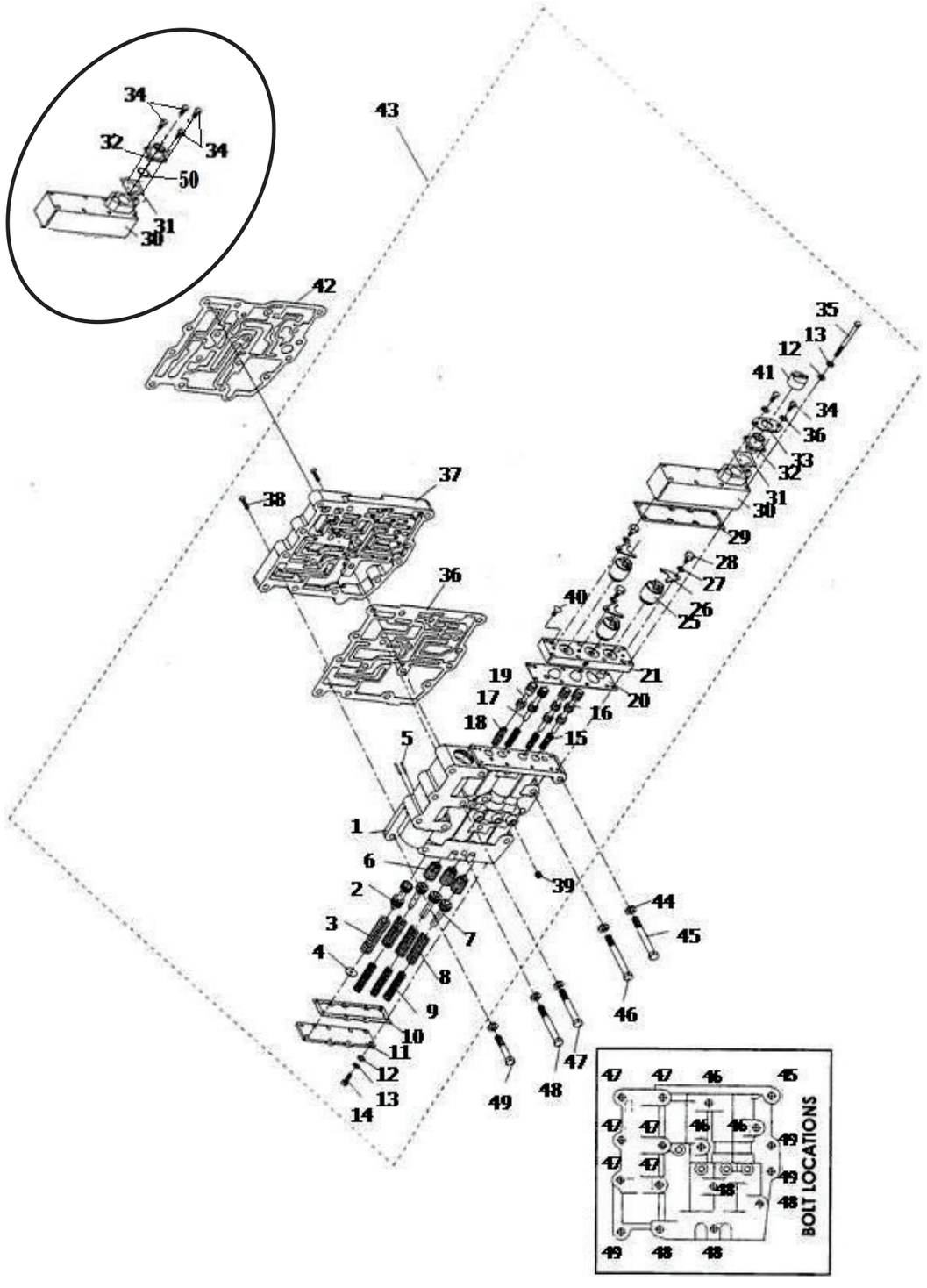
8.13 CONTROL VALVE ELECTRICAL SHIFTER



ITEM NO	PART NO	QTY	DESCRIPTION	M/c Serial No.
1	A001 0204	1	BODY CONTROL VALVE - W.O INCHING	0000 ~
2	A001 0205	1	VALVE - MAIN PRESSURE REGULATOR	0000 ~
3	A001 0206	1	SPRING - MAIN PRESSURE REGULATOR	0000 ~
4	A001 0207	1	PLATE – RETAINER	0000 ~
5	A001 0208	2	PIN SPRING – MPR	0000 ~
6	A001 0209	3	VALVE TRIMMER	0000 ~
7	A001 0210	3	PLUG VALVE TRIMMER	0000 ~
8	A001 0211	3	SPRING - TRIMMER VALVE PLUG	0000 ~
9	A001 0212	3	SPRING - TRIMMER VALVE PLUG	0000 ~
10	A001 0008	1	GASKET TRIMMER COVER	0000 ~
11	A001 0213	1	PLATE - TRIMMER COVER	0000 ~
12	A001 0214	17	WASHER - PLAIN A6	0000 ~
13	A001 0215	17	WASHER - SPRING B6	0000 ~
14	A001 0216	9	BOLT	0000 ~
15	A001 0217	3	SHIFT & CCO SPRING	0000 ~
16	A001 0218	2	VALVE – SHIFT	0000 ~
17	A001 0219	1	VALVE – CCO	0000 ~
18	A001 0220	1	SPRING	0000 ~
19	A001 0221	1	VALVE - SOLENOID PRESSURE REG	0000 ~
20	A001 0009	1	GASKET – SOLENOID PLATE	0000 ~
21	A001 0222	1	PLATE ASSEMBLY	0000 ~
22	A001 0223*	1	PLATE	0000 ~
23	A001 0224*	1	PIN PLUG DIA 4MM	0000 ~
24	A001 0225*	1	PLUG	0000 ~
25	A001 0226	3	SOLENOID	0000 ~
26	A001 0227	3	PLATE - SOLENOID RETAINER	0000 ~
27	A001 0215	3	WASHER SPRING	0000 ~
28	A001 0228	3	BOLT	0000 ~
29	A001 0010	1	GASKET SOLENOID COVER	0000 ~
30	A001 0229	1	COVER – SOLENOID	0000 ~
31	A001 0230	1	GASKET CONNECTOR	0000 ~
32	A001 0011	1	WIRING HARNESS ASSEMBLY	0000 ~
33	A001 0231	1	PLATE - RETAINER CONNECTOR	0000 ~0051 0053 ~ 0059 0061 ~ 0074
34	A001 0228	2	BOLT	0000 ~0051 0053 ~ 0059 0061 ~ 0074
	A001 0264	4	BOLT	0052 & 0060 0075 ~
35	A001 0232	8	BOLT	0000 ~
36	A001 0007	1	GASKET – VALVE BODY	0000 ~
37	A001 0233	1	PLATE - OIL TRANSFER	0000 ~
38	A001 0234	2	CSK SCREW	0000 ~
39	A001 0225	4	PLUG	0000 ~
40	A001 0235	2	HEX SOCKET HEAD CAP SCREW	0000 ~
41	A001 0236	1	CAP SHIPPING	0000 ~
42	A001 0006	1	GASKET	0000 ~
43	A001 0237	1	ELECTRICAL CONTROL VALVE ASSEMBLY	0000 ~

* SERVICED ONLY AS AN ASSEMBLY – NOT AVAILABLE AS A DETAIL PART

CONTROL VALVE ELECTRICAL SHIFTER

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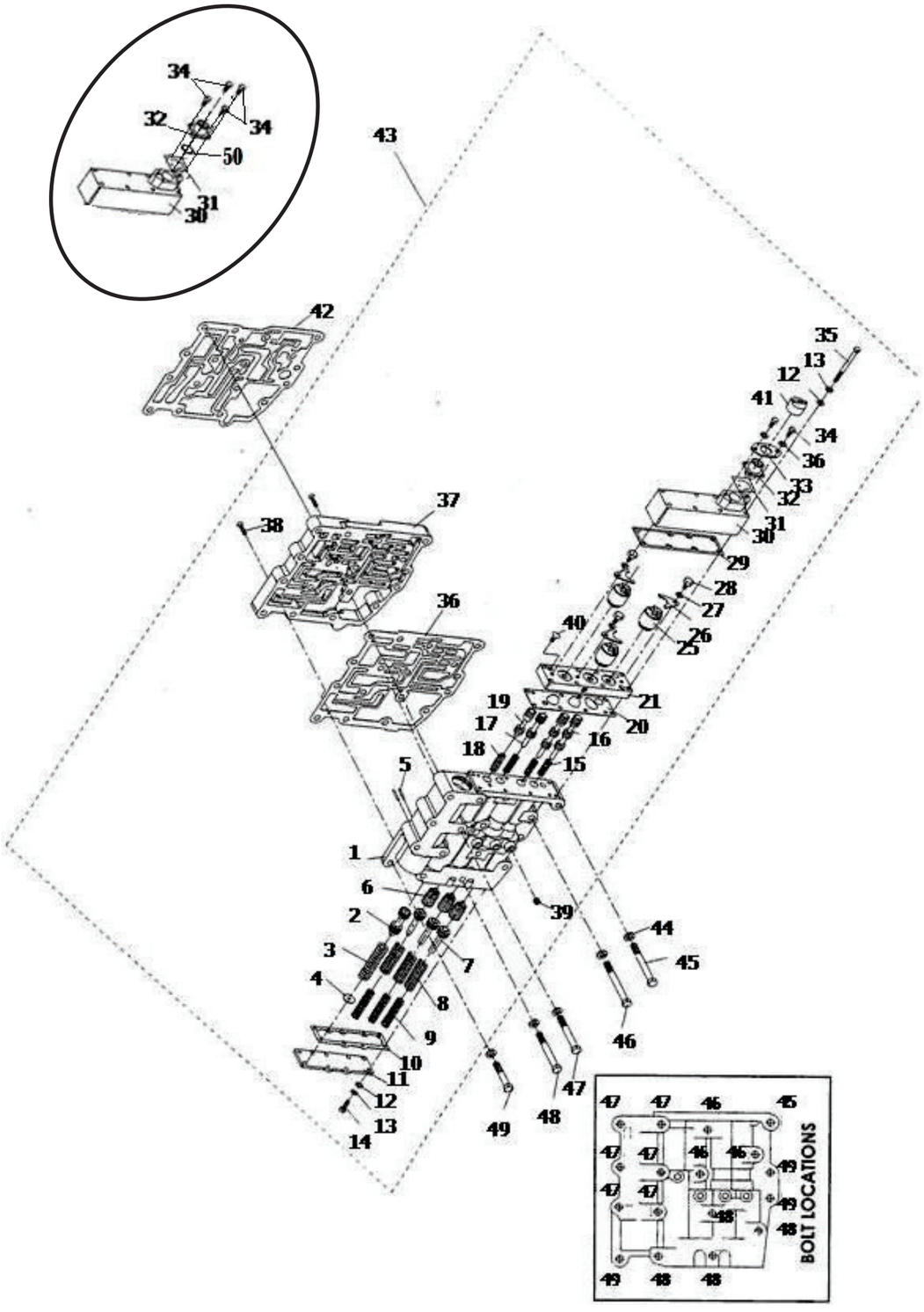


ITEM NO	PART NO	QTY	DESCRIPTION	M/c Serial No.
44	A001 0113	17	WASHER LOCK	0000 ~
45	A001 0238	1	HEX HEAD BOLT	0000 ~
46	A001 0192	3	HEX HEAD BOLT	0000 ~
47	A001 0239	6	HEX HEAD BOLT	0000 ~
48	A001 0240	4	HEX HEAD BOLT	0000 ~
49	A001 0241	3	HEX HEAD BOLT	0000 ~
50	A001 0003	1	O-RING	0052 & 0060 0075 ~

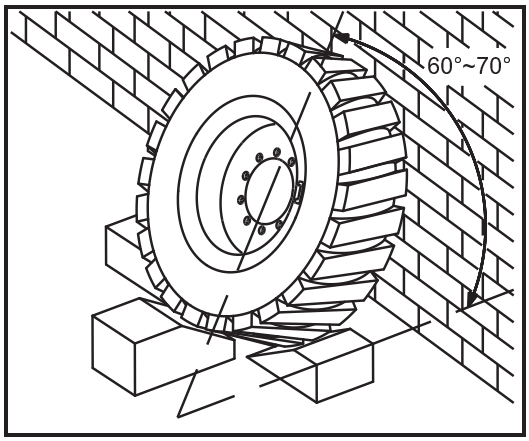
- ❖ Use the specified tyres.

- If the tyres are not used under these specified conditions, they may be cut and burst by sharp stones on rough road surfaces. They may also overheat and burst.

- Disassembly, repair, and assembly of tyres require specialist equipment skill. So please ask your specialist tyre repair shop to carry out repairs.

⚠ CAUTION

If the tyre should fall over, get out of the way quickly. The tyres for construction equipment are extremely heavy. So trying to hold the tyre may lead to serious injury.



- While storing the tyres, stand the tyre on level ground, and block it securely, so that it cannot roll or fall over.

1.4.5 Precautions with Load and Carry Method

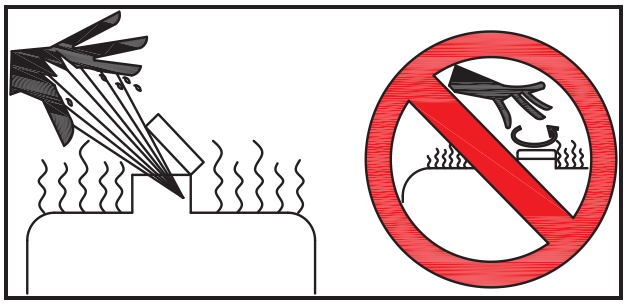
- When travelling continuously with load and carry operations, choose the correct tires to match the operating conditions, or choose the operating conditions to match the tyres.

- If this is not done, the tyre will be damaged. This will reduce the tyre life, so contact your L&T dealer when selecting tyres.

1.4.6 Checking Radiator Coolant Level

⚠ WARNING

Do not open the radiator cap immediately after operations are stopped. Always wait for the temperature to go down and proceed further. Failure to do so may lead to splashing of hot coolant on your body causing injury.



- Before checking the coolant level of radiator, stop the engine and wait for the engine to cool down, and then carry out the inspection.

- While opening the radiator cap, open slowly to release the internal pressure and prevent the hot coolant splashes outside.

1.4.7 Working with Electrical systems

- Before working with batteries, stop the engine, turn the starting switch to OFF position and disconnect the battery using battery disconnect switch.

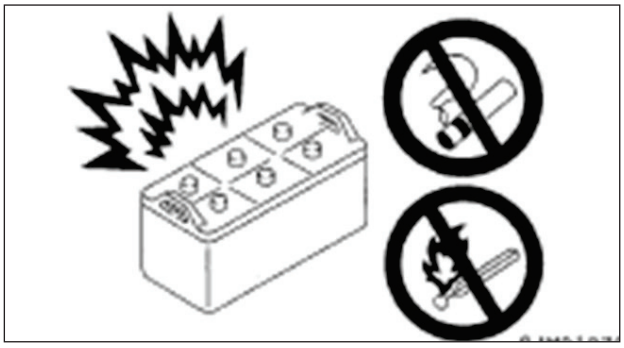
- Avoid short circuiting the battery terminals with metallic objects such as tools, across the terminals.

- Do not use or charge the battery if the battery electrolyte level is below the LOWER LEVEL line. This may cause an explosion. Always check the battery electrolyte level periodically and add distilled water to bring the electrolyte level to the UPPER LEVEL line.

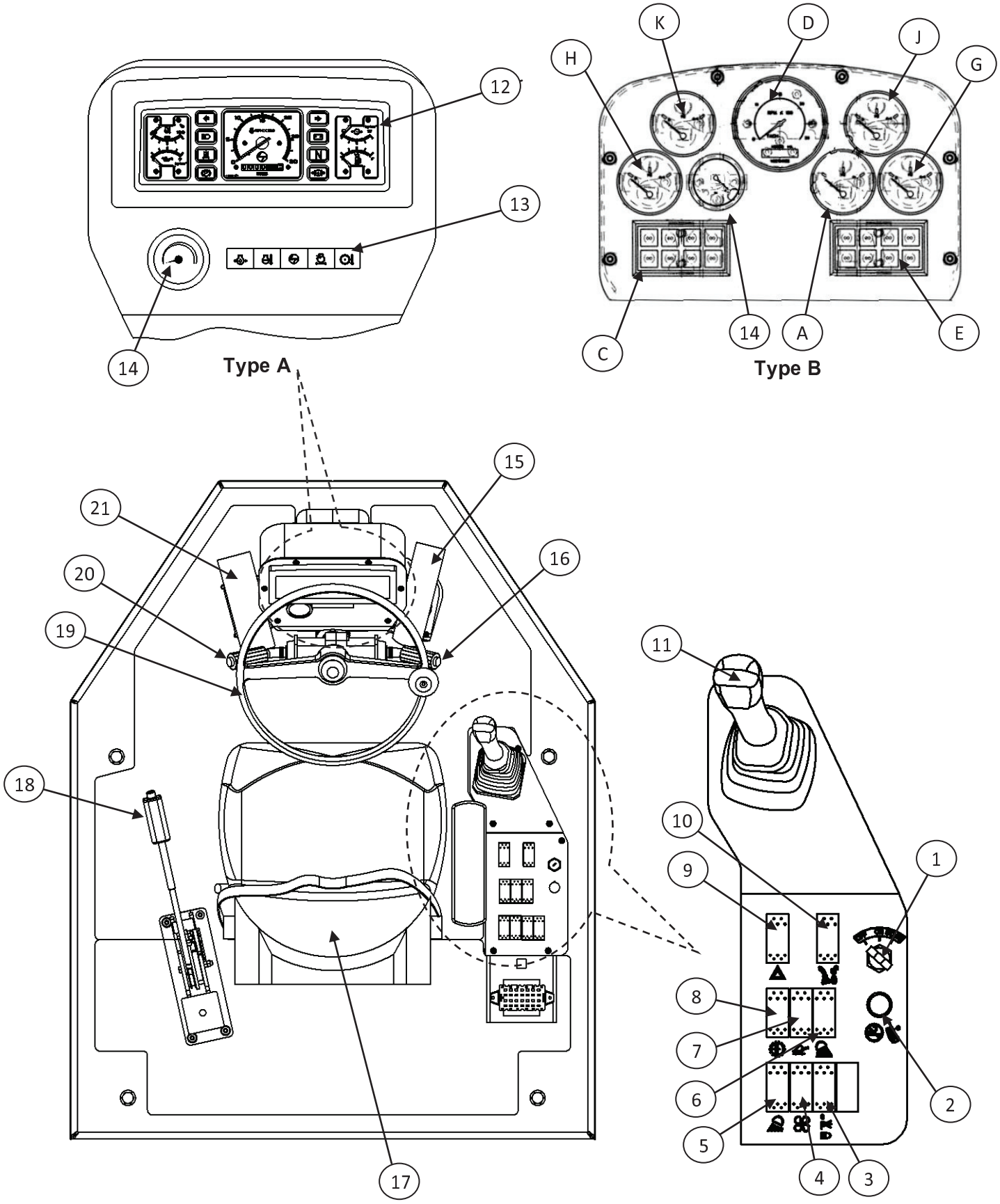
- Always disconnect the negative (-) terminal (ground side) first when removing the battery. When installing the battery, connect the positive (+) terminal first, and connect the ground last. Tighten the battery terminals securely.

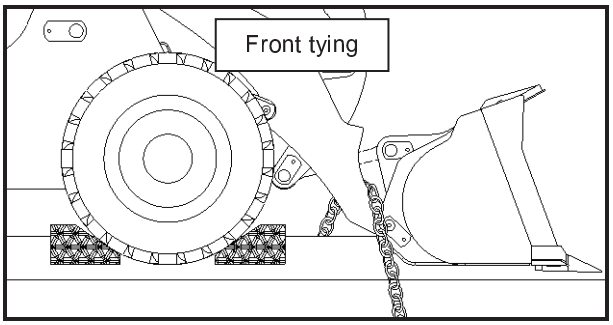
- Flammable hydrogen gas is generated when the battery is charged, so remove the battery from the chassis, take it to a well-ventilated place, and remove the battery caps before charging it.

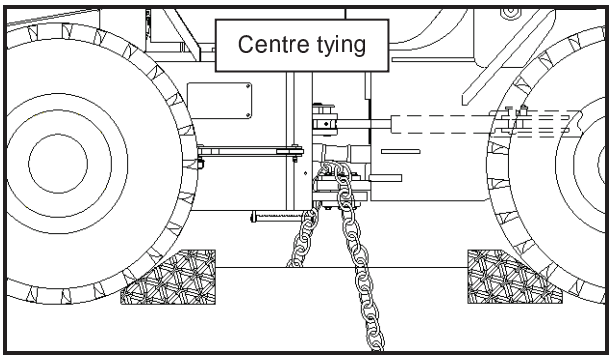
- Never smoke or use any flame near the battery.

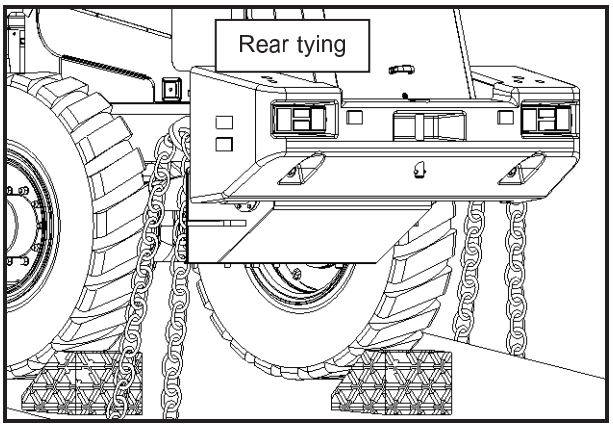


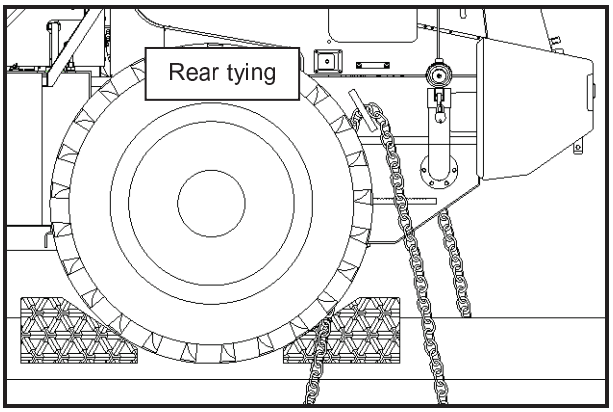
2.2 Controls and Gauges











⚠ CAUTION

Always take care when handling rope or chain will lead injury.

*****

2.4 General Checks before Starting

⚠ DANGER

Before starting the engine, following inspections have to be performed on your loader to make it ready to operate:

- *Walk around check*
- *Bucket should be lowered, so that it does not hinder visibility.*
- *Parking brake should be in fully applied condition.*
- *Transmission and hydraulic system controls should be in Neutral condition.*

⚠ WARNING

Do not leave spilled-out or leaked-out oil, fuel or other flammable materials near the high temperature parts such as exhaust muffler, turbo charger, etc. Failure to do so may lead to fire. Wipe / clean them immediately, if found.

2.4.1 Walk-Around Check

⚠ CAUTION

Remove any waste paper or dead leaves inside the engine compartment. These may cause fire.

- Look around the machine and under the machine for the following inspections.
  - Walk around machine, checking for people, animals, or objects that might be in the way or under the machine.
  - Make sure that the attachment and all pivot pins are secured correctly in place and in good condition.
  - Check wheel nuts and axle nuts are not loosened. Tighten if they are loose (refer chapter 0)
  - Ensure proper AC compressor belt tension.
  - No air leaking from the cabin to maintain proper temperature.
  - No fouling of hoses in the AC circuit.
  - No leakage of oil, fuel, lubricant, and Coolant.
  - No loose wiring connections.
  - No wear and damage of the tyres.

with poor visibility. Keep your machine rear view mirrors always clean and in good condition. Failing may affect your visibility.

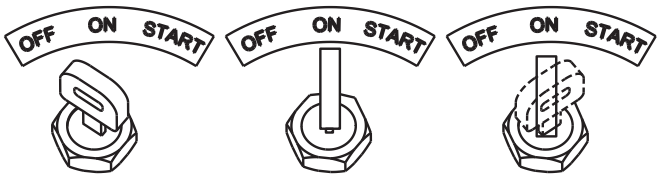
2.5.2 Starting engine

NOTICE: Keep the direction control switch in neutral. If it is not in neutral, the engine will not start.
Ensure AC switch is in off condition before starting on & switching off the engine.

⚠ CAUTION

Do not start the engine when the joystick is not in neutral position. Failure to do so will make the lift arm or bucket move suddenly, causing personnel injury or damage to your machine.

NOTICE: Do not keep the starting motor rotating continuously for more than 20 seconds. Failure to do so will damage your motor or will discharge the battery.



- Insert the ignition key in ignition switch, turn the key to "ON" position
- Check that all the indicator lamps in the cluster glow for 5 seconds continuously. This ensures that the lamps are working properly. If any lamp does not glow, do not start your loader. Contact your service personal for replacement of those lamps.
- Check whether the parking brake lamp glows continuously even after 5 seconds. If it does not glow, apply the parking brake first.

⚠ DANGER

If the machine has to be started on a slope, always turn transmission cut-off switch in OFF condition and depress the brake pedal. Then start the engine and depress the accelerator pedal while releasing the brake pedal to move the machine slowly.

- Turn the key of starting switch to the "START" position to start the engine.
- This will crank the engine. After the engine is started, release the ignition key and the key will return automatically to "ON" position.
- If the engine does not start, wait for at least 2 minutes before trying to restart the engine again.
- If still it does not start, slightly depress the accelerator pedal at the right side of dash board, and then retry starting.

2.5.3 After starting

NOTICE: After starting the engine, do not start operating your loader immediately. Perform the checks after starting and then start operating.

Checks after starting

- Depress accelerator pedal slightly and run the engine with no load at mid-range speed for about 5 minutes.
- Check the engine oil pressure gauge, for pointing the pressure in green zone.
- If the engine lubricating oil pressure gauges does not register oil pressure or it is not in the green zone within 10 to 15 seconds, shut-off the engine to prevent any damage until the trouble is corrected.

NOTICE: Do not run your engine with low engine lubricating oil pressure. This will damage the engine parts and reduce the engine life.

- Check the battery charging indicator lamp extinguish automatically.

⚠ DANGER

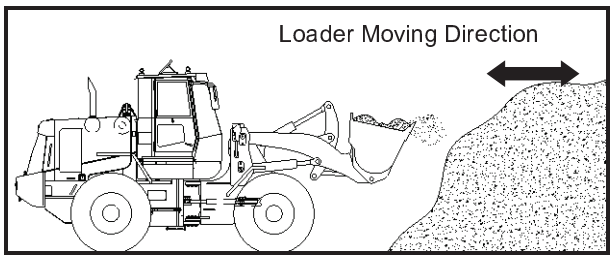
Do not move the machine until the brake oil pressure indicator extinguishes automatically. Failure to do so will cause your brakes to fail and may cause accident killing you or nearby personnel.

- Check the brake oil pressure indicator lamp extinguish automatically. If it does not extinguish, do not try to move the machine. Raise the engine speed and wait for the lamp to extinguish.
- Check the engine sound and exhaust gas colour are normal.
- Check the horn for proper working.
- Check the head lamps to work properly.
- Check the cut-off sensors of the work equipment to work properly. To know the operation of work equipment refer chapter 2.7.

- Scoop some more soil into the bucket, put the lift arm in float, level the bucket at ground level, and smooth the ground by moving backward.

NOTICE: Always move the machine backward during levelling operation. If it is necessary to carry out forward levelling operation, do not set the bucket dumping angle to more than 20° and do not dig the bucket into the ground. This will prevent quick wear and damage of the work equipment and frame.
During levelling operation, put Joy-stick in floating mode.

2.9.7 Pushing operation



- This operation is carried out to level the material which is dumped on the dumper, hopper, etc.
- Never set the bucket to the dump position, when carrying out pushing operation. When carrying out pushing operation, set the bottom of the bucket parallel to the ground surface.

*****

2.10 After Operation

2.10.1 Checks after operation

- After completion of work, check the engine coolant temperature, engine oil pressure, transmission oil temperature, and fuel level.
- Service meter reading should be checked out every day for any necessary maintenance to be carried out.

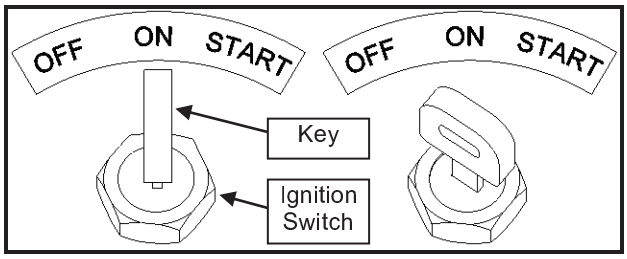
2.10.2 Parking the machine

- Release accelerator pedal, and depress brake pedal to stop the machine.
- Place the drive control switch in neutral.
- Operate the joystick to lower the bucket to the ground (refer chapter 2.7).
- Make sure that the joystick is in neutral position, before leaving from the cabin.
- To apply the parking brake, follow the instructions given in chapter 2.12.1.

NOTICE: Do not stop the engine, unless you follow the above instructions.

2.10.3 Stop the engine

NOTICE: If the engine is overheated, do not abruptly stop it (except in case of emergencies). Run the engine at medium speed to allow it to cool gradually. Check the oil temperature gauge. If it reaches the green scale, stop the engine. Failing to follow will reduce the engine life.



- **Electric engine shut-off** - Turn the key in ignition switch to the OFF position, which will stop the engine. Remove the key from ignition switch.

2.10.4 Checks after stop the engine

- Perform Walk-around checks as given in chapter 2.4.1.
- Check the tyres for damage, trapped stones in the tyre buttons and cracks.
- Check for leakage of oil, fuel, and coolant. If any leakage or abnormality is found, contact your service personnel.
- Check the fuel level and top up the fuel tank.
- Remove any mud stuck to the under the entire machine.

*****

First time Maintenance - Table 1

S.No	SERVICE POINTS	CONSUMABLE	QTY	PLACES	INSTRUCTIONS
AFTER FIRST 250 HOURS WITH NEW MACHINE					
1	ENGINE CRANK CASE OIL-BSII/BSIII***	ENGINE OIL	16.5 L	1	DRAIN & REFILL
2	ENGINE CRANK CASE OIL-ALH6 ***	ENGINE OIL	14 L	1	DRAIN & REFILL
AFTER FIRST 500 HOURS WITH NEW MACHINE					
3	ENGINE CRANK CASE OIL-ALH6 *** (Refer **Note**)	ENGINE OIL	14 L	1	DRAIN & REFILL
AFTER FIRST 50 HOURS WITH NEW MACHINE					
4	DRIVE BELT TENSION	--	--	1	CHECK & ADJUST
AFTER FIRST 100 HOURS WITH NEW MACHINE					
5	TRANSMISSION OIL FILTER ** (ELEMENT)	--	--	1	CHANGE
AFTER FIRST 200 HOURS WITH NEW MACHINE					
6	AXLE CENTRAL HOUSING OIL	AXLE OIL	26L(F)/26L(R)	2	DRAIN & REFILL
7	AXLE PLANETARY OIL			4	

Periodic Maintenance - Table 2

S.No	SERVICE POINTS	CONSUMABLE	QTY	PLACES	INSTRUCTIONS
AFTER EVERY 10 HOURS (DAILY CHECK)					
8	ARM - CHASSIS PIN	GREASE	--	2	APPLY GREASE
9	CHASSIS - TILT CYLINDER PIN			1	
10	CRANK - TILTCYLINDER PIN			1	
11	CHASSIS – LIFT CYLINDER PIN			2	
12	ARM – LIFT CYLINDER PIN			2	
13	CRANK – CROSS PIN			1	
14	BUCKET – LINK PIN			2	
15	CRANK – LINK PIN			1	
16	BUCKET - ARM PIN			2	
17	REAR AXLE TRUNNION PINS			2	
18	UPPER AND LOWER CHASSIS PIVOTS			2	
19	TRANSMISSION OIL *	TRANSMISSION OIL	--	1	CHECK LEVEL / ADD
20	ENGINE CRANK CASE OIL ***	ENGINE LUBRICATION OIL	--	1	
21	RADIATOR COOLANT	ENGINE COOLANT	--	2	
22	HYDRAULIC OIL	HYDRAULIC OIL	--	1	

Periodic Maintenance - Table 3

Sl. No	SERVICE POINTS	CONSUMABLE	QTY	PLACES	INSTRUCTIONS
AFTER EVERY 50 HOURS					
23	PROPELLER SHAFT UNIVERSAL JOINTS &SLIP SPLINES	GREASE	--	8	APPLY GREASE
24	FRONT PROPELLER SHAFT SUPPORT BEARING			1	
25	STEERING CYLINDER PIN			4	
26	WATER SEPARATOR ***	--	--	1	DRAIN WATER
27	CABIN AIR FILTER	--	--	1	CLEAN
28	CONDENSER	--	--	1	AIR & WATER CLEAN
29	COMPRESSOR MOUNTINGS	--	--	1	CHECK & ADJUST
AFTER EVERY 200 HOURS					
30	DRIVE BELT TENSION	--	--	1	CHECK & ADJUST
31	ENGINE WATER PUMP BEARING	GREASE		1	APPLY GREASE
32	AXLE PLANETARY OIL	AXLE OIL		4	CHECK LEVEL / ADD
AFTER EVERY 250 HOURS					
33	ENGINE CRANKCASE OIL-BSII/BSIII ***	ENGINE OIL	16.5 L	1	DRAIN & REFILL
34	ENGINE CRANKCASE OIL-ALH6 ***	ENGINE OIL	14L	1	DRAIN & REFILL
35	ENGINE OIL FILTER *** (FILTER ELEMENT & SEALING RING)	--	--	1	CHANGE
36	FUEL FILTERS ***(FILTER INSERTS PRIMARY, SECONDARY & SEALING RINGS)	--	--	2	CHANGE
37	AXLE CENTRAL HOUSING OIL	AXLE OIL	--	2	CHECK LEVEL / ADD
38	OPERATOR SEAT SLIDE RAILS	GREASE		1	APPLY GREASE
39	TRANSMISSION OIL FILTER** (ELEMENT)	--		1	CHANGE
AFTER EVERY 500 HOURS					
40	ENGINE CRANKCASE OIL-ALH6 *** (Refer **Note**)	ENGINE OIL	14L	1	DRAIN & REFILL
41	WATER SEPARATOR ***	--	--	1	CLEAN
42	HYDRAULIC OIL FILTER (ELEMENT)	--	--	1	CHANGE
43	BRAKE ACCUMULATOR	NITROGEN GAS	40 BAR	2	CHECK / REFILL
44	BATTERY	ELECTROLYTE	--	2	CHECK LEVEL / ADD
AFTER EVERY 1000 HOURS					
45	TRANSMISSION OIL (TOTAL SYSTEM) *	TRANSMISSION OIL	31 L	1	DRAIN & REFILL
46	HYDRAULIC OIL (TOTAL SYSTEM)	HYDRAULIC OIL	140 L	1	

47	TRANSMISSION OIL STRAINER	--	--	1	CLEAN
48	TRANSMISSION BREATHER	--	--	1	
49	HYDRAULIC TANK SUCTION STRAINER	--	--	1	

AFTER EVERY 1500 HOURS					
50	AXLE CENTRAL HOUSING OIL	AXLE OIL	26L(F)/ 26L(R)	2	DRAIN & REFILL
51	AXLE PLANETARY OIL			4	
AFTER EVERY 1875 HOURS					
52	RADIATOR COOLANT	ENGINE COOLANT	49L	1	DRAIN & REFILL

CHECK WHEEL NUT TORQUE INTIALLY AFTER 10hrs. & PERIODICALLY AFTER EVERY 200hrs.

* With oil warm, Transmission in neutral and engine at low idle.
** Replace the transmission oil filter after first 100 hours if new or the transmission has been repaired.
*** Change as recommended by the Engine Manufacturer.

Note: - For 500hrs replacement use GULF LEYPOWER XLL DIESEL OIL in ALH6 engine

When Required - Table 4

a.	APPLY GREASE FOR SERVICE BRAKE, PARKING BRAKE & ACCELERATOR PEDAL PIVOTS
b.	CLEAN THE PRIMARY OF AIR FILTER ELEMENT WHEN THE AIR FILTER CLOG INDICATOR SHOWS RED BAND ON THE TRANSPARENT GLASS, REPLACE THE PRIMARY AFTER 2 INTERVALS. SAFETY CATRIDGE OF AIR FILTER ELEMENT SHOULD BE REPLCAED ATER 2 YEARS OF DURATION OR AT THE TIME OF THIRD REPLCAMENT OF THE PRIMARY CARTRIDGE, WHICHEVER COMES FIRST.
c.	REPLACE HYDRAULIC OIL FILTER ELEMENT WHENEVER THE HYDRAULIC FILTER CLOG INDICATOR GLOWS.
d.	CHECK WHEEL NUT TORQUE AND TYRE PRESSURE AS INDICATED
e.	CLEAN THE RADIATOR CORE, THERMOSTAT VALVE & CHANGE THE COOLANT
f.	REPLACE THE BOLT ON CUTTING EDGE, BUCKET TEETH & BOLTS (IF NECESSARY)
g.	PARKING BRAKE - CHECK & ADJUST
h.	ADJUST ENGINE VALVE CLEARANCE AND CHECK THE INJECTOR
i.	CHECK FINAL DRIVE SYSTEM, TIGHT THE LOCK NUT AND CHANGE WASHERS FOR PLANET GEARS
j.	LUBRICATE ENGINE FAN BEARING
k.	TIGHTNESS OF BOLT ON DRIVE SHAFT SHAFTS, AXLE, RIM AND MOUNTINGS OF ENGINE, TRANSMISSION & RADIATOR

- Check the battery electrolyte level at every 4 weeks.
- For detailed information on Engine maintenance, refer Engine Operators Manual.
- For detailed information on Transmission maintenance, refer Transmission Operators Manual.

*****

3.3 Consumables

- Consumables (service items) which are required for the maintenance of your machine are listed in the table as follows along with the total Quantity & manufacturer's names.
- Oil(s) used in the engine, transmission, and work equipment are under extremely severe conditions (high temperature and high pressure).
- Always use oil(s) given in the chapter 3.3. Even if the oil is not dirty; always replace the oil after the specified Intervals.
- Always add specified volume of oil. Increase or decrease in the volume of oil will cause problem.
- The majority of problems with machine are caused by the entry of impurities. Take particular care not to let any impurities get into that when storing or adding oil.
- When changing the oil, always replace the related filters at the same time.
- The fuel pump of the engine is precision equipment, and if the fuel containing water or dirt is used, it cannot work properly. Always be careful not to let impurities get in when storing or adding fuel.
- To prevent the moisture in the air from condensing and forming water inside the fuel tank, always fill the fuel tank after completing the day's work.
- Before starting the engine, or when 10 minutes have passed after adding fuel, drain the sediment and water from the fuel tank.
- If the engine runs out of fuel, or if the filters have been replaced, it is necessary to bleed the air from the fuel line.
- Do not use water for radiator. Always use coolant given in the chapter 3.3.10
- The anti - freeze can be used continuously for two years or 4000 hours. Therefore, it can be used as it is even in hot areas.
- The proportion of anti - freeze to water differs according to the ambient temperature.
- If the coolant level is low, it will cause overheating and will also cause problems with corrosion from the air in the coolant.
- If the engine temperature is high than the recommended limit, wait for the engine to cool before adding coolant.
- Grease is used to reduce noise and wear & tear of the parts at joints.
- When greasing, always wipe and clean all the old grease. Be particularly careful to wipe off the old grease in places where sand or dirt sticking in the grease would cause damage and wear to the rotating parts.
- Keep it in indoors to prevent any water, dirt, or other impurities from getting in.
- If drum cans have to be stored outside, cover them with a waterproof sheet or take other measures to protect them.
- To prevent any change in quality during long - term storage, be sure to use in the order of first in - first out (use the oldest oil or fuel first).

Refill Capacities

S. No	CONSUMABLES	QTY in Litres
1	Fuel (Diesel)	192
2	Engine lubrication oil - BSII & BSIII	16.5
3	Engine lubrication oil - ALH6	14
4	Engine Coolant	42
5	Hydraulic Oil (Total system)	110
6	Transmission Oil	38
7	Axle Oil	28 (each)
8	Battery Electrolyte	9 (each)

NOTICE: When changing and adding oil (or) coolant do not use different grade of oil (or) coolant.

3.3.1 Fuel

- Use commonly available Diesel as fuel for the engine.

NOTICE: Do not use petrol in this machine. Do not mix petrol with diesel fuel.

3.3.2 AC Refrigerant

- Use 1.5 kg of R134A gas as refrigerant for AC.

3.3.3 Battery Electrolyte

- Use distilled water as electrolyte for Batteries.

3.3.4 Engine Coolant

- Use commonly available Coolant for Copper-Brass Radiator with 20% EURO COOL (MAX).

NOTICE: River water contains large amounts of calcium and other impurities, so if it is used, scale will stick to the engine and radiator, and this will cause defective heat exchange and overheating.

3.3.5 Engine Lubrication Oil

S.No	ENGINE	SPECIFICATION	BRAND NAME	MANUFACTURER
1	BSII	TYPE: API CF-4 + MB228.1 SAE GRADE:SAE15W-40	SUPER FLEET MAX SAE 15W-40	GULF OIL INDIA
2			SERVO PREMIUM ALT 15W-40	INDIAN OIL CORPORATION
3	BSIII	TYPE: API CI-4 PLUS SAE GRADE:SAE15W-40	GULF SUPREME DUTY LE	GULF OIL INDIA
4			GULF SUPERFLEET LE DURA MAX	GULF OIL INDIA
5	ALH6	TYPE: API CI-4 PLUS SAE GRADE:SAE15W-40	GULF LEYPOWER XLL DIESEL OIL (service – 500 hrs.)	GULF OIL INDIA
6			GULF SUPREME DUTY LE	GULF OIL INDIA
7			GULF SUPERFLEET LE DURA MAX	GULF OIL INDIA

3.3.6 Grease

S.No	SPECIFICATION	BRAND NAME	MANUFACTURER
1	EP2	SERVO GEM EP2	INDIAN OIL CORPORATION
2		CASTROL EPL2	CASTROL INDIA LIMITED
3		BALMEROL LIPREX EP2	BALMER LAWRIE & CO. LIMITED
4		SHELL ALVANIA GREASES EP2	SHELL LUBRICANTS

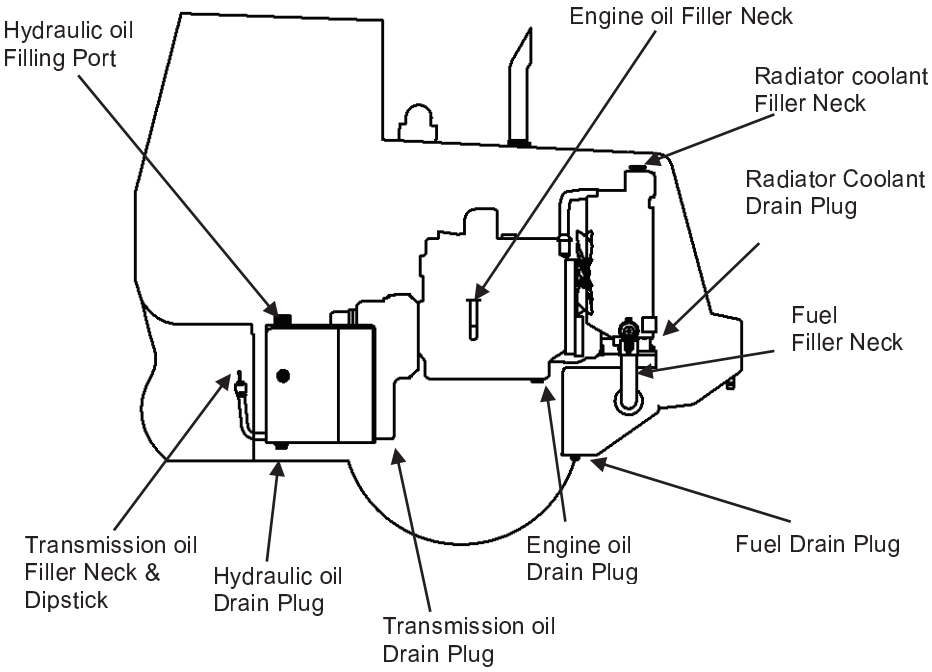
3.3.7 Hydraulic Oil

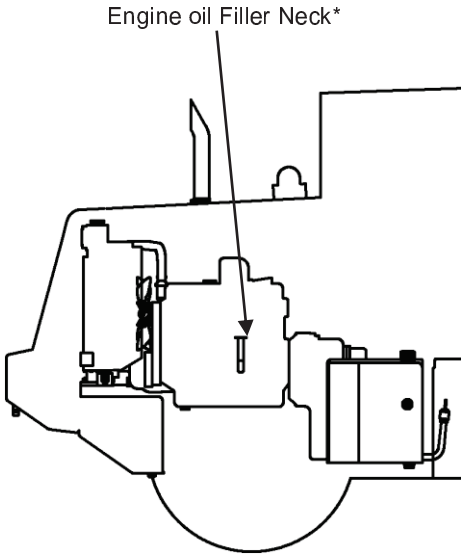
S.No	SPECIFICATION	BRAND NAME	MANUFACTURER
1	ISO VG 68	MAK HYDROL HLP 68	BHARAT PETROLEUM (BPCL)
		HYSPIN AWS 68	CASTROL
		SERVOSYSTEM HLP 68	INDIAN OIL (IOCL)
		HARMONY AW SC 68	GULF OIL (GOCL)
		TELLUS 68	SHELL
		ENKLO HLP 68	HIDUSTAN PETROLEUM (HPCL)

3.3.8 Transmission Oil

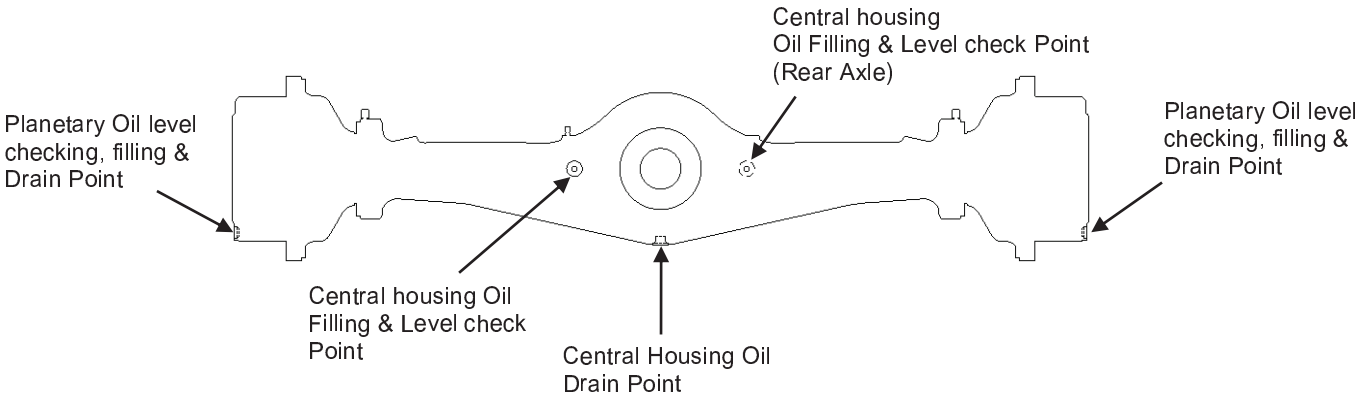
S.No	SPECIFICATION	BRAND NAME	MANUFACTURER
1	TYPE : C4 SAE GRADE : SAE 30	POWER GLIDE C-430	HINDUSTAN PETROLEUM CORPORATION
2		SERVO TRANSMISSION FLUID	INDIAN OIL CORPORATION
3		BHARAT HYDRAULIC TRANSMISSION FLUID	BHARAT PETROLEUM CORPORATION

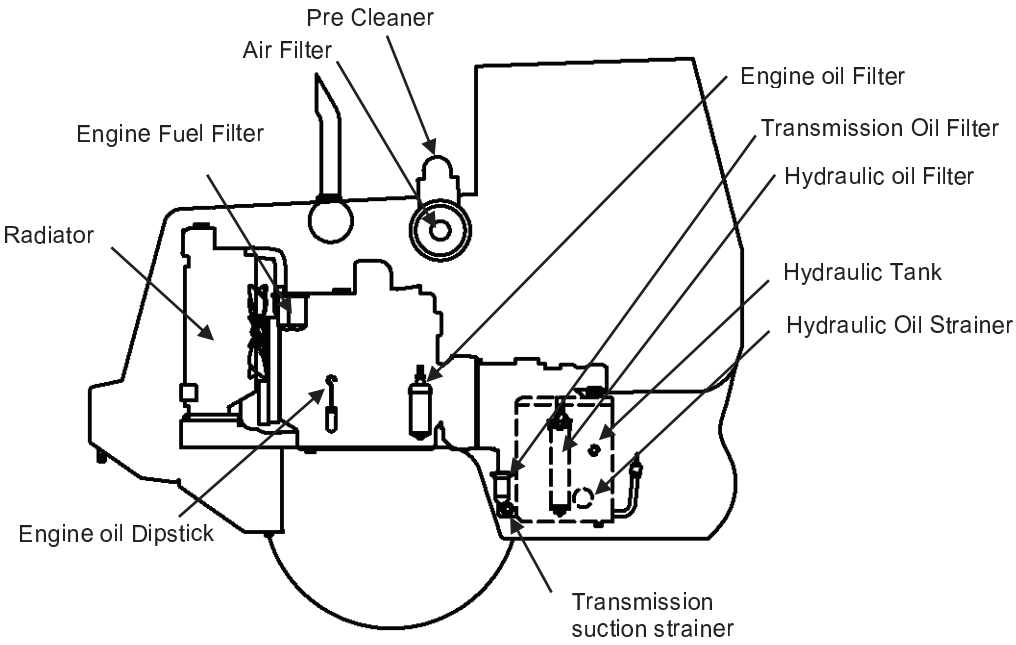
3.4 Location of Maintenance Elements





*Note: For ALH series Engine





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- If any part of the hydraulic system is to be removed for replacement/repair, clean the part thoroughly before removal.
- Use clean tools and keep the parts in a clean place.

3.5.14 Checking Hydraulic Oil Level

General instructions

- Check the hydraulic oil level, before starting the day's work.
- Ensure the bottom of the loader bucket is flat on the ground.

Procedure

- Before checking hydraulic oil level in sight gauge, slowly loosen the breather to release the pressure in tank & tighten it.
- After 5 minutes, check hydraulic oil level using Sight gauge in the Hydraulic tank.
- Hydraulic oil level should be in the middle of the Sight gauge.
- If the Hydraulic oil level is below the Sight gauge, fill the Oil until it reaches the middle of the Sight gauge again. Use the Hydraulic oil given in the Consumables.
- Check the oil level before starting the engine (or) 5 minutes or more after the engine is stopped.
- Never operate the Machine with the oil level below the Sight gauge.

NOTICE: Insufficient oil will cause Vacuum, Wear and tear of Hydraulic elements. Excessive oil causes foaming and other problems.

3.5.15 Changing Hydraulic Oil

General instructions

- Change the hydraulic oil at every 1000 hours of operation or every 6 months whichever is earlier.
- Also replace the hydraulic oil filter element located inside the hydraulic tank.
- Change the hydraulic oil, when it is still warm.

Procedure

- Stop the machine, and wait for five minutes to open the filler cap.
- Place the suitable container below the drain plug.
- Remove the drain plug below the tank, and drain the oil from the tank.
- Remove the access cover and suction strainer and clean it with a good organic solvent. Reinstall suction strainer.
- Refit the drain plug, and tighten it properly.
- Reinstall the suction strainer and the access cover and tighten the bolts properly.

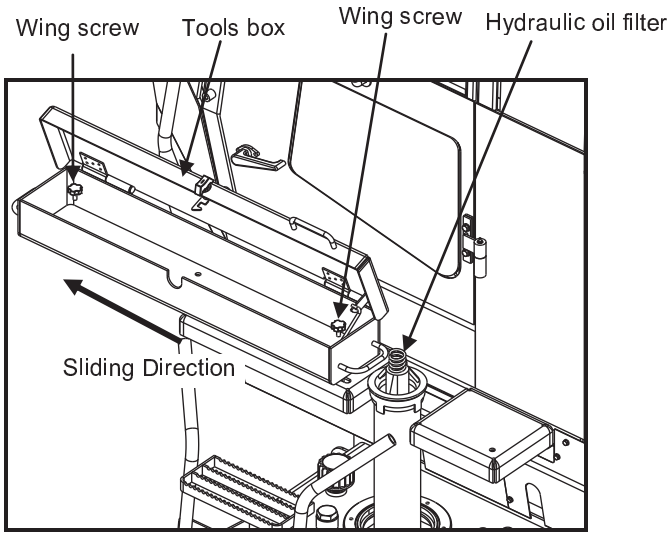
- **Refill the hydraulic oil in the hydraulic tank only through the oil filler port (not through breather) to the required level (refer figure in 3.5.13)**. Hydraulic oil level should be visible in the upper sight gauge. Reinstall the hydraulic filler cap.

3.5.16 Changing Hydraulic Oil Filter

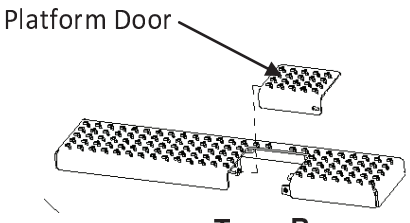
General instructions

- The hydraulic system has a filter which is located in return circuit. It is on the hydraulic tank. There is a suction strainer installed on the suction line inside the hydraulic tank.
- Change the hydraulic oil filters after the first 20 hours. There after change the filters every 500 hours.
  - Replace the filter whenever the hydraulic filter clogging indicator lamp glows.

Procedure



Type A



Type B

- For **type A,** open the tools box, remove wing screws and slide the tools box before removing hydraulic oil filter.
- For **type B**, open the platform door before removing hydraulic oil filter
- And Remove the mounting bolts of the filter at the top of the tank and remove the cover.
- When doing this, the cover may fly off because of the force of spring, so keep the cover pushed down while removing the bolts.
- Remove the spring and bypass valve, then remove the filter element.

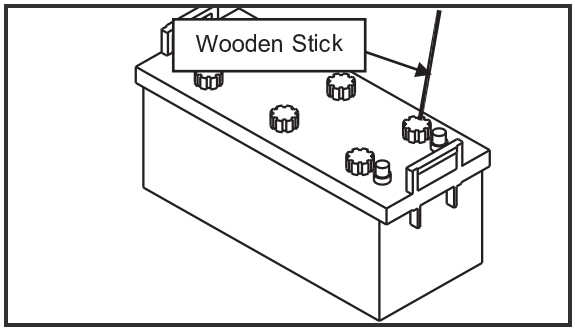
- Clean the Transmission & Hydraulic tank breather whenever required.

NOTICE: Take care not to allow any dust or dirt inside the transmission and hydraulic tank, through the port where the breathers are removed.

Procedure

- Remove all mud and dirt around the breather, and then remove the breathers. Put in cleaning fluid and clean the breathers.

3.5.20 Battery



General instructions

NOTICE: Never interchange battery connections.

- Check charging condition of battery in case of need.
- If the battery has been dismounted, ensure a good contact of battery terminals after and only tighten clamping screws by hand, so as to avoid deformation of poles.

⚠ WARNING

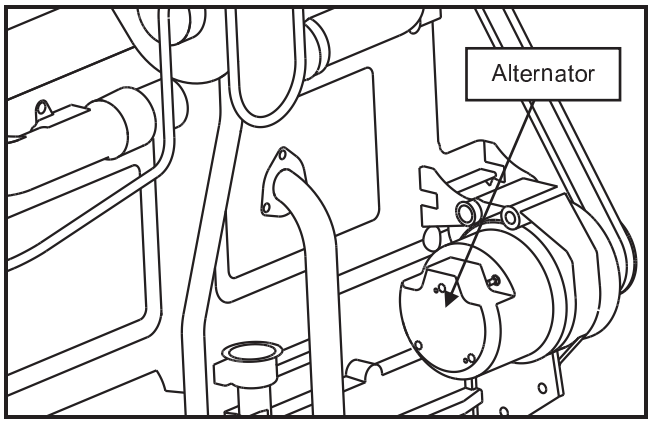
Never place the tools on the battery (or) inside the battery box wheels, due to danger of short circuits. Failing to follow may cause fire accidents.

Procedure

- Unlock battery box cover. Lift the battery by removing the nuts and secure the nuts and washers.
- Screw out battery cell plugs.
- The electrolyte within the individual cells must reach as far as to the bottom of the control inserts. If the control inserts are missing, proceed as follows:
  - Insert a clean wooden stick into the cell opening as far as to the upper edge of the lead plate.
  - After drawing out, the stick must be wet for 10 to 15 mm.
  - If the electrolyte level is too low, refill battery.
  - Refit cell plugs tightly.
- Clean battery poles and apply a thin film of lubricating grease.
- Put the battery into the box and refit the nuts.
- Lower the box cover and fit it in position.

NOTICE:
Keep the terminal contact faces bright and clean.
Vent plugs should be kept clean, tight and free of blockage.
Do not crimp the exhaust tube as it may cause explosion.

3.5.21 Alternator



General instructions

- The Alternator charges the battery, when the Engine is running.
- When maintaining the electrical system, observe the following points.
  - Replace charging current indicating light instantly.
  - Protect and cover the alternator before wet cleaning of the Engine.
  - When carrying out electrical welding operations, connect the ground terminal directly to the part to be welded.

NOTICE: Never disconnect the leads between Battery, Alternator, and Regulator switch with the Engine running.

- Lubricant must be filled correctly especially if the loader is to be used immediately after an oil refill.
- The oil level at both planetary ends every 200 hours of operation and the centre bowl every 250 hours of operation of the differential should be checked.

Procedure

- Park the loader at level ground.
- Rotate the wheel until the oil level plugs of planetary ends should come horizontal.
- Remove filler plugs of planetary ends and the differential. The oil level should be level with the bottom of the filler plug openings.
- Add the oil if necessary. Use the lubricant given in consumables.
- Repeat the same procedure for other axle.

NOTICE: Always clean and refit the drain plugs. Do not allow any dust or dirt inside the axle.

3.5.26 Changing Axle Oils (Front & Rear)

NOTICE: When the axle starts sounding noisy, immediately change the oil.

- For oil changing intervals refer chapter 3.1

Procedure

- Position the machine on level ground with the filler/drain plugs of each planetary end in the bottom position.
- Jack the axle and rotate the wheels by hand if necessary.

⚠ CAUTION

Handle the jack carefully which will cause personnel injury and damage to your machine.

- Remove the filler plug & drain plug from each centre bowl and from each planetary end.
- Drain all the lubricant from the centre bowls as well as planetary ends while the oil is still at the operating temperature.
- Reinstall the drain plug on each centre bowl and on each planetary ends.
- Fill each of the 4 wheel ends as follows,
  - Move the wheel until the fill/drain plug is at the horizontal position.
  - Remove level plug.
  - Fill the oil until the oil level reaches the bottom of the level plug.
  - Reinstall the plugs.
- Fill each of the 2 centre bowl of the differential as follows,
  - Remove level plug.
  - Fill the oil until the oil level reaches the bottom of the level plug.
  - Reinstall the plug.

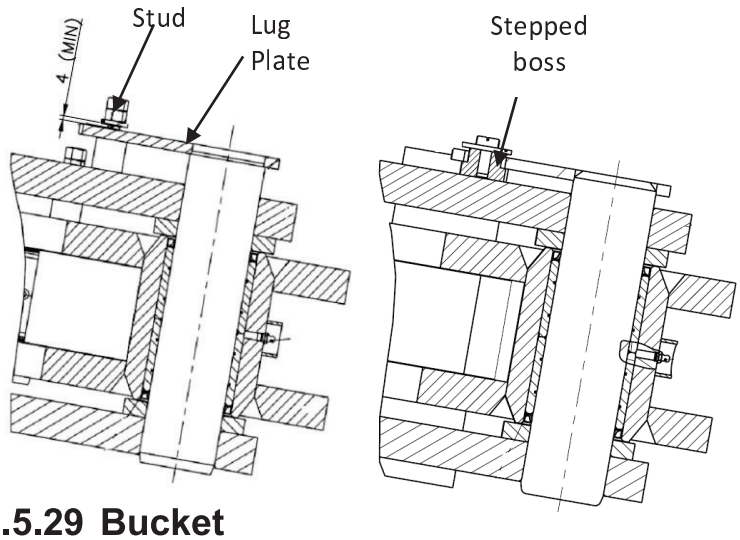
3.5.27 Axles & Wheels

- During the loader run in period, check the tightening torque of the wheel nuts and axle bolts at every 2 hours until the torque is stabilized.
- Whenever the wheels are reinstalled after servicing, check each wheel nut torque every 2 hours until the same stabilizes.

NOTICE: Always maintain the given torque while tightening wheels and axles.

3.5.28 Linkage Pins

NOTICE: Always maintain 4mm clearance between the Lug Plate and Washer for the machines with studs.
For the machines with stepped boss, no clearance required.



3.5.29 Bucket

NOTICE: While welding the bucket for enforcement, pin joints should not be distorted.

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S.No	Troubles	Possible Causes	Remedies
		Loose and corroded battery terminals	Clean, apply petroleum jelly and tighten the terminals
		Short circuits in wiring	Check the electrical system
45	Battery does not charge	Loose or corroded battery terminal connections	Clean, apply petroleum jelly and tighten the terminals
46	Starting motor turns engine sluggishly	Defected starting motor	Replace the starting motor
		Insufficient battery charge	Charge the battery
47	Starting motor disengages before engine starts	Defected wiring	Check the wiring for loose connections
		Insufficient battery charge	Charge the battery
48	Abnormal temperature raise on battery surface	Short circuit in cells	Replace or repair battery
49	Excessive topping up required in battery	Overcharging the battery	Check the battery
50	Abnormal colour of battery electrode plates	Contaminated electrolyte	Wash inside of cells with distilled water. Drain and fill with new electrolyte
		Electrolyte level is low	Top up with distilled water
		Sulphated plates	Try to recover by sulphating treatment
51	Machine not starting /cranking	Battery	Check Battery voltage
		Disconnect Switch	Check disconnect switch is ON / output voltage
		Fuse	Check fuse F-01
		Ignition Key switch	Check the 24 V supply at terminal T17
		Push Button	Check the 24 V supply at terminal T158 when the push button is in pressed condition.
		Neutral start Relay -R2	Check the 24 V supply at pin 1 and 3 of R2 relay.
		Re-cranking prevention Relay - R10	Check the 24 V supply at pin 1 and 5 of R10 relay.
		Power Relay	Check the 24 V supply at terminal T69 and T67
		Starter Motor	Check the 24 V supply at terminal T78 when the machine is cranked and continuous 24 V supply at T75. Also ensure the ground connection of starter motor.
52	Machine not moving forward and reverse	Fuse	Check fuse F04 and F07.
		Loose connection and dust accumulation	Remove the C16 round connector from transmission block and fit it again after cleaning.
		FNR shifter	Check 24 V supply at C04, P3 and P4. Remove the C16 round connector and check for power supply at various pin in this configuration. Forward 1st Position - Pin A Reverse position - Pin A and B Forward 2nd position - Pin A and C
		Declutch Relay - R4	Ensure declutch switch is OFF and check the supply across pin 1 and 3 of R4 relay.

53	Reverse buzzer not blowing.	Fuse	Check Fuse F-11
		Reverse Relay - R01	Check the 24 V supply at R1-P1 when the shifter is at reverse position. Also check the 24 V supply at R1-P5.
		Reverse Buzzer	Check the 24 V supply at connector C14, P1.
54	Hour meter not working	Loose connection and dust accumulation	Check the connector C47 connected to alternator and connector C16 at instrument cluster.
55	Electric Horn not working	Fuse	Check Fuse F-17
		FNR shifter	Check the continuity between C4-P1 and C4-P2 when the horn is pressed.
		Electric Horn	Check the supply across terminals T33 & T34
56	Cabin Fan not working	Fuse	Check Fuse F-19
		Rocker switch	Check the 24 V supply at terminal T23 and T22 when the switch is ON.
		Cabin Fan	Check 24 v supply at C08-P2 & C09-P3
57	Head Lamp not glowing	Fuse	Check Fuse F-10
		Rocker switch	Check the 24 V supply at terminals T26 and T35.Also check the 24 V supply at terminals T24 and T25 when switch is ON.
		Combination switch	Check 24 V supply at C07-P3 in high beam mode and at C07, P5 in low beam mode.
		Head Lamp Bulb	Check 24 V supply at connector L01-P2,L01-P3,L02-P2,L02-P3
58	Cabin Roof lamp not glowing	Fuse	Check Fuse F-09
		Roof Lamp bulb	Check 24 V supply at terminal T34
59	Turn signal indicator not working	Fuse	Check Fuse F-03
		Flasher	Check 24 V supply at R3-P5 when hazard switch is ON
		Relay - R5	Check 24 V supply at R5 -5.
		Combination switch	Check 24 V supply at connectors C07-11
		Turn indicator bulb	Check the 24 V supply at L02-5,L01-4,L06-3 and L05-3
60	Work Lamp (Rear) not working	Fuse	Check fuse F-18
		Rocker switch	check 24 V supply at terminal T06
		Work lamp bulb	Check 24 V supply to L11-2,L10-2,L07-2 and L08-1
61	Work Lamp (front) not working	Fuse	Check fuse F-20
		Rocker switch	Check 24 V supply at terminal T20
		Work lamp bulb	Check 24 V supply to L03-1 and L04 - 1
62	Stop light not working	Fuse	Check Fuse F-05
		Brake pressure switch	Check the continuity between terminals T92 and T93 when the brake is applied.
		Stop light Relay-R6	Check the 24 V supply at R6-1 and R6-5 when the brake is applied.
		Stop light bulb	Check 24 V supply at connector L05-1 and L06-1
63	Detents coil not working	Fuse	Check Fuse F16 and F17
		Proximity switch	Check 24 V supply at following terminals at various operation in automatic mode : Height operation - C28-2

			Float operation - C29-2 Roll back operation - C30-2
64	Safety solenoid not working	Fuse	Check Fuse F-15
		Rocker switch	Check 24 V supply at terminal T08
		Safety solenoid	Check 24 V supply at C27-P2

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4.1 Specifications

Engine (for machines from 0000-0040)

Make & Model	Ashok Leyland AL 412TC2
Type	Liquid cooled, 4 Cycle
Aspiration	Turbocharged
Rated RPM	2300 rpm
Gross Power Rating	97.5 kW (131 HP) at rated rpm (as per ISO 1585)
Net Power Rating	88 kW (118 HP) at rated rpm (as per ISO 1585)

Engine (for machines from 0041-0115)

Make & Model	Ashok Leyland AL 412TAC3
Type	Liquid cooled, 4 Cycle
Aspiration	Turbocharged & Intercooled
Rated RPM	2300 rpm
Gross Power Rating	97.5kW (131 HP) at rated rpm (as per ISO 1585)
Net Power Rating	82.77 kW (111 HP) at rated rpm (as per ISO 1585)

Engine (for machines from 0116 onwards)

Make & Model	Ashok Leyland H6ETIC3RU23/3
Type	Liquid cooled, 4 Cycle
Aspiration	Turbocharged & Intercooled
Rated RPM	2300 rpm
Gross Power Rating	99.17kW (133 HP) at rated rpm (as per ISO 1585)
Net Power Rating	78.29kW (105 HP) at rated rpm (as per ISO 1585)

Transmission

Torque converter	TT260 – 2 phase, 4 – element, Twin turbine with automatic phase transition
Transmission	TT2221-1, Electric power shift, Constant mesh, Spur, Planetary gears.

Travel Speed

		KMPH
Forward – 1	Low Turbine	4.3
	High Turbine	8.9
Forward – 2	Low Turbine	16.5
	High Turbine	29
Reverse	Low Turbine	5.9
	High Turbine	12.1

Axles & Tyres

Front	Fixed
Rear	Centre pin support oscillating 12° up & down
Differentials	Front – 45% Limited slip Rear – 45% Limited slip
Tyre	14.00 x 25 – E3 – 20 PR

Brakes

Service Brakes	Hydraulically actuated, Oil immersed, Wet multiple disc brakes with dedicated circuits for front & rear axle.

Steering System

Type	Articulated type, full hydraulic power steering with arbitral system.
Steering angle	40° each direction

Hydraulic System

Pump type	Tandem Gear pump, Engine driven, Transmission mounted
Loader circuit	2 Spool type
Loader flow	158 lpm at rated rpm
Steering Circuit	Dynamic Load sensing
Steering flow	84 lpm at rated rpm
Loader actuation	hydraulic Joystick
Arm operations	Raise, hold, lower & float
Bucket operations	tilt-back, hold, & dump (Auto Return to dig)

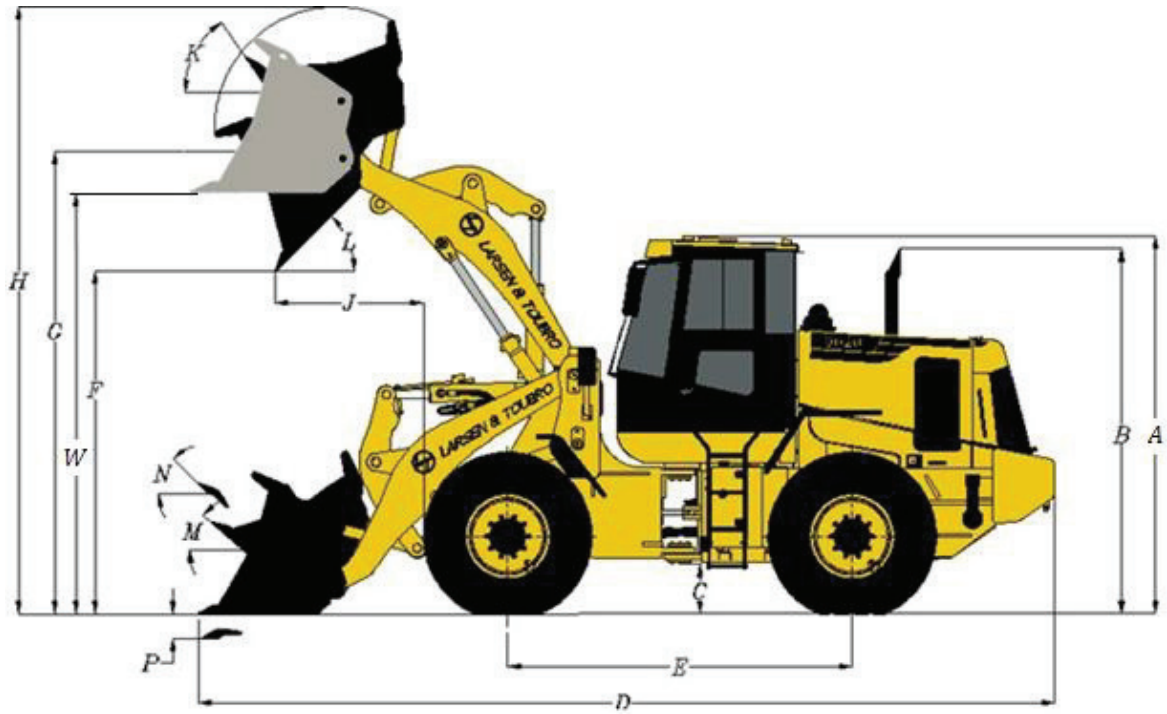
Pressure settings

Loader relief valve	225 bars
Steering relief valve	158 bar

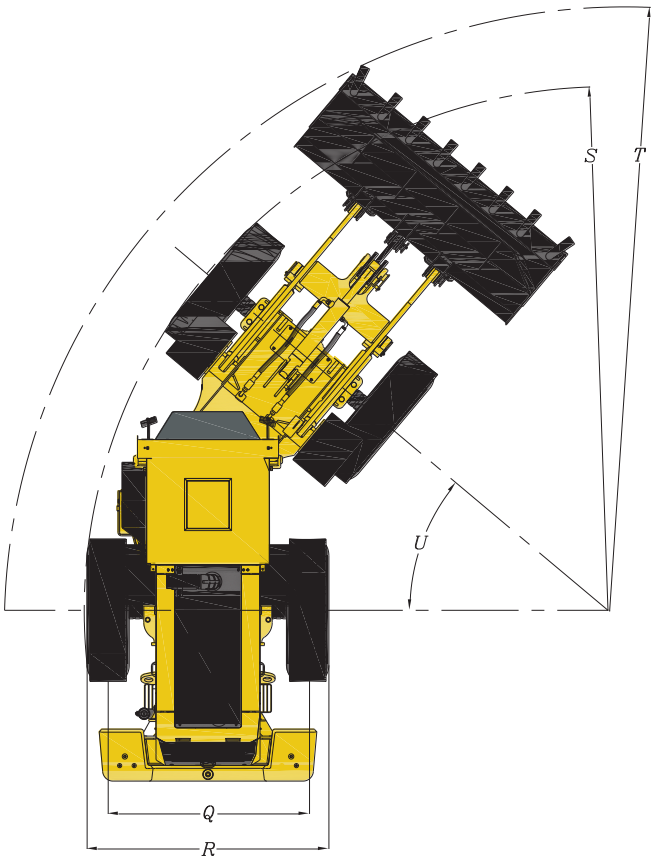
Hydraulic cycle time (Rated load in bucket)

Raise	5.1 sec
Dump	0.5 sec
Lower	2.8 sec

4.2 Static & Operating Dimensions



A	Overall Height	3072 mm
B	Height to top of exhaust stack	2961 mm
C	Ground clearance	410 mm
D	Overall length	7011 mm
E	Wheelbase	2800 mm
F	Dump Height	2746 mm
G	Height to Hinge Pin – Fully Raised	3755 mm
H	Overall Operating Height – Fully Raised	4900 mm
J	Reach Fully Raised	1235 mm
K	Maximum Rollback – Fully Raised	64 deg
L	Dump Angle	45 deg
M	Maximum Rollback at ground	41 deg
N	Maximum Rollback at carry Position	49 deg
P	Digging Depth	110 mm
Q	Tread	1920 mm
R	Overall Width	2325 mm
S	Machine Clearance Radius (Over the tyres)	5021 mm
T	Loader Clearance circle	5795 mm
U	Articulation Angle	40 deg
W	Load Over Height	3495 mm



Note:

- Measured with Weld on Teeth & Standard tyre.