

SL26RTE SL30RTE PARTS MANUAL

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snorkel

SL30RTE SL26RTE



CE

PARTS & SERVICES

MANUAL

Serial Number SL26RTE and after
Serial Number SL30RTE and after

Part Number 516123-200E
OCT 2019

SL26/30ERT SERVICE AND PARTS MANUAL

FOREWORD

This manual is divided into six sections namely;

SECTION 1: INTRODUCTION

General description and machine specifications.

SECTION 2: OPERATION AND SPECIFICATION

See separate Operators Manual.

SECTION 3: SERVICE AND REPAIR

Preventative maintenance and service information.

SECTION 4: TROUBLESHOOTING

Causes and solutions to typical problems.

SECTION 5: SCHEMATICS

Schematics and valve block diagrams with description and location of components.

SECTION 6: ILLUSTRATED PARTS BREAKDOWN

Complete parts list with illustrations.

SPECIAL INFORMATION



NOTE: Provides helpful information.

WORKSHOP PROCEDURES

All information contained in this manual is based on the latest product information available at the time of printing. We reserve the right to make changes at any time without notice.

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C A U T I O N

Detailed prescriptions of standard workshop procedures, safety principles and service operations are not included.

Please note that this manual contains warnings and cautions against some specific service methods which could cause personal injury or could damage a machine or make it unsafe.

Please understand that these warnings cannot cover all conceivable ways in which service, whether or not recommended by Snorkel, might be carried out, or of the possible hazardous consequences of each conceivable way, nor could snorkel investigate all such ways.

Anyone using service procedures or tools whether or not recommended by Snorkel must satisfy themselves thoroughly that neither personal safety nor machine safety will be jeopardized.

INTRODUCTION

INTRODUCTION

PURPOSE

The purpose of this service and parts manual is to provide instructions and illustrations for the operation and maintenance of this work platform manufactured by Snorkel.

SCOPE

The manual includes procedures for proper operation, maintenance, adjustment and repair of this product as well as recommended maintenance schedules and troubleshooting.

GENERAL DESCRIPTION

The work platform consists of the platform, controller, elevating assembly, power module, control module and chassis.



PLATFORM

The platform has a reinforced steel floor, 1.1 m (43.5 inches) high guardrails with a mid rail, 152 mm (6 inches) toe boards and an entry gate at the rear of the platform. The guardrails can be folded down for transportation purposes.

Features of the SL26/SL30ERT is shown in Figure 1-1.

1. Platform
2. Platform controller assembly
3. Elevating assembly
4. Power module
5. Control module
6. Chassis

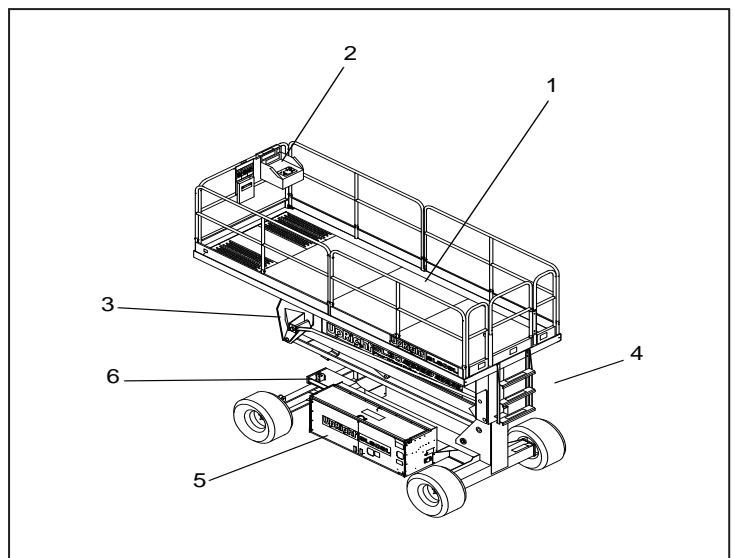


Figure 1-1: Work platform

INTRODUCTION

PLATFORM CONTROLLER

The platform controller contains the controls to operate the machine. It is located at the front of the platform. A complete explanations of control functions can be found in section 2.

ELEVATING ASSEMBLY

The platform is raised and lowered by the elevating assembly. The hydraulic pump driven by the engine, powers the cylinders. Solenoid operated valves control raising and lowering.

CHASSIS

The chassis is a structural frame that supports all the components of the SL26/30SL work platform.

PURPOSE OF EQUIPMENT

The objective of the work platform is to provide a quickly deployable, self propelled, variable height work platform to elevate personnel and materials to overhead work areas.

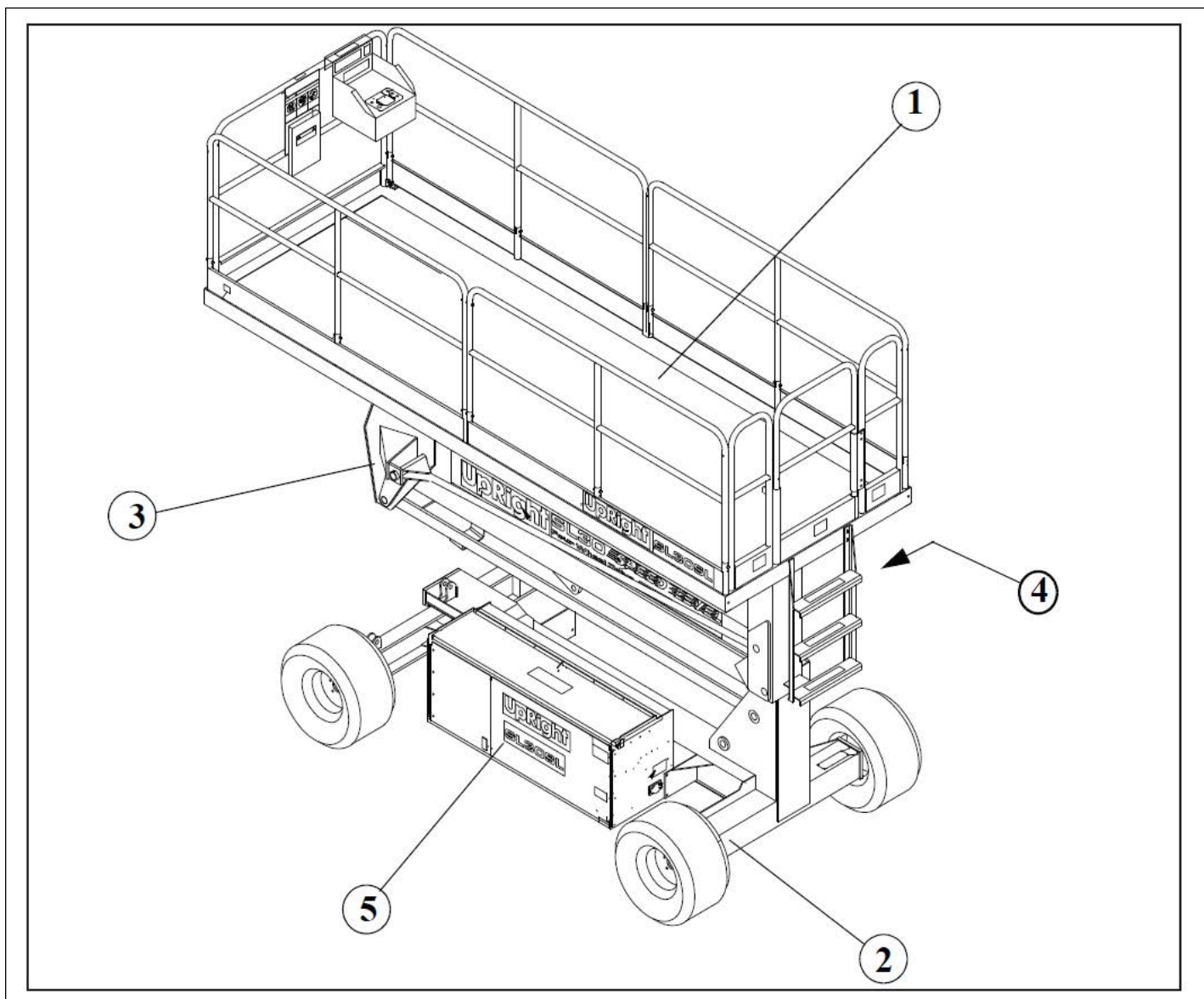
SPECIAL LIMITATIONS

Travel with the platform raised is limited to a creep speed range.

Elevating of the work platform is limited to firm, even surfaces only. The auto level feature is designed to level the platform in a situation where the ground has no more than a 13 degree slope side to side and 9 degrees front to back. If the platform is not level to within 2 degrees, a warning alarm will sound and platform elevation above approximately 1 m will be disabled.

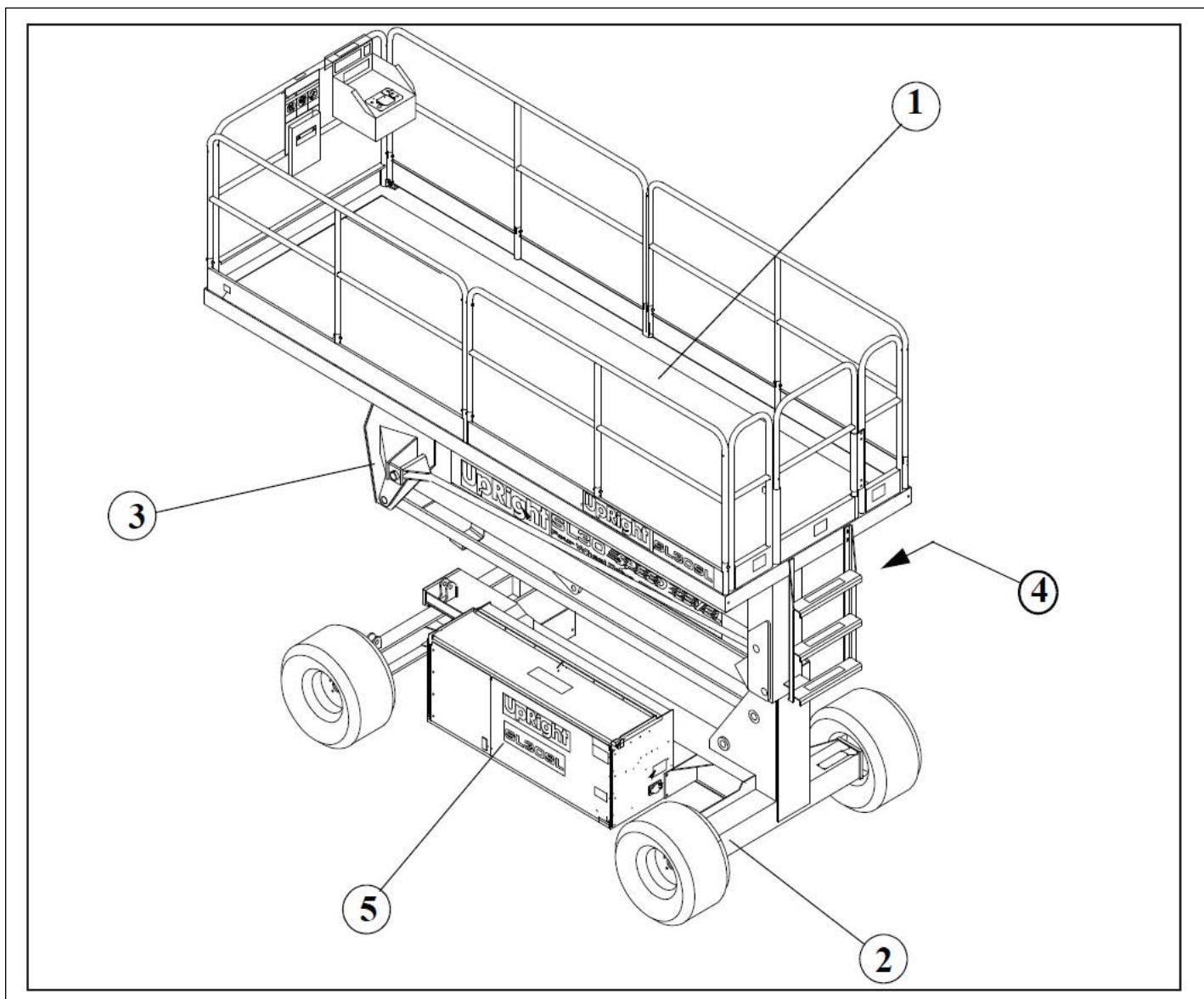


REPAIR PARTS



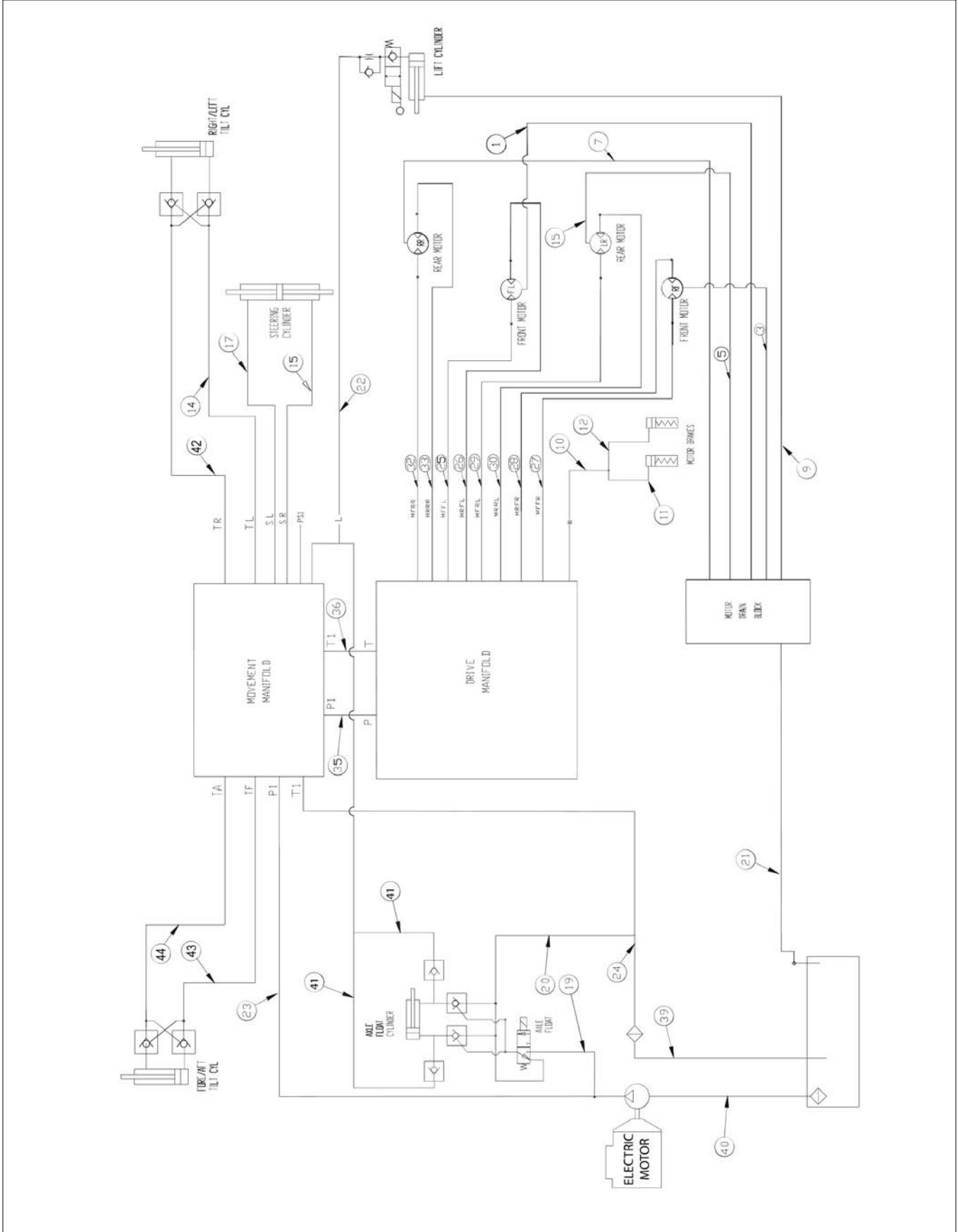
アイテム	部品番号	名前	数量	UOM
Not Shown	514770 800E NM	GENERAL ASSEMBLY SL30RTE		EA
1	505603 000	PLATFORM ASSEMBLY SL26RTE	1	EA
2	505501 000	CHASSIS ASSY SL26/30RTE	1	EA
3	505602 000	ELEVATING ASSEMBLY SL26RTE	1	EA
4	516059 000	Battery Power module	1	EA
5	505515 000	Control module	1	EA

REPAIR PARTS



アイテム	部品番号	名前	数量	UOM
Not Shown	514771 800E NM	GENERAL ASSEMBLY SL26SL		EA
1	505503 000	PLATFORM ASSEMBLY SL30SL	1	EA
2	505501 000	CHASSIS ASSY SL26/30RTE	1	EA
3	505502 000	ELEVATING ASSY SL30SL	1	EA
4	516059 000	Battery Power module	1	EA
5	505515 000	Control module	1	EA

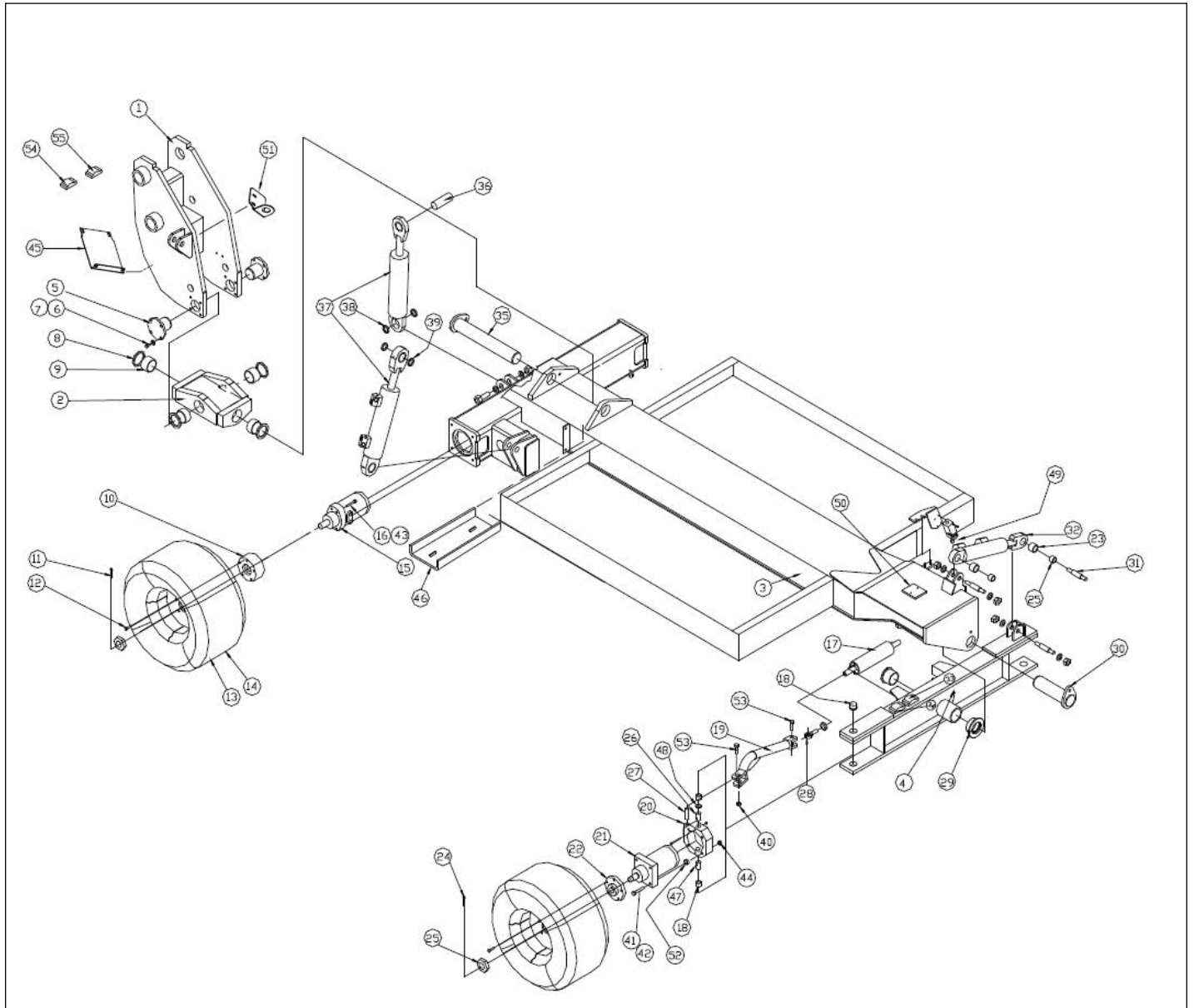
REPAIR PARTS



アイテム	部品番号	名前	数量	UOM
Not Shown	516116 000	HYDRAULIC HOSE ASSEMBLY		EA
1	515428 000	LHF motor drain to return manifold	1	EA
3	515421 000	RHF motor drain to return manifold	1	EA
5	515429 000	LHR motor drain to return manifold	1	EA
7	515435 000	RHR motor drain to return manifold	1	EA
9	510388 000	Lift cylinder to return manifold	1	EA
10	515430 000	Brake port to manifold	1	EA
11	515453 000	LHR BH to LH brake	1	EA
12	515436 000	manifold to RHR brake	1	EA
14	510393 000	Movement manifold to tilt cylinder Left	1	EA
15	515424 000	Steer cylinder to manifold	1	EA
17	515425 000	Steer cylinder to manifold	1	EA
19	510398 000	Run TEE to axle float	1	EA
20	510399 000	Axle float to tank	1	EA
21	510400 000	Return manifold to tank	1	EA
22	510401 000	Movement manifold to lift cylinder	1	EA
23	516118 000	Pump to movement manifold	1	EA
24	514943 000	Drive manifold to return filter	1	EA
25	515426 000	Drive manifold MFFL to LHF MOTOR	1	EA
26	515427 000	Drive manifold MRFL to LHF MOTOR	1	EA
27	515422 000	Drive manifold MFFR to RHF MOTOR	1	EA
28	515423 000	Drive manifold MRFR to RHF MOTOR	1	EA
29	515433 000	Drive manifold MFRL to RL MOTOR	1	EA

アイテム	部品番号	名前	数量	UOM
30	515434 000	Drive manifold MRRR to RR MOTOR	1	EA
32	515431 000	Drive manifold MFRR to RR MOTOR	1	EA
33	515432 000	Drive manifold MRRR to RR MOTOR	1	EA
35	510414 000	Movement to drive manifold press	1	EA
36	510415 000	Movement to drive manifold return	1	EA
39	510418 000	Return filter to tank	1	EA
40	516117 000	Tank to pump suction	1	EA
41	510826 000	Lift TEE to axle float cylinder	2	EA
42	510393 001	Movement manifold to tilt cylinder Right	1	EA
43	510393 002	Movement manifold to tilt cylinder Forward	1	EA
44	510393 003	Movement manifold to tilt cylinder Retract	1	EA

REPAIR PARTS



アイテム	部品番号	名前	数量	UOM
Not Shown	505501 000	CHASSIS ASSY SL26/30RTE		EA
1	064320 001	1st post weldment (Before SL30 01 00168 / SL26 01 00066)	1	EA
1	513347 000	1st post weldment (After SL30 01 00177+ inc.00169,00173 / SL26 01 00090+ inc. 00067,00074,00073)	1	EA
2	064331 001	Leveller weldment (Before SL30 01 00168 / SL26 01 00066)	1	EA
2	513392 000	Leveller weldment (After SL30 01 00177+ inc.00169,00173 / SL26 01 00090+ inc. 00067,00074,00073)	1	EA
3	510501 000	Weldment, chassis	1	EA
4	510497 000	Weldment, front axle	1	EA
5	064343 001	Trunnion	2	EA
6	011256 014	Screw, trunnion	8	EA
7	011238 008	Washer	8	EA
8	064383 000	Thrust washer, 5 mm	4	EA
Not Shown	064383 001	Thrust washer, 4 mm	4	EA
Not Shown	064383 002	Thrust washer, 3 mm	4	EA
9	062642 032	Bushing, level pivot	4	EA
10	064811 000	Hub, rear	2	EA
11	011754 012	Split pin	4	EA
12	98300 9	Wheel Nut	20	EA
13	069129 000	Wheel, right hand (Marking)	2	EA
13	069129 010	Wheel, right hand (non Marking),Before SN SL26 01 00044, SL30 01 00112	2	EA
13	515377 000	Wheel, right hand (non Marking),After SN SL26 01 00045, SL30 01 00113	2	EA
13	069129 002	Wheel, right hand ANSI	2	EA

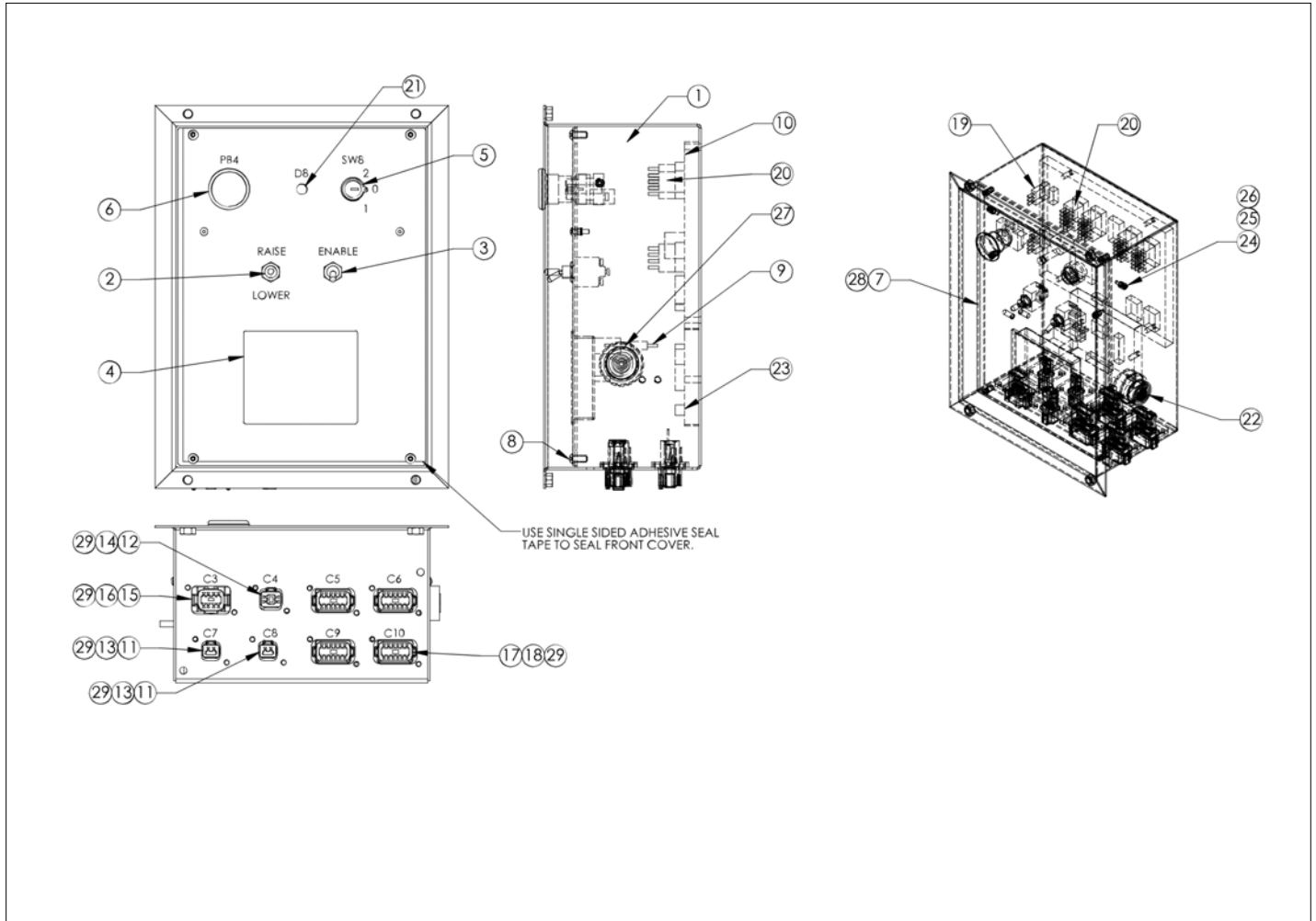
アイテム	部品番号	名前	数量	UOM
14	069129 001	Wheel, left hand (Marking)	2	EA
14	069129 011	Wheel, left hand (Non Marking),Before SN SL26 01 00044, SL30 01 00112	2	EA
14	515377 001	Wheel, left hand (Non Marking),After SN SL26 01 00045, SL30 01 00113	2	EA
14	069129 003	Wheel, left hand ANSI	2	EA
27	062642 001	Bushing, motor mount	4	EA
15	505201 000	Drive motor, rear	2	EA
16	011257 014	Bolt, drive motor, rear	8	EA
17	063905 101	Steer cylinder	1	EA
18	512318 000	Bushing, axle/Motor mount	2	EA
19	510333 000	Steering link arm	2	EA
20	505564 000	Motor mount	2	EA
21	505202 000	Drive motor, front	2	EA
22	064812 000	Hub, front	2	EA
23	027931 057	Bushing, roller (Before SN SL26SL 01 00111 / SL30SL 01 00211) Not used on SLRTE	2	EA
24	011754 012	Split pin	4	EA
25	064350 000	Axle pivot	2	EA
26	509463 000	Top axle pin	2	EA
28	063927 001	Rose bearing, steering cylinder	2	EA
29	064298 005	Bushing, axle to chassis	2	EA
30	064336 000	Pivot pin, front axle	1	EA
31	508020 000	Pivot pin, float cylinder axle	2	EA
32	064346 100	Axle float cylinder	1	EA
33	514482 002	CANTILT sensor ID152	1	EA
34	514482 004	CANTILT sensor ID154	1	EA
35	064339 001	Pin, 1st post/Level pivot/Chassis	1	EA
36	508021 000	Pin, level cylinder 1st post	4	EA

アイテム	部品番号	名前	数量	UOM
37	064345 100	Tilt cylinder	2	EA
38	509445 000	Bearing spacer	4	EA
39	064349 000	Bearing spacer	4	EA
40	505046 000	Nut, steering linkage	4	EA
41	057052 130	Bolt, front motor mount	4	EA
42	056069 012	WASHER DIN125A M12 ZP	4	EA
43	011238 005	Washer, rear motor	4	EA
44	056064 012	NUT HEX M12 X 1.75 GR 10.9 SELF LOCKING DIN 985	4	EA
45	064347 000	Level cover plate	1	EA
46	064384 000	Channel	1	EA
47	509462 000	Bottom axle pin	2	EA
48	011782 001	Bearing thrust washer	2	EA
49	064294 004	Actuator lever	1	EA
50	15 0489	Location pad	1	EA
51	503995 000	Bracket, proximity switch	1	EA
52	509535 000	Axle spacers 6 mm	8	EA
53	011257 024	Bolt, 5/8 x 3 UNC HHC	4	EA
54	514482 001	CANTILT sensor ID151	1	EA
55	514482 003	CANTILT sensor ID153	1	EA

REPAIR PARTS

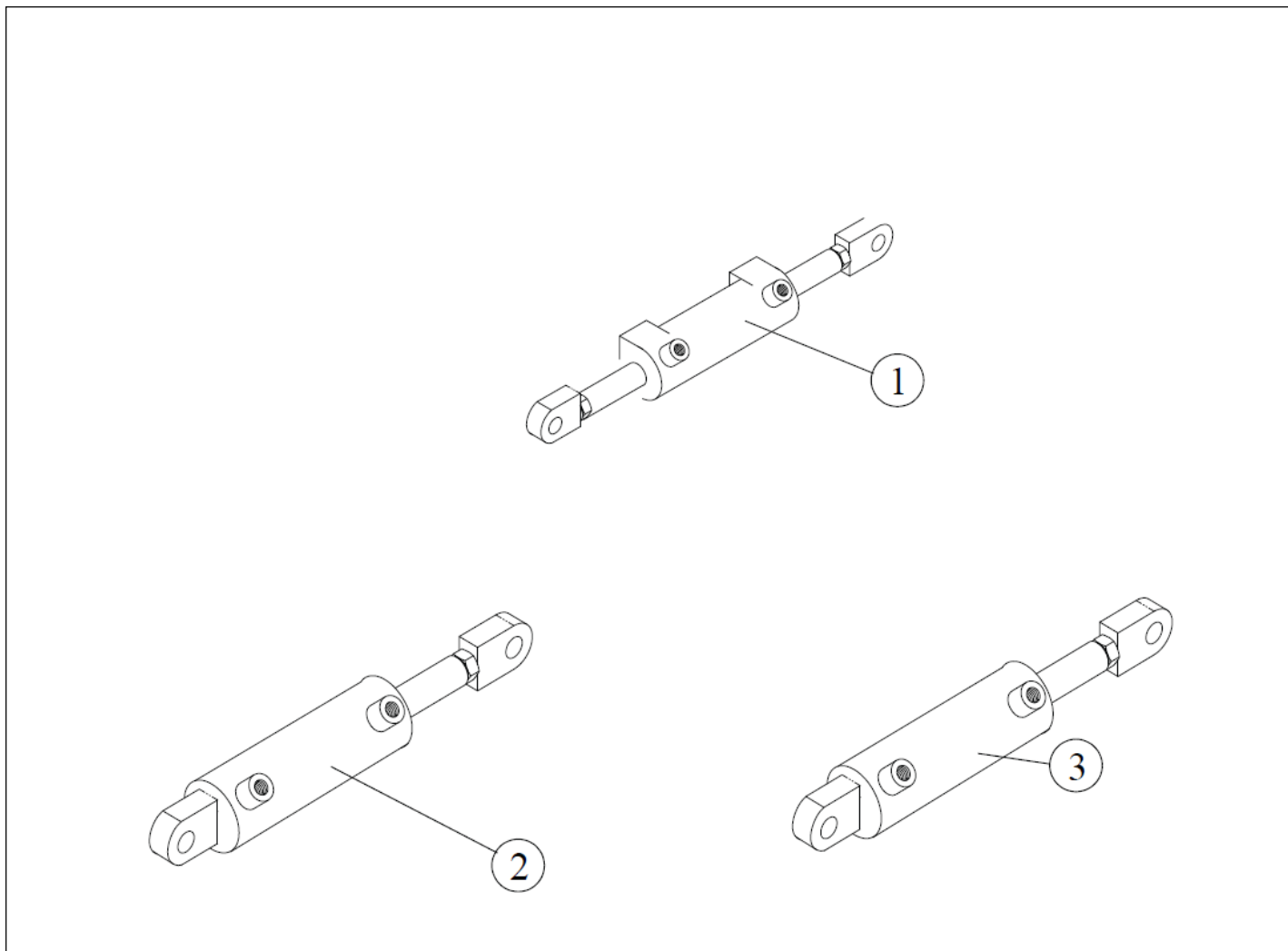
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アイテム	部品番号	名前	数量	UOM
Not Shown	516047 000	LOWER CONTROL ASSY ELEC		EA
1	514488 000	LCB weldment	1	EA
2	3020016	Switch, Toggle Honeywell INTI 7	1	EA
3	3020080	TOGGLE SWITCH	1	EA
4	3087803	EZCal Panel Trionics	1	EA
5	512543 000	3 POS'N KEY SWITCH STAYPUT	1	EA
6	3028810	PUSH/PULL EMERGENCY STOP	1	EA
7	516048 000	LCB FRONT PANEL	1	EA
8	505082 014	Button HD screw M5 x 14 LG	4	EA
9	512366 000	4 WAY PANEL PLUG	2	EA
10	13485 05	Trionics GP400	1	EA
11	514622 000	2 way connector Deutsch	2	EA
12	514626 000	4 way connector, Deutsch	1	EA
13	514624 000	Wedge, Deutsch W2P	2	EA
14	509750 000	Wedge, Deutsch W4P	1	EA
15	514627 000	CONN, DEUTSCH DT06 8SA	1	EA
16	514629 000	LOCK WEDGE W8P	1	EA
17	509743 000	12 way connector, Deutsch	4	EA
18	509744 000	Wedge, Deutsch W12P	4	EA
19	510155 000	3WAY PANEL PLUG SW TWIST RELEASE E/STOP; SCHNEIDER	1	EA
20	512817 000	15WAY PANEL PLUG	4	EA
21	512934 000	LED RED 12V	1	EA
22	502588 000	ALARM, ECCO BEEPING 6 28VDC	1	EA
23	3030181	Trionics TBM	1	EA
24	501251 016	SBHCS M4 x .7 x 16 GR 10.9 black finish	4	EA
25	056069 004	Wshr, SteelFlatWshr M4 DIN125	4	EA
26	056066 004	NUT NYLOCK DIN985 M4 8.0 ZP	4	EA



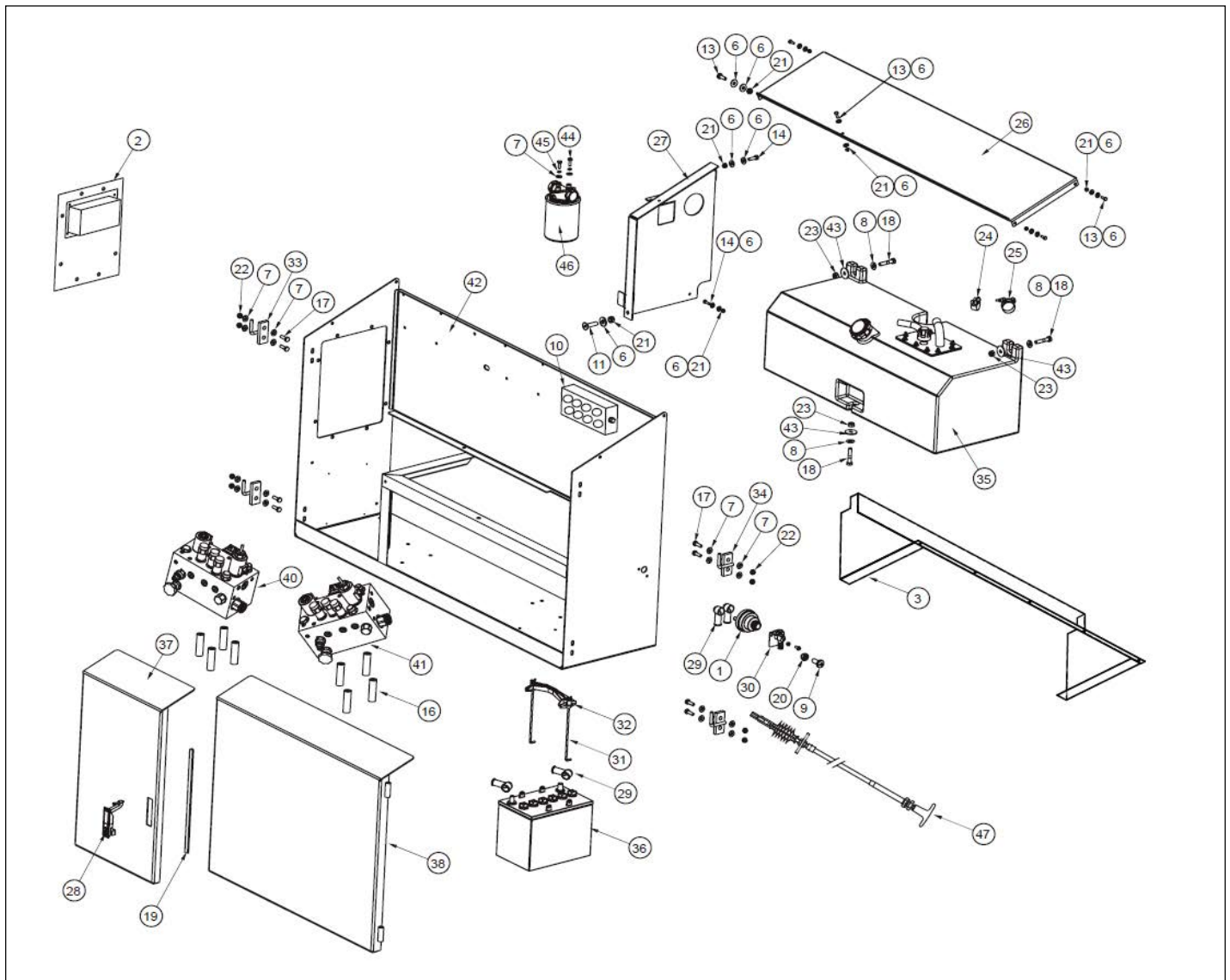
アイテム	部品番号	名前	数量	UOM
27	509755 000	Mate N lock socket contact	4	EA
28	516049 001	OVERLAY	1	EA
29	100338 013	CRIMP PIN DEUTSCH	49	EA
30	514994 000	BLADE FUSE HOLDER (Not Illustrated)	1	EA
31	509740 001	15 AMP BLADE FUSE (Not Illustrated)	1	EA

REPAIR PARTS



アイテム	部品番号	名前	数量	UOM
1	063905 010	Seal kit steer cylinder	1	EA
2	064345 010	Seal kit tilt cylinder	1	EA
3	064346 010	Seal kit axle float cylinder	1	EA
1	063905 101	Steer cylinder	1	EA
2	064345 100	Tilt cylinder	1	EA
3	064346 100	Axle float cylinder	1	EA

REPAIR PARTS

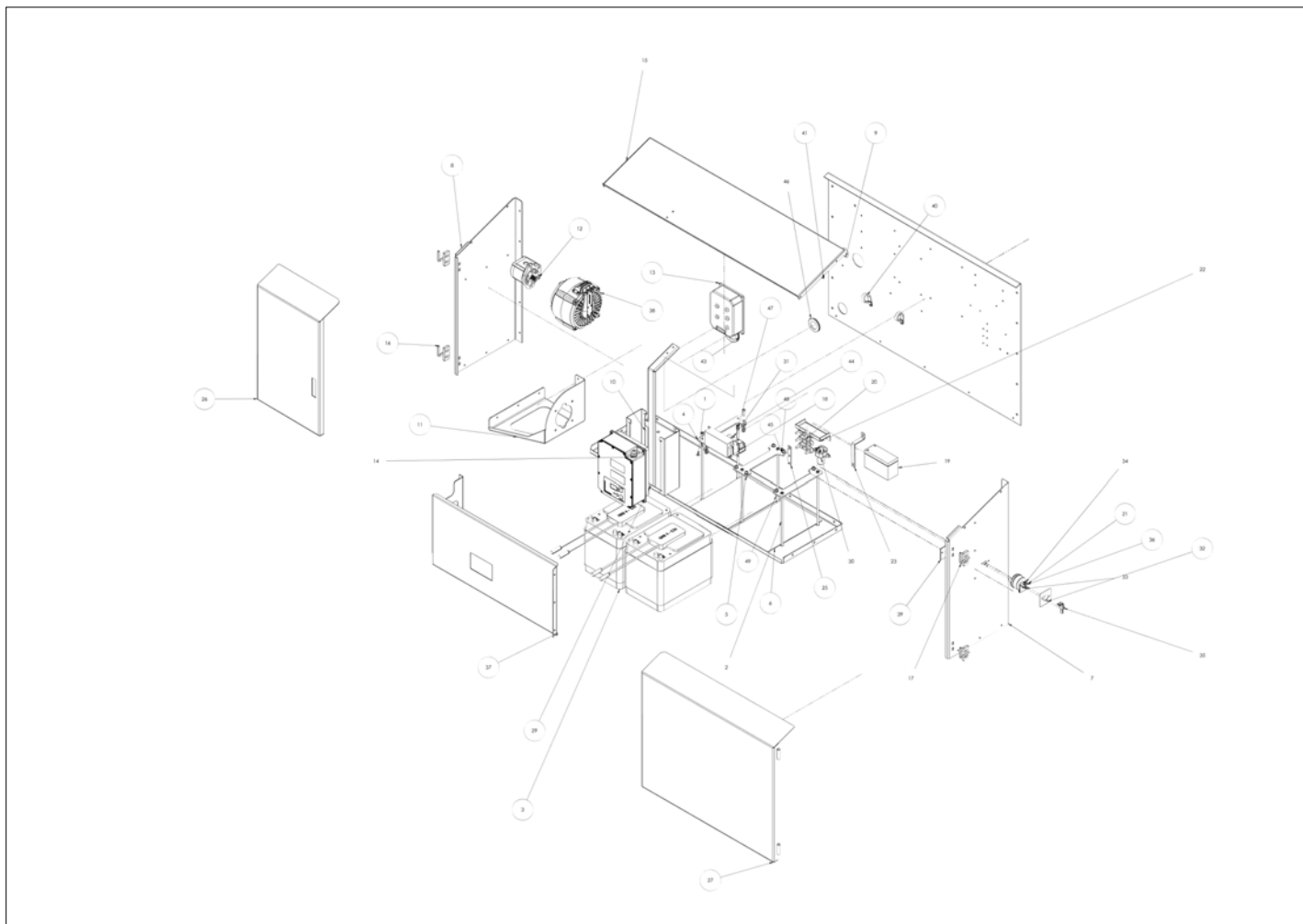


アイテム	部品番号	名前	数量	UOM
Not Shown	505505 000	CONTROL MODULE ASSEMBLY		EA
1	302 0049	Switch Battery Disconnect	1	EA
2	514487 000	LOWER CONTROL PANEL ASSEMBLY CE	1	EA
Not Shown	514487 001	LOWER CONTROL PANEL ASSEMBLY ANSI	1	EA
3	510505 000	Cover, hydraulic hoses	1	EA
5	5563048	FLAT WASHER M 5	6	EA
6	510588 006	WSHR FLAT M6	8	EA
7	510588 008	M8, plain washer	10	EA
8	510588 010	M10, plain washer	3	EA
9	510593 012	Pan head screw, M5 x 12 mm	2	EA
10	13 2367	Manifold tank line drain	1	EA
11	510567 025	CSK socket head screw, M6 x 25 mm	1	EA
12	058490 025	Bolt, M5 x 25 mm	4	EA
13	058491 016	BOLT HEXSETSCREW DIN933 M6 X 16MM 8.8 ZP	5	EA
14	058491 020	HHCS M6 X 1 X 20 G8.8 DIN 933	2	EA
16	510477 000	Stand, manifold mounting	8	EA
17	058492 025	BOLT HEXSETSCREW DIN933 M8 X 25MM 8.8 ZP	8	EA
18	056060 050	Bolt, HexBolt DIN931 M10 x 50m	3	EA
19	PCA015	Rubber Channel Section	1	EA
20	056066 005	Nut NylockNut DIN985 M5 8.0 Zi	6	EA
21	056066 006	Nut NylockNut DIN985 M6 8.0 Zi	8	EA
22	056066 008	NUT NYLOCKNUT DIN985 M8 8.0 ZP	8	EA
23	056064 010	Nut NylockNut DIN985 M10 10.0	3	EA
24	3618 26	Hose Clamp 26 28mm	1	EA

アイテム	部品番号	名前	数量	UOM
25	3618 32	Hose Clamp 34 37mm	1	EA
26	12716 13	Top Plate	1	EA
27	515293 000	Cabinet Support	1	EA
28	8342416	Latch, Adjustable Trigger, Key 508CH	1	EA
29	3040269	Boot Cable Entry Black I/O GA	4	EA
30	300840	Lock Out Lever Assembly	1	EA
31	502197 000	M8 x 300 hook bolt	2	EA
32	064040 000	Angle battery hold down	1	EA
33	11470	LEFT HAND HINGE WELDMENT, UPPER	2	EA
34	11470 1	RIGHT HAND HINGE WELDMENT, UPPER	2	EA
35	11558	Hydraulic Tank Assembly	1	EA
36	062299 002	BATTERY 12vdc	1	EA
37	11679	Cabinet Door Small	1	EA
38	11680	Cabinet Door Large	1	EA
40	514721 000	HYDRAULIC VALVE BLOCK DRIVE	1	EA
41	514720 000	HYDRAULIC VALVE BLOCK MOVEMENT	1	EA
42	514722 000	Control cabinet weld	1	EA
43	5560179	Flat Washer Special	3	EA
44	058492 020	Bolt HexSetScrew DIN933 M8 x 2	2	EA
45	056021 008	Washer SpringWasher DIN127B M8	2	EA
46	508078 001	Filter assembly	1	EA
Not Shown	508078 000	Filter	1	EA
Not Shown	508078 002	Filter head	1	EA
47	503789 002	Emergency down cable	1	EA

アイテム	部品番号	名前	数量	UOM
48	515611 000	BEACON ASSY AMBER	1	EA

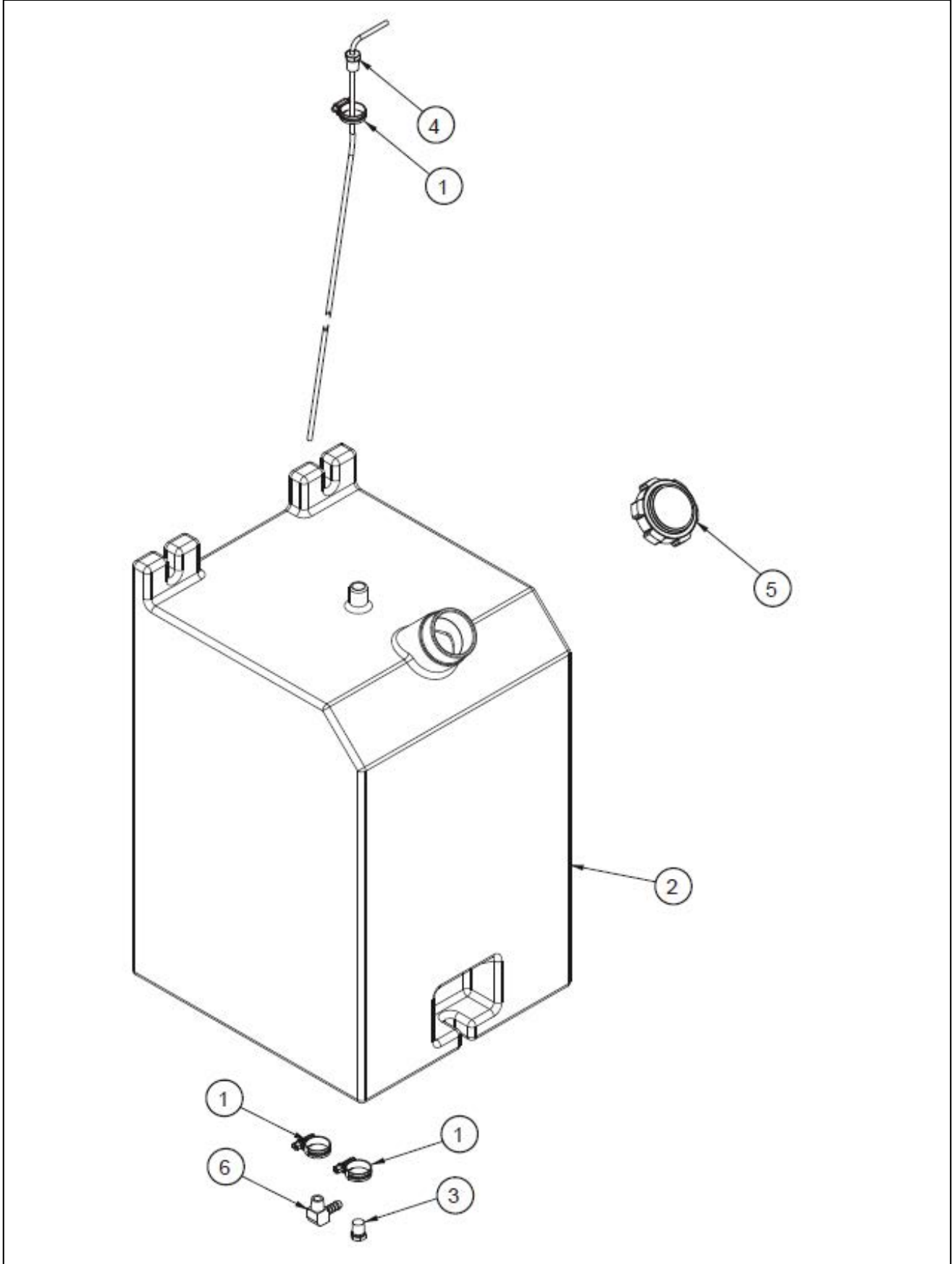
REPAIR PARTS



アイテム	部品番号	名前	数量	UOM
1	515982 000	BATTERY TRAY WELDMENT	1	EA
2	516112 000	Tie Rod, Battery	6	EA
3	515956 000	Battery Pack	3	EA
4	515967 000	MOUNT BRACKET END	3	EA
5	515968 000	MOUNT BRACKET ARRAY	2	EA
6	516147 000	Mat, Isolation, EPDM Rubber	3	EA
7	516022 000	CABINET SIDE RH	1	EA
8	516023 000	CABINET SIDE LH	1	EA
9	516024 000	BACK PANEL	1	EA
10	516025 000	Mount Charger Bracket	2	EA
11	516026 000	MOTOR MOUNT BRACKET	1	EA
12	13049	Pump SAE A 9 Spline 10.3cc	1	EA
13	515958 000	Curtis Drive	1	EA
14	515957 000	Charger Zivan SG3	1	EA
15	516021 000	Top Plate	1	EA
16	13869 01	Cabinet Hinge, LH	2	EA
17	13869 02	Cabinet Hinge, RH	2	EA
18	516050 000	DC DC Converter	1	EA
19	516057 000	Battery , 12V AUX	1	EA
20	446086	Fuse Block	3	EA
21	516163 000	Battery Isolator Switch Double	1	EA
22	516094 000	Tray, Battery Aux	1	EA
23	516095 000	Strap, Aux Battery	1	EA
25	516096 000	BUSBAR	1	EA
26	11679	Cabinet Door Small	1	EA
27	11680	Cabinet Door Large	1	EA
28	8342416 ASM 1	null	1	EA
29	516167 000	DOOR STRUT	1	EA
30	516067 000	Contactora 300AMP	1	EA

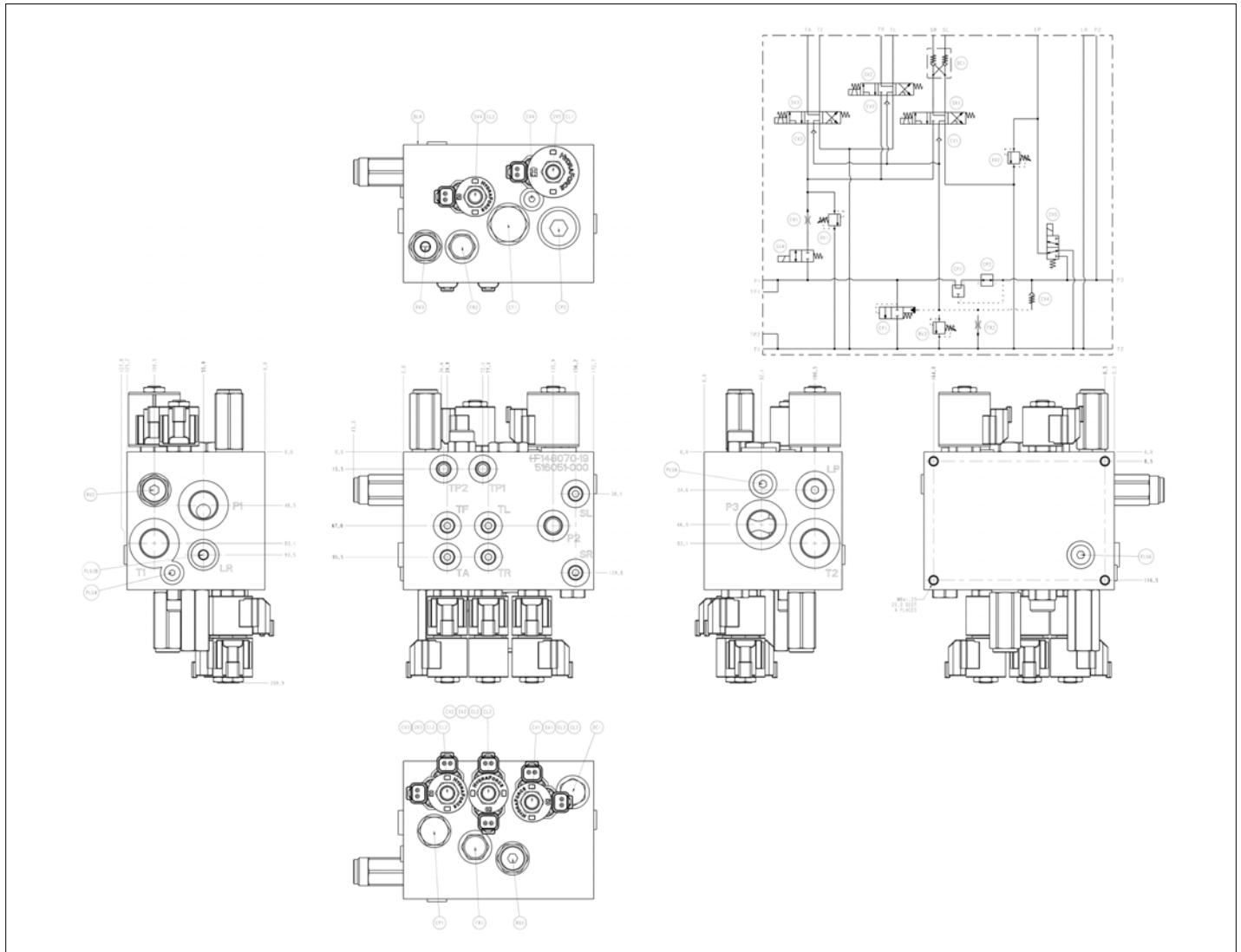
アイテム	部品番号	名前	数量	UOM
31	516068 000 Relay Base Assy	null	1	EA
32	516203 000	Lockout Lever Plate	1	EA
33	300840 1	MTG PLATE	1	EA
34	M20 Internal Shakeproof Washer	null	1	EA
35	300840 2	CAM KNOB	1	EA
36	3020061 1	LOCKNUT	1	EA
37	516219 000	Cover Plate	1	EA
38	515959 000	Motor 01PM 200 66	1	EA
39	516220 000	BLANKING PLATE	1	EA
40	500437 040	P CLIP 40	2	EA
41	500437 001	P CLIP SMALL	1	EA
42	516145 000	BLIND GROMMET RB470	1	EA
43	516146 000	BLIND GROMMET RB700	1	EA
44	516148 000	Nylon Flat Washer	8	EA
45	516149 000	SHOULDER WASHER 16mm	8	EA
46	516204 000	Rubber Grommet	1	EA
47	056066 008	NUT NYLOCKNUT DIN985 M8 8.0 ZP	12	EA
48	056069 008	WASHER, STEELFLATWASHER DIN12M8 FLAT WASHER DIN 125	8	EA
49	058503 025	SHCS M8 X 1.25 X 25 G8.8 ISO 4762 BLACK OXIDE	8	EA

REPAIR PARTS



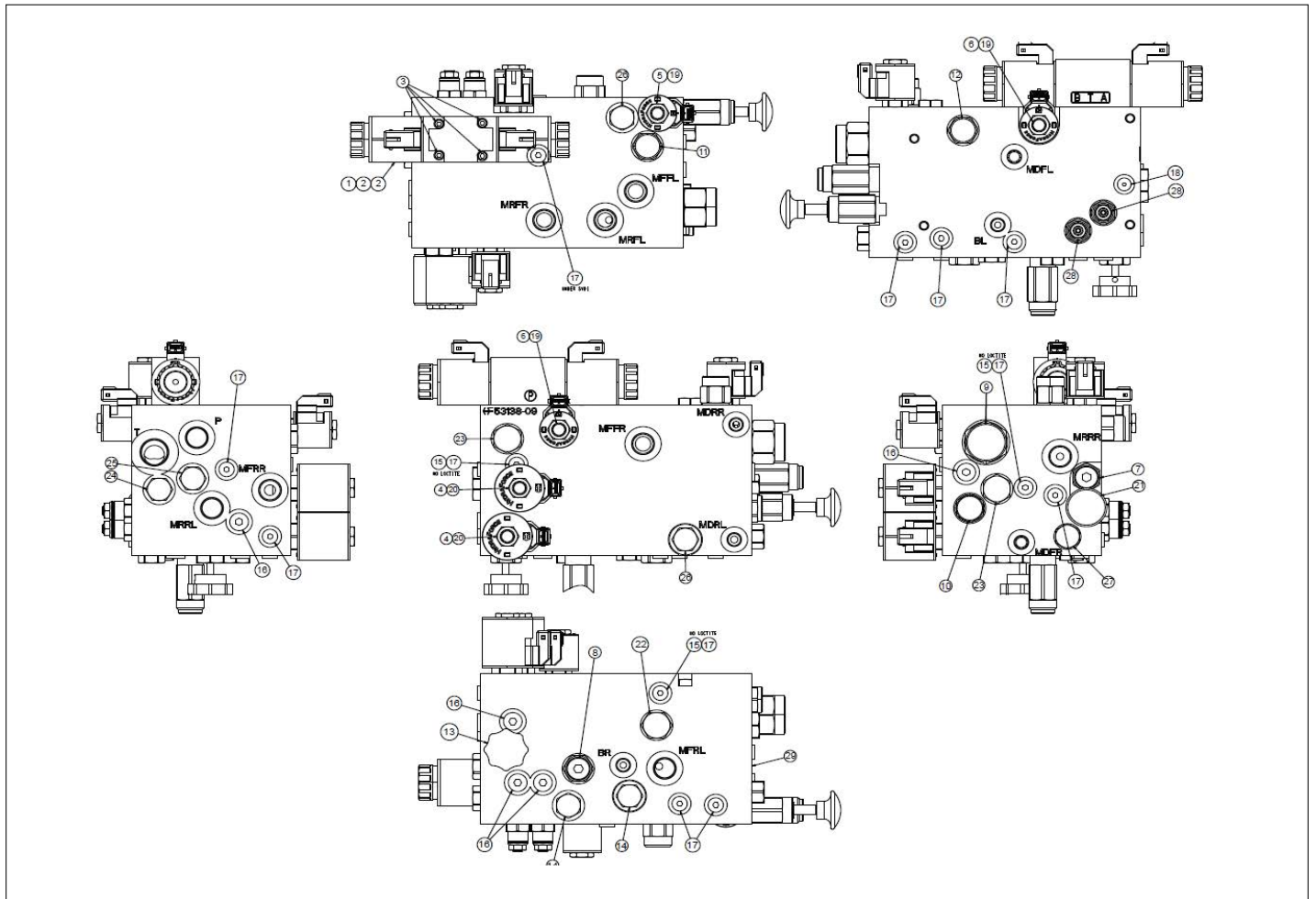
アイテム	部品番号	名前	数量	UOM
Not Shown	13106 2a	FUEL TANK ASSEMBLY DIESEL		EA
1	3618 11	Hose Clamp 11 25mm ZP	1	EA
2	13106 1	Fuel Tank	1	EA
3	13108 04	Plug 1/4 NPTM	1	EA
4	13109	Fuel Return Weld	1	EA
5	605256	Cap, Vented	1	EA
6	967309	Male Elbow 5/16" x 1/4" BSPT	1	EA

REPAIR PARTS



アイテム	部品番号	名前	数量	UOM
Not Shown	516051 000	HYDRAULIC VALVE BLOCK MOVEMENT		EA
1	510740 000	Cartridge (PORT: SV5)	1	EA
2	510741 000	Cartridge (PORT: SV 1, 2, 3)	3	EA
3	510742 000	Cartridge (PORT: SV4)	1	EA
4	516229 000	Valve (PORT: CP2)	1	EA
5	510744 000	Valve (PORT: RV2)	1	EA
6	510745 000	Valve (PORT: RV1)	1	EA
7	510746 000	Valve (PORT: RV3)	1	EA
8	514868 000	Coil (PORT: CL2)	7	EA
9	514869 000	Coil (PORT: CL1)	1	EA
10	510749 000	Plug (PORT: PLG3B)	1	EA
11	510750 000	Plug (PORT: PLG6)	2	EA
12	510751 000	Plug (PORT: PLG4)	1	EA
13	510752 000	Valve (PORT: FR2)	1	EA
14	510753 000	Valve (PORT: FR1)	1	EA
15	510754 000	Valve (PORT: EP1)	1	EA
16	516227 000	Valve (PORT: CP1)	1	EA
17	510756 000	Cartridge (PORT: DC1)	1	EA
18	510757 000	Valve (PORT: CV 1, 2, 3)	3	EA
19	510758 000	Valve (PORT: CV4)	1	EA
20	510759 000	Block (PORT: BLK)	1	EA

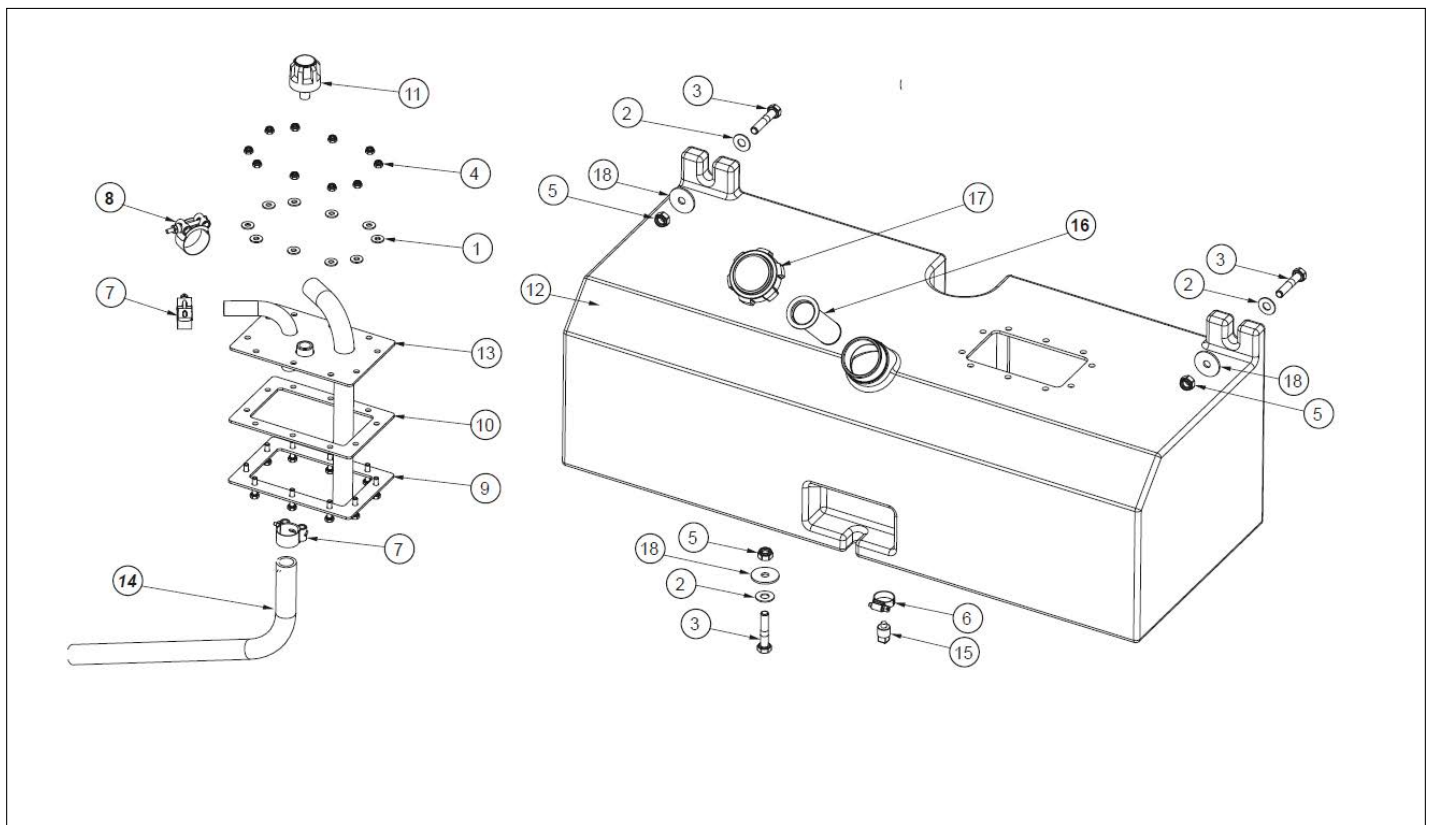
REPAIR PARTS



アイテム	部品番号	名前	数量	UOM
Not Shown	514721 000	HYDRAULIC VALVE BLOCK DRIVE		EA
1	510760 000	Cartridge (PORT: SVDI)	1	EA
2	514878 000	Coil (PORT: CL3)	2	EA
3	510762 000	Head cap screw (PORT: CSI)	4	EA
4	510763 000	Cartridge (PORT: SV4, SV5)	2	EA
5	510764 000	Cartridge (PORT: SVI3)	1	EA
6	510765 000	Cartridge (PORT: SV8, SV11)	2	EA
7	510766 000	Valve (PORT: RV4)	1	EA
8	510767 000	Valve (PORT: PR1)	1	EA
9	510768 000	Valve (PORT: PD2)	1	EA
10	510769 000	Valve (PORT: PD1)	1	EA
11	510770 000	Valve (PORT: PD3)	1	EA
12	510771 000	Valve (PORT: PD4)	1	EA
13	510772 000	Valve (PORT: NV1)	1	EA
14	510773 000	Valve (PORT: LS2, LS4)	2	EA
15	510774 000	Orifice plug (PORT: ORF1, ORF2, ORF3)	3	EA
16	510750 000	Plug (PORT: PLG6)	5	EA
17	510751 000	Plug (PORT: PLG4)	12	EA
18	510775 000	Plug (PORT: PLG3)	1	EA
19	514868 000	Coil (PORT: CL2)	3	EA
20	514869 000	Coil (PORT: CL1)	2	EA
21	510778 000	Valve (PORT: HP1)	1	EA
22	510779 000	Valve (PORT: FD2)	1	EA
23	510780 000	Valve (PORT: FD1, FD3)	2	EA
24	510781 000	Valve (PORT: FC2)	1	EA
25	510782 000	Valve (PORT: FC1)	1	EA
26	510783 000	Cartridge (PORT: CV5, CV6)	2	EA
27	510784 000	Valve (PORT: PC3)	1	EA

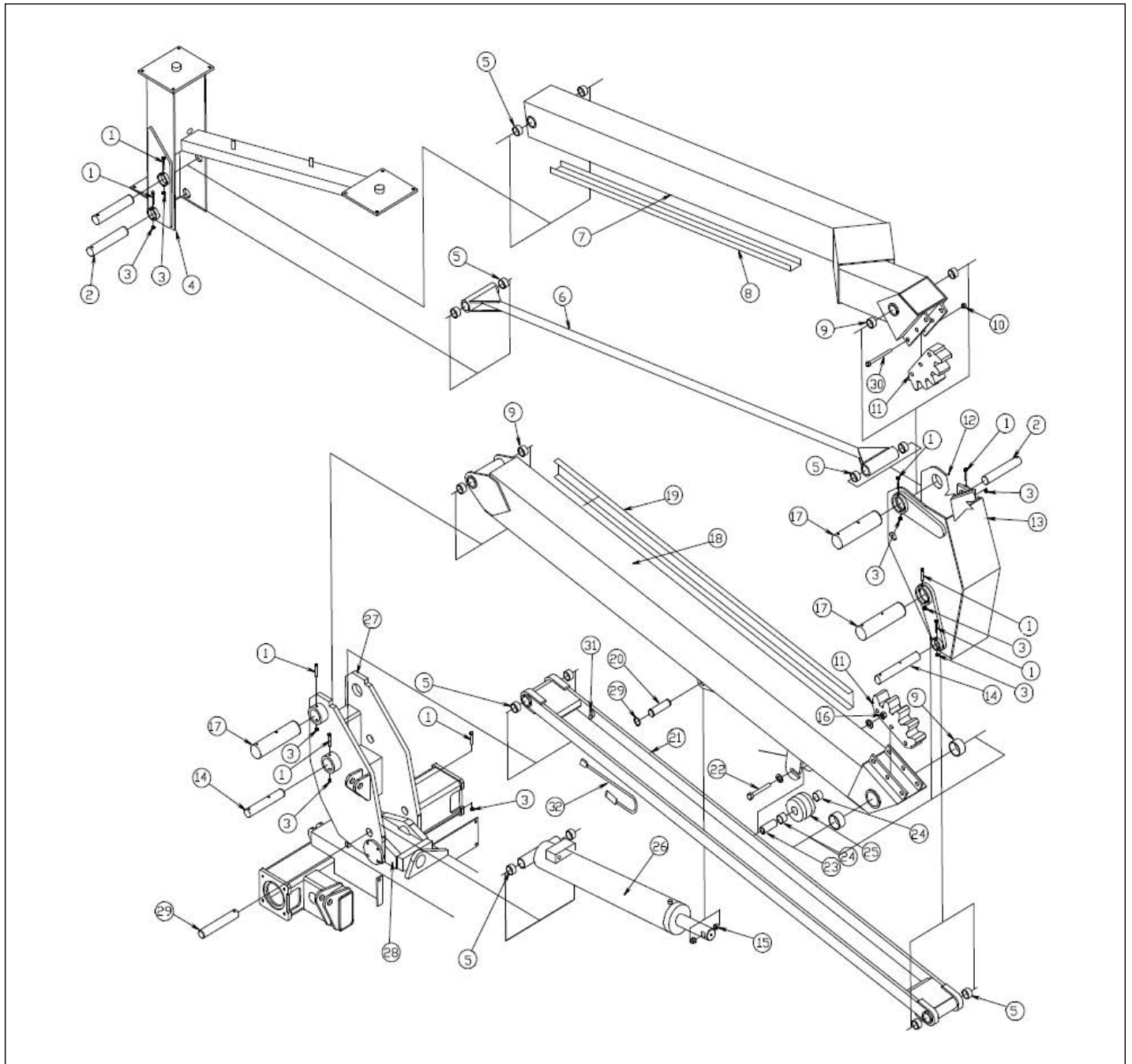
アイテム	部品番号	名前	数量	UOM
28	510785 000	Valve (PORT: CBV1, CBV2)	2	EA
29	510786 000	Block (BLK)	1	EA

REPAIR PARTS



アイテム	部品番号	名前	数量	UOM
Not Shown	11558	Hydraulic Tank Assembly		EA
1	056069 006	WSHR STEELFLATWSHE M6 DIN125A	10	EA
2	056069 010	Washer, SteelFlatWasher DIN125A M10 ZincPlated	3	EA
3	056060 050	Bolt, HexBolt DIN931 M10 x 50m	3	EA
4	056066 006	Nut NylockNut DIN985 M6 8.0 Zi	10	EA
5	056064 010	Nut NylockNut DIN985 M10 10.0	3	EA
6	3618 11	Hose Clamp 11 25mm ZP	1	EA
7	3618 26	Hose Clamp 26 28mm	2	EA
8	3618 32	Hose Clamp 34 37mm	1	EA
9	11430 1	Base Plate Weld	1	EA
10	11430 5	Gasket	1	EA
11	11487	Filter Breather	1	EA
12	11558 1	Tank 13 Gal	1	EA
13	11558 2	Top plate weld, plated	1	EA
14	11558 8	Tank Inner Hose	1	EA
15	452756	Plug, Magnetic 3/8 NPT	1	EA
16	605246	Strainer Hyd Tank Fill	1	EA
17	605256	Cap, Vented	1	EA
18	5560179	Flat Washer Special	3	EA

REPAIR PARTS

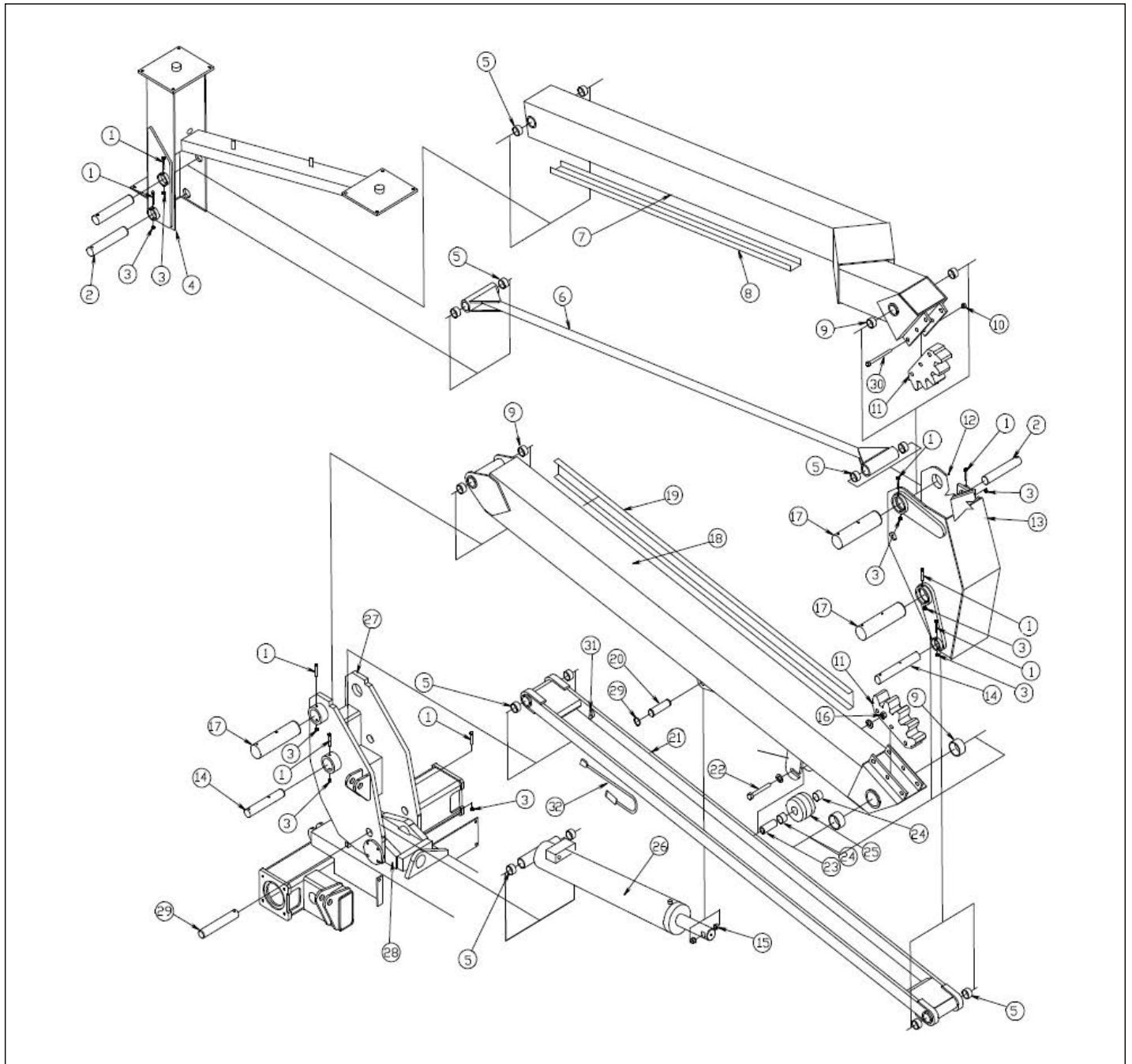


アイテム	部品番号	名前	数量	UOM
Not Shown	505602 000	ELEVATING ASSEMBLY SL26RTE		EA
1	011254 024	Bolt, Pin lock 3/8	9	EA
2	064090 000	Pivot pin, upper T bar & up boom PED	3	EA
3	011248 006	Locknut 3/8 16	9	EA
4	064111 001	Pedestal weldment (Before SL26 01 00066)	1	EA
4	513285 000	Pedestal weldment (After SL26 01 00090+ inc. 00067,00074,00073)	1	EA
5	062649 020	Bushing, all 1.75 pins	12	EA
6	064087 000	Upper tension bar (Before SL26 01 00066)	1	EA
6	513289 000	Upper tension bar (After SL26 01 00090+ inc. 00067,00074,00073)	1	EA
7	064078 002	Upper boom (Before SL26 01 00066)	1	EA
7	513255 000	Upper boom (After SL26 01 00090+ inc. 00067,00074,00073)	1	EA
8	064451 000	Channel, wire cover (upper boom)	1	EA
9	062642 030	Bushing, all 2.75 pins	6	EA
10	011248 016	Nut (roller)	6	EA
11	064089 000	Gear segment	2	EA
12	013336 001	FITTING, GREASE	16	EA
13	064070 002	2nd Post weldment (Before SL30 01 00168 / SL26 01 00066)	1	EA
13	513219 000	2nd Post weldment (After SL30 01 00177+ inc.00169,00173 / SL26 01 00090+ inc. 00067,00074,00073)	1	EA
14	064094 000	Pivot pin, cylinder body 1st post	2	EA
15	062649 010	Flanged bushing	2	EA
16	011248 016	Nut (roller)	1	EA

アイテム	部品番号	名前	数量	UOM
17	064095 000	Pivot pin, lower boom & upper boom 2nd	3	EA
18	064060 003	Lower boom (Before SL26 01 00066)	1	EA
18	513278 000	Lower Boom Weldment (After SN SL26SL 01 00112)	1	EA
18	513278 000	Lower Boom Weldment (After SN SL26SL 01 00112)	1	EA
20	064093 000	Pivot pin, cylinder rod lower boom	1	EA
19	064450 000	Channel, wire cover (lower boom)	1	EA
21	064084 001	Lower tension bar (Before SL26 01 00066)	1	EA
21	513288 000	Lower tension bar (After SL26 01 00090+ inc. 00067,00074,00073)	1	EA
22	014918 048	Bolt (roller, boom rest)	1	EA
23	064356 000	Roller pin (Before SN SL26SL 01 00111 / SL30SL 01 00211) Not used on SLRTE	1	EA
24	027931 057	Bushing, roller (Before SN SL26SL 01 00111 / SL30SL 01 00211) Not used on SLRTE	2	EA
25	064354 000	Roller (Before SN SL26SL 01 00111 / SL30SL 01 00211) Not used on SLRTE	1	EA
26	063904 101	HYDRAULIC CYLINDER ASSEMBLY MAIN LIFT	1	EA
27	064320 001	1st post weldment (Before SL30 01 00168 / SL26 01 00066)	1	EA
27	513347 000	1st post weldment (After SL30 01 00177+ inc.00169,00173 / SL26 01 00090+ inc. 00067,00074,00073)	1	EA
28	064331 001	Leveller weldment (Before SL30 01 00168 / SL26 01 00066)	1	EA
28	513392 000	Leveller weldment (After SL30 01 00177+ inc.00169,00173 / SL26 01 00090+ inc. 00067,00074,00073)	1	EA

アイテム	部品番号	名前	数量	UOM
29	064094 000	Pivot pin, cylinder body 1st post	1	EA
30	014918 056	Bolt,1 8 UNC x 7	6	EA
31	504559 000	Overload EZfit angle transducer	2	EA
32	504560 000	Overload 3000 PSI pressure transducer	1	EA
33	515555 000	Lower Boom Support (After SN SL26SL 01 00112) (Not illustrated)	1	EA

REPAIR PARTS

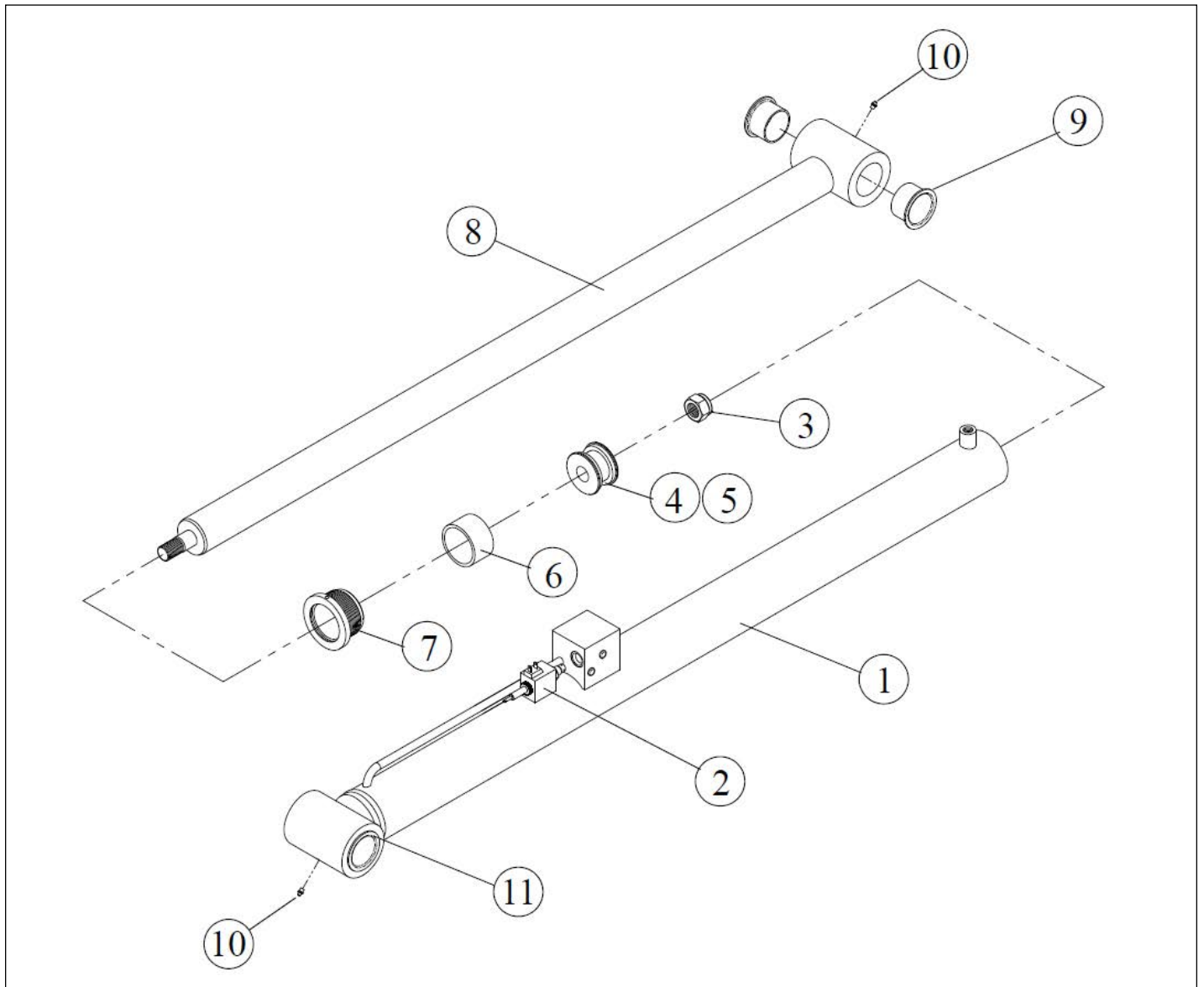


アイテム	部品番号	名前	数量	UOM
Not Shown	505502 000	ELEVATING ASSY SL30SL		EA
1	011254 024	Bolt, Pin lock 3/8	9	EA
2	064090 000	Pivot pin, upper T bar & up boom PED	3	EA
3	011248 006	Locknut 3/8 16	9	EA
4	064111 002	Pedestal weldment (Before SL30 01 00168)	1	EA
4	513237 000	Pedestal weldment (After SL30 01 00177+ inc.00169,00173)	1	EA
5	062649 020	Bushing, all 1.75 pins	12	EA
6	064536 000	Upper tension bar (Before SL30 01 00168)	1	EA
6	513247 000	Upper tension bar (After SL30 01 00177+ inc.00169,00173)	1	EA
7	064521 000	Upper boom (Before SL30 01 00168)	1	EA
7	513182 000	Upper boom (After SL30 01 00177+ inc.00169,00173)	1	EA
8	064538 000	Channel, wire cover (upper boom)	1	EA
9	062642 030	Bushing, all 2.75 pins	6	EA
10	011248 016	Nut (roller)	6	EA
11	064089 000	Gear segment	2	EA
12	013336 001	FITTING, GREASE	16	EA
13	064070 002	2nd Post weldment (Before SL30 01 00168 / SL26 01 00066)	1	EA
13	513219 000	2nd Post weldment (After SL30 01 00177+ inc.00169,00173 / SL26 01 00090+ inc. 00067,00074,00073)	1	EA
14	064094 000	Pivot pin, cylinder body 1st post	2	EA
15	062649 010	Flanged bushing	2	EA
16	011248 016	Nut (roller)	1	EA
17	064095 000	Pivot pin, lower boom & upper boom 2nd	3	EA

アイテム	部品番号	名前	数量	UOM
18	064530 000	Lower boom (Before SL30 01 00168)	1	EA
18	513192 000	Lower boom (After SL30 01 00177+ inc.00169,00173)	1	EA
18	515780 000	Lower boom (After SN SL30SL 01 00212) On SL30RTE from first build	1	EA
19	064542 000	Channel, wire cover (lower boom)	1	EA
20	064093 000	Pivot pin, cylinder rod lower boom	1	EA
21	064531 001	Lower tension bar (Before SL30 01 00168)	1	EA
21	513236 000	Lower tension bar (After SL30 01 00177+ inc.00169,00173)	1	EA
22	014918 048	Bolt (roller, boom rest)	1	EA
23	064356 000	Roller pin (Before SN SL26SL 01 00111 / SL30SL 01 00211) Not used on SLRTE	1	EA
24	027931 057	Bushing, roller (Before SN SL26SL 01 00111 / SL30SL 01 00211) Not used on SLRTE	2	EA
25	064354 000	Roller (Before SN SL26SL 01 00111 / SL30SL 01 00211) Not used on SLRTE	1	EA
26	063904 101	HYDRAULIC CYLINDER ASSEMBLY MAIN LIFT	1	EA
27	064320 001	1st post weldment (Before SL30 01 00168 / SL26 01 00066)	1	EA
27	513347 000	1st post weldment (After SL30 01 00177+ inc.00169,00173 / SL26 01 00090+ inc. 00067,00074,00073)	1	EA
28	064331 001	Leveller weldment (Before SL30 01 00168 / SL26 01 00066)	1	EA
28	513392 000	Leveller weldment (After SL30 01 00177+ inc.00169,00173 / SL26 01 00090+ inc. 00067,00074,00073)	1	EA
29	064094 000	Pivot pin, cylinder body 1st post	1	EA

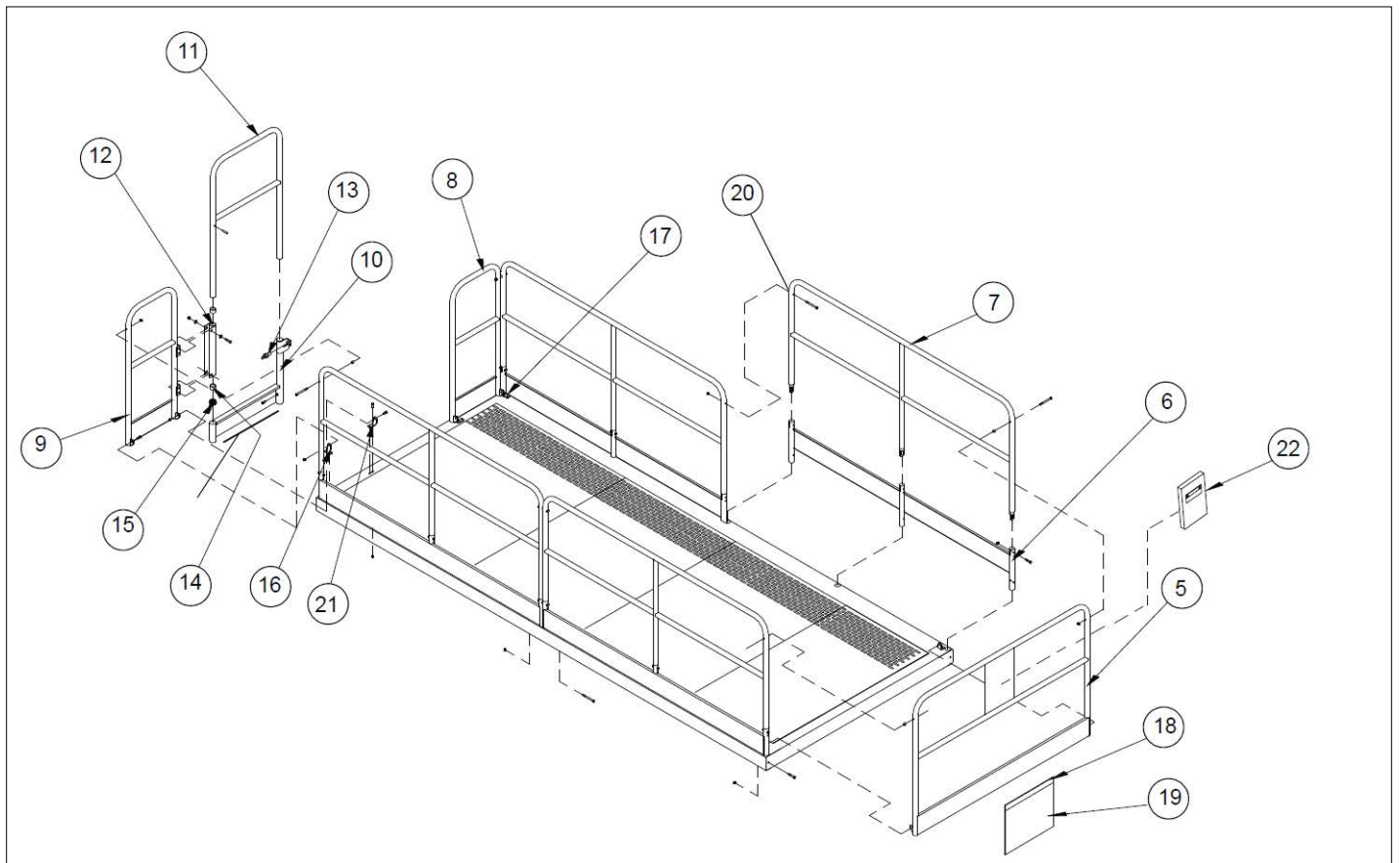
アイテム	部品番号	名前	数量	UOM
30	014918 056	Bolt,1 8 UNC x 7	6	EA
31	504559 000	Overload EZfit angle transducer	2	EA
32	504560 000	Overload 3000 PSI pressure transducer	1	EA
33	515549 000	Lower boom support (After SN SL26SL 01 00112 / SL30SL 01 00212) On SLRTE from first build	1	EA

REPAIR PARTS

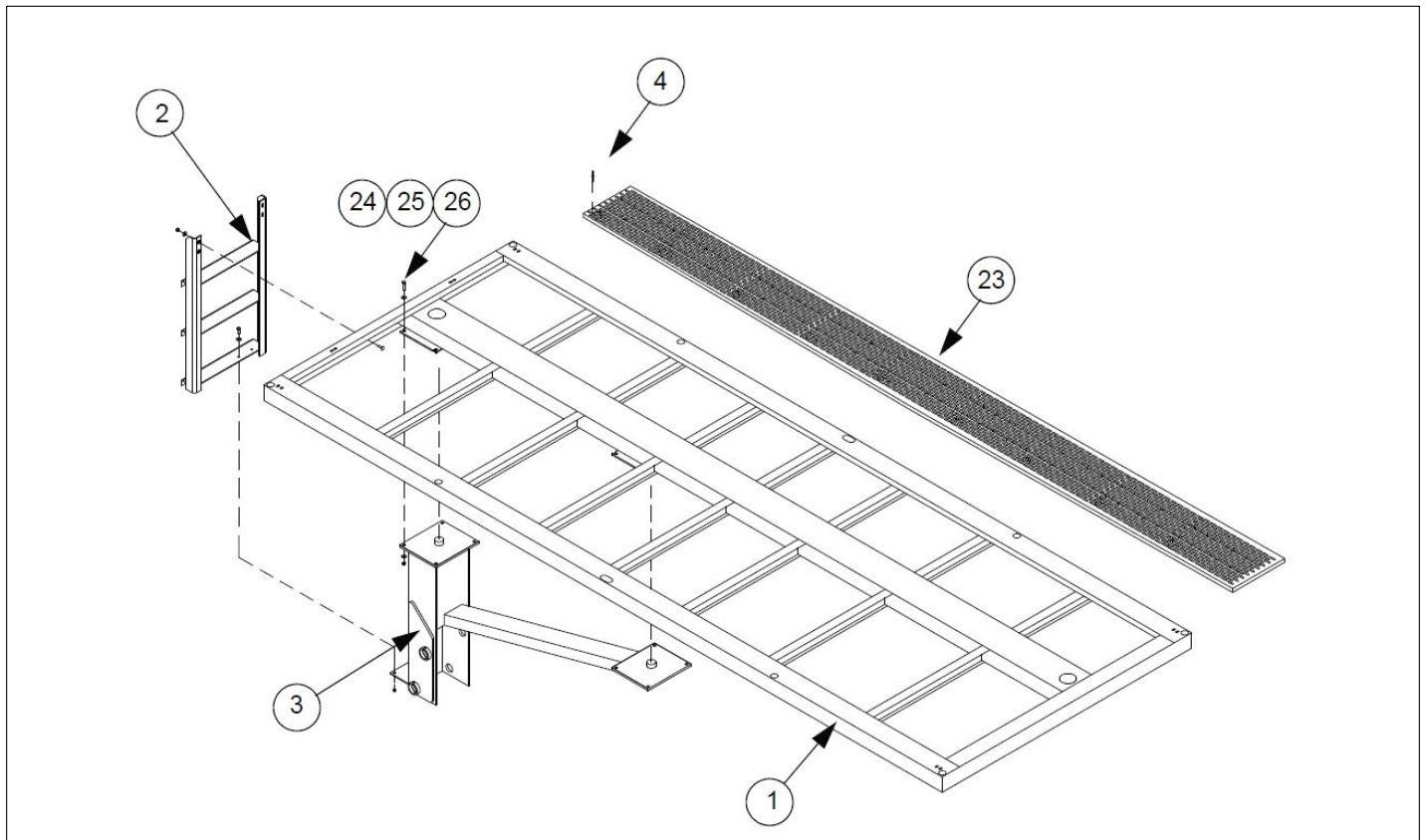


アイテム	部品番号	名前	数量	UOM
Not Shown	063904 101	HYDRAULIC CYLINDER ASSEMBLY MAIN LIFT		EA
1	Contact product support	Bushing	1	EA
2	Contact product support	Bushing	1	EA
3	Contact product support	Bushing	1	EA
4	Contact product support	Bushing	1	EA
5	063904 010	Seal kit	1	EA
6	Contact product support	Bushing	1	EA
7	Contact product support	Bushing	1	EA
8	Contact product support	Bushing	1	EA
9	062649 010	Flanged bushing	2	EA
10	058819 000	M6 grease nipple	2	EA
11	Contact product support	Bushing	2	EA

REPAIR PARTS

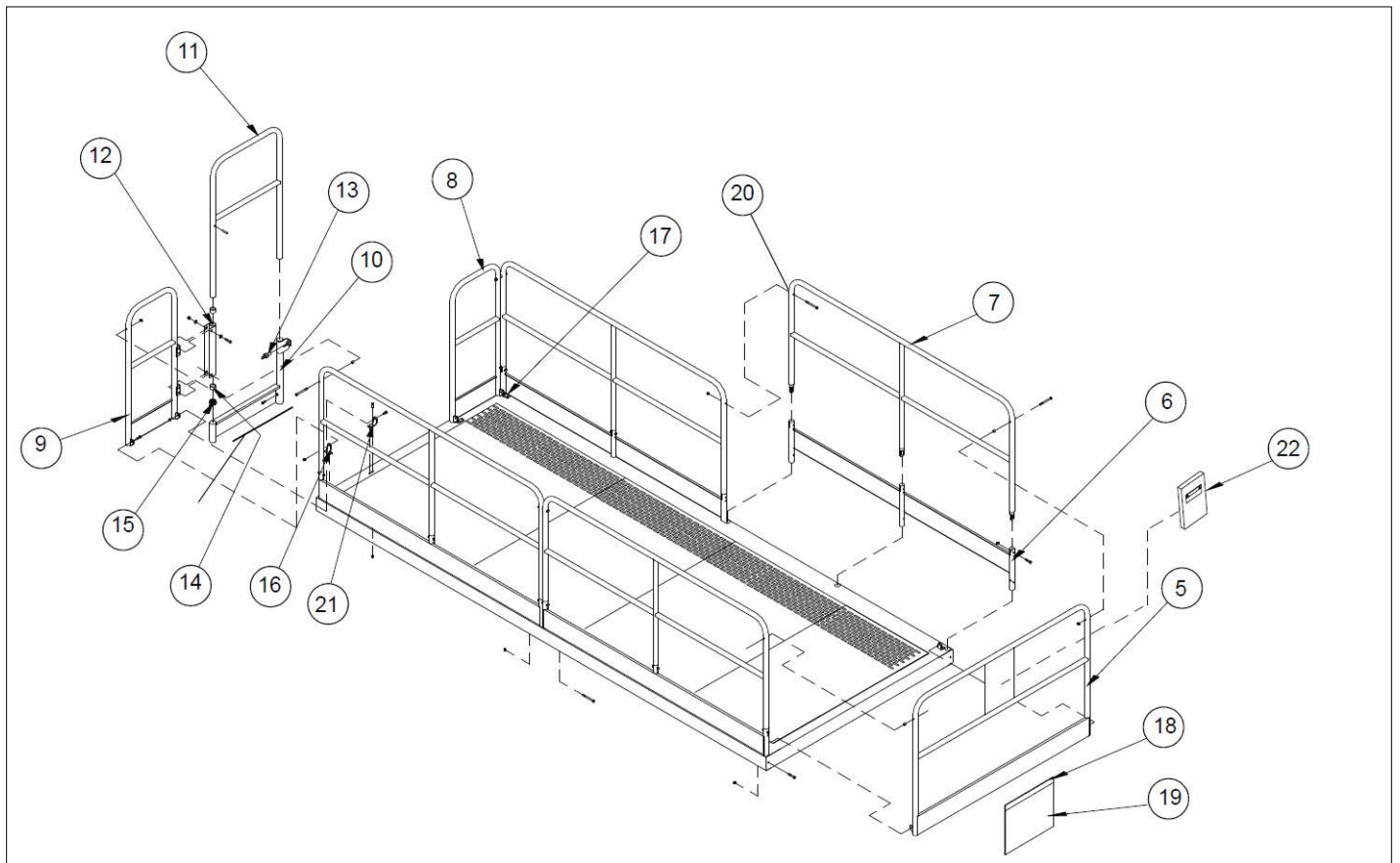


アイテム	部品番号	名前	数量	UOM
Not Shown	505503 000	PLATFORM ASSEMBLY SL30SL		EA
1	064540 011	Deck weldment (Before MAY 2017)	1	EA
1	515348 000	Deck weldment (After MAY 2017)	1	EA
2	510502 000	Ladder weldment	1	EA
3	064111 002	Pedestal weldment (Before SL30 01 00168)	1	EA
4	510678 000	Safe deck mounting	30	EA
5	064700 000	GUARDRAIL, FRONT	1	EA
6	064696 000	Kick plate, side (Before MAY 2017)	4	EA
6	515347 000	Kick plate, side (After MAY 2017)	4	EA
27	515346 000	Surf Plug Guard (option if Surf Plug fitted)	1	EA
7	064698 000	Guardrail, side	4	EA
8	064702 002	Guardrail, end left hand side	1	EA
9	064702 001	Guardrail, end right hand side	1	EA
10	067764 001	Kick plate, gate	1	EA
11	067883 000	Gate weldment	1	EA
12	067712 000	Gate pivot tube	1	EA
13	003570 005	RETAINING PIN ASSY.	1	EA
14	515659 000	OILITE BEARING #TFPI 22 TH 16	2	EA
15	066526 004	Gate spring	1	EA
16	064688 001	Bracket toe board pivot right hand	2	EA
17	064688 002	Bracket toe board pivot left hand	2	EA
18	064447 000	Skirt plate (rubber skirt)	1	EA
19	064448 000	Rubber skirt	1	EA
20	067695 000	Spacer	6	EA
21	064046 000	Rail mounting bracket	2	EA

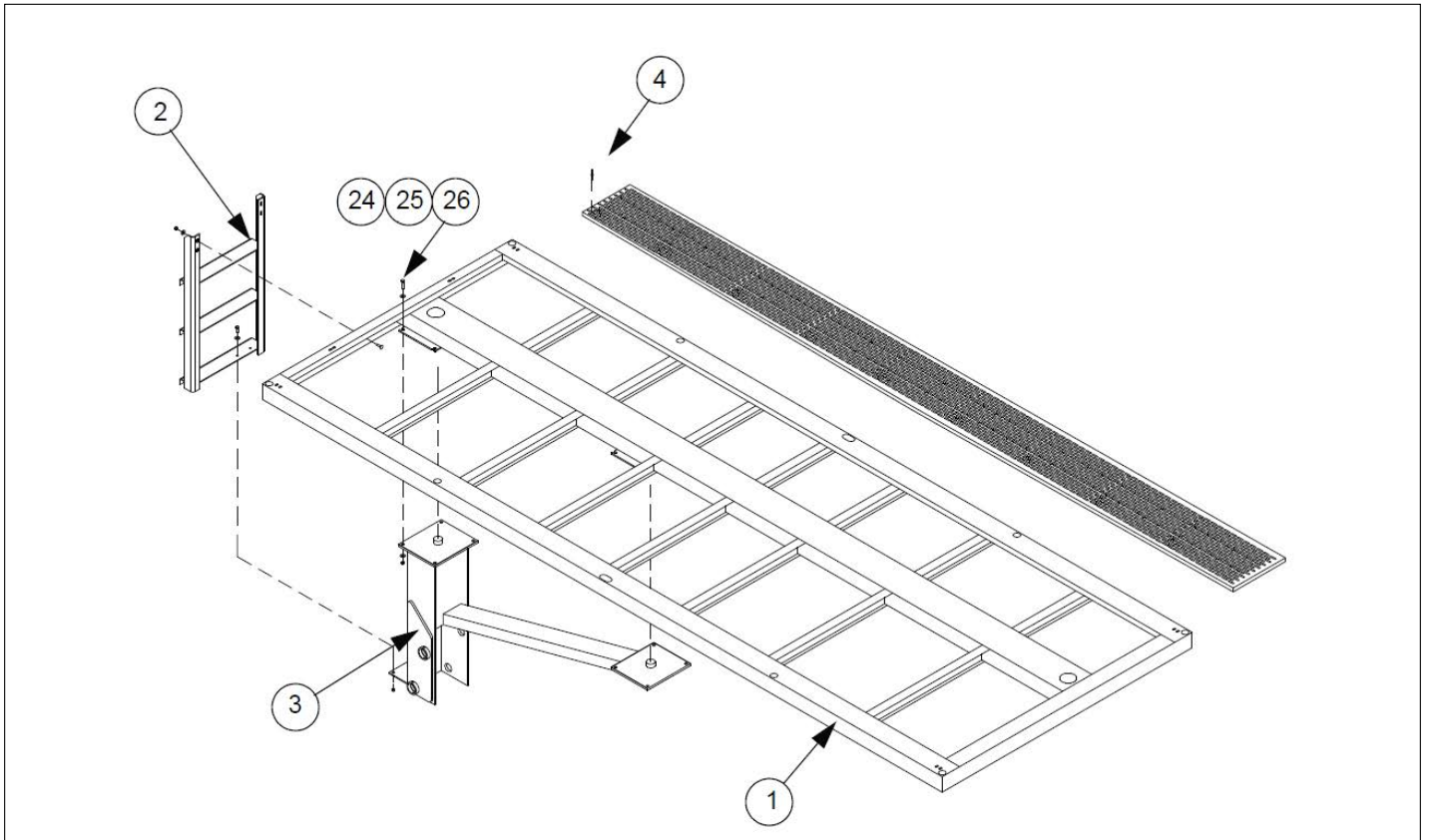


アイテム	部品番号	名前	数量	UOM
22	010076 000	Manual Enclosure	1	EA
23	510677 000	Safe deck, aluminium stabil	5	EA
24	057052 050	BOLTHEXBOLT DIN983 M12 X 50MM 10.9 DACROMET	8	EA
25	505087 012	Hardened washer, M12	16	EA
26	056064 012	NUT HEX M12 X 1.75 GR 10.9 SELF LOCKING DIN 985	8	EA
27	514743 000	Aluminium/Nylon Black Brush Strip	1	EA

REPAIR PARTS

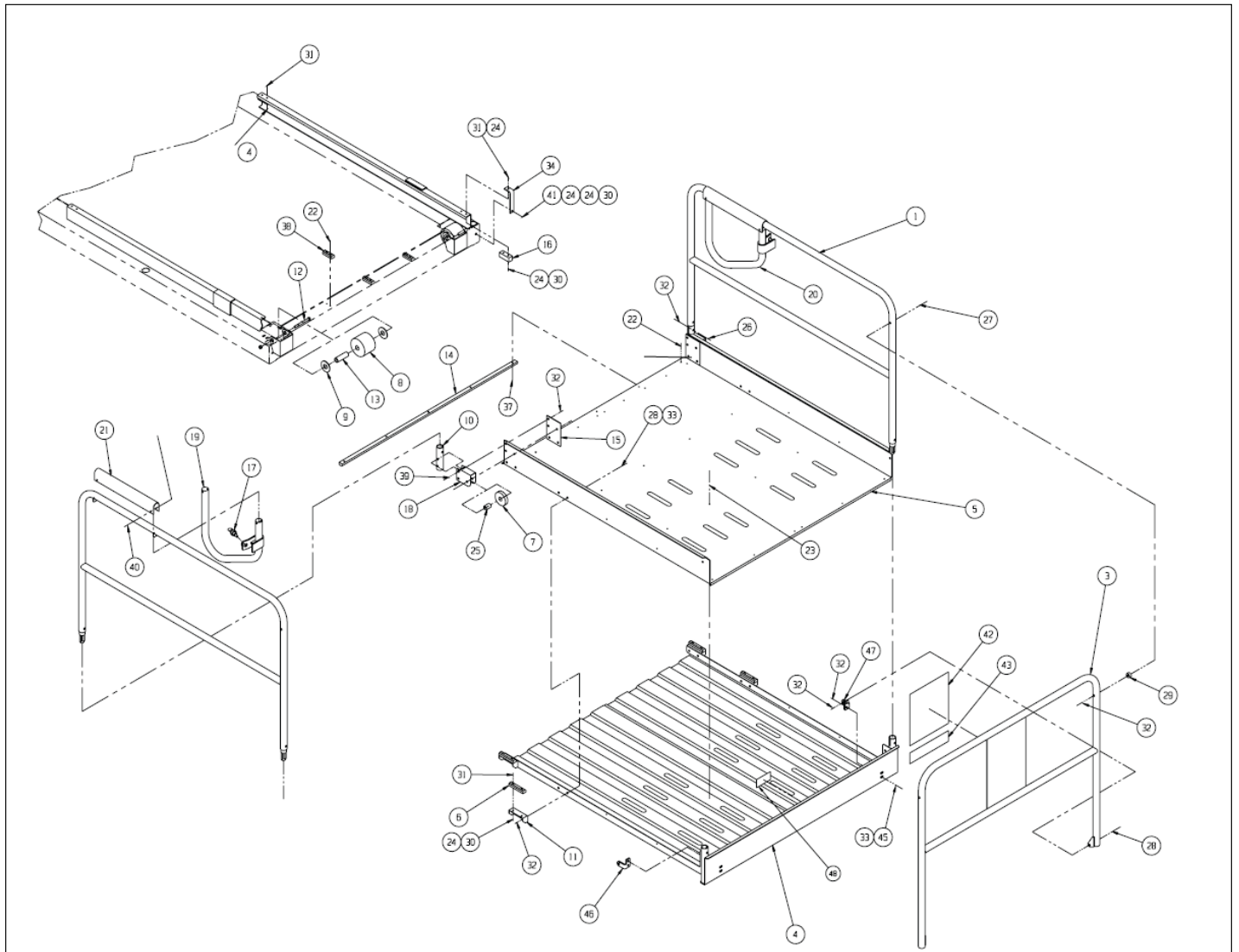


アイテム	部品番号	名前	数量	UOM
Not Shown	505603 000	PLATFORM ASSEMBLY SL26RTE		EA
1	064100 011	Deck weldment	1	EA
2	510502 000	Ladder weldment	1	EA
3	064111 001	Pedestal weldment (Before SL26 01 00066)	1	EA
4	026554 002	Rivet (main deck)	24	EA
5	064700 000	GUARDRAIL, FRONT	1	EA
6	064695 000	Kick plate, side	4	EA
7	064697 000	Guardrail, side	4	EA
8	064702 002	Guardrail, end left hand side	1	EA
9	064702 001	Guardrail, end right hand side	1	EA
10	067764 001	Kick plate, gate	1	EA
11	067883 000	Gate weldment	1	EA
12	067712 000	Gate pivot tube	1	EA
13	003570 005	RETAINING PIN ASSY.	1	EA
14	515659 000	OILITE BEARING #TFPI 22 TH 16	2	EA
15	066526 004	Gate spring	1	EA
16	064688 001	Bracket toe board pivot right hand	2	EA
17	064688 002	Bracket toe board pivot left hand	2	EA
18	064447 000	Skirt plate (rubber skirt)	1	EA
19	064448 000	Rubber skirt	1	EA
20	067695 000	Spacer	6	EA
21	064046 000	Rail mounting bracket	2	EA
22	010076 000	Manual Enclosure	1	EA
24	057052 050	BOLTHEXBOLT DIN983 M12 X 50MM 10.9 DACROMET	8	EA
25	505087 012	Hardened washer, M12	16	EA
26	056064 012	NUT HEX M12 X 1.75 GR 10.9 SELF LOCKING DIN 985	8	EA



アイテム	部品番号	名前	数量	UOM
27	514743 000	Aluminium/Nylon Black Brush Strip	1	EA

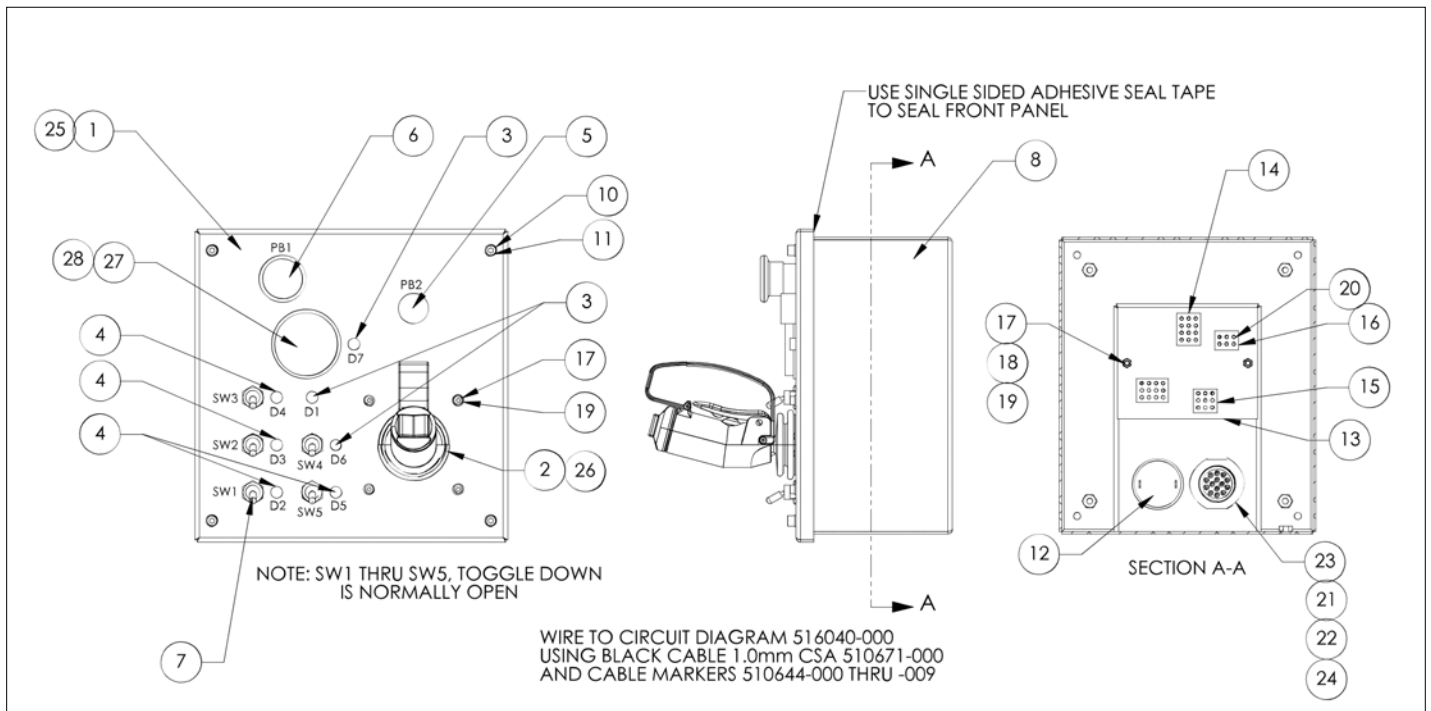
REPAIR PARTS



アイテム	部品番号	名前	数量	UOM
Not Shown	064617 002	PLATFORM ASSEMBLY SLIDE OUT SECTION SL26SL		EA
1	064785 000	Side rail	2	EA
3	064778 000	Front rail	1	EA
4	064763 000	Deck weldment (Before SN SL26SL 01 xxxx00092)	1	EA
4	515824 000	Deck Slide Out Weldment (After SN SL26SL 01 xxxx00093)	1	EA
5	064761 000	Floor (Aluminium)	1	EA
6	063727 000	Block	4	EA
7	064233 000	Wheel (narrow)	4	EA
8	064234 000	Wheel (wide)	2	EA
9	064235 000	Washer	4	EA
10	064776 000	Tube, rail support	2	EA
11	064425 000	Slide bracket (Before SN SL26SL 01 xxxx00092)	4	EA
11	515825 000	Slide Bracket (After SN SL26SL 01 xxxx00093)	4	EA
12	063990 003	Axle	2	EA
13	064249 000	Bushing (spanner)	2	EA
14	064256 000	Bearing strip (Ply Deck)	1	EA
14	515285 000	Bearing strip (Aluminium Deck)	1	EA
15	064795 000	Gusset plate (Before SN SL26SL 01 xxxx00092)	2	EA
15	515827 000	GUSSET, RH (After SN SL26SL 01 xxxx00093)	1	EA
15	515826 000	GUSSET, LH (After SN SL26SL 01 xxxx00093)	1	EA
16	064267 000	Bumper pad	4	EA
17	003570 001	Retaining pin assembly	2	EA
18	064774 000	Roller bracket	2	EA
19	064769 001	Right handle	1	EA
20	064769 002	Left handle	1	EA

アイテム	部品番号	名前	数量	UOM
21	064773 000	Handle bracket	2	EA
22	026553 008	Pop rivet 3/16 diameter 1/2 5/8 grip	12	EA
23	026553 002	Pop rivet 3/16 diameter 1/8 1/4 grip	30	EA
24	011240 004	Flat washer 1/4 standard	22	EA
25	064240 001	Bushing	2	EA
26	011254 018	Screw Cap 3/8 16 x 2 1/4	4	EA
27	011254 032	Screw CAP 3/8 16 x 4	2	EA
28	011254 010	Screw CAP 3/8 16 x 1 1/4	10	EA
29	067695 000	Spacer	2	EA
30	011248 004	Locknut 1/4 20	22	EA
31	011252 014	Screw 1/4 20 UNC hex hd x 1 3/4	10	EA
32	011248 006	Locknut 3/8 16	26	EA
33	011240 006	Flat washer 3/8 standard	12	EA
34	064775 000	Front angle	2	EA
37	011240 002	Washer #8	6	EA
38	064247 000	Guide slide	3	EA
39	011254 020	Screw cap 3/8 16 x 2 1/2	6	EA
40	011252 016	Screw cap 1/4 20 x 2	4	EA
41	011252 006	screw cap 1/4 20 hex hd x 3/4	2	EA
42	066550 006	Decal danger	1	EA
43	066551 003	Tipping hazard	1	EA
45	011254 008	Screw 3/8 16 hex hd x 1	4	EA
46	064688 001	Bracket toe board pivot right hand	1	EA
47	064688 002	Bracket toe board pivot left hand	1	EA
48	101251 001	Decal danger tip over	1	EA

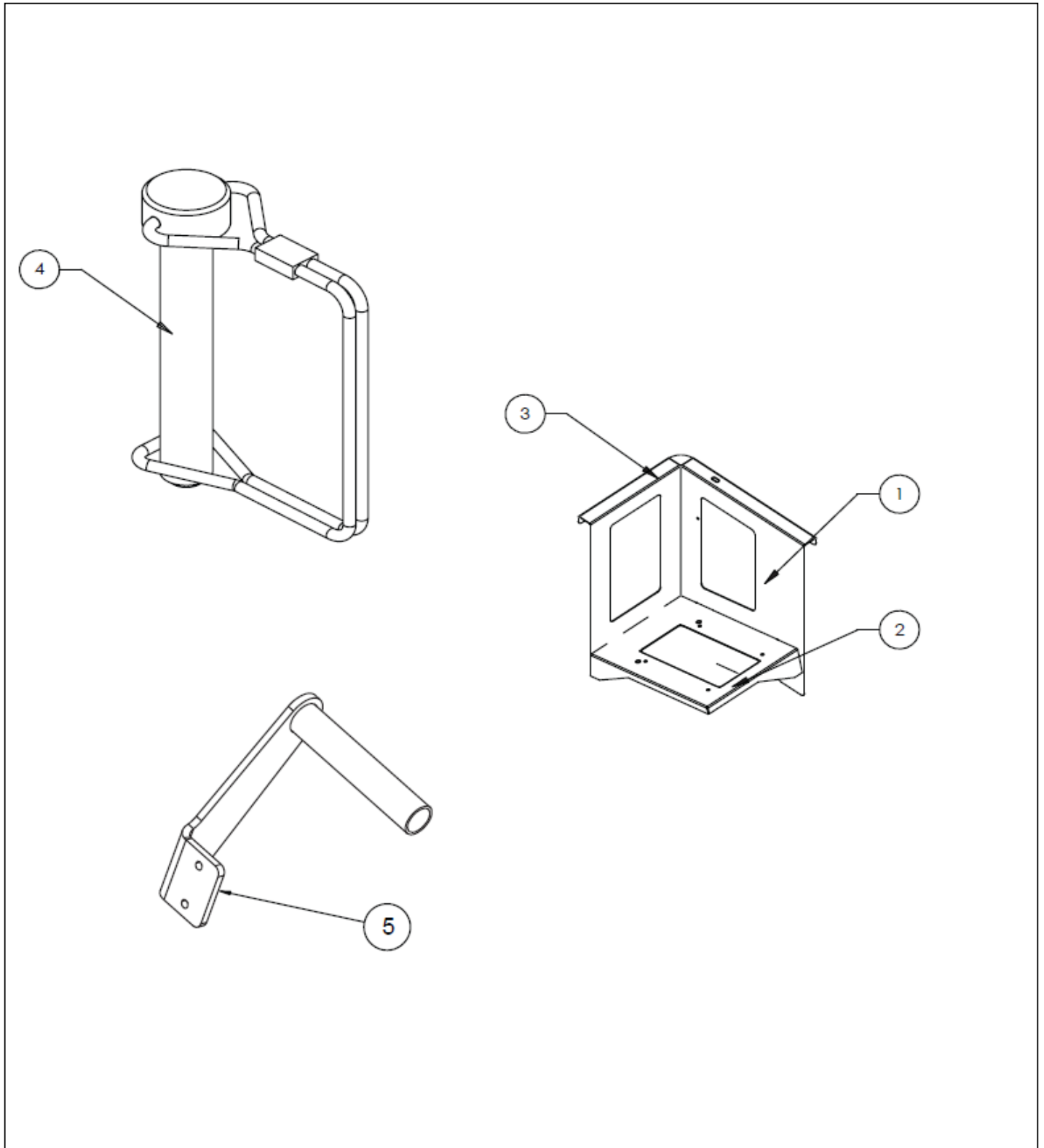
REPAIR PARTS



アイテム	部品番号	名前	数量	UOM
Not Shown	516041 000	UPPER CONTROL PANEL SLE		EA
1	516043 000	SL26E UPPER CONTROL PANEL	1	EA
2	3028933	Joystick 1 Axis, Deadman Guard	1	EA
3	512934 000	LED RED 12V	3	EA
4	512935 000	LED GREEN 12V	4	EA
5	510542 000	PUSHBUTTON BLACK C/W 1 N/O CON	1	EA
6	3028810	PUSH/PULL EMERGENCY STOP	1	EA
7	3020080	TOGGLE SWITCH	5	EA
8	514485 000	SL UCB enclosure	1	EA
9	056066 005	Nut NylockNut DIN985 M5 8.0 Zi	4	EA
10	056069 005	Washer SteelFlatWasher DIN125A	4	EA
11	058501 016	M5 x 16 S.H.C.S. GR 12.9	4	EA
12	502588 000	ALARM, ECCO BEEPING 6 28VDC	1	EA
13	3030169	Matrix board (After SN SL30 01 XXXX00062 / SL26 01 XXXX000018)	1	EA
14	510157 000	12 way panel plug	2	EA
15	510156 000	9WAY PANEL PLUG	1	EA
16	510154 000	6WAY PANEL PLUG	1	EA
17	058500 025	M4 x 25 SHCS 12.9	6	EA
18	056066 004	NUT NYLOCK DIN985 M4 8.0 ZP	2	EA
19	056069 004	Wshr, SteelFlatWshr M4 DIN125	6	EA
20	509755 000	Mate N lock socket contact	26	EA
21	514604 000	LOCKWASHER DEUTSCH 114021	1	EA
22	514605 000	LOCKNUT DEUTSCH 114020 90	1	EA
23	3049862	Receptacle, Flgd HD30, 14 Way	1	EA
24	100338 013	CRIMP PIN DEUTSCH	7	EA
25	516045 000	Overlay,Upper Control Box	1	EA

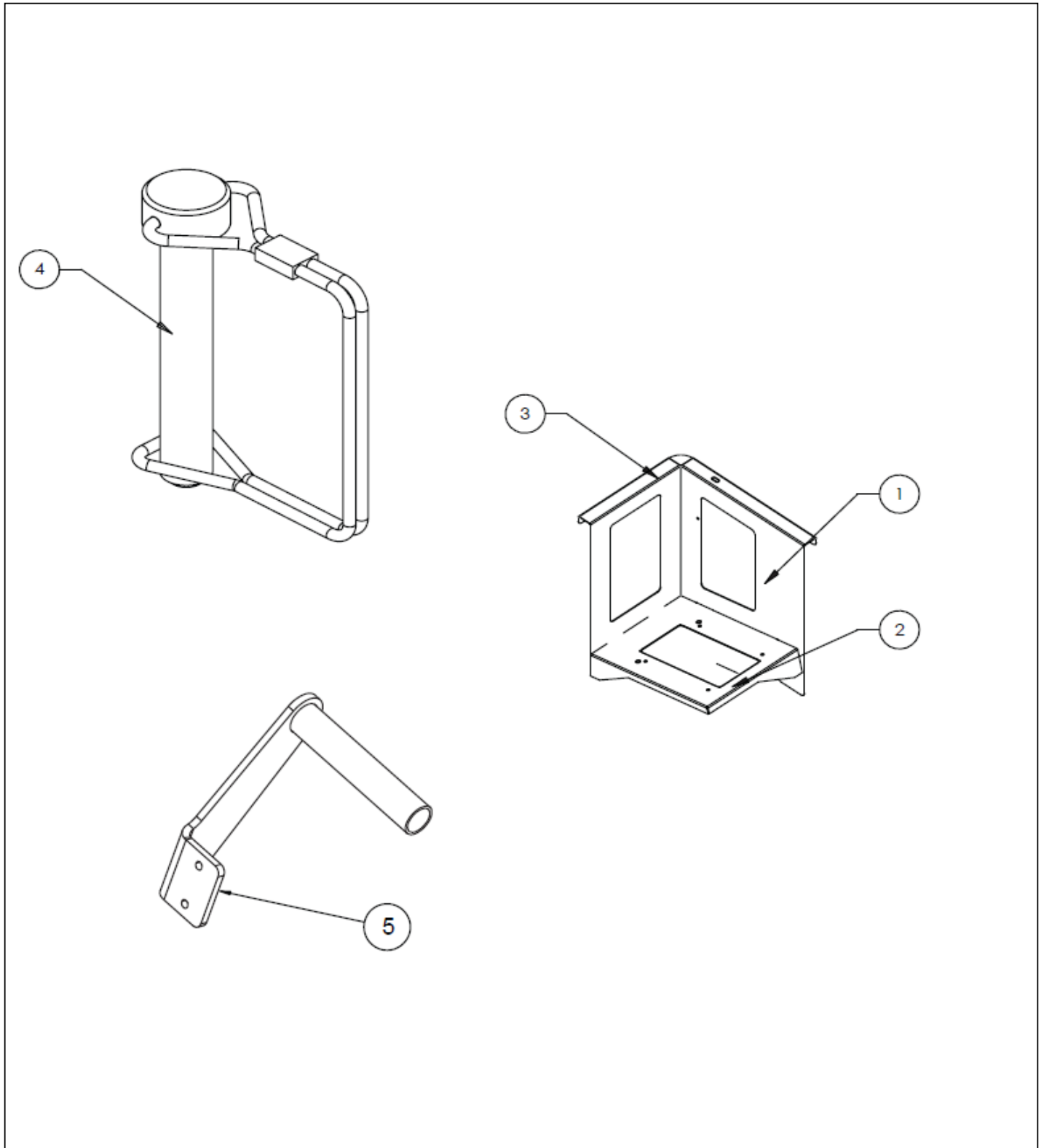
アイテム	部品番号	名前	数量	UOM
26	514945 000	Joystick harness	1	EA
27	516042 000	CAN840 Display	1	EA
28	516044 000	MOLEX 39 01 2085	1	EA

REPAIR PARTS



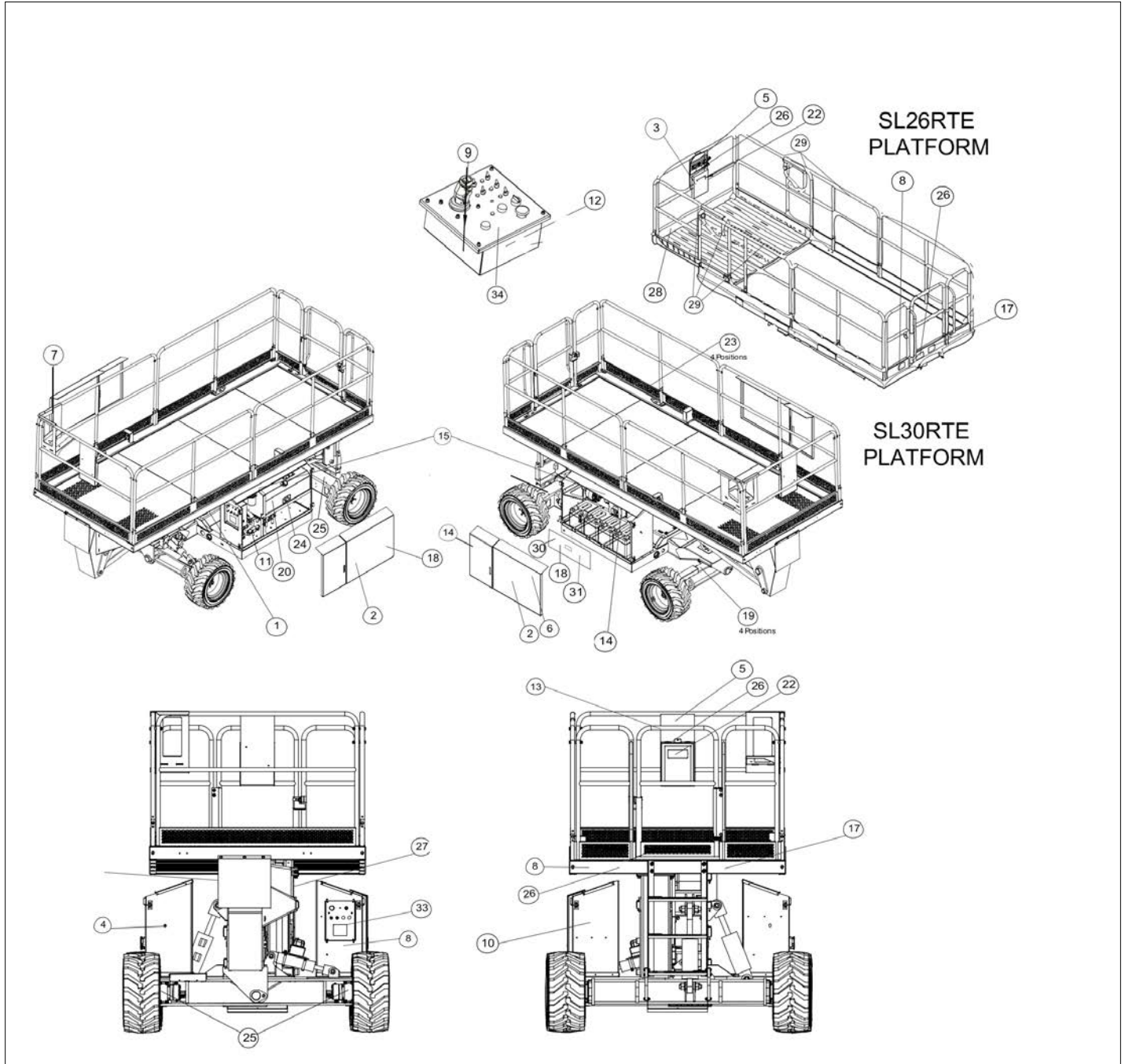
アイテム	部品番号	名前	数量	UOM
Not Shown	514521 000	UPPER CONTROL PANEL ASSEMBLY SL30 ADDITIONS		EA
1	514521 001	UCB mount side plate	1	EA
2	514521 002	UCB mount base	1	EA
3	514521 003	UCB mount fillet	1	EA
4	302544	Pin & Lock	1	EA
5	14002	Wrist Support	1	EA

REPAIR PARTS





アイテム	部品番号	名前	数量	UOM
Not Shown	514938 000	UPPER CONTROL PANEL ASSEMBLY SL26 ADDITIONS		EA
1	514938 001	UCB mount side plate	1	EA
2	514521 002	UCB mount base	1	EA
3	514521 003	UCB mount fillet	1	EA
4	302544	Pin & Lock	1	EA
5	14002	Wrist Support	1	EA

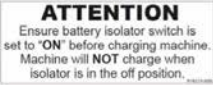
REPAIR PARTS






アイテム	部品番号	名前	数量	UOM
Not Shown	516215 000	DECAL KIT SL26RTE ENGLISH		EA
1	515980 001	Decal, Snorkel SL26RTE	2	EA
2	515980 000	Decal, Snorkel SL26RTE	2	EA
3	515335 100	Decal, QR Barcode, English	1	EA
4	516213 000	Decal, Battery isolator	1	EA
5	066550 005	Warning	1	EA
6	508494 068	LWA Decal 68 dB	1	EA
7	066551 003	Tipping hazard	1	EA
8	066551 002	Tipping hazard	2	EA
9	066554 000	DECAL, BEFORE OPERATING	1	EA
10	510280 000	DECAL, IPAf EMERG LWR	1	EA
11	066555 000	DECAL, RELIEF VALVE	1	EA
12	064374 000	Decal, To level	1	EA
13	066563 000	Distance to ground	1	EA
14	101210 000	Risk of hydrogen gas and battery leakage	1	EA
15	066556 900	Risk from above	2	EA
16				EA
17	508047 000	Safe working load	1	EA
18	516231 000	Decal, Disconnect Batteries	1	EA
19	058531 000	Lift/tie down point	4	EA
20	510787 000	Hydraulic fluid	1	EA
21				EA
22	010076 901	DECAL SNORKEL LOGO, 183MM CAP	1	EA
23	068635 001	Harness anchor point	4	EA
24	302950	Decal, Hydraulic Oil Level (On Hydraulic Oil Tank)	1	EA
26	508875 000	Decal, side force 400 N	2	EA
25	510885 000	Decal, wheel loading	4	EA


1 515980-001 ,qty 2



2 515980-000 ,qty 2



3 515335-100 qty 1



4 516213-000 qty 1



5 512309-001 qty 1




6 508494-068 qty 1



7 066551-003 qty 1



8 066551-002 qty 2



9 066554-000 qty 1



10 510280-100 qty 1



11 066555-000 qty 1



12 064374-000 qty 1



13 066563-000 qty 1


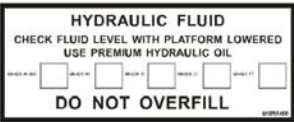
14 101210-000 qty 1



15 066556-900 qty 2



17 508047-000 qty 1



18 516231-000 qty 1



19 058531-000 qty 4



20 510787-000 qty 1


22 010076-901 qty 1


23 068635-001 qty 4


24 302950 qty 1


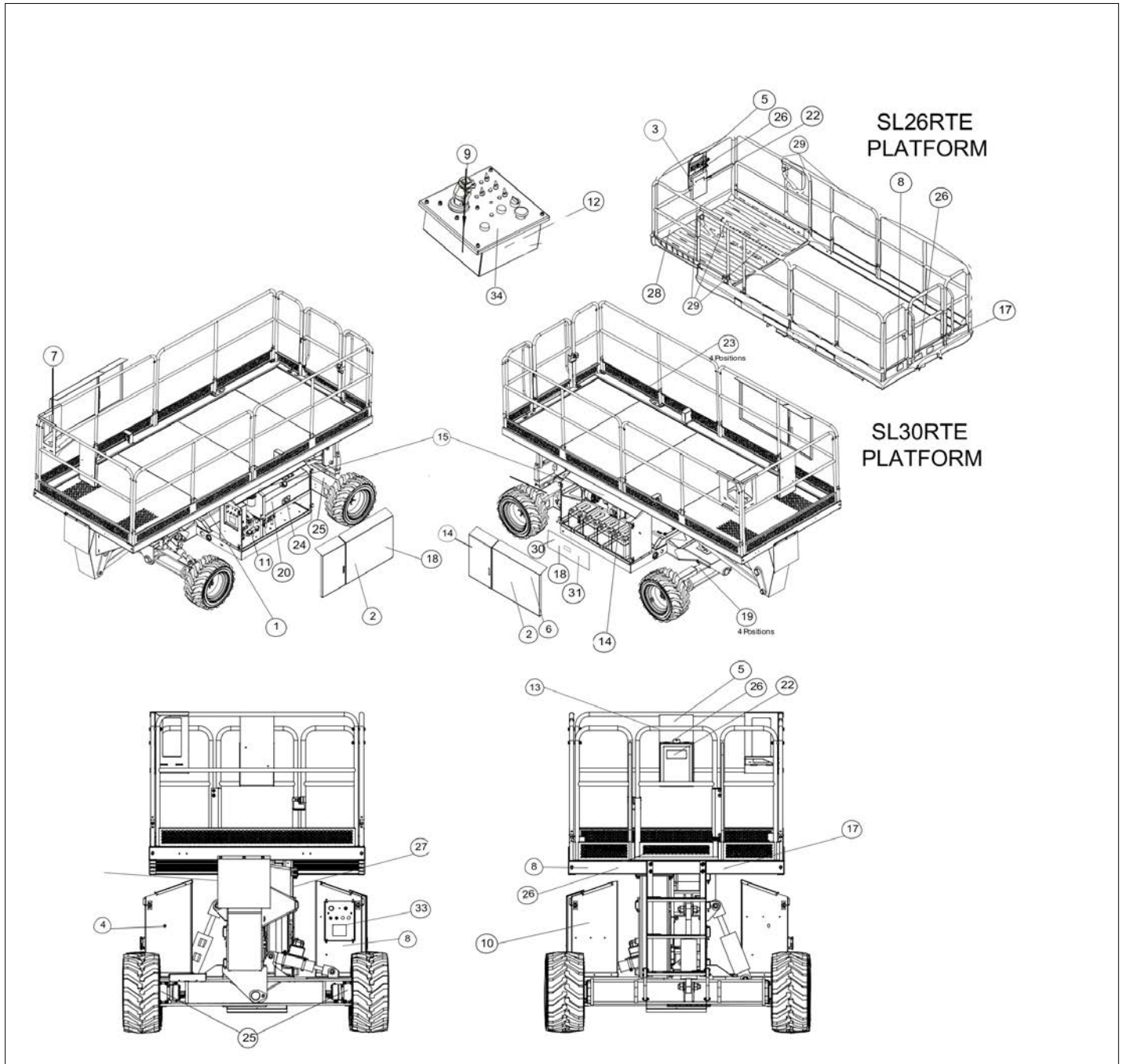
25 510885-000 qty 4


26 508875-000 qty 2













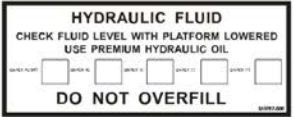











27 511066-000 qty 1
www.snorkellifts.com

アイテム	部品番号	名前	数量	UOM
27	511066 000	Decal, web address	1	EA
28	066551 225	Decal, safe working load extension (SL26RTE Only)	1	EA
29	514360 000	Decal, Hand Trap	6	EA
30	0162366	Decal,Electric Shock	1	EA
31	516213 001	Decal,Battery Disconnect	1	EA
32				EA
33	516049 000	Overlay, Lower Control Box	1	EA
34	516045 000	Overlay,Upper Control Box	1	EA

REPAIR PARTS



アイテム	部品番号	名前	数量	UOM
Not Shown	516214 000	DECAL KIT SL30RTE ENGLISH		EA
1	515232 001	Decal, Snorkel SL30RTE	2	EA
2	515232 000	Decal, Snorkel SL30RTE	2	EA
3	515335 100	Decal, QR Barcode, English	1	EA
4	516213 000	Decal, Battery isolator	1	EA
5	066550 005	Warning	1	EA
6	508494 068	LWA Decal 68 dB	1	EA
7	066551 003	Tipping hazard	1	EA
8	066551 002	Tipping hazard	2	EA
9	066554 000	DECAL, BEFORE OPERATING	1	EA
10	510280 000	DECAL, IPAf EMERG LWR	1	EA
11	066555 000	DECAL, RELIEF VALVE	1	EA
12	064374 000	Decal, To level	1	EA
13	066563 000	Distance to ground	1	EA
14	101210 000	Risk of hydrogen gas and battery leakage	1	EA
15	066556 900	Risk from above	2	EA
16				EA
17	505573 001	Safe working load	1	EA
18	516231 000	Decal, Disconnect Batteries	1	EA
19	058531 000	Lift/tie down point	4	EA
20	510787 000	Hydraulic fluid	1	EA
21				EA
22	010076 901	DECAL SNORKEL LOGO, 183MM CAP	1	EA
23	068635 001	Harness anchor point	4	EA
24	302950	Decal, Hydraulic Oil Level (On Hydraulic Oil Tank)	1	EA
26	508875 000	Decal, side force 400 N	2	EA
25	510885 000	Decal, wheel loading	4	EA

<p>snorkel SL30RTE</p> <p>1 516323-001 ,qty 2</p> <p>snorkel SL30RTE</p>			
<p>2 516323-000 ,qty 2</p> 	<p>10 510280-100 qty 1</p>	<p>17 505573-001 qty 2</p>	<p>31 516213-001 qty 1</p>
<p>3 515335-100 qty 1</p> <p>ATTENTION Ensure battery isolator switch is set to "ON" before charging machine. Machine will NOT charge when isolator is in the off position.</p>			
<p>4 516213-000 qty 1</p>	<p>11 066555-000 qty 1</p>	<p>18 516231-000 qty 1</p>	<p>30 0162336 qty 1</p>
			
	<p>12 064374-000 qty 1</p>	<p>19 058531-000 qty 4</p>	
			
<p>5 066550-005 qty 1</p>	<p>13 066563-000 qty 1</p>	<p>20 510787-000 qty 1</p>	
			
<p>6 508494-068 qty 1</p>	<p>14 101210-000 qty 1</p>		
		<p>22 010076-901 qty 1</p>	<p>25 510885-000 qty 4</p>
<p>7 066551-003 qty 1</p>	<p>15 066556-900 qty 2</p>		
	<p>23 068635-001 qty 4</p>		
		<p>26 508875-000 qty 2</p>	<p>www.snorkellifts.com</p>
<p>9 066554-000 qty 1</p>	<p>24 302950 qty 1</p>		<p>27 511066-000 qty 1</p>

アイテム	部品番号	名前	数量	UOM
27	511066 000	Decal, web address	1	EA
28				EA
29				EA
30	516230 000	Decal,Electric Shock	2	EA
31	516213 001	Decal,Battery Disconnect	1	EA
32	514360 000	Decal, Hand Trap	4	EA
33	516049 000	Overlay, Lower Control Box	1	EA
34	516045 000	Overlay,Upper Control Box	1	EA

SERVICE AND REPAIR

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SERVICE AND REPAIR

INTRODUCTION

! WARNING !

Be sure to read, understand and follow all information in the operation section of this manual before attempting to operate or perform service on any SL26/30SL work platform.

! CAUTION !

It is the responsibility of the person carrying out any maintenance operations to ensure that any hazardous substances eg waste oil, batteries or tyres are disposed of in accordance with local regulations.

! CAUTION !

Detailed descriptions of standard workshop procedures, safety principles and service operations are not included.

Please note that this manual contains warnings and cautions against some specific service methods which could cause personal injury or could damage a machine or could make it unsafe.

Please understand that these warnings cannot cover all conceivable ways in which service, whether or not recommended by Snorkel, might be carried out or of the possible hazardous consequences of each conceivable way nor could Snorkel investigate all such ways.

Anyone using service procedures or tools whether or not recommended by Snorkel, must satisfy themselves thoroughly that neither personal safety nor machine safety will be jeopardized

This section contains instructions for the maintenance of the SL26/30SL work platform. Procedures for operation inspection, adjustment, scheduled maintenance and repair/removal are included.

Referring to section 2 will aid in understanding the operation and function of the various components and systems of the SL26/30SL work platform and help in diagnosing and repair of the machine.

Refer to page 3-2 for recommended maintenance intervals.

NOTE: Unless otherwise specified, torque all fittings according to the “Torque Specifications for Fasteners” and the “Torque Specifications for Hydraulic Components” on page 3-22 and page 3-23.

SPECIAL TOOLS

The following is a list of special tools which may be required to perform certain maintenance procedures on the work platform.

- 0-600 PSI (0-45 bar) hydraulic pressure gauge
- 0-3500 PSI (0-250) hydraulic pressure gauge
- Inclinator
- Quick disconnect gauge port

PREVENTATIVE MAINTENANCE

The complete inspection consists of periodic visual and operational checks together with all necessary minor adjustments to assure proper performance. Daily inspection will prevent abnormal wear and prolong the life of all systems. The inspection and maintenance schedule is to be performed at regular intervals.

Inspection and maintenance shall **ONLY** be performed by personnel who are trained and familiar with mechanical and electrical procedures.

! WARNING !

Before performing maintenance, familiarize yourself with the operation of the machine. Always chock the elevating assembly whenever it is necessary to enter elevating assembly

The preventative maintenance table has been designed to be used primarily for machine service and maintenance repair.

Please photocopy the preventative maintenance checklist on page 3-3 and use this table as a checklist when inspecting the machine for service.

PREVENTATIVE MAINTENANCE TABLE

INTERVAL

Daily = each shift or everyday
 50 hrs/30 d = every 50 hours or 30 days
 250 hrs/6 m = every 250 hours or 6 months
 1000 hrs/2 y = every 1000 hours or 2 years
 Y = Yes/Acceptable
 N = No/Not Acceptable
 R = Repaired/Acceptable

PREVENTATIVE MAINTENANCE REPORT

Date:
 Owner:
 Model #:
 Serial #:
 Serviced By:
 Service Interval:

DO NOT fit replacement parts other than genuine components without express written approval from the manufacturer.

COMPONENT	INSPECTION OR SERVICES	INTERVAL	Y	N	R
Battery System	Clean exterior	6m			
	Check battery cable condition	Daily			
Hydraulic Oil	Clean terminals	6m			
	Check oil level	Daily			
	Change filter	6m			
Hydraulic system	Drain and replace oil	2y			
	Check for leaks	Daily			
	Check hose connections	30d			
Emergency hydraulic System	Check hoses for exterior wear	30d			
	Operate the emergency lowering valve and check for serviceability	Daily			
Controller	Check switch operation	Daily			
Control Cable	Check the exterior of the cable for pinching, binding or wear	Daily			
Platform deck and rails	Check fasteners for proper torque	Daily			
	Check welds for cracks	Daily			
	Check condition of deck	Daily			
Tyres	Check for damage	Daily			
	Check lug nuts (torque to 122 Nm/90 ft. lbs.)	30d			
Hydraulic pump	Wipe clean	30d			
	Check for leaks at mating surfaces	30d			
	Check for hose fitting leaks	Daily			
	Check mounting bolts for proper torque	30d			
Entire unit	Check for and repair collision damage	Daily			
	Check fasteners for proper torque	3m			
	Check for corrosion-remove and paint	6m			
	Lubricate	30d			

COMPONENT	INSPECTION OR SERVICES	INTERVAL	Y	N	R
Drive Motors	Check for operation and leaks	Daily			
Steering system	Check hardware & fittings for proper torque	6m			
	Grease pivot pins	30d			
	Oil king pins	30d			
	Check steering cylinder for leaks	30d			
Elevating Assembly	Inspect for structural cracks	Daily			
	Check pivot points for wear	30d			
	Check mounting pin pivot bolts for proper torque	30d			
	Check linkage gear for wear	6m			
	Check elevating arms for bending	6m			
	Grease linkage pins	30d			
Chassis	Grease linkage gear	30d			
	Check hoses for pinch or rubbing points	Daily			
	Check component mounting for proper torque	6m			
Lift Cylinder	Check welds for cracks	Daily			
	Check the cylinder rod for wear	30d			
	Check mounting pin pivot bolts for proper torque	30d			
	Check seals for leaks	30d			
	Inspect pivot points for wear	30d			
	Check fittings for proper torque	30d			
Fore/Aft cylinder & side/cylinder	Check the cylinder rod for wear	30d			
	Check mounting pin pivot bolts for proper torque	30d			
	Check seals for leaks	30d			
	Inspect pivot points for wear	30d			
Axle cylinder	Check fittings for proper torque	30d			
	Check the cylinder rod for wear	30d			
	Check mounting pin pivot bolts for proper torque	30d			
	Check seals for leaks	30d			
Labels	Inspect pivot points for wear	30d			
	Check fittings for proper torque	30d			
Wheel bearings	Check for peeling, missing or unreadable labels & replace	Daily			
	Replace wheel bearings (replace wheel bearings and seals at 2000 hours)	2y			

Table 3-1: Preventative maintenance checklist

A thorough investigation should be carried out every 6 months.

NOTE: Frequency and extent of periodic examinations may depend on national regulations.

Fitment of any component other than approved items designed for use with this machine can result in serious danger to operators, property and bystanders.

SERVICE AND REPAIR

CHOCKING THE ELEVATING ASSEMBLY

CAUTION

DO NOT support or raise the front of the platform during any maintenance operation as this may result in damage to the tension members.

WARNING

Before performing maintenance on a work platform while it is elevated, ensure that the elevating assembly is properly supported.

DO NOT stand under the elevated assembly area while installing or removing the jackstand.

INSTALLATION

1. Park the work platform on a firm, level ground and leave the engine running.
2. Elevate the platform approximately 300 mm (12 inches).
3. Place a jackstand with a minimum rating of 2000 kg (400 lbs.) between the lower mast and chassis, just behind the front axle.
4. Gradually lower the platform until the jackstand is secured tightly between the lower mast and chassis.

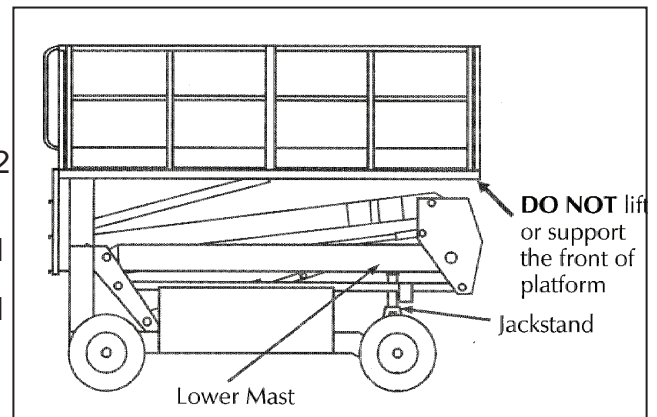


Figure 3-1: Blocking the elevating assembly

REMOVAL

Elevate the platform until the jackstand can be removed. Remove the jackstand and completely lower the platform.

BATTERY CHARGING AND MAINTENANCE

Ensure the machine batteries are recharged at the end of the working shift, do not store machine for long periods of time with partially charged batteries. Permanent damage to the batteries will result if the batteries are not immediately re-charged after dis-charging.

Use the following procedure to charge the batteries.

1. The battery disconnect switch is at the rear of the control cabinet (Refer to Fig 3.1.1), ensure the switch is set to ON before charging.
2. Plug the charger into a properly grounded AC outlet using a 3 conductor, 12 guage (2.5mm core) or larger extension cord. The extension cord must be as short as possible and in good electrical condition.
3. Leave the charger plugged in permanently or until last green light on the battery charge indicator illuminates (Refer to Figure 3.1.2).
4. If the machine is intended to be stored for large periods of time ensure the batteries are fully charged before storing. After periods of 3 months batteries must be re-charged fully to preserve battery life.



Figure 3.1.1: Battery Disconnect Switch



Figure 3.1.2: Battery charge indicator

LUBRICATION

Refer to Table 3-1 for lubrication intervals and Figure 3-2 for location of items that require lubrication service. Refer to the appropriate sections for lubrication information on the hydraulic tank and filter.

GREASE FITTINGS

Wipe each grease fitting before and after greasing. Using a lithium based multipurpose grease in a grease gun, pump the grease into the fitting until grease begins to appear at the edges of the pivot. Wipe off any excess grease.

LINKAGE GEARS

1. Raise platform fully.
2. Using another work platform or ladder, get up high enough to comfortably reach the gears.
3. Use a long handled brush to apply gear linkage lubricant (part number): 509594-000.
4. Lower the platform after greasing.

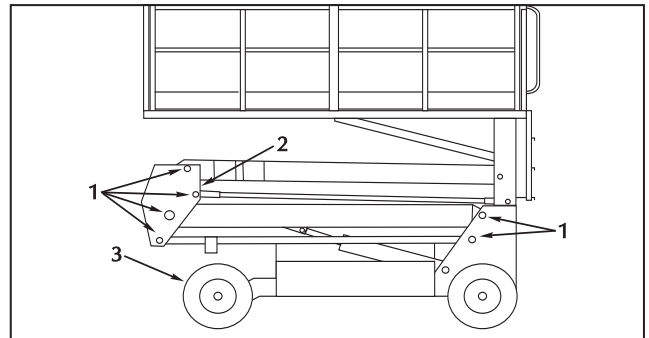


Figure 3-2: Lubrication points

1	Grease fittings	3	Steering linkage
2	Linkage gears		



STEERING LINKAGE

Apply one or two drops of SAE 10 W or spray lube oil to each pivot and grease upper and lower king pin bearing.

SERVICE AND REPAIR

HYDRAULICS

HYDRAULIC PUMP

Remove the cap screws that mount the pump to the pump motor. Remove the pump from the motor and apply high pressure molybdenum grease to the splines. Re-install the pump and secure the cap screws. Tighten using a torque of 30 Nm.

HYDRAULIC OIL TANK & FILTER

Fluid Level:

- With the platform fully lowered, the oil should be between the levels 'low and high'.
- If the oil is not visible, fill the tank until the oil can be seen.
- Do not fill the oil tank above the high level mark or when the platform is elevated.

OIL AND FILTER REPLACEMENT

1. Operate the work platform for 5 minutes to warm up the oil. To change filter only, refer to step 5.



2. Use a suitable container to drain the oil into. The hydraulic tank has an oil capacity of 75 litres.
3. Remove the drain plug and allow all the oil to drain into the container. Make sure the oil is disposed off properly.
4. Re-install the drain plug.
5. Unscrew the filter element from the filter body.
6. Lubricate the rubber seal and fill the tank with clean hydraulic oil.
7. Screw the replacement filter element onto the filter body.
8. Fill the hydraulic oil tank to the level required with the recommended fluid. Check decals for details on oil to use. The standard oil to use is ISO #46. The oil is being strained as it enters the tank leading to an increase in the time used to fill the tank.

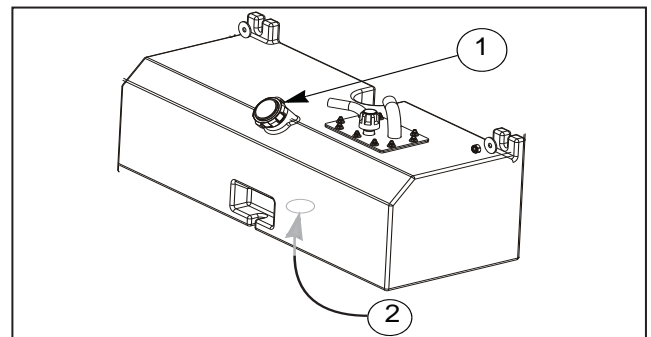
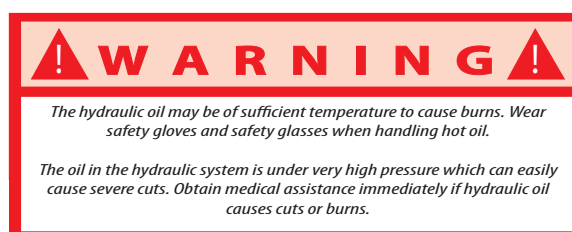


Figure 3-3: Hydraulic oil tank

1	Filler breather	2	Drain Plug (under tank)
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SETTING HYDRAULIC PRESSURES

NOTE: Check the hydraulic pressures whenever the pump, manifold or relief valve(s) have been serviced or replaced.



MAIN RELIEF VALVE RV3

Refer to Figure 3-4 while reading the following procedures.

1. Operate the hydraulic system 10 to 15 minutes to warm the oil.
2. Remove the cap or loosen the locknut on the main relief valve.
3. Install a 0-250 bar (0-3500 psi) pressure gauge to the gauge port.
4. Select "Drive mode" and remove the wires from the forward/reverse drive coils.
5. While engaging the safety interlock trigger, move the joystick fully forward. Adjust the main relief valve until the pressure gauge reads 210 bar (3000 psi).
6. Release the joystick.
7. Replace the cap or tighten the locknut on the main relief valve and torque to 8 Nm (6 ft. lbs.)

LIFT RELIEF VALVE RV2

Refer to Figure 3-4 while reading the following procedures.

1. Operate the hydraulic system for 5 minutes.
2. Remove the cap or loosen the locknut on the lift relief valve.
3. Install a 0-250 bar (0-3500 psi) pressure gauge.
4. With the keyswitch set to platform, select "lift mode". Lift the platform fully by moving the joystick fully forward.
5. While holding the joystick forward, set the pressure to 180 bar (2600 psi) maximum by slowly turning the adjustment screw. A clockwise turn increases pressure.
6. Tighten the locknut to 8 Nm (6 ft. lbs.).
7. Remove the gauge.

FORE/AFT TILT AND STEERING RELIEF VALVE RV1

Refer to Figure 3-4 while reading the following procedures.

1. Operate the hydraulic system for 5 minutes.
2. Remove the cap or loosen the locknut on the main relief valve.
3. Install a 0-100 bar (0-1450 psi) pressure gauge.
4. With the keyswitch set to platform, steer the wheels fully left or right using the steering buttons.
5. While holding the steering button, set the pressure to 100 bar (1450 psi) maximum by slowly turning the adjusting screw. A clockwise turn increases pressure.
6. Tighten locknut to 8 Nm (6 ft. lbs.).
7. Remove the gauge.

COUNTERBALANCE VALVES

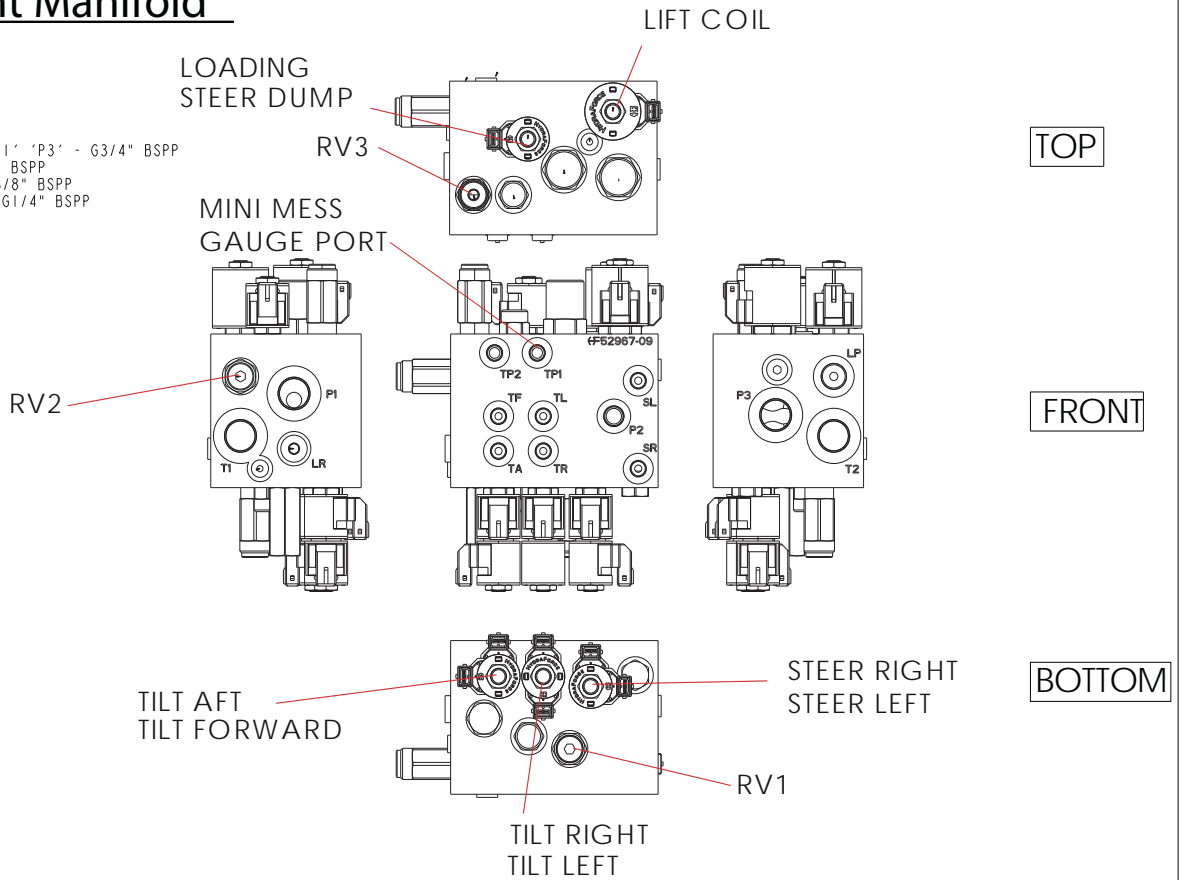
The counterbalance valves are not adjustable. If a suspected problem exists, a counterbalance valve can be changed for one of the same specification.

SERVICE AND REPAIR

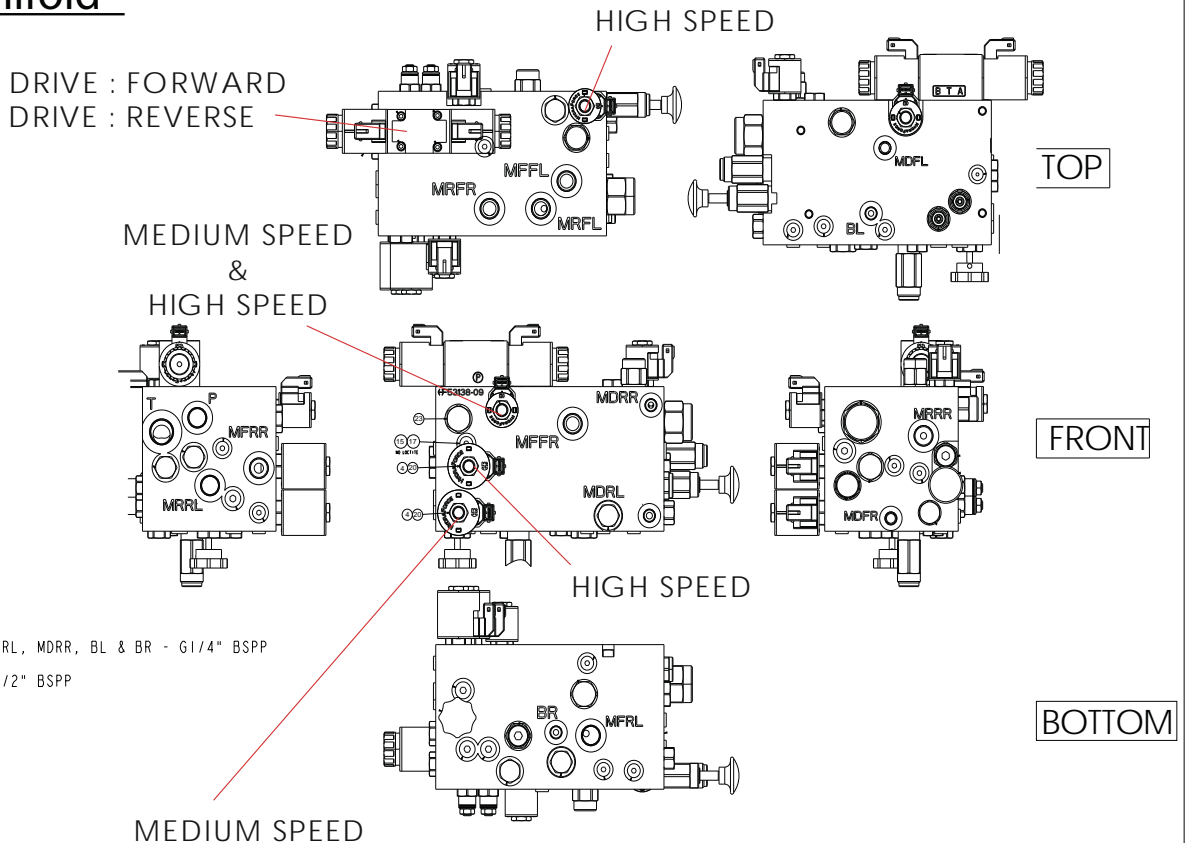
Movement Manifold

PORTING:

PORTS 'T1' 'T2' 'P1' 'P3' - G3/4" BSPP
 PORTS 'LP' - G1/2" BSPP
 PORT 'P2' 'LR' - G3/8" BSPP
 ALL OTHER PORTS - G1/4" BSPP



Drive Manifold



PORTING:

PORTS MDFL, MDFR, MDRL, MDRL, BL & BR - G1/4" BSPP
 PORT T - G3/4" BSPP
 ALL OTHER PORTS - G1/2" BSPP

Figure 3-4: Hydraulic manifold (coil and port)

HYDRAULIC MANIFOLD

Though it is not always necessary to remove the manifold to perform maintenance procedures, a decision should be made prior to beginning as to whether or not the manifold should be removed before maintenance procedures begin. This work should only be carried out by competent and approved technicians in a clean environment.

REMOVAL

1. Turn isolator switch to the OFF position.
2. Tag and disconnect the solenoid valve leads.
3. Tag, disconnect and plug the hydraulic hoses.
4. Remove the bolts that hold the manifold to the mounting bracket.
5. Remove manifold block.

DISASSEMBLY

NOTE: Mark all components as they are removed to avoid confusion of their location during assembly. Refer to the valve block drawing and schematic regularly to aid in disassembly and assembly.

1. Remove coils from solenoid valves.
2. Remove spool valve covers and spool valves.
3. Remove solenoid valves, main relief valve, counterbalance valves and emergency lowering valves. Remove fittings, plugs, springs, balls and orifices.

CLEANING AND INSPECTION

1. Wash the manifold in cleaning solvent to remove built up contaminants and then blow out all passages with clean compressed air.
2. Inspect the manifold for cracks, thread damage and scouring where the O-rings seal acts against internal and external surfaces.
3. Wash and dry each component and check for thread damage, torn or cracked O-rings and proper operation.
4. Replace parts and O-rings found unserviceable.

ASSEMBLY

NOTE: Lubricate all O-rings before installation to prevent damage to O-rings. Seat all balls in manifold block by lightly tapping on the ball with a brass drift.

1. Install fittings, plugs, balls and orifices. Use one drop of loctite #242 on each screw-in orifice.
2. Install emergency lowering valves, counterbalance valves, main relief valve, break pressure reducing valve, solenoid valves and spool valves.
3. Install coils on solenoid valves.

INSTALLATION

1. Attach manifold assembly to mounting plates with bolts.
2. Connect solenoid leads (as previously tagged).
3. Connect hydraulic hoses. Be certain to tighten hoses to manifold.
4. Operate each hydraulic function and check for proper operation and leaks.
5. Adjust all hydraulic pressures according to instructions.

SERVICE AND REPAIR

REPLACING HYDRAULIC PUMP

NOTE: If the hydraulic tank has not been drained, suitable means for plugging the hoses should be provided to prevent excessive fluid loss.

REMOVAL

1. Mark, disconnect and plug the hose assemblies.
2. Loosen the cap screws and remove the pump assemblies from the engine.

INSTALLATION

1. Lubricate the pump shaft with extreme high pressure molybdenum grease and attach the pump to the engine with cap screws.
2. Using a crisscross pattern, torque each cap screw a little at a time until all four cap screws are torqued to 30 Nm (22 ft. lbs.).
3. Unplug and re-connect the hydraulic hoses.
4. Check the oil level in the hydraulic tank before operating the work platform.

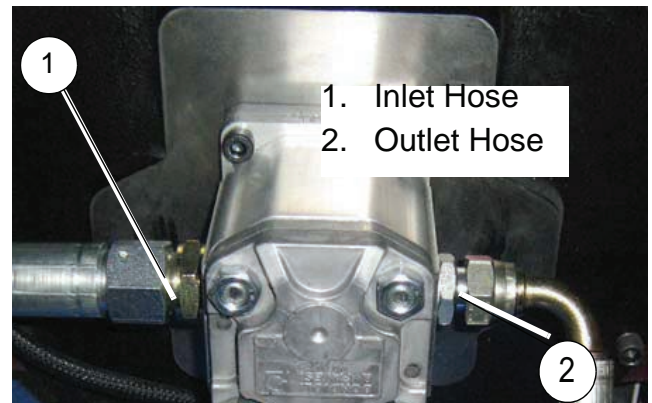


Figure 3-5: Typical hydraulic pump

HYDRAULIC BRAKES, DRIVE MOTORS & HUBS

REAR AXLE REMOVAL

1. Park the work platform on firm, level ground and block the wheels to prevent the work platform from moving.
2. Loosen the wheel lug bolts on the motor to be removed.
3. Raise the rear of the work platform using a 2 tonne jack.
4. Position two 1 tonne jack stands under the rear axle to prevent the work platform from falling if the jack fails.
5. Remove the wheel lug bolts and wheel.
6. Remove the cotter pin, nut, hub and shaft key.

! CAUTION !

***ONLY** use a puller to remove the hub. Using any other method of removal may damage the drive motor housing or shaft and void the warranty.*

Clean all fittings before disconnecting the hose assemblies. Plug all port holes and hose assemblies immediately to prevent contamination from dust and debris.

7. Tag and disconnect the hose assemblies.
8. Remove the cap screws, washers, brake and drive motor assembly from the rear axle.
9. Remove the socket screws from the drive motor and then separate the brake from the drive motor.

REAR AXLE INSTALLATION

1. Insert the drive motor with O-ring (lubricate O-ring before assembly) installed into the brake and secure the socket screws using loctite #242 retaining compound on the screw threads.
2. Position the drive motor and brake on the rear axle and secure with washers and H.H. set-screws.
3. Re-install the hose assemblies.
4. Re-install the shaft key, hub and nut. Torque each wheel hub nut to 475 Nm (350 ft. lbs.).
5. Align the slot in the nut with the hole in the shaft and insert the cotter pin. Do not back off the nut to align.
6. Re-install the wheel and lug on the hub. Torque the bolts to 123 Nm (90 ft. lbs.).
7. Lower the jack stands and remove.
8. Operate the drive system to check for leaks and proper function.

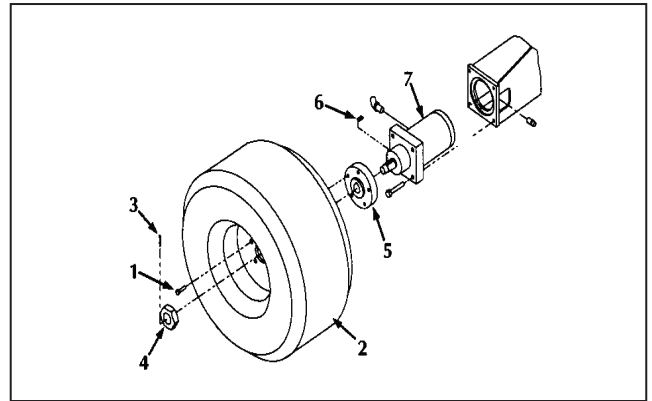


Figure 3-6: Rear axle assembly

1	Lug bolt	2	Tyre/Wheel Assembly
3	Cotter pin	4	Slotted nut
5	Adaptor hub	6	Shaft key
7	Drive motor		

FRONT AXLE REMOVAL

1. Park the work platform on firm, level ground and chock the wheels to prevent the work platform from moving.
2. Loosen the wheel lug bolts on the motor to be removed.
3. Raise the front of the chassis using a 2 tonne jack.
4. Position two 1 tonne jack stands under the front axle to prevent the work platform from falling if the jack fails.
5. Remove the wheel lug bolts and wheel.
6. Remove the cotter pin, nut, hub and shaft key.
7. Tag and disconnect the hose assemblies.
8. Remove the adaptor hub from the hydraulic motor.
9. Remove the cap screws and nuts followed by the drive motor from the front axle steering mount.

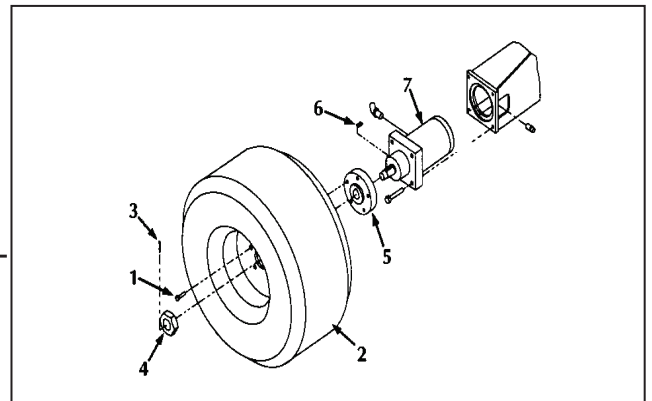
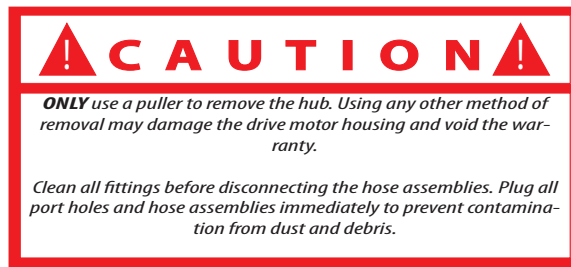


Figure 3-7: Front axle assembly

1	Lug bolt	2	Tyre/Wheel Assembly
3	Cotter pin	4	Slotted nut
5	Adaptor hub	6	Shaft key
7	Drive motor	8	Steering mount

SERVICE AND REPAIR



FRONT AXLE INSTALLATION

1. Position the drive motor into the steering mount and secure the cap screws and nuts.
2. Re-install the adaptor on the hydraulic motor.
3. Re-install the hose assemblies.
4. Re-install the shaft key, hub and nut. Torque each wheel hub nut to 475 Nm (350 ft. lbs.). Align the slot in the nut with the hole in the shaft and insert the cotter pin. Do not back off the nut to align.
5. Re-install the wheel and lug bolts onto the hub. Torque the lug bolts to 123 Nm (90 ft. lbs.).
6. Lower the jack stands and remove.
7. Operate the drive system to check for leaks and proper function.

AXLE CYLINDER

REMOVAL

Ensure the platform is fully lowered and the machine is on a firm level ground.

1. Remove and cap the hoses.
2. Remove the pivot pins.
3. Remove the cylinder.

INSTALLATION

1. Attach both ends of the cylinder to mounts with pivot pins and retaining bolts.
2. Torque the retaining bolts to 203 Nm (150 ft. lbs.).
3. Connect all hoses.
4. Jack up the front axle and support.
5. With the engine running, oscillate the axle from side to side slowly to bleed air from the cylinder and hoses.
6. Lower the axle to the ground.
7. Operate the work platform over rough terrain and check for proper function and leaks. This is done by elevating the platform above 2 m (levelling may be required). Drive the platform so that one wheel drives up an incline of 150 mm (6 inches). The platform should continue to drive until the wheel diagonally opposite lifts off the ground and the tilt sensor is activated. If this cannot be achieved, either the float cylinder contains air or the float cylinder solenoid valve is faulty.

STEERING CYLINDER

REMOVAL

1. Mark and disconnect the hose assemblies from the fittings and immediately cap the openings to prevent foreign material from entering.
2. Remove the setscrews securing the rod ends to the steering linkage.
3. Remove the setscrews and locknuts that fasten the cylinder assembly to the chassis.
4. Remove the cylinder from the chassis.

DISASSEMBLY

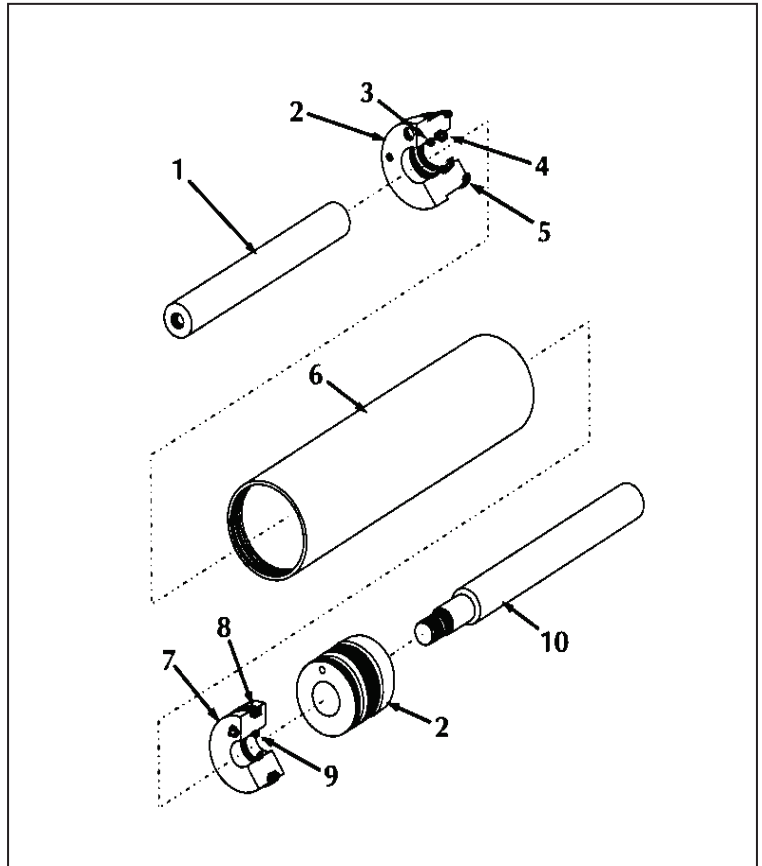
1. Remove the head caps from the barrel tube.
2. Mark which end of the barrel tube the head cap was removed from.
3. Withdraw the entire shaft assembly from either end of the barrel tube.
4. Remove the rod wipers, rod seals and static O-rings from the head caps.
5. Discard all the seals.
6. Unscrew the #1 shaft from the #2 shaft and remove the piston.
7. Remove the piston seal and static O-ring from the piston and discard.

CLEANING AND INSPECTION

1. Wash all the metal parts in cleaning solvent and blow dry with filtered compressed air.
2. Inspect all the threaded components for stripped or damaged threads.
3. Check the inside surface of the barrel tube for scouring or excessive wear.
4. Check the piston and head caps for scouring or excessive wear.
5. Inspect the surface of both shafts for scouring or excessive wear.

ASSEMBLY AND INSTALLATION

1. Install a new piston seal and static O-rings.
2. Install the piston on the #1 shaft.
3. Thread the #2 shaft onto the #1 shaft and tighten securely.
4. Lubricate the piston seal with clean hydraulic fluid and install the shaft assembly in the barrel tube.
5. Lubricate and install new rod seals and static O-rings on the head caps.
6. Lubricate and install new rod wipers on the head caps.
7. Install head caps on the barrel tube and tighten until the mounting holes are in line.



NOTE: Head caps must be re-installed on the same end from which they were removed.

Figure 3-8: Steering Cylinder assembly

1	#2 Shaft	2	Head cap (2)
3	Rod wiper (2)	4	Rod seal (2)
5	Static O-ring (2)	6	Cylinder barrel
7	Piston	8	Piston seal
9	Piston static O-ring		

8. Install the fittings on the ends of the cylinder.
9. Position the cylinder assembly on the chassis and install the cap screws and locknuts but do not tighten.
10. Tighten the nut and bolt in front of the cylinder that goes through the frame and then tighten the cylinder mounting cap screws.
11. Install the cylinder rod ends.
12. Set rod ends to align front wheels.
13. Connect the hose assemblies to the fittings.
14. Operate the steering circuit several times throughout its entire range of travel to expel trapped air and check for leaks.
15. Check and adjust front wheel tracking if required.

SERVICE AND REPAIR

ADJUSTMENT

1. Disconnect the cylinder rod ends (if connected).
2. Operate steering so that both ends of the cylinder rod are equal in length therefore within 0.8 mm (1/32 inch).
3. Position both tyres so that they are parallel with the frame, with each other and with the rear wheels.
4. Adjust rod ends until they align with the holes on the steering linkage bars.
5. Re-install the bolts through the steering linkage bars and rod ends. Tighten the jam nuts on the rod ends and all hardware.
6. When properly adjusted, the wheels must turn the same amount in each direction. The steering stops must make contact with each side at the same time.

LIFT CYLINDER

NOTE: Do not support or raise the front of the platform during any maintenance operation as this might result in damage to the tension members.

REMOVAL

1. Raise and chock the front of the elevating assembly approximately 300 mm (12 inches) above the chassis support with a jack stand; a minimum rating of 2000 kg (4000 lbs.).
2. Open the emergency lowering valve to ensure all the pressure is released from the lift cylinder.
3. Remove and cap both hoses and fittings.
4. Support the lift cylinder to prevent it from falling.
5. Remove the setscrew from the end of the cylinder rod.
6. Remove the retaining ring from the upper cylinder pin. Remove the upper cylinder pin by tapping out using a soft punch.
7. Remove the retaining bolt from the lower cylinder pin and remove the pin using a soft punch.
8. Remove the cylinder by sliding it out towards the front of the machine.

1	Cylinder barrel	2	Velocity fuse
3	Fitting, Adapter	4	Hose assembly
5	Breather	6	Piston nut
7	Piston seal	8	Piston
9	Piston static O-ring	10	Static O-rings
11	Head cap	12	Cylinder rod
13	Set screw	14	Rod wiper
15	Rod seal	16	Nut

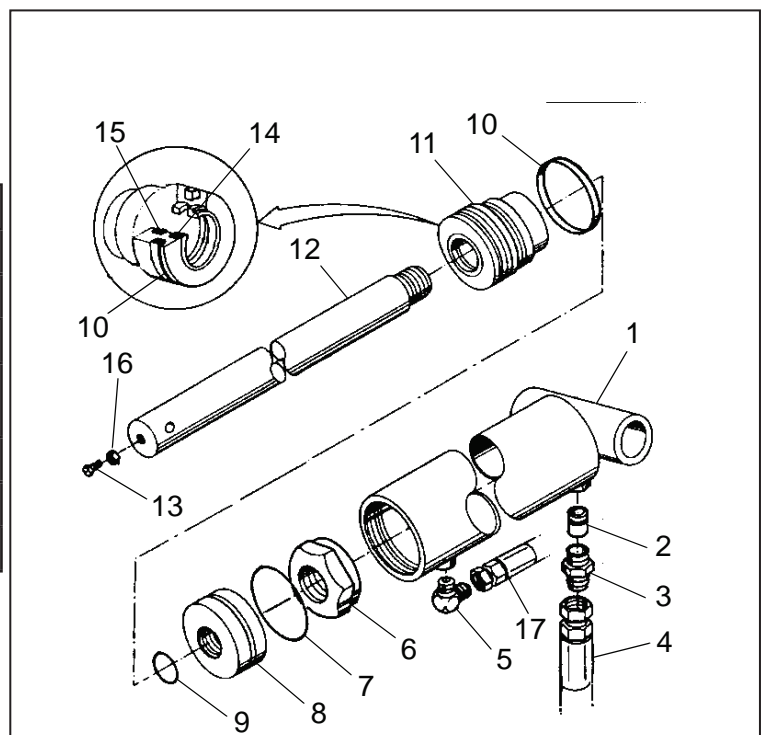


Figure 3-9: Steering Cylinder assembly

DISASSEMBLY

1. Unscrew the head cap from the cylinder barrel.
2. Remove the piston and rod assembly from the cylinder barrel.
3. Unscrew the piston nut and remove piston and head cap from the piston rod.
4. Remove the piston static O-ring from the cylinder rod and discard.
5. Remove the piston seal from the piston and discard.
6. Remove the static O-rings, rod seal and rod wiper.
7. Remove the rod end breather.
8. Do not remove the velocity fuse unless replacement is necessary.

CLEANING AND INSPECTION

1. Clean all the metal parts in cleaning solvent and blow dry with filtered compressed air.
2. Check the working surfaces of the piston head cap, cylinder barrel and rod for excessive wear or scouring.
3. Replace parts found to be unserviceable.
4. Replace all seals, O-rings and wipers.

RE-ASSEMBLY

1. Lubricate the static O-ring, rod seal and rod wiper and then install it on the head cap.
2. Install the piston seal on the piston.
3. Install the head cap, piston static seal, piston and piston nut on the cylinder rod. Torque nut to 96 Nm (70 ft. lbs.).

NOTE: The head cap should be installed from the piston end of the cylinder rod. Sliding the head cap over the pivot pin hole may damage the rod seal and rod wiper.

4. Lubricate the piston seal and install the piston and rod assembly into the cylinder barrel.
5. Screw the head cap into the cylinder barrel until it is tight. Turn a further 1/4 to ensure it is well tight.

INSTALLATION

NOTE: Before installing the cylinder, check the pins and bearings for excessive wear. Replace if necessary.

1. Place the cylinder in position taking care to support the cylinder to prevent falling.
2. Install the lower pin and retaining bolt.
3. Install the upper pin and retaining ring.
4. Install both hoses.
5. Raise the machine and check for leaks.

NOTE: The cylinder may need to be extended and retracted so as to align the rod end pivot hole.

MANUAL LEVELLING

- There are occasions when the operation of manual levelling is required.
 - Manual levelling cannot be carried out above the elevation height (approximately 2 m).
1. Select platform controls from the ground control box(#3). Release the ground “Emergency stop button”(#1) and enter the platform (refer to Figure 3-11).
 2. Release the platform “Emergency stop button” (#1) .
 3. To access the manual levelling mode, press and hold the “Lift/Lower switch” (#12) and the “Auto level switch” (#14). Release the toggle switches.
 4. When the manual levelling mode is active, the “Lift/Lower enabled LED” (#13) and the “Medium speed drive enabled LED” (#9) will flash.
 5. If the platform is out of level from right to left, the “High speed drive enabled LED” (#11) will flash. If the platform is out of level from front to back, the “Platform tilt-steady red axle tilt” (#15) will flash.
 6. For left to right adjustments, press and hold the “Auto level switch” (#14) then pull in the trigger on the joystick and use the steer switch on the joystick to adjust the platform level to left or right. The “High speed drive enabled LED” (#11) will extinguish when the platform is level in that direction.
 7. For Fore to Aft adjustment, press and hold the “Auto level switch” (#14) then pull in the trigger on the joystick and push the joystick forward or backwards to adjust the platform level Fore or Aft. The “Platform tilt-steady red axle tilt” (#15) will extinguish when the platform is level in that direction.
 8. To exit manual levelling mode, switch the machine off.

PLATFORM CONTROLS AND INDICATORS

1. Emergency stop button
2. Horn button
3. Battery charge indicator.
4. Joystick with safety interlock trigger.
5. Battery low warning LED
6. Low speed drive switch
7. Low speed drive enabled LED
8. Medium speed drive switch
9. Medium speed drive enabled LED
10. High speed drive switch
11. High speed drive enabled LED
12. Lift/Lower Switch
13. Lift/Lower enabled LED
14. Auto level switch
15. Platform tilt-steady red Axle tilt - flashing red
16. Overload LED

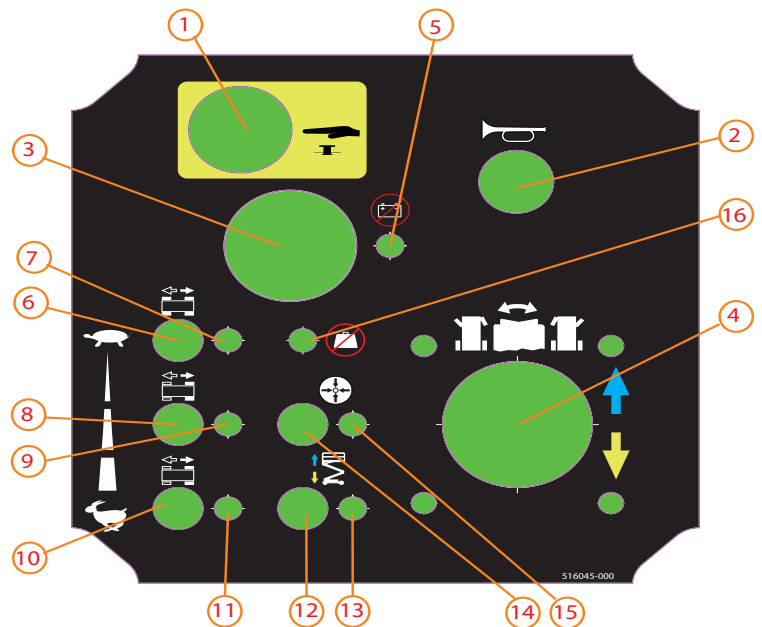


Figure 3-10: Platform Controls and indicator locations

CALIBRATE LEVEL

- This machine is equipped with level sensors for the chassis, the front axle and the platform as follows:
 - Chassis level sensor: This is incorporated in the ECU (GP400 control module) in the lower control box.
 - Front axle level sensor: This is a pair of CANtilt level sensors mounted on the front axle. There are two available for self checking incase one fails. Elevation above elevated height is not allowed if the front axle is out of level with the chassis by more than 1 degree.
 - Platform level sensor: This is a pair of CANtilt level sensors mounted on the rear of the 1st post weldment. There are two available for self checking incase one fails

! W A R N I N G !

If the GP400 control module or any of the CANtilt level sensors are replaced and/or moved, level on the full system must be recalibrated using the procedure provided. Failure to do so could result in serious injury or death.

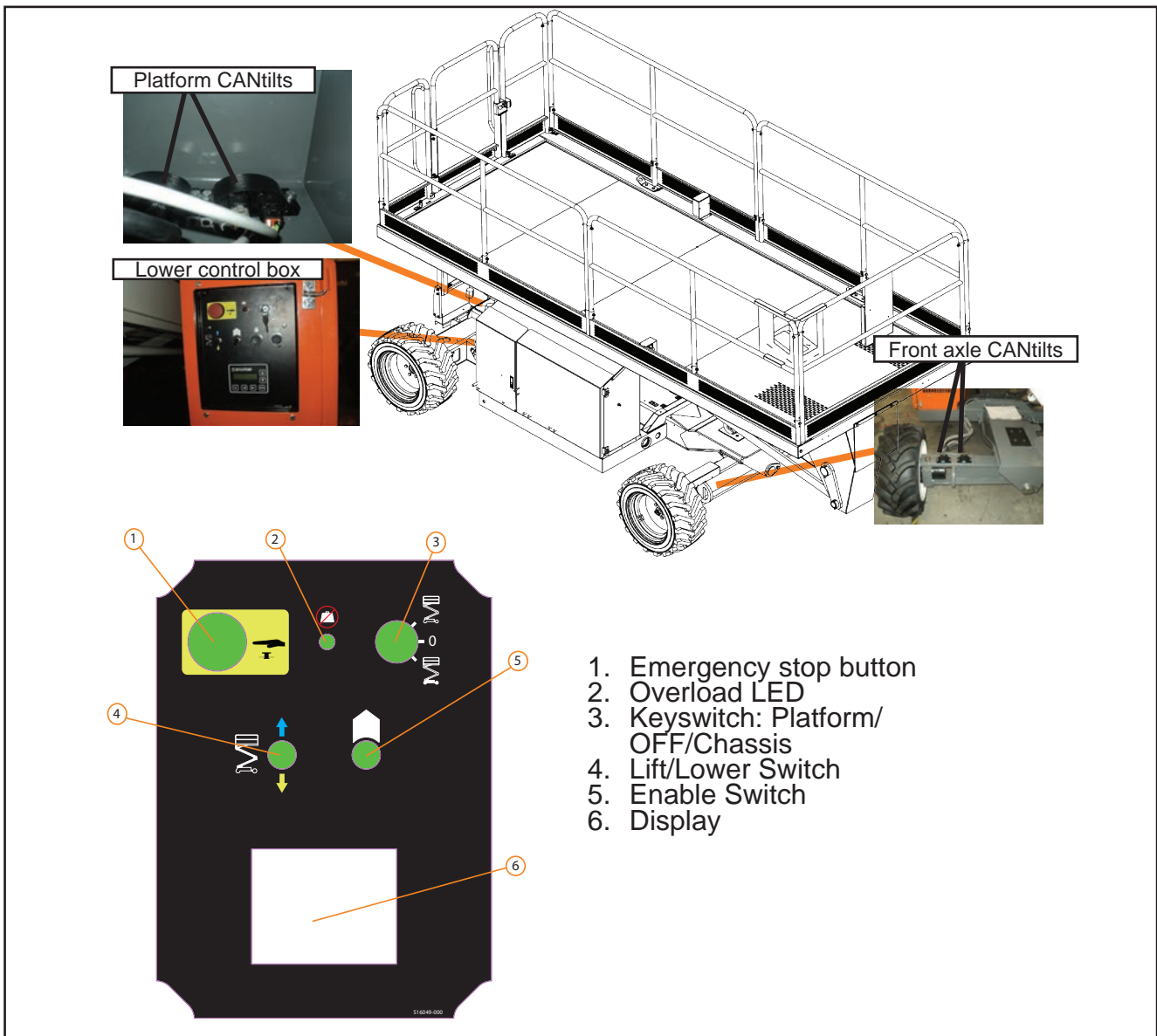


Figure 3-11: Platform CANtilts, Lower control box and Front axle CANtilts location

SERVICE AND REPAIR

LEVELLING PROCEDURE

1. Place the machine on a firm, level surface. Using a digital inclinometer, check that the chassis and the front axle are level with each other within +/- 0.25 degrees side to side.
2. Using the manual levelling procedure (refer to page 3-15), level the platform using a digital inclinometer to within +/- 0.25 degrees.

NOTE: Since level has not yet been calibrated, ignore the level indicators on the platform and level using the digital inclinometer only.

3. Switch the machine to ground controls.
4. Press and hold "ESC" for 5 seconds until "#### MENU: HELP: PRESS ENTER" is displayed.
5. Scroll to "ACCESS LEVEL" and press "ENTER".
6. Enter the code 2222 for "ACCESS LEVEL 2" and press "ENTER".
7. Scroll to "SETUPS" and press "ENTER".
8. Scroll to "TILT SETUPS" and press "ENTER".
9. The question "CALIBRATE LEVEL" pops up. Press "ENTER".
10. Press "ENTER" for yes.

To confirm level calibration has worked, switch the machine off then back on again.

11. Press and hold "ESC" for 5 seconds.
12. Scroll to "DIAGNOSTICS" and press "ENTER".
13. Select "SYSTEM" and press "ENTER".
14. Scroll to "TILT" to display the platform tilt angles.
15. Press "ENTER" to display the chassis tilt angles.
16. Press "ESC" then scroll to "AXLE" and press "ENTER" to display the axle tilt angles.
17. All angles displayed during 14, 15 and 16 should be below 0.2 degrees. If not, repeat the procedure from 5.

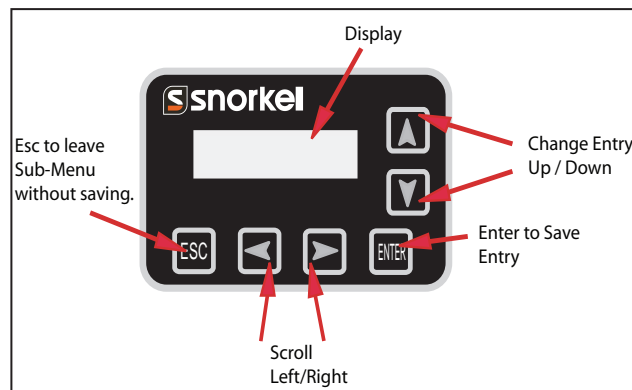
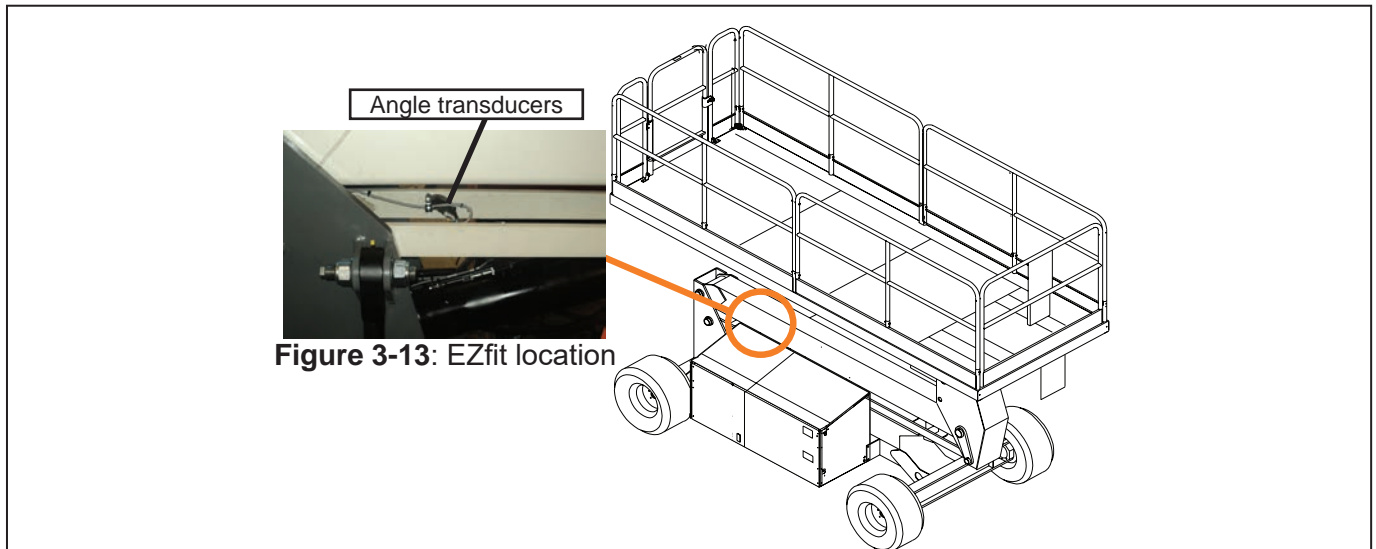


Figure 3-12: EZcal Display

CALIBRATE HEIGHT

- This machine has an angle transducers (EZfit) attached to the boom which allows the ECU to calculate the platform height by comparing the boom angle with the platform angle.



⚠ WARNING ⚠

If the GP400 control module, either of the boom angle transducers or either of the CANTilt level sensors are replaced and/or moved, platform height on the full system must be recalibrated using the procedure provided. Failure to do so could result in serious injury or death.

HEIGHT CALIBRATION PROCEDURE

If “LEVEL” hasn’t been calibrated, then follow the procedure (refer to page 3-17) to “CALIBRATE LEVEL” first.

- Place the machine on a firm level surface and level the platform.
- Switch the machine to ground controls.
- Press and hold “ESC” for 5 seconds until “#### MENU: HELP: PRESS ENTER” is displayed.
- Scroll to “ACCESS LEVEL” and press “ENTER”.
- Enter code 2222 for “ACCESS LEVEL 2” and press “ENTER”.
- Scroll to “SETUPS” and press “ENTER”.
- Scroll to “HEIGHT SETUPS” and press “ENTER”.
- Scroll to “CALIBRATE HEIGHT” and press “ENTER”.
- The question “PLATFORM DOWN” pops up. Check that the platform is fully lowered and press “ENTER”.
- The suggestion “PLEASE LIFT” pops up. Use the lift controls to fully elevate the platform.
- The suggestion “PLEASE LOWER” pops up. Use the lower control to fully lower the platform.
- The suggestion “CAL DATE” pops up. Use the up and right arrows to enter the calibration date and press “ENTER”.
- The suggestion “FINISHED” pops up. Height calibration is now finished.

SERVICE AND REPAIR

CALIBRATE LOAD

- This machine has a pressure transducer fitted to the lift cylinder which allows the ECU to calculate the platform load by comparing the lift pressure with load calibration curves stored in the ECU.

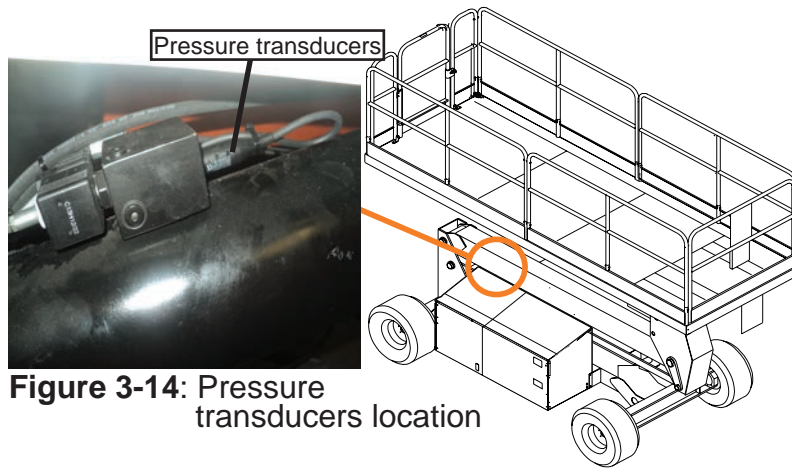


Figure 3-14: Pressure transducers location

! WARNING !

If the GP400 control module, either of the boom angle transducers or the lift cylinder pressure transducers are replaced and/or moved, platform load must be recalibrated using the procedure provided. Failure to do so could result in serious injury or death.

LOAD CALIBRATION PROCEDURE

If “LEVEL” hasn’t been calibrated, then follow the procedure (refer to page 3-17) to “CALIBRATE LEVEL” first.

If “HEIGHT” hasn’t been calibrated, then follow the procedure (refer to page 3-18) to “CALIBRATE HEIGHT” first.

1. Place the machine on a firm level surface and level the platform.
2. Switch the machine to ground controls.
3. Press and hold “ESC” for 5 seconds until “##### MENU: HELP: PRESS ENTER” is displayed.
4. Scroll to “ACCESS LEVEL” and press “ENTER”.
5. Enter code 2222 for “ACCESS LEVEL 2” and press “ENTER”.
6. Scroll to “SETUPS” and press “ENTER”.
7. Scroll to “LOAD SETUPS” and press “ENTER”.
8. Scroll to “CALIBRATE LOAD” and press “ENTER”.
9. The question “REDO DYNAMIC” pops up. Press on the up arrow for yes and press “ENTER”.
10. The question “PLATFORM DOWN” pops up. Press “ENTER” to confirm the platform is fully lowered.
11. The question “PLATFORM LOADED” pops up. Place the safe working load (SWL) on the platform and press “ENTER”.
12. The suggestion “PLEASE LIFT” pops up. Use the lift controls to fully elevate the platform. Do not release the control until the platform is fully elevated.
13. The suggestion “PLEASE LOWER” pops up. Use the lower control to fully lower the platform. Do not release the control until the platform is fully lowered.
14. The question “REDO LOADED” pops up. Press on the up arrow for yes and press “ENTER”.
15. The question “PLATFORM LOADED” pops up. Place the safe working load (SWL) on the platform and press “ENTER”.
16. The suggestion “PLEASE LIFT” pops up. Use the lift controls to fully elevate the platform. Do not release the control until the platform is fully elevated.

NOTE: During this elevation procedure, the platform will lift-stop-lift repeating the process several times taking load readings while the work platform is in a stationary position. Do not release the lift switch until the platform is fully elevated.

17. The suggestion "PLEASE LOWER" pops up. Use the lower control to fully lower the platform. Do not release the control until the platform is fully lowered.

NOTE: During this lowering procedure, the platform will lower-stop-lower repeating the process several times taking load readings while the work platform is in a stationary position. Do not release the lift switch until the platform is fully lowered.

18. The question "REDO EMPTY" pops up. Press on the up arrow for yes and press "ENTER".
19. The question "PLATFORM EMPTY" pops up. Remove the safe working load (SWL) from the platform and press "ENTER".
20. The suggestion "PLEASE LIFT" pops up. Use the lift controls to fully elevate the platform. Do not release the control until the platform is fully elevated.

NOTE: During this elevation procedure, the platform will lift-stop-lift repeating the process several times taking load readings while the work platform is in a stationary position. Do not release the lift switch until the platform is fully elevated.

21. The suggestion "PLEASE LOWER" pops up. Use the lower control to fully lower the platform. Do not release the control until the platform is fully lowered.

NOTE: During this lowering procedure, the platform will lower-stop-lower repeating the process several times taking load readings while the work platform is in a stationary position. Do not release the lift switch until the platform is fully lowered.

22. The suggestion "CAL DATE" pops up. Use the up and right arrows to enter the calibration date and press "ENTER".
23. The suggestion "FINISHED" pops up. Load calibration is now finished.

SERVICE AND REPAIR

TORQUE SPECIFICATIONS HYDRAULIC COMPONENTS

NOTE: Always lubricate threads with clean hydraulic oil prior to installation
Use the following values to torque hydraulic components used on Snorkel work platforms.

ORFS				JIC Hose fittings				BSP 60° cone	
Thread size	Tightening Nm	FFWR new	FFWR reassembly	Hose dim.	Thread	FFWR hose	FFWR pipe	Thread size	Tightening Nm
9/16" - 18	25	1/2-3/4	1/4-1/2	3/16	7/16"-20 UNF	2	2	1/8"	20
11/16" - 16	35	1/2-3/4	1/4-1/2		1/2"-20 UNF	2	2	1/4"	25
13/16" - 16	55	1/2-3/4	1/4-1/2	1/4	9/16"-18 UNF	2	1 1/2	3/8"	40
1" - 14	80	1/2-3/4	1/4-1/2	3/8	3/4"-16 UNF	2	1 1/2	1/2"	60
1 3/16" - 12	120	1/3-1/2	1/4-1/2	1/2	7/8"-14 UNF	1 1/2	1 1/2	5/8"	70
1 7/16" - 12	150	1/3-1/2	1/4-1/2	3/4	1.1/16"-12 UN	1	1 1/4	3/4"	115
1 11/16" - 12	180	1/3-1/2	1/4-1/2	1	1.5/16"-12 UN	1	1	1"	140
2" - 12	220	1/3-1/2	1/4-1/2	1 1/4	1.5/8"-12 UN	1	1	1 1/4"	200
2 1/2" - 12	490	1/3-1/2	1/4-1/2	1 1/2	1.7/8"-12 UN	1	1		270
				2	2.1/2"-12 UN	1	1	1 1/2"	270
								2"	350

BSP Tread	Torque (Nm)	UN/UNF Thread	Torque (Nm)
G 1/8"			
G 1/8"	20	7/16"-20 UNF	20
G 1/4"	45	1/2"-20 UNF	25
G 3/8"	70	9/16"-18 UNF	30
G 1/2"	85	3/4"-16 UNF	45
G 1/2"	85		
G 3/4"	170	1 1/16"-12 UN	85
G 1"	330	1 5/16"-12 UN	130
G 1 1/4"	430	1 5/16"-12 UN	170
G 1 1/2"	510	1 7/8"-12 UN	180
		7/8"-14 UNF	55

Table 3-2: Hose fittings

Table 3-3: Hydraulic fittings

FASTENERS

This standard applies to the pre-loading of fasteners measured by installation torque.

NOTE: For other pre-loading methods or fasteners, consult Snorkel engineering department.

This general standard applies to all SAE and metric fasteners unless otherwise specified.

THREAD CONDITION

- For lube or zinc plated fasteners, use $k = 0.15$
- For dry unplated fasteners, use $k = .20$

	Nominal Thread Size	SAE J429 Grade 5			SAE J429 Grade 8		
		Clamp Load	Tightening Torque		Clamp Load	Tightening Torque	
			K=.15	K=.20		K=.15	K=.20
Unified Coarse Thread Series		lbs.	in-lbs.	in-lbs.	lbs.	in-lbs.	in-lbs.
	1/4 -20	2,000	75	100	2850	107	143
	5/16 - 18	3,350	157	210	4700	220	305
		lbs.	ft-lbs.	ft-lbs.	lbs.	ft-lbs.	ft-lbs.
	3/8-16	4,950	23	31	6950	32.5	44
	7/16-14	6,800	37	50	9600	53	70
	1/2-13	9,050	57	75	12800	80	107
	9/16-12	11,600	82	109	16400	115	154
	5/8-11	14,500	113	151	20300	159	211
	3/4-10	21,300	200	266	30100	282	376
	7/8-9	29,435	321	430	41550	454	606
	1-8	38,600	483	640	54540	680	900
Unified Fine Thread Series		lbs.	in-lbs.	in-lbs.	lbs.	in-lbs.	in-lbs.
	1/4 -28	2,300	85	115	3250	120	163
	5/16-24	3,700	173	230	5200	245	325
		lbs.	ft-lbs.	ft-lbs.	lbs.	ft-lbs.	ft-lbs.
	3/8-24	5,600	26	35	7900	37	50
	7/16-20	7,550	42	55	10700	59	78
	1/2-20	10,200	64	85	14400	90	120
	9/16-18	13,000	92	122	18300	129	172
	5/8-18	16,300	128	170	23000	180	240
	3/4-16	23,800	223	298	33600	315	420
	7/8-14	32,480	355	473	45855	500	668
	1-12	42,270	528	704	59670	745	995

Table 3-4: Torque specifications for SAE fasteners

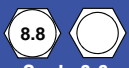
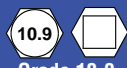

Nominal Thread Size	 Grade 8.8			 Grade 10.9			 Grade 12.9		
	Clamp Load	Tightening Torque		Clamp Load	Tightening Torque		Clamp Load	Tightening Torque	
		K = .15	K = .20		K = .15	K = .20		K = .15	K = .20
mm	lbs.	in-lbs.	in-lbs.	lbs.	in-lbs.	in-lbs.	lbs.	in-lbs.	in-lbs.
3	-	-	-	-	-	-	823	14.6	19.5
3.5	-	-	-	-	-	-	1,109	22.9	30.5
4	-	-	-	-	-	-	1,436	33.9	45.2
5	1,389	41.0	19.5	1,987	58.7	19.5	2,322	68.6	91.2
6	1,966	69.7	28.3	2,813	100.0	28.3	3,287	116.8	155.8
7	2,826	116.8	37.2	4,044	167.3	37.2	4,727	195.6	260.2
		ft-lbs.	ft-lbs.		ft-lbs.	ft-lbs.		ft-lbs.	ft-lbs.
8	3,579	14.1	18.8	5,122	20.1	26.9	5,986	23.6	31.4
10	11,742	27.9	37.2	8,117	39.9	53.3	9,486	46.7	62.3
12	8,244	48.7	64.9	11,797	69.7	92.2	13,787	81.1	108.4
14	11,246	77.4	103.3	16,093	110.6	147.5	18,808	129.1	172.6
16	15,883	125.4	166.7	21,971	173.3	230.9	25,677	202.1	269.2
18	19,424	171.9	229.4	26,869	238.2	317.2	31,401	278.1	371.0
20	2,304	243.4	325.3	34,286	337.8	449.9	40,070	394.6	525.9
22	30,653	331.9	442.5	42,403	458.8	612.2	49,556	536.2	715.4
24	35,711	420.4	562.0	49,400	583.4	778.1	57,733	682.2	909.4
27	46,435	617.3	84.8	64,235	853.4	1138.1	75,069	997.2	1329.8
30	56,753	837.9	1117.4	78,509	1159.4	1545.2	91,751	1354.9	1807.0
33	70,208	1140.3	1520.1	97,121	1576.9	2102.8	113,503	1843.9	2457.5
36	82,651	1464.1	1952.3	114,334	2025.3	2700.9	133,620	2367.6	3156.0

Table 3-5: Torque specifications for metric fasteners, U.S. customary units

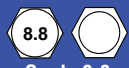
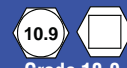

Nominal Thread Size	 Grade 8.8			 Grade 10.9			 Grade 12.9		
	Clamp Load	Tightening Torque		Clamp Load	Tightening Torque		Clamp Load	Tightening Torque	
		K = .15	K = .20		K = .15	K = .20		K = .15	K = .20
mm	N	N-m	N-m	N	N-m	N-m	N	N-m	N-m
3	-	-	-	-	-	-	3,660	1.65	2.2
3.5	-	-	-	-	-	-	4,932	2.59	3.45
4	-	-	-	-	-	-	6,387	3.83	5.11
5	6,177	4.63	2.2	8,840	6.63	2.2	10,330	7.75	10.3
6	8,743	7.87	3.2	12,512	11.3	3.2	14,623	13.2	17.6
7	12,570	13.2	4.2	17,990	18.9	4.2	21,025	22.1	29.4
8	15,921	19.1	25.5	22,784	27.3	36.5	26,626	32	42.6
10	25,230	37.8	50.5	36,105	54.1	72.2	42,195	63.3	84.4
12	36,670	66	88	52,475	94.5	125	61,328	110	147
14	50,025	105	140	71,587	150	200	83,663	175	234
16	70,650	170	226	97,732	235	313	114,218	274	365
18	86,400	233	311	119,520	323	430	139,680	377	503
20	10,250	330	441	152,513	458	610	178,238	535	713
22	136,350	450	600	188,618	622	830	220,433	727	970
24	158,850	570	762	219,743	791	1055	256,808	925	1233
27	206,550	837	115	285,728	1157	1543	333,923	1352	1803
30	252,450	1136	1515	349,223	1572	2095	408,128	1837	2450
33	312,300	1546	2061	432,015	2138	2851	504,885	2500	3332
36	367,650	1985	2647	508,582	2746	3662	594,368	3210	4279

Table 3-6: Torque specifications for metric fasteners, SI units

TROUBLESHOOTING

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TROUBLESHOOTING

INTRODUCTION

The following section on troubleshooting provides guidelines on the types of problems users may encounter in the field. This helps to determine the cause of problems and provides suggestions for proper corrective action.

Careful inspection and accurate analysis of the symptoms listed in the troubleshooting guide will localize the trouble more quickly than any other method. This manual cannot cover all possible problems that may occur. If a specific problem is not covered in this manual, call Snorkel for service assistance.

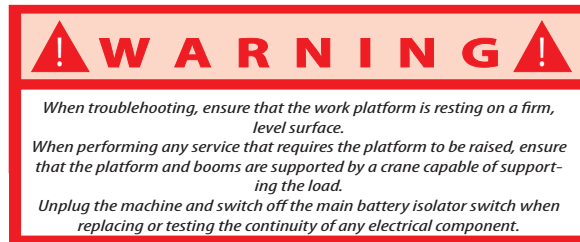
Referring to section 2 and 5 will aid in understanding the operation and function of the various components and systems helping in diagnosing and repairing of the machine.

GENERAL PROCEDURE

It is important to thoroughly study the hydraulic and electrical schematics.

- Check for loose connections and short circuits.
- Check/repair/replace each component that does not operate properly using the Truth table listed under each machine function.
- Use the information provided in this section to help determine the cause of a fault.

NOTE: Spike protection diodes on components have been left out to eliminate confusion.



TROUBLESHOOTING PROCEDURE

1. Verify the problem: Perform a full function test from both the platform and chassis controls and note all functions that are not operating correctly.
2. Narrow the possible causes: Use the troubleshooting guide to determine which components are common to all circuits that are not functioning correctly.
3. Identify the problem component: Test components that are common to all circuits that are not functioning correctly. Remember to check wires and terminals between suspected components. Be sure to check connections to the battery negative terminal.
4. Repair or replace any component found to be faulty.
5. Verify that repair is complete: Do a full function test from both the platform and chassis controls to verify that all functions are operating correctly and that the machine is performing to specific values.

SPECIAL TOOLS

The following is a list of tools which may be required to perform certain maintenance procedures on the SL-series work platforms.

- 0-45 bar (0-600 psi) hydraulic pressure gauge with adapter fittings.
- 0-250 bar (0-3500 psi) hydraulic pressure gauge with adaptor fittings
- Mini mess hydraulic test point fittings.
- Inclinator
- Crimping tools, STD insulated and Deutsch
- EZcal calibrator (Snorkel part number: 504560-001)

ADJUSTMENT PROCEDURES

Hydraulic settings must be checked whenever a component is repaired or replaced.

- Do not remove the counterbalance valves and “bench test” them if they are faulty.
- Only replace them with valves of the same type.
- Connect a pressure gauge of appropriate range to the test port located on the hydraulic manifold.
- Correct pressure settings are listed in the hydraulic schematic.

CHECKING PUMP PRESSURES

Remove hose from manifold pump port and connect pressure gauge.

TROUBLESHOOTING GUIDE

Trouble	Probable Cause	Remedy
All functions do not operate, machine does not start.	Faulty main battery.	After completely charging batteries, test each battery. Replace if necessary.
	Faulty Auxiliary battery.	Check battery voltage and condition.
	Loose or broken battery lead.	Check continuity of all battery and motor leads. Replace if necessary.
	Emergency stop switch/switches failed to open.	With emergency stop switch in the “ON” position, check continuity.
Loss of hydraulic power with machine “ON”.	Oil level in hydraulic reservoir is low.	Check hydraulic fluid level and top up as required.
	Faulty hydraulic pump.	Check pressure and delivery of the hydraulic oil. Replace if necessary.
Loss of electrical power with machine “ON” and hydraulic power available.	Emergency lowering valve open	Close emergency lowering valve.
	Platform overloaded and alarm sounds.	Observe maximum load rating (refer to operation section of this manual).
	Faulty controller at upper controls.	Check functionality of controller. Replace if faulty.
	Battery level low.	Check battery voltage. Charge the battery if necessary.
Platform drifts down	Emergency lowering valve opened.	Ensure that the emergency lowering valve is completely closed. Replace if necessary.
	Leaking piston seals in lift cylinders	Check for leakage at cylinder return line. Replace seals if necessary.

TROUBLESHOOTING

DIAGNOSTICS

The EZcal display has a number of diagnostic tools to aid troubleshooting. To access these with the machine switched on, press and hold "ESC" for 5 seconds until "#### MENU: HELP: PRESS ENTER" is displayed. Press "ENTER" for a top level fault message.

For more detailed diagnostics from the top menu, scroll right to "DIAGNOSTICS" and press "ENTER". A list of diagnostics sub menus become available as follows:

SYSTEM

The information listed below is relevant to this machine (ignore any other data).

- MODE: Ground or platform mode selected.
- SUPPLY: The supply voltage at the GP400.
- VALVE SUPPLY: Valve supply "ON" or "OFF".
- TILT: This is the platform tilt angle in X and Y.
From tilt, press "ENTER" for chassis tilt angle in X and Y.
- AXLE: Press "ENTER" for "AXLE Tilt angle".
- TILTED: "YES" if the platform angle exceeds 2 degrees in X or Y.
- HEIGHT: The platform height as a percentage of full elevation.
- LOAD: The platform load as a percentage of full Safe Working Load (SWL).
- OVERLOADED: "YES" if the platform load exceeds 120% of the Safe Working Load (SWL).
- LAST MOVED: The last movement.
- ELEVATED: "YES" if the height is above the elevation height.

PLATFORM

The information listed below is relevant to this machine (ignore any other data).

- TRIGGER: "ON" if the joystick trigger is activated.
- JOYSTICK: Gives the percentage of joystick deflection.
- FWD/UP: "ON" if the joystick is pushed forward beyond its "ON" position for "ON/OFF" applications eg "MANUAL LEVELLING" forwards.
- REV/DOWN: "ON" if the joystick is pulled backward beyond its "ON" position for "ON/OFF" applications eg. "MANUAL LEVELLING" backwards.
- LEFT: "ON" for steer left.
- Right: "ON" for steer right.

GROUND

The information listed below is relevant to this machine (ignore any other data).

- UP: "ON" for lift selected.
- DOWN: "ON" for lower selected.

INPUTS

This provides the condition for all digital inputs to the GP400 controller in the ground control box and the matrix board in the platform control box. Refer to the electrical circuit diagram and the I/O list for details of each input function.

ANALOGS

This provides the voltage on the analogue inputs to the GP400 controller in the ground control box and the MATRIX board in the platform control box. Refer to the electrical circuit diagram and the I/O list for details of each input function.

OUTPUTS

This provides the condition for all digital outputs from the GP400 controller in the ground control box and the MATRIX board in the platform control box. Refer to the electrical circuit diagram and the I/O list for details of each output function.

SL26-30 I/O LIST

GP400 I/O

Key	Meaning
MM	Movement Manifold Block
DM	Drive manifold Block
***	Elevated drive is always low speed

Connector-pin	I/O type	Function	Comment
P7-1	B+	TBM +ve	Powers valve outputs, does not power GP400
P8-14	B-	TBM -ve	
P7-2	B+ Digital Input	Key Switch Ground Mode	High selects ground control and powers GP400
P7-4	B+ Digital Input	Key Switch Platform Mode	High selects platform control and powers GP400
P7-3	B+ Digital Input	Ground Enable	Enables Ground Controlled Functions
P7-5	B+ Digital Input	Ground Lift	Momentary: Hold to Lift platform from ground controls when allowed
P7-6	B+ Digital Input	Ground Lower	Momentary: Hold to Lower platform from ground controls when allowed
P7-7	B+ Digital Input	NOT USED	N/A
P7-8	B+ Digital Input	NOT USED	N/A
P8-1	Analogue Input	NOT USED	N/A
P8-12	+5v via 1K	NOT USED	
P8-13, P8-15	0v for sensors	Sensor ground	Ground to 2 off Ezfit, & Pressure transducer.
P8-2	Analogue Input	Ezfit #1	From Ezfit # 1 output.
P8-5	Analogue Input	Ezfit #2	From Ezfit # 2 output.
P8-6	Analogue Input	Pressure transducer	From pressure transducer output CE ONLY
P8-9	Analogue Input	TBM current sense	From TBM
P8-10	0-5v PWM output	Motor Speed Control	0 to 4.5v for motor speed control

TROUBLESHOOTING

GP400 I/O

Connector-pin	I/O type	Function	Comment
P7-14	B- Digital input	Not Used	N/A
P7-13	B- Digital input	LOW BATTERY LIMP MODE	Low input: prevent lift and only allow drive in low speed mode, and illuminate low bat led on Matrix MP4-7
P7-15	B- Digital input	Not Used	N/A
P4-7	High side 2A output	Not Used	N/A
P4-1	High Side PWM o/p	Not Used	N/A
P4-8	High side 2A output	Not Used	N/A
P4-4	High side 2A output	Motor controller enable	High to allow pump to run
P4-5	High side 2A output	Not Used	N/A
P5-2	High side 2A output	Steer Left Solenoid - MM:SV1a	To steer left energise MM:SV1a & MM:SV4
P5-3	High side 2A output	Steer Right Solenoid - MM:SV1b	To steer right energise MM:SV1b & MM:SV4
P5-7	High side 2A output	Platform Tilt Left Sol - MM:SV2a	To tilt platform left energise MM:SV2a & MM:SV4
P5-8	High side 2A output	Platform Tilt Right Sol - MM:SV2b	To tilt platform right energise MM:SV2b & MM:SV4
P5-9	High side 2A output	Platform Tilt Forward Sol - MM:SV3a	To tilt platform forward energise MM:SV3a & MM:SV4
P5-11	High side 2A output	Platform Tilt Backward Sol - MM:SV3b	To tilt platform backward energise MM:SV3b & MM:SV4
P5-15	High side 2A output	Tilt/Steer dump solenoid - MM:SV4	Energise to allow platform levelling and steering.
P4-14	High side 2A output	Lift Solenoid - MM:SV5	To lift platform energise MM:SV5 and analogue o/p to motor controller
P4-13	High side 2A output	Lower Solenoid	Energise to lower the platform.
P4-2	High side 2A output	Drive Forward Sol - DM:SV01a	For Low speed forward drive energise DM:SV01a and analogue o/p to motor controller ***
P4-6	High side 2A output	Drive Reverse Sol - DM:SV01b	For Low speed reverse drive energise DM:SV01b and analogue o/p to motor controller ***
P4-3	High side 2A output	Medium Speed Sol - DM:SV4	For medium speed drive energise DM:SV4 & DM:SV8 and select fwd/rev with DM:SV01a/DM:SV01b and analogue o/p to motor controller
P5-14	High side 2A output	High Speed Sol - DM:SV5	For high speed drive energise DM:SV5, DM:SV8, DM:SV11 & DM:SV13 and select fwd/rev with DM:SV01a/DM:SV01b and analogue o/p to motor controller
P4-9	High side 2A output	2 Wheel Drive Sol - DM:SV8	Energised for high & Medium speed drive.
P4-10	High side 2A output	Series Drive Sol - DM:SV11	Energised for High Speed Drive.
P5-1	High side 2A output	High Speed Sol - DM:SV13	Energised for High Speed Drive.
P4-15	High side 2A output	Axle Float Solenoid	Energise when driving and NOT elevated to allow axle float.

GP400 I/O

Connector-pin	I/O type	Function	Comment
P5-4	High side 2A output	Generator Solenoid	Energises Generator Solenoid when MP3-1/11 ON
P5-5	High side 2A output	Ground Alarm	Alarm sounds as set in adjustments
P5-6	High side 2A output	Overload LED	On when overloaded

PLATFORM MATRIX I/O

Connector-pin	I/O type	Function	Comment
MP3-1	Mux digital input	Common for selector switches	
MP3-1/4	Mux digital output	Drive High speed select	Momentary switch latches High speed drive function
MP3-1/5	Mux digital output	Drive Medium speed select	Momentary switch latches medium speed drive function
MP3-1/6	Mux digital output	Drive Low speed select	Momentary switch latches low speed drive function
MP3-1/7	Mux digital output	Auto Level	Momentary: Hold (along with joystick trigger) for Auto Platform Level, Auto Level only allowed when the platform is below elevated height, and the chassis tilt is within pre-selected Chassis Tilt limits.
MP3-1/8	Mux digital output	Lift/lower select	Momentary switch latches platform lift/lower function
MP3-1/9	Mux digital output	NOT USED	N/A
MP3-1/10	Mux digital output	NOT USED	N/A
MP3-1/11	Mux digital output	Generator Select	On to energise generator solenoid
MP4-1	Low side 1A output	Overload LED	Flash & steady on when overload dependant on adjustment setting
MP4-2	Low side 1A output	Drive High speed select LED	Steady on when High speed drive selected
MP4-3	Low side 1A output	Drive Medium speed select LED	Steady on when medium speed drive selected
MP4-4	Low side 1A output	Drive Low speed select LED	Steady on when low speed drive selected
MP4-5	Low side 1A output	Lift/lower select LED	Steady on when platform lift/lower selected
MP4-6	Low side 1A output	Tilt LED	Flash when platform is tilted beyond Platform tilt limits.
MP4-7	Low side 1A output	Engine LED	Steady on when GP400 P7-13,14, or 15 are low.
MP4-8	Low side 1A output	Buzzer	Alarm sounds as set in adjustments

TROUBLESHOOTING

PLATFORM MATRIX I/O

Connector-pin	I/O type	Function	Comment
MP2-1	B+ Digital Input	Steer left Switch	Activate left steer when drive is allowed and trigger closed.
MP2-2	B+ Digital Input	Steer right Switch	Activate right steer when drive is allowed and trigger closed.
MP2-5	B+ Digital Input	Trigger Switch	Trigger enable from joystick
MP2-7	Analogue input	Joystick	Joystick hall effect output
MP2-10	5v protected supply	Joystick	Joystick hall effect supply
MP2-11	B- protected supply	Joystick	Joystick hall effect gnd
MP2-12	B+ protected supply	Joystick	Joystick switches supply
MP1-1	B+ supply	CANTILT (x4)	2 off platform tilt sensors used for Auto Level and to prevent drive and lift above elevated height if platform is outside of preselected Platform Tilt limits & 2 off axle tilt sensors used to prevent lift and drive above elevation height if the axle is out of level with the chassis by more than 1degree. Connected in series over CAN and into the matrix board and GP400C.
MP1-3	CANH		
MP1-6	CANL		
MP1-4	GND		

BATTERY / MOTOR FAULT CODES

Battery Fault

When the battery system is in fault the spanner LED will flash and the text will show BTFLT XX where XX is the error code (Refer to Battery Charge Fault Code Table on page 10 -11). Fault code will be displayed until the batteries shut themselves down to save energy, make a note of the motor fault code.



Battery Fault Display

Motor Fault

If the machine reports a motor fault the spanner LED will flash and the text will read "MTFLT XX" where XX is the motor fault code (Refer to the Motor Fault Code Table on page 12 -19), make a note of the motor fault code reported and contact Snorkel immediately.



Motor Fault Display

TROUBLESHOOTING

BATTERY CHARGE FAULT CODES (1 OF 2)

CODE	Fault name	What the problem is	Why is this a problem?	User action on warning	User action for recovery
1	High Cell Voltage	The high cell voltage is too high	If the cell voltage gets too high the pack may heat up leading to swelling and gas release	Stop Charge or Regenerative braking	Discharge Pack
2	Low Cell Voltage	The Low cell voltage is too low	If the cell voltage gets too low, the cells become discharged	Stop Discharge	Charge Pack
3	Discharge Over Current	The discharge current is above the acceptable limit	If the current gets too high, the pack will heat up	Reduce current draw. Check for safe function of system.	Ensure full system load is less than maximum system current.
4	Charge Current above Maximum	The charge current is higher than the pack absolute current limit.	If the current gets too high, the pack will heat up, which may lead to cell swelling and gas release	Reduce charge current	Check the charger settings and control to make sure the maximum charge current is below the maximum system charge current
5	High Cell Temperature	The cells are too hot	If the cell temperature gets too high, the cells may swell up and release gas.	Reduce current draw. Start cooling if fitted	Let the packs cool down. Check the pack and surroundings for faults or heat sources.
6	Low Cell Temperature	The cells are too cold	If the cell temperature gets too low, the cells cannot absorb or produce current safely	Discharge/Charge cells at a low current to warm the cells up.	Discharge/Charge cells at a low current to warm the cells up.
7	High Fuse Temperature	The Fuse is too hot	The fuse heating up is a sign that the fuse may be damaged, or the current is too high.	Reduce or stop current flow	Let the pack cool. If fault re-occurs, contact your distributor.
8	High PCB Temperature	The PCB is too hot	The PCB heating up is a sign that the PCB may be damaged, there is a loose electrical connection, or the current is too high.	Reduce or stop current flow	Let the pack cool. If fault re-occurs, contact your distributor.
9	Charge Mismatch	The charge current is higher than the allowable current level calculated by the BMS	The BMS calculates the maximum acceptable charge current for a range of cell voltages and temperatures. If the charge current is above this, then the cells may be damaged, or have reduced working life	Reduce the charge current.	Ensure the charger settings and control responds appropriately to the maximum allowable charge current message.
10	Cell Voltage Imbalance	The voltage difference between the highest and lowest voltage cell in this pack is too high.	The BMS balances the cells in the pack. If the cell voltage range within the pack is too large it is a sign that the balancing may not be working properly. If cells are unbalanced the pack will not be operating at full capacity.	Check cell voltages using CAN bus information or GUI. If the max min cell voltage difference is greater than 0.5V contact your distributor.	Leave the pack enabled to allow the BMS time to balance the cells. The voltages should equalise over time. This will take a few hours.
11	Reserved				
12	Cell in deep discharge	One of the cells in the pack has been discharged to the point it would be unsafe to recharge it.	If the cell voltages drop below this voltage, then the cell internal structure is damaged. If they are recharged, damage is likely to occur. To prevent this the pack will never go into run mode again and will go into sleep mode after 10 seconds.		Deep discharged cells are unrecoverable. Batteries must be returned to your distributor.
13	Welded Contactor	There is current flowing when it is not safe and the contactor should be open.	If there is current flowing when the BMS thinks the contactor is open this is a sign that the contactor is welded, not present or has been bypassed. As the external contactor is the primary protection against faults, this means the pack is in a potentially hazardous situation.	User must check contactor for continuity when the system is isolated and ensure that there are no current paths that bypass the contactor.	If the contactor is faulty, replace the contactor. If there are any circuits that bypass the contactor they must be moved to the switched side of the contactor.
14	Node Missing	The master pack is not receiving CAN messages from all the packs in the array.	If the master is not receiving messages from all the battery nodes then one of the nodes has failed or is missing, therefore the array is faulty		Check all pack control connections, Check the CAN bus for faults. Check the array settings are correct. Fix any faults found.
15	Reserved				
16	Array Cell Voltage Imbalance	The voltage difference between the highest and lowest voltage cell in the whole array is too high	The BMS balances all the cells across the array. If the cell voltage range within the pack is too large it is a sign that the balancing may not be working properly. If cells are unbalanced the pack will not be operating at full capacity.		Check all packs in the system are the same voltage (to within 0.3 V). Manually charge or discharge individual packs to bring all of the pack voltages together then reconnect.
17	Thermistor Error	One or more of the cell thermistors are reading incorrectly.	The thermistor reading is invalid, which means that the BMS cannot use that value for safety checks.		Cycle pack enable. If fault recurs, contact your distributor.
18	PCB Thermistor Error	The PCB thermistor is reading incorrectly.	The thermistor reading is invalid, which means that the BMS cannot use that value for safety checks.		Cycle pack enable. If fault recurs, contact your distributor.
19	Fuse Thermistor Error	The fuse thermistor is reading incorrectly.	The thermistor reading is invalid, which means that the BMS cannot use that value for safety checks.		Cycle pack enable. If fault recurs, contact your distributor.
20	SPI Error	There are errors on the SPI bus, which the BMS uses to communicate between components	The microcontroller cannot communicate with all the BMS components.		Cycle pack enable. If fault recurs, contact your distributor.
21	Reserved				
22	Reserved				
23	I2C 1 Error	There are errors on the I2C bus, which the BMS uses to communicate between components	The microcontroller cannot communicate with all the BMS components.		Cycle pack enable. If fault recurs, contact your distributor.

BATTERY CHARGE FAULT CODES (2 OF 2)

CODE	Fault name	What the problem is	Why is this a problem?	User action on warning	User action for recovery
24	I2C 2 Error	There are errors on the I2C bus, which the BMS uses to communicate between components	The microcontroller cannot communicate with all the BMS components.		Cycle pack enable. If fault recurs, contact your distributor.
25	CAN Error	There are errors on the CAN bus	If the BMS detects multiple CAN bus faults it will report this error. It generally means that the CAN bus is faulty.		Check the CAN bus for faults and correct any found, e.g incorrect termination resistor or cable, a CAN node at an incorrect bus speed, high bus loading.
26	Discharge In Must Charge Mode	Discharge current is detected when the pack is in Must Charge mode	When the pack is in must charge mode, it is at a very low voltage, so discharging it is not allowed.		Stop discharge and charge system
27	Charge In Must Discharge Mode	Charge current is detected when the pack is in Must Discharge mode	When the pack is in must discharge mode, it is at a very high voltage, so charging it is not allowed.		Stop charge and discharge system
28	Must Charge Mode	The system voltage is too low, and the pack must be charged to avoid under-voltage damage.		Charge system	
29	Must Discharge Mode	The system voltage is too high, and the pack must be discharge to avoid over-voltage damage		Discharge system	
30	Pack about to change to Sleep Mode	The pack and/or system is about to change to sleep mode.	The BMS sends this for 5 secs before it goes into sleep mode. In sleep mode the BMSs go into their low power mode, the interlock is opened and CAN messaging stops.		Cycle the enable input to re-enable the battery packs.
31	Opening Interlock	The system is about to open the interlock	The BMS sends this when it opens the interlock		Shut down anything in the user system that may be damaged by sudden power loss. In vehicle systems inform user of imminent power loss.
32	Short Circuit Discharge	The BMS hardware has detected a short circuit. The interlock will open instantly with no pre-warning.	Very high currents will cause the cells to overheat, expand and release hot gas.		Investigate system for source of short circuit. Fix any faults.
33	BMS Hardware error 1	The BMS hardware has detected an internal fault.	If the BMS components are in fault, the BMS cannot protect the cells properly.		Cycle pack enable. If fault recurs, contact your distributor.
34	BMS Hardware error 2	The BMS hardware has detected an internal fault.	If the BMS components are in fault, the BMS cannot protect the cells properly.		Cycle pack enable. If fault recurs, contact your distributor.
35	Array Current error - 10%	The highest pack current in the array is 10% different to the lowest pack current.	The current should be the same in every pack in the array, in both parallel and series arrangements. If the high and low pack currents are too far apart it indicates that there may be a problem with the system.	Check the connectors and conductors in your system to make sure that none are damaged, overheating or loose. You may need to resize cables or conductors to reduce resistance in your system.	
36	Array Current error - 20%	The highest pack current in the array is 20% different to the lowest pack current.	The current should be the same in every pack in the array, in both parallel and series arrangements. If the high and low pack currents are too far apart it indicates that there may be a problem with the system.	Check the connectors and conductors in your system to make sure that none are damaged, overheating or loose. You may need to resize cables or conductors to reduce resistance in your system.	
37	Cell Voltage Error	System high cell and system low cell voltage are greater than 2% apart	The BMS balances the cells in the pack. If the cell voltage range within the pack is too large it is a sign that the balancing may not be working properly, and that you are not getting the best possible performance from your pack.	Check cell voltages using CAN bus information or GUI. If the max min cell voltage difference is greater than 0.5V contact your distributor.	Leave the pack enabled to allow the BMS time to balance the cells. The voltages should equalise over time.
38	More than one BMS master in system	If a master receives CAN messages transmitted by another master pack on the bus.	If there are two master BMSs on the CAN bus it means that the array has not been configured properly and the user system will be getting conflicting information.		Check the system and battery settings to ensure there is only one master node. Reconfigure nodes if required. Check if a CAN node other than the batter master sends out the
39	Array Size does not match configuration	If a master receives CAN messages transmitted by a pack that is not in the configured array.	If there are battery nodes that the master does not expect it means that the master is incorrectly configured and will not be calculating the array values properly and will not react to node faults if they occur.		Check the system and battery settings, in particular the number of series and parallel packs, to ensure the system configuration is correct. Reconfigure system config if required.
40	Reserved				
41	No BMS Master Messages received	A slave node has not received a message from the master for 60 seconds	If the master pack is not operational, the slaves do not know what state the other packs are in and if they should have their interlocks open or closed.		Check the CAN bus for disconnected cables and faults and correct any found, e.g incorrect termination resistor or cable, a CAN node at an incorrect bus speed, high bus loading. Check if the master pack is transmitting messages onto the CAN bus.

TROUBLESHOOTING

MOTOR FAULT CODES (1 OF 8)

CODE	PROGRAMMER LCD DISPLAY EFFECT OF FAULT	POSSIBLE CAUSE	SET / CLEAR CONDITIONS
12	Controller Overcurrent ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; FullBrake.	<ol style="list-style-type: none"> 1. External short of phase U,V, or W motor connections. 2. Motor parameters are mis-tuned. 3. Controller defective. 4. Speed encoder noise problems. 	<p>Set: Phase current exceeded the current measurement limit.</p> <p>Clear: Cycle KSI.</p>
13	Current Sensor Fault ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; FullBrake.	<ol style="list-style-type: none"> 1. Leakage to vehicle frame from phase U, V, or W (short in motor stator). 2. Controller defective. 	<p>Set: Controller current sensors have invalid offset reading.</p> <p>Clear: Cycle KSI.</p>
14	Precharge Failed ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; FullBrake.	<ol style="list-style-type: none"> 1. See Monitor menu » Battery: Capacitor Voltage. 2. External load on capacitor bank (B+ connection terminal) that prevents the capacitor bank from charging. 	<p>Set: The precharge failed to charge the capacitor bank.</p> <p>Clear: Cycle Interlock input or use VCL function Enable_Precharge().</p>
15	Controller Severe Undertemp ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; FullBrake.	<ol style="list-style-type: none"> 1. See Monitor menu » Controller: Temperature. 2. Controller is operating in an extreme environment. 	<p>Set: Heatsink temperature below -40°C.</p> <p>Clear: Bring heatsink temperature above -40°C, and cycle interlock or KSI.</p>
16	Controller Severe Overtemp ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; FullBrake.	<ol style="list-style-type: none"> 1. See Monitor menu » Controller: Temperature. 2. Controller is operating in an extreme environment. 3. Excessive load on vehicle. 4. Improper mounting of controller. 	<p>Set: Heatsink temperature above +95°C.</p> <p>Clear: Bring heatsink temperature below +95°C, and cycle interlock or KSI.</p>
17	Severe B+ Undervoltage No drive torque.	<ol style="list-style-type: none"> 1. Battery parameters are misadjusted. 2. Non-controller system drain on battery. 3. Battery resistance too high. 4. Battery disconnected while driving. 5. See Monitor menu » Battery: Capacitor Voltage. 6. Blown B+ fuse or main contactor did not close. 	<p>Set: Capacitor bank voltage dropped below the Severe Undervoltage limit with FET bridge enabled.</p> <p>Clear: Bring capacitor voltage above Severe Undervoltage limit.</p>
17	Severe KSI Undervoltage No action.	<ol style="list-style-type: none"> 1. See Monitor menu » Battery: Keyswitch Voltage. 2. Non-controller system drain on battery/ KSI circuit wiring. 3. KSI disconnected while driving. 4. Blown KSI fuse. 	<p>Set: When below Brownout Voltage for 2 seconds (see Table D-1).</p> <p>Clear: Bring KSI voltage above Brownout Voltage.</p>
18	Severe B+ Overvoltage ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; FullBrake.	<ol style="list-style-type: none"> 1. See Monitor menu » Battery: Capacitor Voltage. 2. Battery parameters are misadjusted. 3. Battery resistance too high for given regen current. 4. Battery disconnected while regen braking. 	<p>Set: Capacitor bank voltage exceeded the Severe Overvoltage limit with FET bridge enabled.</p> <p>Clear: Bring capacitor voltage below Severe Overvoltage limit, and then cycle KSI.</p>

TROUBLESHOOTING

MOTOR FAULT CODES (2 OF 8)

CODE	PROGRAMMER LCD DISPLAY EFFECT OF FAULT	POSSIBLE CAUSE	SET / CLEAR CONDITIONS
18	Severe KSI Overvoltage ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; FullBrake.	1. Incorrect (to high) battery-voltage applied to KSI (pin 1) 2. See Monitor menu » Battery: Keyswitch Voltage. Note: Prevents the Main Contactor closure if KSI is greater than the Severe Overvoltage limit.	Set: KSI voltage exceeded Severe Overvoltage limit Clear: Bring KSI voltage below the Severe Overvoltage limit (Severe Overvoltage)
22	Controller Overtemp Cutback Reduced drive and brake torque.	1. See Monitor menu » Controller: Temperature. 2. Controller is performance-limited at this temperature. 3. Controller is operating in an extreme environment. 4. Excessive load on vehicle. 5. Improper mounting of controller.	Set: Heatsink temperature exceeded 85°C. Clear: Bring heatsink temperature below 85°C.
23	B+ Undervoltage Cutback Reduced drive torque.	1. Normal operation. Fault indicates the batteries need recharging. Controller is performance limited at this voltage. 2. Battery parameters are misadjusted. 3. Non-controller system drain on battery. 4. Battery resistance too high. 5. Battery disconnected while driving. 6. See Monitor menu » Battery: Capacitor Voltage. 7. Blown B+ fuse or main contactor did not close.	Set: Capacitor bank voltage dropped below the Undervoltage limit with the FET bridge enabled. Clear: Bring capacitor voltage above the Undervoltage limit.
24	B+ Overvoltage Cutback Reduced brake torque. Note: This fault is declared only when the controller is running in regen.	1. Normal operation. Fault shows that regen braking currents elevated the battery voltage during regen braking. Controller is performance limited at this voltage. 2. Battery parameters are misadjusted. 3. Battery resistance too high for given regen current. 4. Battery disconnected while regen braking. 5. See Monitor menu » Battery: Capacitor Voltage.	Set: Capacitor bank voltage exceeded the Overvoltage limit with the FET bridge enabled. Clear: Bring capacitor voltage below the Overvoltage limit.
25	+5V Supply Failure None, unless a fault action is programmed in VCL.	1. External load impedance on the +5V supply (pin 26) is too low. 2. See Monitor menu » outputs: 5 Volts and Ext Supply Current.	Set: +5V supply (pin 26) outside the 5 V±10% range. Clear: Bring voltage within range.
26	Digital Out 6 Open/Short Digital Output 6 driver will not turn on.	1. External load impedance on Digital Output 6 driver (pin 19) is too low.	Set: Digital Output 6 (pin 19) current exceeded 1 Amp. Clear: Remedy the overcurrent cause and use the VCL function Set_DigOut() to turn the driver on again.
27	Digital Out 7 Open/Short Digital Output 7 driver will not turn on.	1. External load impedance on Digital Output 7 driver (pin 20) is too low.	Set: Digital Output 7 (pin 20) current exceeded 1 Amp. Clear: Remedy the overcurrent cause and use the VCL function Set_DigOut() to turn the driver on again.

TROUBLESHOOTING

MOTOR FAULT CODES (3 OF 8)

CODE	PROGRAMMER LCD DISPLAY EFFECT OF FAULT	POSSIBLE CAUSE	SET / CLEAR CONDITIONS
28	Motor Temp Hot Cutback Reduced drive torque.	<ol style="list-style-type: none"> 1. Motor temperature is at or above the programmed Temperature Hot setting, and the current is being cut back. 2. Motor Temperature Control Menu parameters are mis-tuned. 3. See Monitor menu » Motor: Temperature and » Inputs: Analog2. 4. If the application doesn't use a motor thermistor, Temp Compensation and Temp Cutback should be programmed Off. 	<p>Set: Motor temperature is at or above the Temperature Hot parameter setting.</p> <p>Clear: Bring the motor temperature within range.</p>
29	Motor Temp Sensor Fault MaxSpeed reduced (LOS, Limited Operating Strategy), and motor temperature cutback disabled.	<ol style="list-style-type: none"> 1. Motor thermistor is not connected properly. 2. If the application doesn't use a motor thermistor, Motor Temp Sensor Enable should be programmed Off. 3. See Monitor menu » Motor: Temperature and » Inputs: Analog2. 	<p>Set: Motor thermistor input (pin 8) is at the voltage rail (0 V or 10 V).</p> <p>Clear: Bring the motor thermistor input voltage within range.</p>
31	Coil1 Driver Open/Short ShutdownDriver1.	<ol style="list-style-type: none"> 1. Open or short on driver load. 2. Dirty connector pins. 3. Bad crimps or faulty wiring. 	<p>Set: Driver 1 (pin 6) is either open or shorted. This fault can be set only when Main Enable = Off.</p> <p>Clear: Correct open or short, and cycle driver.</p>
31	Main Open/Short ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; FullBrake.	<ol style="list-style-type: none"> 1. Open or short on driver load. 2. Dirty connector pins. 3. Bad crimps or faulty wiring. 	<p>Set: Main contactor driver (pin 6) is either open or shorted. This fault can be set only when Main Enable = On.</p> <p>Clear: Correct open or short, and cycle driver</p>
32	Coil2 Driver Open/Short ShutdownDriver2.	<ol style="list-style-type: none"> 1. Open or short on driver load. 2. Dirty connector pins. 3. Bad crimps or faulty wiring. 	<p>Set: Driver 2 (pin 5) is either open or shorted. This fault can be set only when EM Brake Type = 0.</p> <p>Clear: Correct open or short, and cycle driver.</p>
32	EMBrake Open/Short ShutdownEMBrake; ShutdownThrottle; FullBrake.	<ol style="list-style-type: none"> 1. Open or short on driver load. 2. Dirty connector pins. 3. Bad crimps or faulty wiring. 	<p>Set: Electromagnetic brake driver (pin 5) is either open or shorted. This fault can be set only when EM Brake Type >0.</p> <p>Clear: Correct open or short, and cycle driver.</p>
33	Coil3 Driver Open/Short ShutdownDriver3.	<ol style="list-style-type: none"> 1. Open or short on driver load. 2. Dirty connector pins. 3. Bad crimps or faulty wiring. 	<p>Set: Driver 3 (pin 4) is either open or shorted.</p> <p>Clear: Correct open or short, and cycle driver.</p>
34	Coil4 Driver Open/Short ShutdownDriver4.	<ol style="list-style-type: none"> 1. Open or short on driver load. 2. Dirty connector pins. 3. Bad crimps or faulty wiring. 	<p>Set: Driver 4 (pin 3) is either open or shorted.</p> <p>Clear: Correct open or short, and cycle driver.</p>
35	PD Open/Short ShutdownPD.	<ol style="list-style-type: none"> 1. Open or short on driver load. 2. Dirty connector pins. 3. Bad crimps or faulty wiring. 	<p>Set: Proportional driver (pin 2) is either open or shorted.</p> <p>Clear: Correct open or short, and cycle driver.</p>
36	Encoder Fault ShutdownEMBrake; Motor disabled.	<ol style="list-style-type: none"> 1. Motor encoder failure. 2. Bad crimps or faulty wiring. 3. See Monitor menu » Motor: Motor RPM. 	<p>Set: Motor encoder phase failure detected.</p> <p>Clear: Either cycle KSI, or if parameter LOS Upon Encoder Fault= On and Interlock has been cycled, then the Encoder Fault is cleared and Encoder LOS fault (code 93) is set, allowing limited motor control.</p>
36	Sin/Cos Sensor Fault ShutdownEMBrake; Motor disabled.	<ol style="list-style-type: none"> 1. Sin/Cos sensor failure. 2. Bad crimps or faulty wiring. 3. See Monitor menu » Motor: Motor RPM. 	<p>Set: Greater than Sin_Cos_Fault_Threshold % difference from expected value between two phases seen 5 times within one second.</p> <p>Clear: Cycle KSI, or VCL reset, or Entry into LOS mode if enabled, (or entry into an ACIM auto-characterization).</p>

TROUBLESHOOTING

MOTOR FAULT CODES (4 OF 8)

CODE	PROGRAMMER LCD DISPLAY EFFECT OF FAULT	POSSIBLE CAUSE	SET / CLEAR CONDITIONS
37	Motor Open ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; FullBrake.	1. Motor phase is open. 2. Bad crimps or faulty wiring.	Set: Motor phase U, V, or W detected open. Clear: Cycle KSI.
38	Main Contactor Welded ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; FullBrake.	1. Main contactor tips are welded closed. 2. Motor phase U or V is disconnected or open. 3. An alternate voltage path (such as an external precharge resistor) is providing a current to the capacitor bank (B+ connection terminal).	Set: Just prior to the main contactor closing, the capacitor bank voltage (B+ connection terminal) was loaded for a short time and the voltage did not discharge. Clear: Cycle KSI
39	Main Contactor Did Not Close ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; FullBrake.	1. Main contactor did not close. 2. Main contactor tips are oxidized, burned, or not making good contact.* 3. External load on capacitor bank (B+ connection terminal) that prevents capacitor bank from charging. 4. Blown B+ fuse.	Set: With the main contactor commanded closed, the capacitor bank voltage (B+ connection terminal) did not charge to B+. Clear: Cycle KSI. *New contactors may need to be cycled electrically & mechanically to remove any non-conductive material on the tips. Use reduced voltage (e.g., 12V) to prevent tip damage through excessive arcing.
41	Throttle Wiper High ShutdownThrottle.	1. See Monitor menu » Inputs: Throttle Pot. 2. Throttle pot wiper voltage too high.	Set: Throttle pot wiper (pin 16) voltage is higher than the high fault threshold (can be changed with the VCL function Setup_Pot_Faults()). Clear: Bring throttle pot wiper voltage below the fault threshold.
42	Throttle Wiper Low ShutdownThrottle.	1. See Monitor menu » Inputs: Throttle Pot. 2. Throttle pot wiper voltage too low.	Set: Throttle pot wiper (pin 16) voltage is lower than the low fault threshold (can be changed with the VCL function Setup_Pot_Faults()). Clear: Bring throttle pot wiper voltage above the fault threshold.
43	Pot2 Wiper High FullBrake.	1. See Monitor menu » Inputs: Pot2 Raw. 2. Pot2 wiper voltage too high.	Set: Pot2 wiper (pin 17) voltage is higher than the high fault threshold (can be changed with the VCL function Setup_Pot_Faults()). Clear: Bring Pot2 wiper voltage below the fault threshold.
44	Pot2 Wiper Low FullBrake.	1. See Monitor menu » Inputs: Pot2 Raw. 2. Pot2 wiper voltage too low.	Set: Pot2 wiper (pin 17) voltage is lower than the low fault threshold (can be changed with the VCL function Setup_Pot_Faults()). Clear: Bring Pot2 wiper voltage above the fault threshold.
45	Pot Low OverCurrent ShutdownThrottle; FullBrake.	1. See Monitor menu » Outputs: Pot Low. 2. Combined pot resistance connected to pot low is too low.	Set: Pot low (pin 18) current exceeds 10 mA. Clear: Clear pot low overcurrent condition and cycle KSI.
46	EEPROM Failure ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; ShutdownInterlock; ShutdownDriver1; ShutdownDriver2; ShutdownDriver3; ShutdownDriver4; ShutdownPD; FullBrake.	1. Failure to write to EEPROM memory. This can be caused by EEPROM memory writes initiated by VCL, by the CAN bus, by adjusting parameters with the programmer, or by loading new software into the controller.	Set: Controller operating system tried to write to EEPROM memory and failed. Clear: Download the correct software (OS) and matching parameter default settings into the controller and cycle KSI.

TROUBLESHOOTING

MOTOR FAULT CODES (5 OF 8)

CODE	PROGRAMMER LCD DISPLAY EFFECT OF FAULT	POSSIBLE CAUSE	SET / CLEAR CONDITIONS
47	HPD/Sequencing Fault ShutdownThrottle.	<ol style="list-style-type: none"> 1. KSI, interlock, direction, and throttle inputs applied in incorrect sequence. 2. Faulty wiring, crimps, or switches at KSI, interlock, direction, or throttle inputs. 3. See Monitor menu » Inputs. 	<p>Set: HPD (High Pedal Disable) or sequencing fault caused by incorrect sequence of KSI, interlock, direction, and throttle inputs.</p> <p>Clear: Reapply inputs in correct sequence.</p>
47	Emer Rev HPD ShutdownThrottle; ShutdownEMBrake.	<ol style="list-style-type: none"> 4. Emergency Reverse operation has concluded, but the throttle, forward and reverse inputs, and interlock have not been returned to neutral. 	<p>Set: At the conclusion of Emergency Reverse, the fault was set because various inputs were not returned to neutral.</p> <p>Clear: If EMR_Interlock = On, clear the interlock, throttle, and direction inputs. If EMR_Interlock = Off, clear the throttle and direction inputs.</p>
49	Parameter Change Fault ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; FullBrake.	<ol style="list-style-type: none"> 1. This is a safety fault caused by a change in certain parameter settings so that the vehicle will not operate until KSI is cycled. For example, if a user changes the Throttle Type this fault will appear and require cycling KSI before the vehicle can operate. 	<p>Set: Adjustment of a parameter setting that requires cycling of KSI.</p> <p>Clear: Cycle KSI.</p>
51-67	OEM Faults (See OEM documentation.)	<ol style="list-style-type: none"> 1. These faults can be defined by the OEM and are implemented in the application-specific VCL code. See OEM documentation. 	<p>Set: See OEM documentation.</p> <p>Clear: See OEM documentation.</p>
68	VCL Run Time Error ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; ShutdownInterlock; ShutdownDriver1; ShutdownDriver2; ShutdownDriver3; ShutdownDriver4; ShutdownPD; FullBrake.	<ol style="list-style-type: none"> 1. VCL code encountered a runtime VCL error. 2. See Monitor menu » Controller: VCL Error Module and VCL Error. This error can then be compared to the runtime VCL module ID and error code definitions found in the specific OS system information file. 	<p>Set: Runtime VCL code error condition.</p> <p>Clear: Edit VCL application software to fix this error condition; flash the new compiled software and matching parameter defaults; cycle KSI.</p>
69	External Supply Out of Range None, unless a fault action is programmed in VCL.	<ol style="list-style-type: none"> 1. External load on the 5V and 12V supplies draws either too much or too little current. 2. Fault Checking Menu parameters Ext Supply Max and Ext Supply Min are mis-tuned. 3. See Monitor menu » Outputs: Ext Supply Current. 	<p>Set: The external supply current (combined current used by the 5V supply [pin 26] and 12V supply [pin 25]) is either greater than the upper current threshold or lower than the lower current threshold. The two thresholds are defined by the External Supply Max and External Supply Min parameter settings.</p> <p>Clear: Bring the external supply current within range.</p>
71	OS General ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; ShutdownInterlock; ShutdownDriver1; ShutdownDriver2; ShutdownDriver3; ShutdownDriver4; ShutdownPD; FullBrake.	<ol style="list-style-type: none"> 1. Internal controller fault. 	<p>Set: Internal controller fault detected.</p> <p>Clear: Cycle KSI.</p>
72	PDO Timeout ShutdownThrottle; CAN NMT State set to Pre-operational.	<ol style="list-style-type: none"> 1. Time between CAN PDO messages received exceeded the PDO Timeout Period. 	<p>Set: Time between CAN PDO messages received exceeded the PDO Timeout Period.</p> <p>Clear: Cycle KSI or receive CAN NMT message.</p>

TROUBLESHOOTING

MOTOR FAULT CODES (6 OF 8)

CODE	PROGRAMMER LCD DISPLAY EFFECT OF FAULT	POSSIBLE CAUSE	SET / CLEAR CONDITIONS
73	Stall Detected ShutdownEMBrake; Motor disabled; Control Mode changed to LOS (Limited Operating Strategy).	<ol style="list-style-type: none"> 1. Stalled motor. 2. Motor encoder failure. 3. Bad crimps or faulty wiring. 4. Problems with power supply for the motor encoder. 5. See Monitor menu » Motor: Motor RPM. 	<p>Set: No motor encoder movement detected.</p> <p>Clear: Either cycle KSI, or if parameter LOS Upon Encoder Fault = On and Interlock has been cycled, then the Stall Detected fault is cleared and Encoder LOS fault (code 93) is set, allowing limited motor control.</p>
74	Fault On Other Traction Controller	<ol style="list-style-type: none"> 1. Dual Drive fault: see Dual Drive manual. 	
75	Dual Severe Fault	<ol style="list-style-type: none"> 1. Dual Drive fault: see Dual Drive manual. 	
77	Supervisor Fault ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; ShutdownInterlock; ShutdownDriver1; ShutdownDriver2; ShutdownDriver3; ShutdownDriver4; ShutdownPD; FullBrake.	<ol style="list-style-type: none"> 1. The Supervisor has detected a mismatch in redundant readings. 2. Internal damage to Supervisor microprocessor. 3. Switch inputs allowed to be within upper and lower thresholds for over 100 milliseconds. (for recurring errors, check the switches for moisture). 	<p>Set: Mismatched redundant readings; damaged Supervisor; illegal switch inputs.</p> <p>Clear: Check for noise or voltage drift in all switch inputs; check connections; cycle KSI.</p>
78	Supervisor Incompatible ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; ShutdownInterlock; ShutdownDriver1; ShutdownDriver2; ShutdownDriver3; ShutdownDriver4; ShutdownPD; FullBrake.	<ol style="list-style-type: none"> 1. The main OS is not compatible with the Supervisor OS. 	<p>Set: Incompatible software.</p> <p>Clear: Load properly matched OS code or update the Supervisor code; cycle KSI.</p>
82	Bad Calibrations ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; FullBrake.	<ol style="list-style-type: none"> 1. Internal controller fault. 	<p>Set: Internal controller fault detection.</p> <p>Clear: Cycle KSI.</p>
83	Driver Supply ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; FullBrake.	<ol style="list-style-type: none"> 1. Internal controller fault in the voltage supply for the driver circuits. 	<p>Set: Internal controller fault detection.</p> <p>Clear: Cycle KSI.</p>

TROUBLESHOOTING

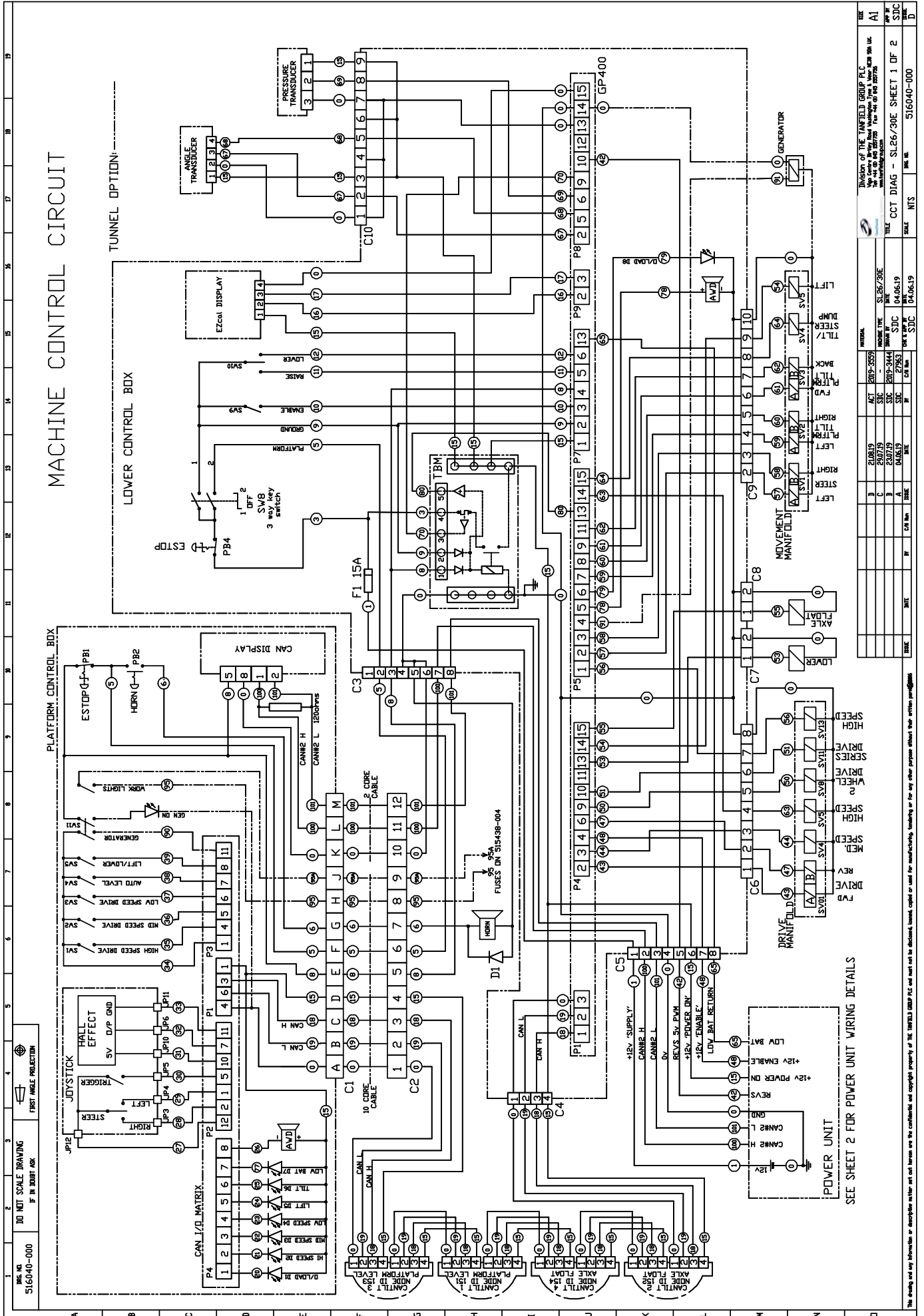
MOTOR FAULT CODES (7 OF 8)

CODE	PROGRAMMER LCD DISPLAY EFFECT OF FAULT	POSSIBLE CAUSE	SET / CLEAR CONDITIONS
87	Motor Characterization Fault ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; FullBrake.	1. Motor characterization failed during characterization process. See Monitor menu » Controller: Motor Characterization Error for cause: 0 = sequencing error. Normally caused by turning off Motor Characterization Test Enable before running the test. 1 = encoder signal seen but step size not auto-detected; set up Encoder Steps manually 2 = motor temp sensor fault 3 = motor temp hot cutback fault 4 = controller overtemp cutback fault 5 = controller undertemp cutback fault 6 = undervoltage cutback fault 7 = severe overvoltage fault 8 = encoder signal not seen, or one or both channels missing 9 = motor parameters out of characterization range 20 = Sin/Cos sensor not found 21 = phasing not detected 22 = Sin/Cos sensor characterization failure 23 = started characterization procedure while motor rotating.	Set: Motor characterization failed during the motor characterization process. Normally caused by turning off Motor_Characterization_Test_Enable before running test. Needs controller reset. Clear: Correct fault; cycle KSI, or VCL reset.
88	Encoder Pulse Count Fault ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; ShutdownInterlock; ShutdownDriver1; ShutdownDriver2; ShutdownDriver3; ShutdownDriver4; ShutdownPD; FullBrake.	1. Encoder Steps parameter does not match the actual motor encoder.	Set: Detected wrong setting of the Encoder Steps parameter. Clear: Ensure the Encoder Steps parameter matches the actual encoder; cycle KSI.
89	Motor Type Fault ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; FullBrake.	2. The Motor_Type parameter value is out of range.	Set: Motor_Type parameter is set to an illegal value. Clear: Set Motor_Type to correct value and cycle KSI.

CODE	PROGRAMMER LCD DISPLAY EFFECT OF FAULT	POSSIBLE CAUSE	SET / CLEAR CONDITIONS
91	VCL/OS Mismatch ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; ShutdownInterlock; ShutdownDriver1; ShutdownDriver2; ShutdownDriver3; ShutdownDriver4; ShutdownPD; FullBrake.	1. The VCL software in the controller does not match the OS software in the controller.	Set: VCL and OS software do not match; when KSI cycles, a check is made to verify that they match and a fault is issued when they do not. Clear: Download the correct VCL and OS software into the controller.
92	EM Brake Failed to Set ShutdownEMBrake; ShutdownThrottle. Position Hold is engaged when Interlock = On.	1. Vehicle movement sensed after the EM Brake has been commanded to set. 2. EM Brake will not hold the motor from rotating.	Set: After the EM Brake was commanded to set and time has elapsed to allow the brake to fully engage, vehicle movement has been sensed. Clear: 1. Activate the Throttle (EM Brake type 2). 2. Activate the Interlock (EM Brake type 1).
93	Encoder LOS (Limited Operating Strategy) Enter LOS control mode.	1. Limited Operating Strategy (LOS) control mode has been activated, as a result of either an Encoder Fault (Code 36) or a Stall Detected fault (Code 73). 2. Motor encoder failure. 3. Bad crimps or faulty wiring. 4. Vehicle is stalled.	Set: Encoder Fault (code 36) or Stall Detected (code 73) was activated, if parameter LOS Upon Encoder Fault = On and Interlock has been cycled, then the Encoder LOS (code 93) control mode is activated, allowing limited motor control. Clear: Cycle KSI or, if LOS mode was activated by the Stall Detected fault, clear by ensuring encoder senses proper operation, Motor RPM = 0, and Throttle Command = 0.
94	Emer Rev Timeout ShutdownEMBrake; ShutdownThrottle.	1. Emergency Reverse was activated and concluded because the EMR Timeout timer has expired. 2. The emergency reverse input is stuck On.	Set: Emergency Reverse was activated and ran until the EMR Timeout timer expired. Clear: Turn the emergency reverse input Off.
98	Illegal Model Number ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; FullBrake.	1. Model_Number variable contains illegal value. 2. Software and hardware do not match. 3. Controller defective.	Set: Illegal Model_Number variable; when KSI cycles, a check is made to confirm a legal Model_Number, and a fault is issued if one is not found. Clear: Download appropriate software for your controller model.
99	Parameter Mismatch ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; FullBrake.	1. Dual drive enabled on only one controller. 2. Incorrect position feedback type chosen for motor technology in use. 3. Dual drive is enabled in torque mode.	Set: When the Dual Drive software is enabled, the controller must be set to either Speed Mode Express or Speed Mode; otherwise this fault is set. Motor Technology=0 must be paired with Feedback Type=1, and Motor Technology=1 must be paired with Feedback Type=2; otherwise this fault is set. Clear: Adjust parameters to appropriate values and cycle KSI.

SCHEMATICS

ELECTRICAL SCHEMATIC CE - 516040-000 (1 OF 2)



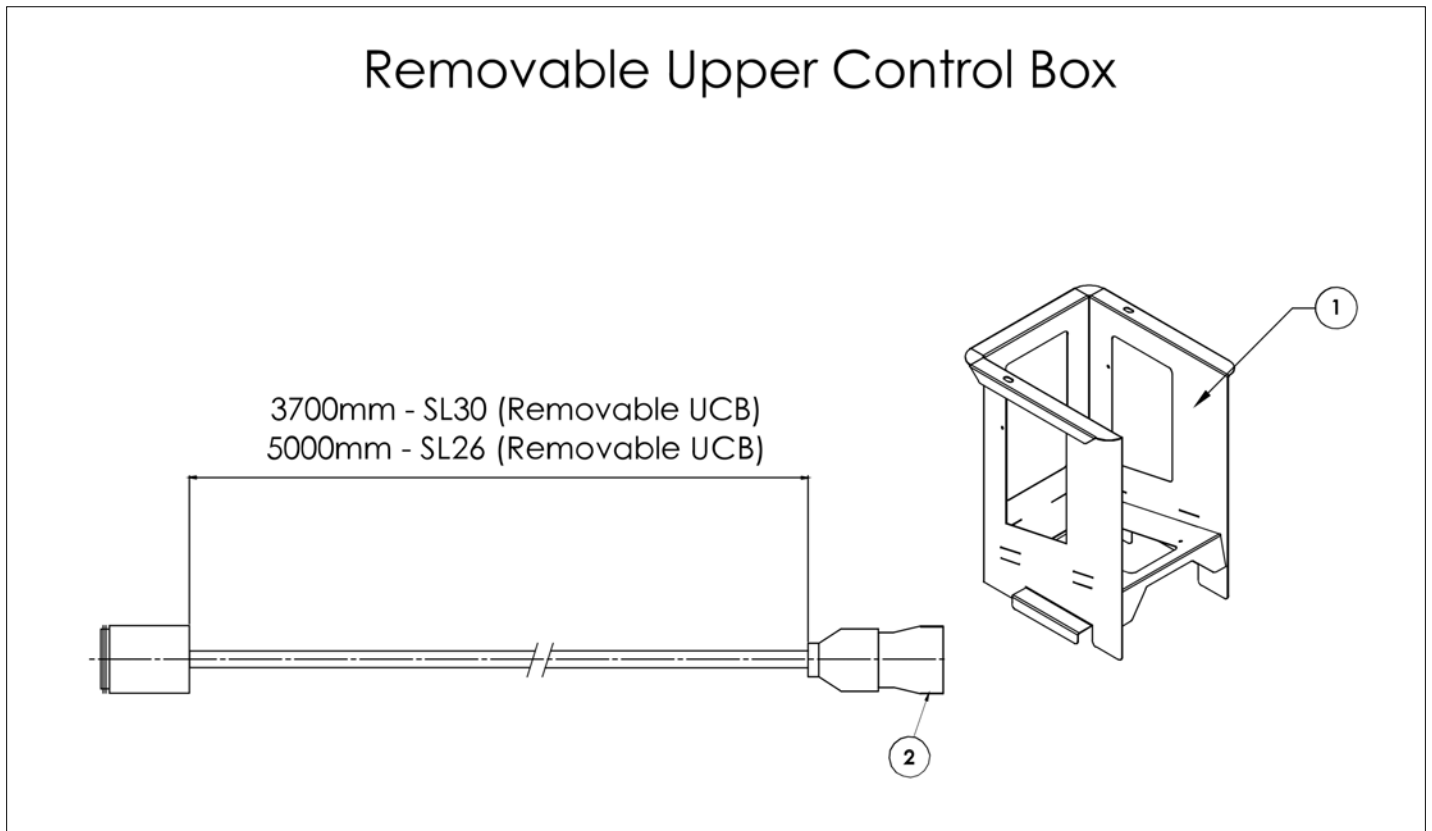
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REV	DATE	BY	CHKD	SCALE	NTS	DRW. NO.	516040-000
A1							
SOC							
DF 2							

REV	DATE	BY	CHKD	SCALE	NTS	DRW. NO.	516040-000
A1							
SOC							
DF 2							

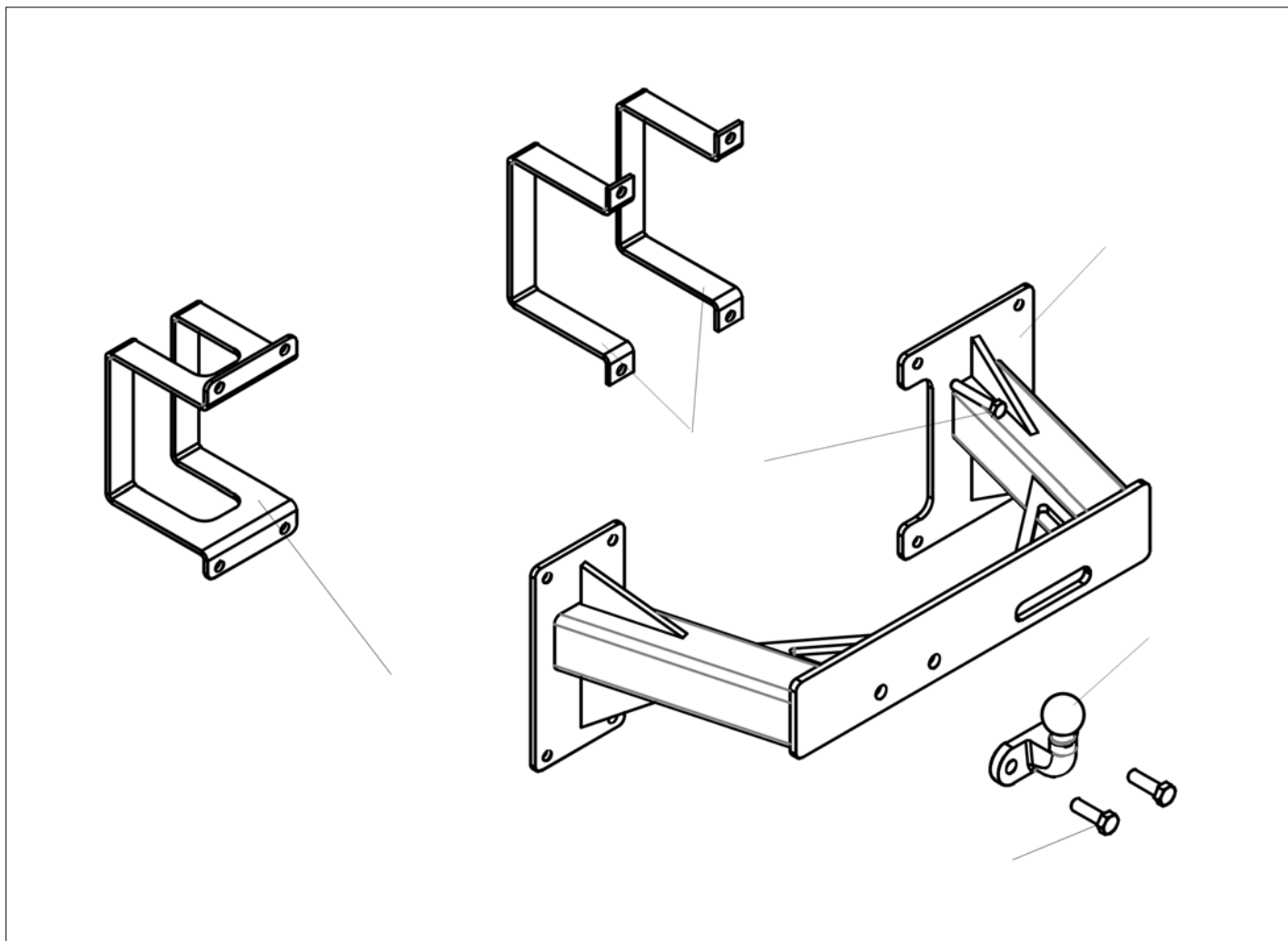
REV	DATE	BY	CHKD	SCALE	NTS	DRW. NO.	516040-000
A1							
SOC							
DF 2							

OPTIONS



アイテム	部品番号	名前	数量	UOM
1	515443 000	UPPER CONTROL BOX MOUNT SL26 (REPLACES 514938 000)	1	EA
2	515442 000	UPPER CONTROL BOX MOUNT SL30 (REPLACES 514521 000)	1	EA
3	514608 002	PLATFORM EXTENSION CABLE 5M SL26 (REPLACES 514608 000)	1	EA
4	514608 003	PLATFORM EXTENSION CABLE 3.7M SL30 (REPLACES 514608 001)	1	EA
5	302544	Pin & Lock	4	EA

OPTIONS



アイテム	部品番号	名前	数量	UOM
1	515480 000	Tow Hitch Weldment	1	EA
2	515481 000	Towball	1	EA
3	515480 008	Clamp Bracket	2	EA
4	515480 009	Clamp Bracket	1	EA
7	057052 070	Hex Hd Bolt M12 x 70 Dacromet	8	EA
8	514163 012	Nyloc Nut M12 Dacromet	8	EA
9	505087 012	Hardened washer, M12	8	EA
10	058480 050	Hex Hd Bolt M16 x 50 Dacromet	2	EA
11	500281 000	WSHR M16 HARDEND STL DIN 6016 PLTD	2	EA
12	514163 016	Nyloc Nut M16 Dacromet	2	EA

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DECAL KIT SL30RTE - ENGLISH	
ELEVATING ASSEMBLY SL26SL	
ELEVATING ASSEMBLY SL30SL	
FUEL TANK ASSEMBLY - DIESEL	
GENERAL ASSEMBLY SL26RTE	
GENERAL ASSEMBLY SL30RTE	
HYDRAULIC CYLINDER ASSEMBLY - MAIN LIFT	
HYDRAULIC HOSE ASSEMBLY	
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