UpRight
POWERED ACCESS

MB 20/26

WORK PLATFORMS

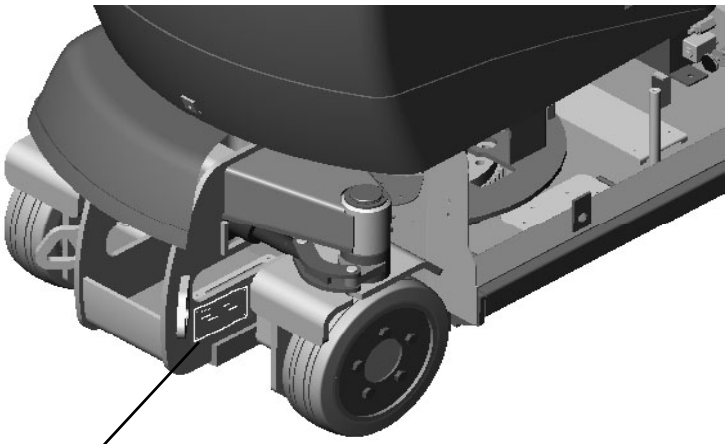
Service & Parts Manual

SERVICE & PARTS MANUAL

MB 20/26

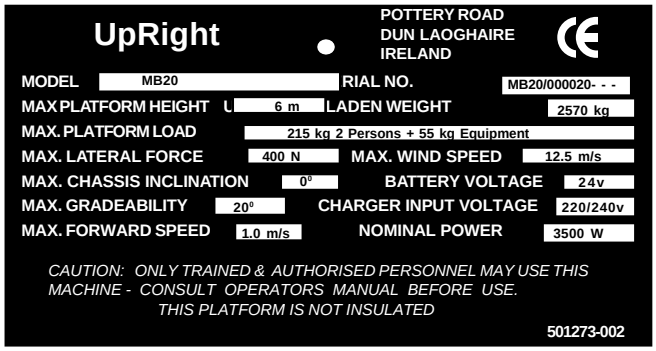
Aerial Work Platform

MB Service & Parts Manual Part No: 501376-000



Nameplate

The Work Platform Name Plate is located externally at the front of the chassis.



Serial Numbers viz. **MB20/0001....to ....**
or **MB26/0001....to....**

When contacting UpRight for service or parts information, be sure to include the MODEL and SERIAL NUMBERS from the equipment nameplate.

The MB20/26 Work Platform meets and exceeds the requirements of both **prEn280** and **ANSI A92.5 (1999).**

UpRight

UpRight Ireland Ltd.,
Pottery Road,
Dun Laoghaire,
Ireland.
Tel: +353-1-202-4100
Fax: +353-1-202-4105

UpRight

EC Declaration of Conformity of Machinery
EC-Konformitätserklärung für Maschinen
Declaration De Conformite CE pour les Machines
Declaracion De Conformidad CE Para Maquinaria
Dichiarazione Di Conformità CE Per Le Macchine
CE Conformiteitsverklaring voor Machinerie
EU Deklaration Avseende Överensstammelse För Maskinutrustning
EF-Samsvarserklaering For Maskiner
EF-Overensstemmelseserklaering for Maskiner
EU Vaatimustenmukaisuusvakuutus

Model	**Modello**	
Modell	**Verticaal model**	
Modele	**Malli**	
Modelo		**«MB 20/26»**
Serial number	**Serienummer**	
Matricola	**Numero de serie**	**«MB20/0001 - - -»**
Sarajanumero		**«MB26/0001 - - -»**

Notified body Notifizierte Stelle Organisme notifie Organismo notificado Aangemelde instantie Myndighet Avendte harmoniserte standarder Udpeget organ Asiasta on tehty ilmoitus seuraaville tahoille Ente Notificatore	**Technische Prûfstelle** **Dienstbier & Pix** **Hundert Beete 13** **D-91334 Hemhofen** **DEUTSCHLAND**

EC Type Examination Certificate number EC-Typenprufung Zertifikat-Nr Examen type CE Numero de Certificat Inspeccion tipo CE Numero de certificado Attestato di certificazione CE nr Onderzoek van het type EC Certificaatnummer EU typkontroll Certifieringsnummer EF-typeproving Sertifikatnummer EF-typegodkendelse Nummer pa typeattest EU-tyyppitarkastuksen nr.	**MB 20N CE 0533 6800** **MB 20 CE 0533 8500** **MB 26 CE 0533 6900**

Manufacturer Hersteller Fabricant Fabricante Fabbricante	**UpRight Ireland Ltd** **Pottery Road** **Dun Laoghaire** **IRELAND** **Tel: (353) 1 202 4100** **FAX: (353) 1 202 4101**
Fabrikant Tillverkare Produsent Valmistaja	

Authorized Representative Autorisierte Vertretung Representant autorise Representante autorizado Mandatario Erkend vertegenwoordiger Auktoriserad representant Autorisert representant Represenentant Valtuutettu edustaja	as above

Jonathan Kellett (B.Sc.Eng.) Quality Assurance Manager Leiter Qualitätssicherung Directeur de l'Assurance Qualite Gerente de Garantia de Calidad Responsabile Garanzia di Qualità Kwaliteitscontrole Manager Kvalitetskontroll Chef Kvalitetssikringssjef Kvalitetssikringschef	Date **«01 June 2000»** Datum Fecha Data Dato Paivamaara

Description	**Aerial Work Platform**
Bezeichnung	**Arbeitsbühne**
Description	**Plate-forme elevatrice de personnel**
Descripcion	**Platforma aerea de trabajo con motor**
Descrizione	**Piattaforma di sollevamento motorizzata**
Beschrijving	**Mechanisch aangedreven werkplatform**
Beskrivning	**Höj-och sänkbar arbetsplattform**
Beskrivelse	**Selvgående arbetsplattform**
Beskrivelse	**Motordrevet lofteplatform**
Kuvaus	**Konevoimalla toimiva nostolava** **Selvgående personarbetslift**

ENGLISH

The Machine specified herein complies with the following provisions:

Directive	As amended by Directive	Harmonized Standards	
98/37/EC		EN60204-1:1997	Safety of Machinery
89/336/EEC	93/68/EEC	EN50081-1:1992 EN50082-1:1992	Electromagnetic compatibility

DEUTSCH

Die obengenannte Maschine entspricht den folgenden Bestimmungen:

Richtlinie	Geändert durch Richtlinien	Harmonisierte Normen:	
98/37/EC		EN60204-1:1997	Maschinensicherheit – Elecktrische Maschinenausrüstung
89/336/EEC	93/68/EEC	EN 50081-1:1992 EN 50082-1:1992	Elektromagnetische Kompatibilität

NEDERLANDS

De bovenvermelde machine voldoet aan de volgende voorwaarden:

Richtlijn	Zoals gewijzigd door richtlijnen	Aanvaarde geharmoniseerde normen:	
98/37/EC		EN60204-1:1997	Veiligheid van machinerie
89/336/EEC	93/68/EEC	EN50081-1:1992 EN50082-1:1992	Elektromagnetische compatibiliteit

FRANCAIS

La machine décrite ci-dessus est conforme aux normes ci-dessous:

Directive	Amendée par les directives	Normes harmonisées adoptées	
98/37/EC		EN60204-1:1997	Sécurité des machines
89/336/EEC	93/68/EEC	EN50081-1:1992 EN50082-1:1992	Compatibilité électromagnétique

ITALIANO

La macchina sopra specificata è conforme alle seguenti disposizioni:

Direttiva	Modificata dalle Direttive	Norme armonizzate adottate	
98/37/EC		EN60204-1:1997	Sicurezza del macchinario
89/336/EEC	93/68/EEC	EN50081-1:1992 EN50082-1:1992	Compatibilità elettromagnetica

SUOMI

Yllämainittu laite täyttää seuraavat vaatimukset:

Direktiivi	Muutettuna direktiiveillä	Hyzäksytyt yhdenmukaiset standardit	
98/37/EC		EN60204-1:1997	Koneturvallisuus
89/336/EEC	93/68/EEC	EN50081-1:1992 EN50082-1:1992	Sähkömagneettinen yhteensopivuus

SVENSKA

Maskinen som specificeras ovan överensstämmer med följande bestämmelser:

Direktiv	Med ändringar enligt direktiven	Harmoniserade standarder som har tillämpats:	
98/37/EC		EN60204-1:1997	Säkerhet hos maskinutrustning
89/336/EEC	93/68/EEC	EN50081-1:1992 EN50082-1:1992	Elektromagnetisk kompatibilitet

DANSK

Den anførte maskine er i overensstemmelse med følgende bestemmelser:

Direktiv	Som ændret ved Rådets direktiver	Anvendte harmoniserede standarder:	
98/37/EC		EN60204-1:1997	Maskinsikkerhed
89/336/EEC	93/68/EEC	EN50081-1:1992 EN50082-1:1992	EMC

NORSK

Den ovenfor angitte maskinen samsvarer med følgende bestemmelser:

Direktiv	Med endringer i Rådets direktiv	Anvendte harmoniserte standarder:	
98/37/EC		EN60204-1:1997	Maskinsikkerhet
89/336/EEC	93/68/EEC	EN50081-1:1992 EN50082-1:1992	Elektromagnetisk kompatibilitet

ESPANOL

La máquina especificada arriba de estas líneas cumple con las disposiciones indicadas a continuación:

Directiva	Según las enmiendas de las Directivas	Estándares armonizados adoptados:	
98/37/EC		EN60204-1:1997	Seguridad de la maquinaria
89/336/EEC	93/68/EEC	EN50081-1:1992 EN50082-1:1992	Compatibilidad electromagnética

Foreword

Introduction

HOW TO USE THIS MANUAL

This manual is divided into 7 Sections, one of which is in a loose leaf format. Use the black edge markings to locate the desired section.

The section number printed at the top corner of each page can also be used as a quick guide.

SPECIAL INFORMATION

Throughout this manual, the users attention is drawn to these special warning boxes:-

⚠ CAUTION ⚠

The stated hazard or unsafe practice could result in *minor* injury, damage to the machine or the environment.

⚠ WARNING ⚠

The stated hazard or unsafe practice *could* result in severe injury or death.

⚠ DANGER ⚠

The stated hazard or unsafe practice *will* result in severe injury or death.

Foreword

NOTES:

Contents

Index

Contents

NOTES:

1.0 Introduction

PURPOSE

The purpose of this Service & Parts Manual is to provide instructions and illustrations for the operation and maintenance of the MB20 & MB26 Work Platform manufactured by Upright Ireland Ltd.

SCOPE

This manual includes the procedures and responsibilities for the safe operation, maintenance, adjustment, and repair of this product. The Maintenance Section covers preventative maintenance and trouble shooting in more detail.

1.2 General Information

The MB20 & MB26 are self propelled, fast acting aerial work platforms, designed to raise two operators with hand tools to a platform floor height of 6.00 m and 7.76 m respectively. The accessible height is approximately 2.00 m above these figures. It is designed to travel with safe working load and work tools up to an upper limit of **215 kg** (475 lbs). The unit offers the ability to reach over obstacles but must be used on firm and level ground at all times.

PLATFORM

The platform is large enough for two operators and has a free-draining perforated floor with 150 mm toeboards. Hand-rails are constructed from aluminium tubing and a safety drop-bar is provided at the entrance. Safety harness anchor points are also fitted in the floor of the platform. These must be used at all times. The main controls are fitted to this platform.

CONTROL BOX

The primary control box is permanently fitted to the front of the platform. It features a joystick which provides proportional control for raising or lowering the mast, raising or lowering the jib or rotating the complete mast assembly. The same joystick is also used to drive and steer the machine.

A safety Interlock Switch or 'deadman button' is incorporated into the Joystick . It must be activated at all times in order to operate any function. This feature allows for one-handed operation. A comprehensive explanation of control functions is given in the Operators Manual - a copy of which shall be located in the platform document wallet located just beneath the upper control station in the platform.

⚠ WARNING ⚠

NEVER operate the machine from the upper controls until the platform entrance drop-bar is in the fully lowered position and the safety harness is fitted.

ELEVATING ASSEMBLY

The platform is raised and lowered by a combination of a steel jib and a series of telescoping mast sections. The main hydraulic cylinder, mounted within the masts, lifts the first mast directly. The other masts are connected by a system of heavy duty plate chains and pulleys to ensure sequential lifting.

A parallel system of heavy duty straps ensures that the masts descend in the proper sequence and also ensure that a mast cannot be held in suspension by an obstacle during descent.

The jib cylinder provides a lifting arc to the jib and cage assembly. All hydraulic functions are carried out using solenoid operated control valves. Each cylinder features an integral holding valve to prevent uncontrolled descent in the case of a hose bursting.

ROTATION GEAR

The complete mast, jib and cage assembly can be rotated to provide a maximum outreach of 2.6 m in the case of the MB20 and 2.96 m in the case of the MB26 machine. This dimension is measured from the centreline of rotation. Rotation is carried out by means of an integral hydraulic motor driving a Worm Drive Unit, around an heavy duty Slew Gear.

Introduction & Specifications

PARAMETER	MB 20N EU VERSION	MB 20N US VERSION
Duty Cycle	45% over 8-hour cycle	35% over 8-hour cycle
Platform Size	780mm x 745mm	31 in. x 29 in.
Maximum Platform Capacity	215 kg	425 lbs
Maximum No. of Persons	2	2
Heights:		
Maximum Platform Height	6.00 m	19.69 ft
Maximum Working Height	8.00 m	26.25 ft
Platform Height at Maximum Outreach	5.04 m	16.54 ft
Maximum Working Outreach	2.64 m	8.66 ft
Stowed Dimensions:		
Length	2.222 m	7.97 ft
Width	0.815 m	32 in.
Height	1.990 m	6.50 ft
Chassis Ground Clearance	90 mm	3.54 in.
Wheel Base x Wheel Gauge	1465 mm x 708 mm	4.81ft x 2.32ft
Rotation	360 deg non-continuous	360 deg non-continuous
Gross Vehicle Weight	2570 kg	6674 lbs
Maximum Drive Speed - Stowed	3.03 km/h.	1.9 mph
Maximum Drive speed - Elevated	0.70 kmh.	0.43 mph
Maximum Gradeability	25%	25%
Outside Turning Radius	1.85 m	6.1 ft
Electrical:		
Power Source	4 x 6V @ 375 Ah Battery	4 x 6V @ 375 Ah Battery
System Voltage	24 Volt DC	24 Volt DC
Battery Charger	24V x 30A ,220v 50Hz Ac	24V x 30A, 110v 60Hz Ac
Control System	Single Joystick, Function Selector, DC Motor Controller	
Hydraulic System:		
System Relief Setting	220 bar	3190 psi
Hydraulic Oil Type	ISO VG 46	ISO VG 46
Hydraulic Tank Capacity	20 litres	5.3 gallons (U.S)
Brakes	Spring Applied, Hydraulically Released	
Wheels & Tyres	13.5 in x 4.0 in Solid Non-Marking	
Noise Pressure Level	68 dB (A) at Control Station	

PARAMETER	MB 20 EU VERSION	MB 20 US VERSION
Duty Cycle	35% of 8-hour cycle	35% of 8-hour cycle
Platform Size	780mm x 745mm	31 in. x 29 in.
Maximum Platform Capacity	215 kg	474 lbs
Maximum No. of Persons	2	2
Heights:		
Maximum Platform Height	6.00 m	19.69 ft
Maximum Working Height	8.00 m	26.25 ft
Platform Height at Maximum Outreach	5.04 m	16.54 ft
Maximum Working Outreach	2.64 m	8.60 ft
Stowed Dimensions:		
Length	2.430 m	7.97 ft
Width	0.990 m	39 in.
Height	1.990 m	6.50 ft
Chassis Ground Clearance	90 mm	3.54 in.
Wheel Base x Wheel Gauge	1465 mm x 708 mm	4.81ft x 2.93ft
Rotation	360 deg non-continuous	360 deg non-continuous
Gross Vehicle Weight	2172 kg	5742 lbs
Maximum Drive Speed - Stowed	3.03 km/h.	1.9 mph
Maximum Drive speed - Elevated	0.70 kmh.	0.43 mph
Maximum Gradeability	25%	25%
Outside Turning Radius	2.1 m	6.9 ft
Electrical:		
Power Source	4 x 6V @ 275 Ah Battery	4 x 6V @ 275 Ah Battery
System Voltage	24 Volt DC	24 Volt DC
Battery Charger	24V x 50A ,220v 50Hz Ac	24V x 50A ,110v 60Hz Ac
Control System	Single Joystick, Function Selector, DC Motor Controller	
Hydraulic System:		
System Relief Setting	220 bar	3190 psi
Hydraulic Oil Type	ISO VG 46	ISO VG 46
Hydraulic Tank Capacity	20 litres	5.3 gallons (U.S)
Brakes	Spring Applied, Hydraulically Released	
Wheels & Tyres	13.5 in x 4.0 in Solid Non-Marking	
Noise Pressure Level	68 dB (A) at Control Station	

Introduction & Specifications

PARAMETER	MB26 EU VERSION	MB26 US VERSION
Duty Cycle	45% of 8-hour cycle	35% of 8-hour cycle
Platform Size	780 mm x 745 mm	31 in. x 29 in.
Maximum Platform Capacity	215 kg	474 lbs
Maximum No. of Persons	2	2
Heights:		
Maximum Platform Height	7.79 m	26.00 ft
Maximum Working Height	9.79 m	32.00 ft
Platform Height at Maximum Outreach	6.51 m	21.36 ft
Maximum Working Outreach	3.00 m	10.00 ft
Stowed Dimensions:		
Length	2.825 m	9.3 ft
Width	0.990 m	39 in.
Height	1.990 m	6.54 ft
Chassis Ground Clearance	90 mm	3.54 in.
Wheel Base x Wheel Gauge	1465mm x 890mm	4.81ft x 2.93ft
Rotation	360 deg non-contin.	360 deg non-contin.
Gross Vehicle Weight	2672 kg	7012 lbs
Maximum Drive Speed - Stowed	3.03 km/h.	1.9 mph
Maximum Drive speed - Elevated	0.70 kmh.	0.43 mph
Maximum Gradeability	25%	25%
Outside Turning Radius	2.1 m	6.9 ft
Electrical:		
Power Source	4 x 6V @ 375 Ah Battery	4 x 6V @ 375 Ah Battery
System Voltage	24 Volt DC	24 Volt DC
Battery Charger	24V x 30A 220v 50Hz Ac	24V x 30A 110v 60Hz Ac
Control System	Single Joystick, Function Selector, DC Motor Controller	
Hydraulic System:		
System Relief Setting	220 bar	3190 psi
Hydraulic Oil Type	ISO VG 46	ISO VG 46
Hydraulic Tank Capacity	18 litres	4.7 gallons (U.S)
Brakes	Spring Applied, Hydraulically Released	
Wheels & Tyres	13.5 in x 4.0 in Solid Non-Marking	
Noise Pressure Level	68 dB (A) at Control Station	

2.1 Introduction

This section contains safety precautions which must be observed during the maintenance and servicing of the MB20 & MB26 work platforms.

Failure to adhere strictly to these instructions will result in personal injury to yourself or others and damage to the machine or the local environment.

Owners of this work platform must set up a maintenance programme and have prepared a safety statement in advance as required by the relevant National Body.

⚠ WARNING ⚠

RISK of SERIOUS INJURY. DO NOT undertake any mechanical, electrical or structural modifications to the design of this machine. Any departure from the normal use of the machine must be certified in writing from UpRight Ireland Ltd. or other responsible authority.
Failure to abide by this instruction is a Safety Violation and a Warranty Violation.

The specific procedures and precautions for maintenance are detailed in Section 3.0 of this Manual. In general, the maintenance procedures and methods used are similar to those for heavy engineering machines which incorporate hydraulic, electrical and structural components.

Be aware that your safey and that of others is of the utmost importance when carrying out maintenance. The following basic principles should be applied:-

1. Never lift heavy weights without the aid of a mechanical device.
2. Do not allow objects to rest in unstable equilibrium even for short periods.
3. Always place supports under structural members.
4. Always presume that any action, no matter how insignificant, could result in the sudden and uncontolled motion of machine parts under gravity.

⚠ WARNING ⚠

Neither the manufacturer, UpRight Ireland Ltd. nor its distributor has direct control over the field inspection, maintenance and safety of this macine.

This is the responsibility of the owner or operator.

2.2 Hydraulic System Safety

The operating pressures within the hydraulic circuit are very high. Be aware that personal injury can occur if this pressure is released uncontrollably. Always presume that there is residual high pressure in a hose, pipe cylinder or valve body.

Take steps to eliminate this residual pressure by operating the booms and masts into their rest positions before carrying out any maintenance.

The MB machine should be maintained while on level ground only. This will ensure that the mast rotating mechanism and the running gear are stable.

The greatest risk to safety when maintaining the work platform is the sudden motion under gravity when a hose connection or built-in valve is loosened. The motion control valve is designed to prevent motion under gravity of cylinders in the event of a hose burst. However, loosening or partial removal of the hose burst valve will cause instant motion of the cylinder and the associated structural components.

Oil spillages should be cleared up immediately. Avoid the temptation to do it later.

2.3 Electrical System Safety

Take note that there is a facility to charge the batteries using an on-board charger. During this operation the machine is therefore connected to a potentially dangerous AC supply. Be conscious that ingress of water and or climatic conditions could result in circuit faults and the machine becoming ‘live’.

There is a risk of burns caused by dead shorting of battery terminal.

The severe dangers associated with spilt battery acid and gaseous product are well documented.

Personnel must be fully aware of all these dangers before embarking on work platform maintenance.

2.4 Safety Checklist

⚠ WARNING ⚠

Failure to comply with the following safety precautions may result in death or injury of personnel or machine damage and is a safety violation.

- **Ensure that lifting equipment including chains and straps are in good condition. Check the certification of all lifting gear.**
- **Provide independent supports for all booms, masts, jibs etc. before working underneath. Preferably, these support should be made up of a strong stable structure. Overhead slings or chains may be used only if the slings, chains and the supporting device such as crane, jib or hoist is certified for use as such.**
- **Use non-flamable cleaning solvents.**
- **Keep oil, grease and water wiped from floor surfaces and hand hold areas.**
- **Do not wear loose fitting clothing or neckties. These items and long hair may become entangled in rotating or moving machinery.**
- **Smoking is strictly forbidded. DO NOT weld or grind in the vicinity of the machine until the batteries are disconnected and removed.**
- **Remove rings watches and other jewelry when performing maintenance.**
- **Shut off all power sources and switches before embarking on maintenance.**

WORKSHOP PROCEDURES

CAUTION: Detailed descriptions of standard workshop procedures, safety principles and service operations are not included. Please note that this manual contains warnings and cautions concerning some specific service methods which could cause personal injury, or could damage the machine and make it unsafe.

Other service methods may be deployed to carry out a specific task, however, these methods may not be recommended by UpRight Ireland Ltd. UpRight cannot investigate all possible methods nor can they warn against all possible dangers.

Service personnel must be fully satisfied that neither personal safety nor machine safety is compromised.

⚠ WARNING ⚠

Where an abnormal situation is noted - for example damage to a part etc. - it is imperative that advice is sought from UpRight Techncal advisors or from a suitably qualified person before continuing with maintenance.

It is very important to be aware of the potential dangers associated with maintaining these machines. Think carefully about the possible consequences of all actions before carrying them out. In particular, take precautions against dropping structures when working on the support components such as:-

Cylinders
Hydraulic hoses
Hydraulic valves
Pivot pins
Chains
Sequence Straps
Chain Anchor Blocks
Bolts & Screws etc.

Never attempt to repair the mast, jib or platform components while the assembly is partially elevated. In the event of failure of the assembly to descend by normal means use the emergency lowering valves as described in the Operators Manual. If this fails then support the structure by means of an approved overhead lifting equipment or an approved adjustable

support jack prior to loosening or removing any parts. Failure to carry out this instruction could lead to serious injury or death.

⚠ WARNING ⚠

Where an abnormal situation is noted - for example damage to a part etc. - it is imperative that advice is sought from UpRight Techncal advisors or from a suitably qualified person before continuing with maintenance.

TOOLS

The following special tools will assist in speedy repair and maintenance of the MB20/26 machines:-

- Multi-meter capable of reading DC Volts, Ohms and Amps.
- 1/4" standard quick -connect hydraulic pressure gauge - Range (0 - 300 bar)
- Calibrator Pt. No. 057128-000 - A test and analysis instrument for the D.C. motor controller.

TIGHTENING TORQUES

Use the following tightening torque values on bolts or screws.

Thread Size	Location	Tightening Torque	
		Metric	Imperial
M4	-	3 Nm	2 ft-lbs
M6	-	10 Nm	7 ft-lbs
M8	-	25 Nm	18 ft-lbs
M10	Pin Lock Plates	40 Nm	30 ft-fbs
M10	Jib Mount Structure	50 Nm	37 ft-lbs
M12	-	80 Nm	59 ft-lbs
5/8" - 11 UNC x 3 1/2" US Grade 8	SLEW BEARING	220 Nm	165 ft-lbs

⚠ WARNING ⚠

RISK of SERIOUS INJURY.
Take particular care when handling batteries. Acid spills can cause severe burns or blindness. DO NOT store batteries close to naked flames or close to steel fabrication areas.

NOTES:

3.1 Introduction

This section contains information necessary to perform maintenance on the MB20 & MB26 work platforms. Procedures and techniques are designed to provide the safest and most efficient methods for scheduled maintenance and repair of the machine.

3.2 Preventive Maintenance Charts

Preventive maintenance and inspection checks are listed in Tables on the following 3 pages. The tables list the components to be checked and the period between checks.

The **keyword(s)** within the boxes are self-explanatory in most cases, however, by way of clarification, these keywords are expanded in the legend which follows.

Items for inspection on the table are generally in order, starting at the ground and progressing upwards along the machine. For example, wheel bearings appear near the start of the list while the cage components appear towards the end.

All hoods and covers except for the ballast covers must be removed before proceeding with the preventative maintenance checks. This applies to the daily checks also.

It is a condition of warranty that machines are properly maintained according to this schedule.

MAINTENANCE TABLE KEYWORDS

Fixing	Check for secure installation and operation of the part.
Damage	Check for visible damage to welds and deformation of the part or local structure.
Level	Check fluid level and top up as necessary.
Leaks	Check for signs of leak and correct the problem immediately.
Dirt	Check for excessive dirt causing overheating and possible short circuit.
Wear	Check for excessive wear on the part.
Torque	Tighten up per Tightening Torque Table
Lube	Lubricate per Lube Chart
Rod	Cylinder rod straightness. Fit a complete new cylinder if rod is bent.
Score	Check cylinder rod for abrasions
Change	Replace with Upright Spare Part.
Clean	Extract, clean and replace.
Replace	Part liable to become detached. Replace if missing.
Equalise	Battery maintenance procedure (see Battery Cell Equalisation)

	Description	DAILY	WEEKLY	MONTHLY	3 MONTH	YEARLY
	CHASSIS BASE:-					
1	Chassis Structure			damage	clean	
2	Chassis Towing Points			damage		
3	GRP Covers			fixing		replace
4	Tyres			wear		
5	Wheel Studs		fixing		wear	
6	Hydraulic Drive Motors	leaks				
7	Parking Brakes	leaks				
8	Rear Wheel Bearings			wear		
9	Steering Components		damage		wear	
10	Slew Bearing Motor	fixing	torque			
11	Slew Bearing & Housing			lube		
12	Decals			damaged		replace
	DRIVES AREA:-					
13	Battery Cables		dirt, tight			
14	Electrical Terminals	damaged				
15	MOS 90 Controller		dirt			
16	Line-Contactor		dirt	wear		
17	DC Motor		dirt			wear
18	Hydraulic Pump					wear
19	Main Hydraulic Valve	leak				
20	Control Solenoids	damage				

Table 3-1: Maintenance Schedule

	Description	DAILY	WEEKLY	MONTHLY	3 MONTH	YEARLY
	Drives (cont'd):-					
21	Valve Cartridges		leaks		fixing	
22	Solenoid Terminals	fixing			clean	
23	Hydraulic Hoses		leaks			
24	Tilt Sensor	fixing				
25	Hydraulic Tank		level	leaks		
26	Hyd. Return Filter Element			change		
27	Hyd. Internal Suction Filter					clean
28	Hyd. Filler Breather	fixing				replace
29	Lift Cylinder Control Valve	fixing				
30	Emergency Down Valve	fixing				
31	Turntable Fixing Screws			fix		
32	Lower Control Station		damage			
33	Jib-Rest Limit Switch	fixing				
34	Main Lift Chain & Anchors		wear	lube		clean
35	Mid Chain & Anchors		wear			clean
36	Chain Pulleys (Sheaves)			wear		clean

Table 3-1: Maintenance Schedule

	Description	DAILY	WEEKLY	MONTHLY	3 MONTH	YEARLY
	Upper Structure (cont'd)					
37	Wear Pads		lube	wear		clean
38	Jib to Platform mount Pins			wear		
39	Platform Mounting		damage			
40	Upper Control Station		fixing			
41	Battery		leaks	equalise		
42	Main Lift Cylinder		leaks	damage	rod, score	
43	Jib Cylinder		leaks	damage	rod, score	
44						
45						

Table 3-1: Maintenance Schedule

3-3 *Lubrication*

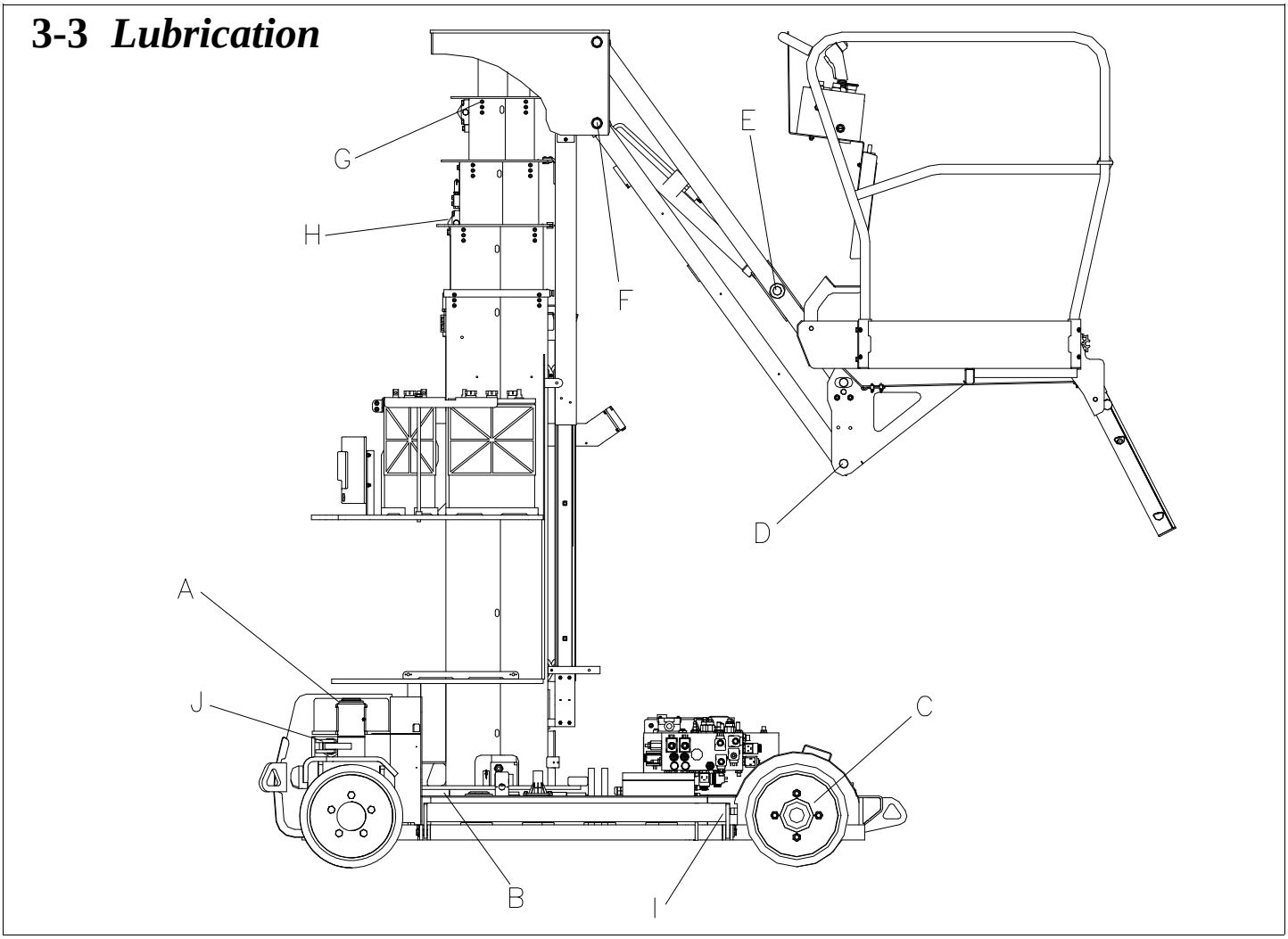


Figure 3-1: Lubrication Points

GREASE FITTINGS

Clean each fitting before applying grease. Using multipurpose grease (NLGI #1 or #2), pump the grease into the fitting using a gun until grease just begins to appear at the edges of the pivot pin. Wipe away excess grease.

Grease Point (refer to Fig. 3-1 above)

Front Wheel Pivots (2 places)	A
Slew Bearing (1 fitting)	B
Rear Wheel Bearing Caps (2 places)	C
Jib End-Boss (4 places)	D
Jib Cylinder Rod-End (1 place)	E
Jib Cylinder Barrel-End (1 place)	F
Wear Pad (12 places)	G
Lifting Chains (3 places)	H
Pothole Cylinder Pivot Pins	I
Steering Cylinder Pivot Pins	J

PIVOT PINS

Apply grease liberally to the Pivot Pin and Pin Lock Plate locations using a brush or cloth. Force as much grease as possible between the Pins & Pin Lock Plates and the Weldments. Wipe away all excess grease.

LIFT CHAINS

Raise the masts to full height. Apply grease liberally to the external lift chains using a small paint brush. The main internal chain may be lubricated by removing the top cover from the jib mount structure. With the jib fully lowered, apply grease to the chain from the platform. The masts may be raised or lowered to expose the links. This operation should be carried out at monthly intervals.

SLEW RING

Using a brush, apply grease evenly and sparingly to the slew ring gear teeth. **DO NOT** subject this area to powerwashing.

3.4 Removal of Chassis Covers

Refer to the photo below for a description of the covers.

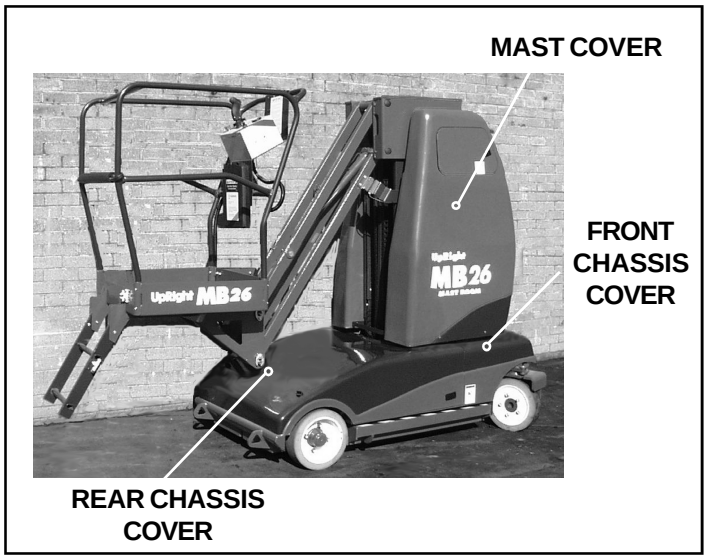


Figure 3-2: Covers

The rear chassis cover must be removed in order to access the majority of hydraulic and electrical components on the MB machines.

No tools are required to remove this cover and it is possible to remove and refit with the jib and cage in the stowed position.

To remove the cover, loosen the 2 bonnet catches by twisting half a turn in the anticlockwise direction.

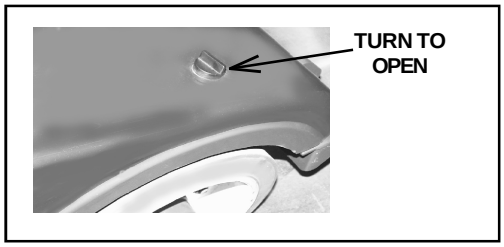


Figure 3-3: Covers

Undo the 2 side catches by pressing on the black tab lock, flipping out the tab and twisting 1/4 turn in the clockwise direction.

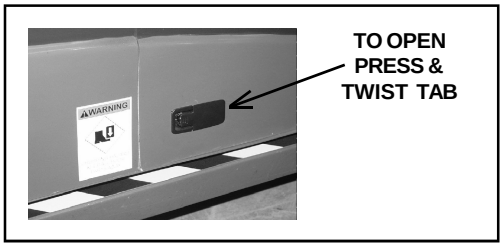


Figure 3-4: Covers

Figure 3-5: Covers

When all 4 catches have been loosened it is then possible to remove the rear cover clear of the chassis.
Use the central handle to lift the cover upwards and rearward in order to clear the chassis. Take care not to snag the electrical wiring when removing this cover.

It is not necessary to remove the small front cover on the MB range of machines except for replacement. To remove this cover undo the quick action captive screws which become visible after the rear cover has been removed.

3.5 Removal of Mast Cover

The mast cover must be removed to replace a battery or battery charger. Servicing of the batteries, however,does not require removal of this cover.

Before removing the cover, raise the mast assembly until the cage is about 2 metres clear of the ground.

To remove the cover, undo the 4 captive screws connecting the cover to the ballast support plate. Undo the 2 similar screws at the back of the cover as shown below.

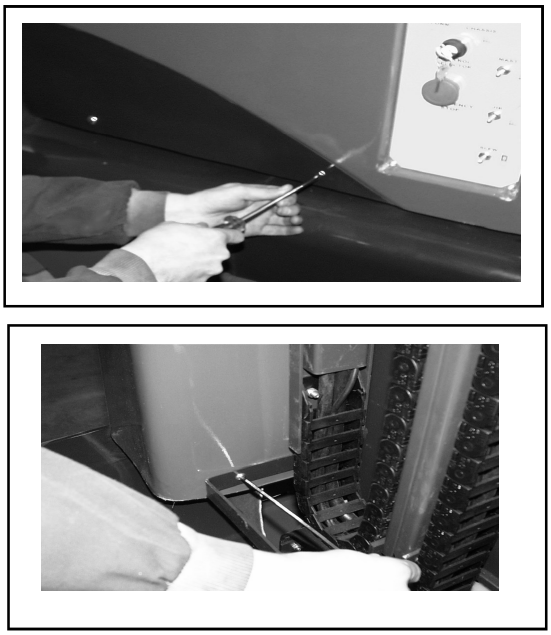


Figure 3-6: Covers

Mast removal is easier if 2 persons work together. Refer to the figures below.

1. The rear 'wings' of the cover must be splayed out as shown while lifting the cover off its rest position.

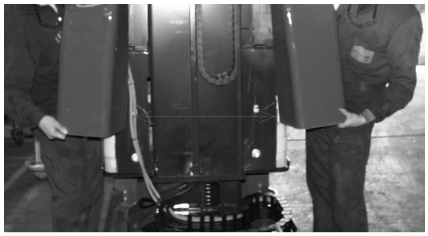


Figure 3-7: Covers

2. Locate the lower control box cable within the left wing and undo the cable connector by turning it anticlockwise.

3. Store the cable end safely in the chassis.

4. Splay out the wings and lift the cover upwards until the front edge rests on the battery support plate.

Figure 3-8: Covers

5. Continue to lift the cover upwards and forwards until the wings are clear of the batteries.

Figure 3-9: Covers

6. **TAKE CARE** to ensure that the cover does not fall forward at this point as the centre of gravity of the cover is quite high relative to its midpoint.

Figure 3-10: Covers

7. Refitting of the covers is in the reverse order.

⚠ WARNING ⚠

RISK of SERIOUS INJURY.
DO NOT remove ballast material from this machine. Stability is critically dependent on the weight of ballast as supplied from the factory.

3.6 Jib & Platform Assembly

Regular inspection checks should be carried out on the jib and platform assembly. Pay particular attention to the following areas:-

1. Platform ladder mounting bolts and pivots
2. Ladder raising mechanism
3. Platform drop bar
4. Cage rail bolts
5. Jib to platform pivot pins & lock bolts
6. Jib to mast pivot pins & lock bolts
7. Jib cylinder hydraulic hose routing & fitting
8. Jib cylinder emergency lowering mechanism
9. Jib cylinder end pivots

Ladder

The machine should not be operated with a damaged ladder. Failure to replace a damaged ladder could result in injury. Do not repair a damaged or broken ladder. Use only plated bolts and nylok nuts when renewing the ladder pivots.

Drop-Bar

Replace damaged, missing or jammed drop-bars on the cage rails. It is not permitted to enter the platform unless it is fitted with a proper drop-bar.

⚠ WARNING ⚠

BEFORE commencing any work on the jib cylinder, jib cylinder valve, jib cylinder hose or jib cylinder emergency lowering mechanism, it is vitally important to either lower the jib completely or to support the assembly externally.
Failure to do this could result in sudden dropping of the jib during dissasembly and consequential serious injury.

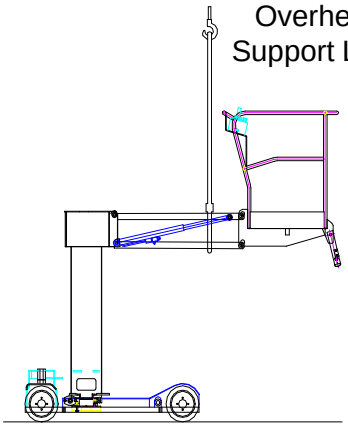


Figure 3-11: External Support

⚠ WARNING ⚠

BEFORE commencing work on the Mast Assembly ensure that the jib is fully lowered and approaching the reed switch as shown.
Failure to do this could result in sudden dropping of the jib during dissasembly and consequential serious injury.

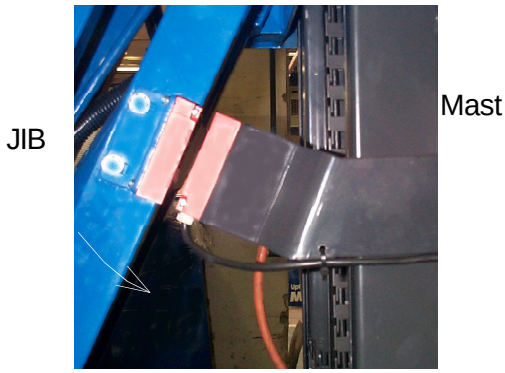


Figure 3-12: Platform Stowed Limit

Cage Rails

The cage rails are fixed in position by means of 8 No. M8 ISO grade 8.8 bolts. Regularly inspect these bolts for damage and replace as necessary. The bolts should be tightened to a torque of 20.0 Nm.

The cage rails are manufactured from painted aluminium alloy. It is very important to thoroughly inspect the whole Jib & Platform assembly when broken or damaged rails are encountered.

PLATFORM & JIB REMOVAL

The platform assembly (steel base, aluminium rails, ladder sub-assembly and Upper Control Station) may be removed as a single unit. The total weight of this assembly is approximately 70 kg. Remove the rear chassis cover and proceed as follows:-

1. Disconnect the Upper Control Station cable from the underside of the box. Turn the plastic socket locknut anticlockwise and withdraw the pin connector. Take note of the socket orientation and the locating tabs to facilitate refitting later.

2. Remove the cable ties on the cage rail and platform base and secure the connector end against damage.

3. Remove the two M10 screws from the lock-plate retainers and slide the lock plates from the pin slots.

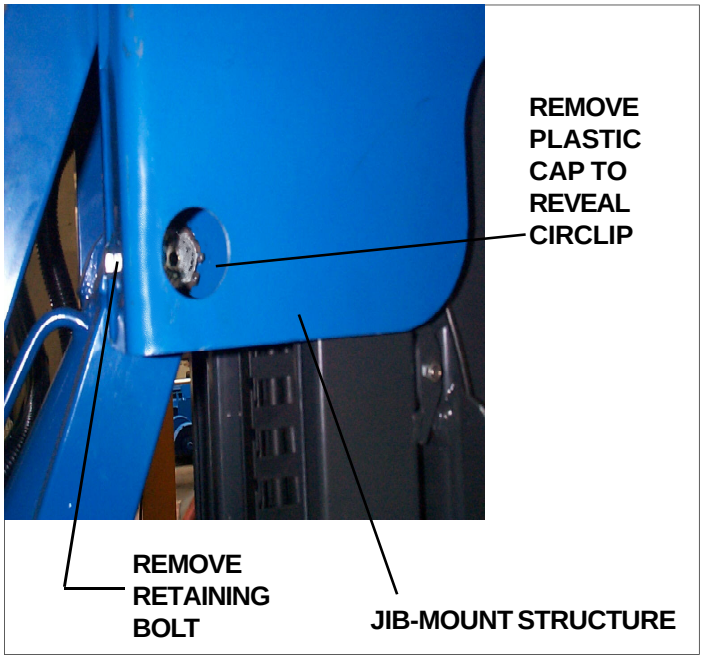


Figure 3-13: Circlip Location

4. Remove the circlip as shown above. Using an arbour and mallet, tap out the upper jib-mount lower pin taking care to prevent the platform from swinging backwards uncontrollably. Lower the platform backwards and downwards until it rests on the ground or on some temporary sup port on the chassis. In the case of the MB 20 machine, a common long pin is used to connect the jib cylinder and the jib strut to the jib-mount structure. Take precautions to prevent the cylinder from falling when this common pin is removed.

Figure 3-14: Jib Pin Removal

5. Remove the lower pin in the same way.

6. Inspect the cylinder boss and the jib ends for bushing wear and replace as necessary.

7. When replacing the bushings it is important to first remove burrs and lightly oil the steel bosses. Use a small mallet and drift to fit the bearings. Take care not to score the ptfe/bronze coatings as this will greatly reduce the useful life of the bearing.

8. Assembly is in the reverse order of dissassembly.

9. When replacing the pins, coat them in a light oil and align the steel bosses and bearings before tapping in the pin. Difficulties with pin fitting are normally caused by misalignment of the parts. Careful attention to alignment of the bosses before driving the pin saves time and minimises the risk of bearing damage.
This applies to such assemblies throughout the machine.

10. Removal of the jib members follows in the same manner. The jib upper pins may be accessed by first removing the plastic caps from the sides of the jib-mount structure.

11. Disconnect the jib cylinder hose, solenoid cables and emergency lowering mechanism. Remove the remaining control cable ties from the jib members.

Make a note of cables and hose routing in the area of the jib mount access hole. Incorrect re-assembly may result in cable pinching or shearing of either and considerable expense later.

12. Before removing the pins it is necessary to first remove the retaining circlips. Take care when removing the pin to support the jib cylinder which will become free before the jib member.

13. Use new circlip retainers and cable ties when re-assembling the jib members and jib cylinder.

14. Reinstate the cables and hose as per the original routing. Fix the control cable to the jib and plat form rails by means of new ties.

15. Test the jib operation from the Lower Control Station initially. Inspect the cable and hose routing. Lower the jib by means of the emergency lowering lever. Test the operation of the jib, mast and slew etc. from the Upper Control Station. Malfunction at this point is most likely caused by an incorrectly fitted control cable connector at the base of the control station. Remove and refit taking care to correctly locate the plastic tabs within the connector.

3.7 Switch Adjustments

JIB REST LIMIT SWITCH

Function:
This limit switch is activated when the Elevating Assembly is fully lowered into the stowed position.
The limit switch is a magnetic reed type and is mounted on a bracket between the jib strut and the fixed mast. The high speed drive can only be operated when this switch is activated. When the boom leaves the boom rest the Normally Open contacts of the limit switch open and power is cut to the high speed drive function.

Adjustment:
The switch itself is not adjustable and is not serviceable.
Check regularly for damage to the 2-core cable and clear the faces of contaminants.
The switch mounting brackets should be adjusted to give a maximum gap of 10mm between the magnetic faces of the switch.

⚠ WARNING ⚠

NEVER remove or over-ride this switch. The machine may not be used unless the switch is in working order. To do otherwise could result in serious injury.

Function:
This switch is activated when the internal sensor in the 'Tilt Sensor' is tilted **2**° or more in either direction. This setting is preset at the factory and should on no account be adjusted. The sealed adjuster screws shall not be altered. **Doing so will void Warranty.**

When the Tilt Sensor activates the elevating and telescope extend functions will be locked out and an audible warning alarm will sound. The Tilt Sensor has three wires;

red	-	24v power in
black	-	ground (earth)
white	-	signal output 24v

Location:
The Tilt Sensor is fitted to the chassis frame as shown above
Adjustment:
To verify that the sensor is working properly proceed as follows.

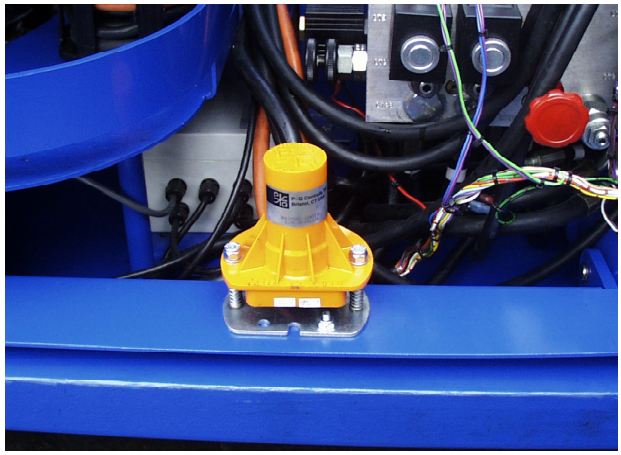


Figure 3-15: Tilt Sensor Location

Locate the two LED's under the sensor's plastic housing. The Green light indicates that the sensor is powered while the Red light indicates the sensor is not level with loss of 24v signal in the white wire.

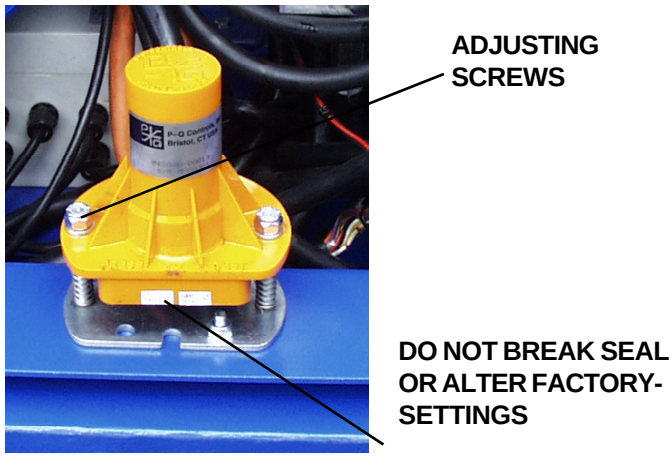


Figure 3-16: Tilt Sensor Adjustment

TILT SENSOR SWITCH

1. Place the machine on firm level surface.
2. Use an level gauge to ensure that the front and rear of the Chassis are level to within ± 0.25°.
3. Place a small spirit (bubble) level on the top of the sensor along the longitudinal axis of the machine. Adjust one of the 3 nuts until the bubble is level. Repeat the check and adjustment with the level gauge on the transverse axis of the machine.
4. Elevate the platform slightly until the jib limit switch is separated. Depress the joystick deadman button while a colleague manually tilts the sensor housing. The tilt alarm should sound and normal lift functions should be disabled.

3.8 Mast Assemblies

JIB-MOUNT STRUCTURE

Disassembly and re-assembly of the MB20/26 masts is a specialised task requiring special tools, jigs and fixtures. Structural damage to any of the masts requires a total replacement of the complete mast assembly by Upright Ireland.

The jib-mount structure may be replaced as follows:-

1. Remove the platform and jib assembly as per the instructions in Section 3.3.

2. Carefully route the hoses and cables through the openings in the back of the jib-mount weldment. Take note of the positions of hoses and cables to facilitate refitting.

3. Remove the cover plate at the top of the jib-mount to reveal the chain and pulley assembly.

4. Remove and discard the 12 No. M10 screws holding the jib-mount to the upper mast.

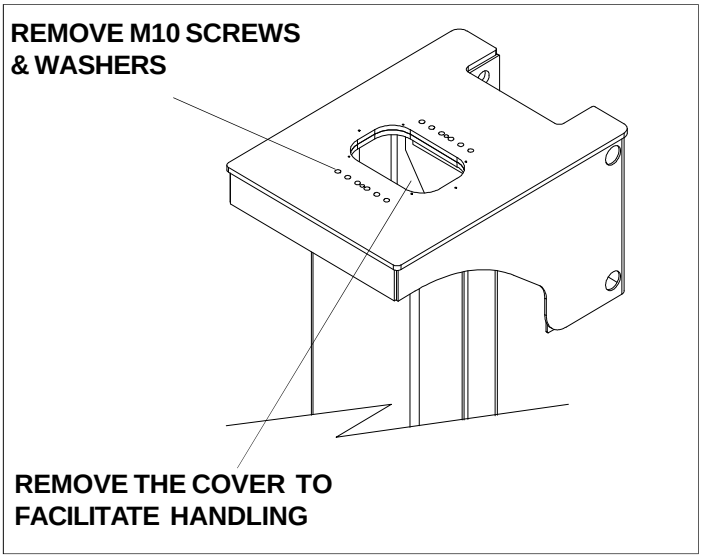


Figure 3-17: Jib-Mount Removal

5 Remove the jib-mount from the top mast by lifting vertically upwards with a hoist.

The jib-mount structure weighs **44kg.**

6. DO NOT attempt to repair this crucially important structural component. [Spare Part No. 500721]

7. Thoroughly inspect and clean the internal treads on the mast flange plate before re-fitting the jib-mount. DO NOT fit the jib-mount to the mast if any thread is damaged or blocked.

8. Do not lubricate the screw threads. Do not lubricate the internal threads . Use replacement screws M10 x 50, ISO Grade 8.8 only.

9. Tighten each screw using a short spanner initially. Gradually increase the torque in a cross-pattern. Finally tighten each screw using a calibrated torque wrench to a maximum value of 65 Nm.

10. Refit the dust cover.

11. Reassemble the platform and jib assembly as per the instructions in Section 3.3.

12. It is recommended to check the torque on the 12 screws after a number of working cycles of the machine.

WEAR PADS

Correct lubrication, replacement and adjustment of the mast wear pads is critical to the safety of the machine and to the comfort of the operator.

Refer to the figure below.

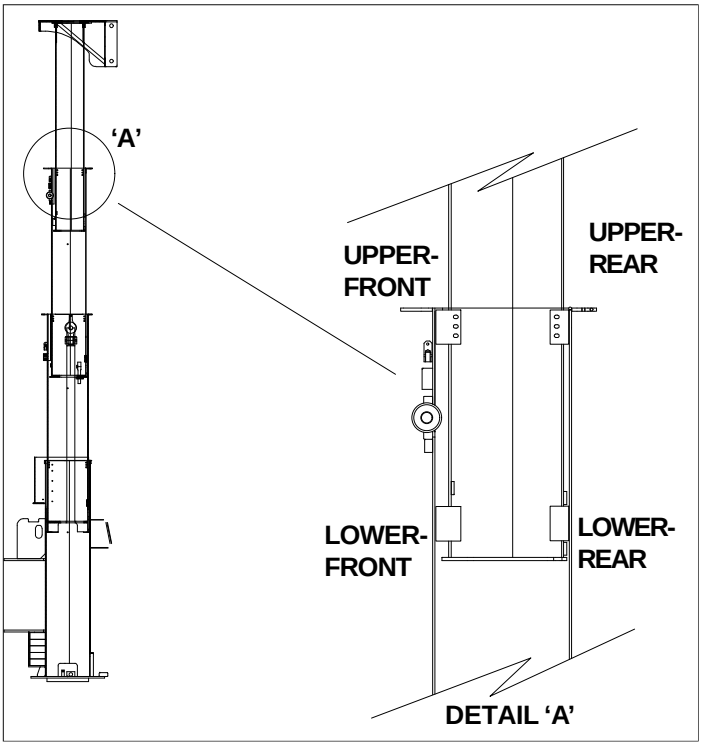


Figure 3-18: Wear Pads

The two Upper-Rear pads being the most heavily loaded, should be replaced every two years or after 1500 hours work. The Upper-Front pads will have a much longer life. The lower wear pads can be replaced during a major mast overhaul only.

Replacement of Wear Pads:-

1. Fully lower the Platform assembly into the stowed position.

2. Raise the top mast section approximately 30cm. Wear pad replacement is facilitated if the platform is supported either by using an adjustable jack or an overhead hoist.

3. By means of a retainer (flat steel or bent wire) support the wear pad and prevent it from dropping into the mast.

Figure 3-19: Wear Pad Retaining

4. Using a 4mm Allen key remove the 3 No. M6 button head screws and washers from the mast as shown above.

5. Replace the worn pad with a new part. Retain and reuse the shim(s) if required. Replacement shims may be used provided they are of stainless stell or plated steel material. Use 1mm and 2mm thick shim material only. It is advisable to remove pads from one side (front face or back face) at a time. Do not fit shims beyond a total of 3mm as this will lead to excessive power consumption in the mast motion until the pads bed in.

Lubrication of Wear Pads:-

The lubrication of the internal wear pads is very important. Use a Molybdenum based grease. Fully raise the mast sections and apply grease with a brush on to the rear face of the mast in the way of the wear pads.

The front wear pads may be more conveniently lubricated using a heavy grade oil. It is desirable to lubricate the area beneath these wear pads as the loaded pads are at the base of the mast in each case.

3.9 Chains & Straps

CHAINS

Disassembly and replacement of the lifting chains on the MB20 & MB26 machines is a specialised task requiring special tools, jigs and fixtures. Damage to the chains requires a re-assembly of the mast sections.

Servicing of the lifting chains can be broken into 3 separate functions:-

Chain Lubrication
Chain Anchor Inspection
Chain Tension Adjustment

Refer to the maintenance table for cahin lubrication periods. A light coating of grease should be visible on the chains at all times.

Chain Anchor Inspection & Adjustment

The chain anchors on the MB20 & MB26 machines can be inspected by adjusting the height of the masts until the anchor points come into view through the inspection opening.

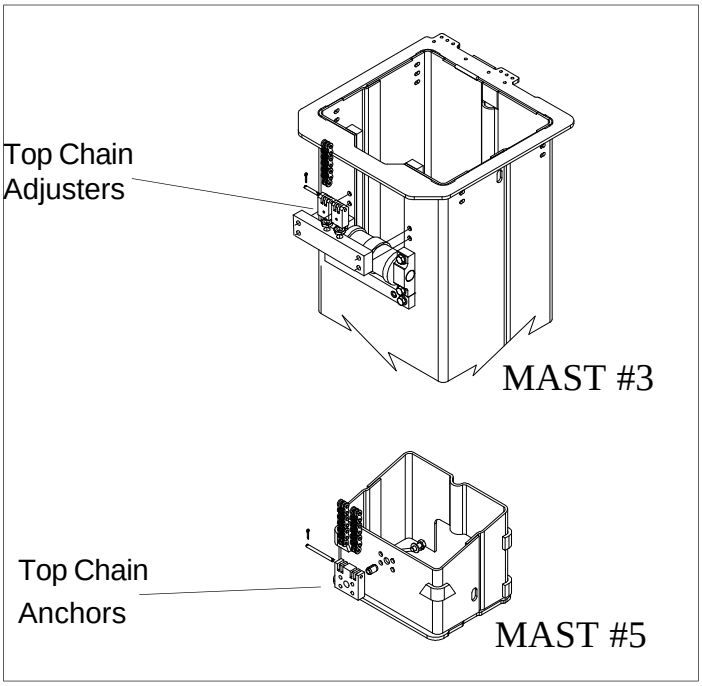


Figure 3-20: Top Chain Ends

Inspect the wear on the anchor block and anchor block cross-pin. Replace the pin and block if there is any visible signs of wear.

Also inspect the clamping bolts and central locating pin. Tighten the clamping pin as neseccary.

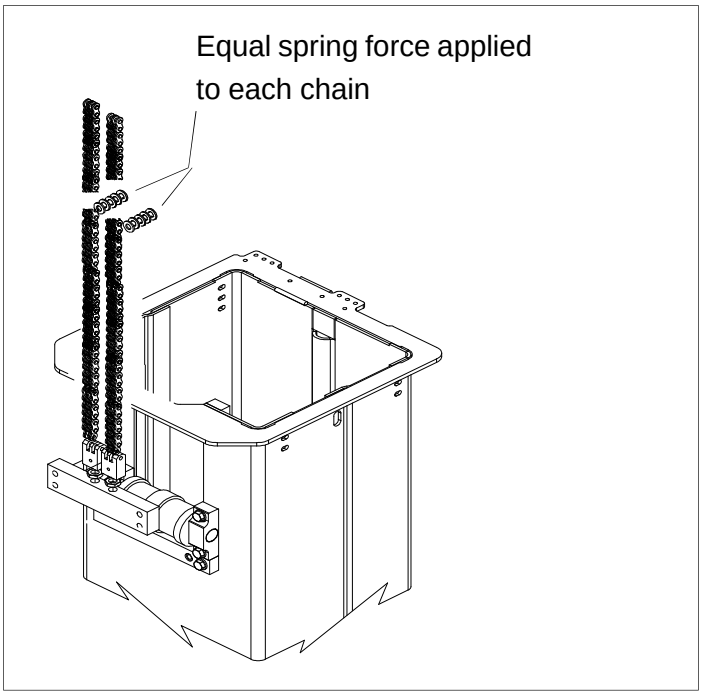


Figure 3-21: Adjustment Technique

Refer to Fig. 3-21 above. The chains are selected to give adequate safety factors against breaking even if only one chain bears load. However, it is absolutely imperative that each chain in the pair is loaded as evenly as possible throughout its life. To adjust the balancing of chain tension proceed as follows:-

1. Extend the unladen masts to full height
2. Using a pair of identical compression springs, position each spring betwen the mid point of the external chain and the mast plating. The spring stiffness is not critical but a spring having the following approximate dimension will suffice.

Wire diameter	-	2 to 3mm
Ouside diameter	-	40 to 50mm
Free length	-	90 to 100mm

   Measure the difference in outward deflection of each of the two chains in the pair.
3. If the differential dimension is greater than 6mm. then it is neccessary to tighten the loose adjuster.
4. Return the masts to the fully lowered position and check the overall height of the mast assembly from the ground. The nominal dimension is 1995 mm.

   If this dimension has been exceeded during chain balancing, then it is likely that one of the chain pairs the chains has been overtightened, causing the masts to rise above the normal

position. If this is the case then return to 3. above and balance the chains by slackening off the tightest adjuster.

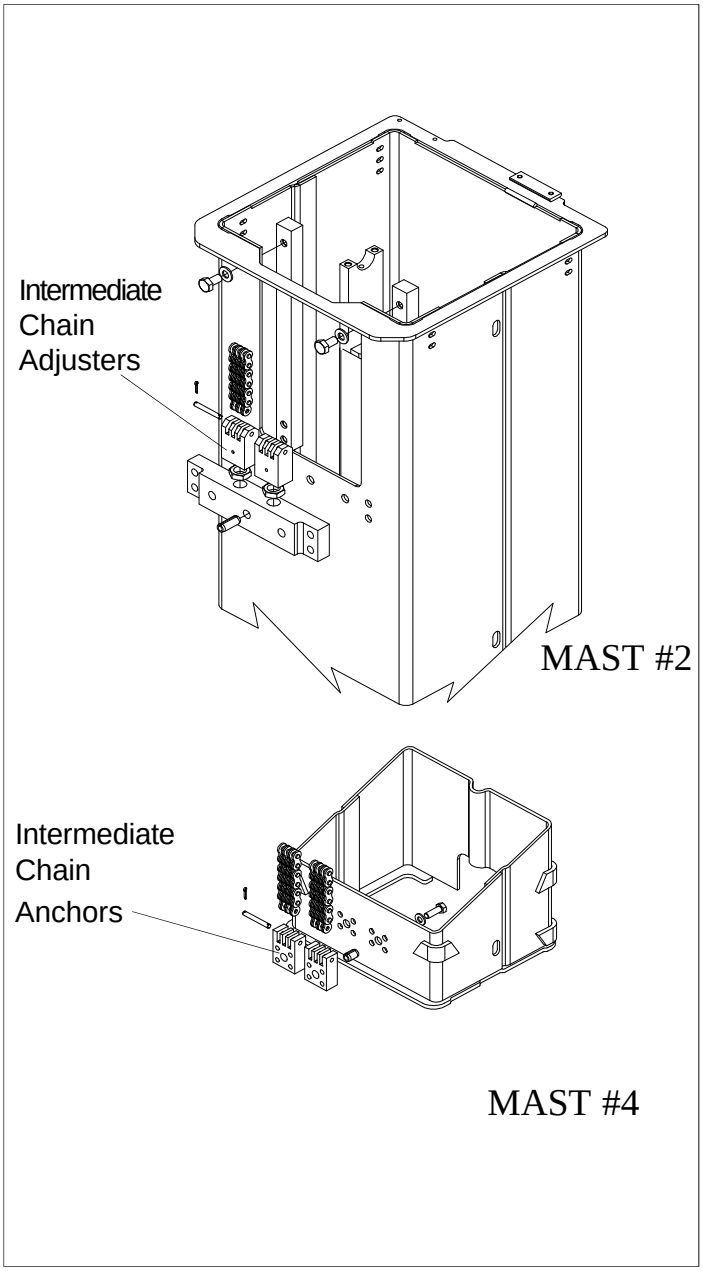


Figure 3-22: IntermediateChain Ends

LOWER CHAIN ADJUSTMENT

The lower chain adjustment and inspection requires special consideration. Excessive slackness of the lower chain causes slamming of the chain during acceleration and deceleration of the machine during travel. To adjust the chain tension it is necessary to fully lower the mast assembly. Remove the chassis covers and locate the inspection cutout at the base of the fixed mast.

Check that the anchor pins are secured by means of the split pin as shown in Figure 3-23. Using a 22mm spanner adjust the nut at the base of the main chain adjusting end until the chain slackness ie reduced to a minimum. There is no advantage to be gained in continued tightening of the chain. This will lead to raising of Mast #3 and loss of stowed height clearance. Balance the chain tensions by inspecting each chain from the top mast inspection hatch. Tighten the locknuts at the base of each chain tensioner.

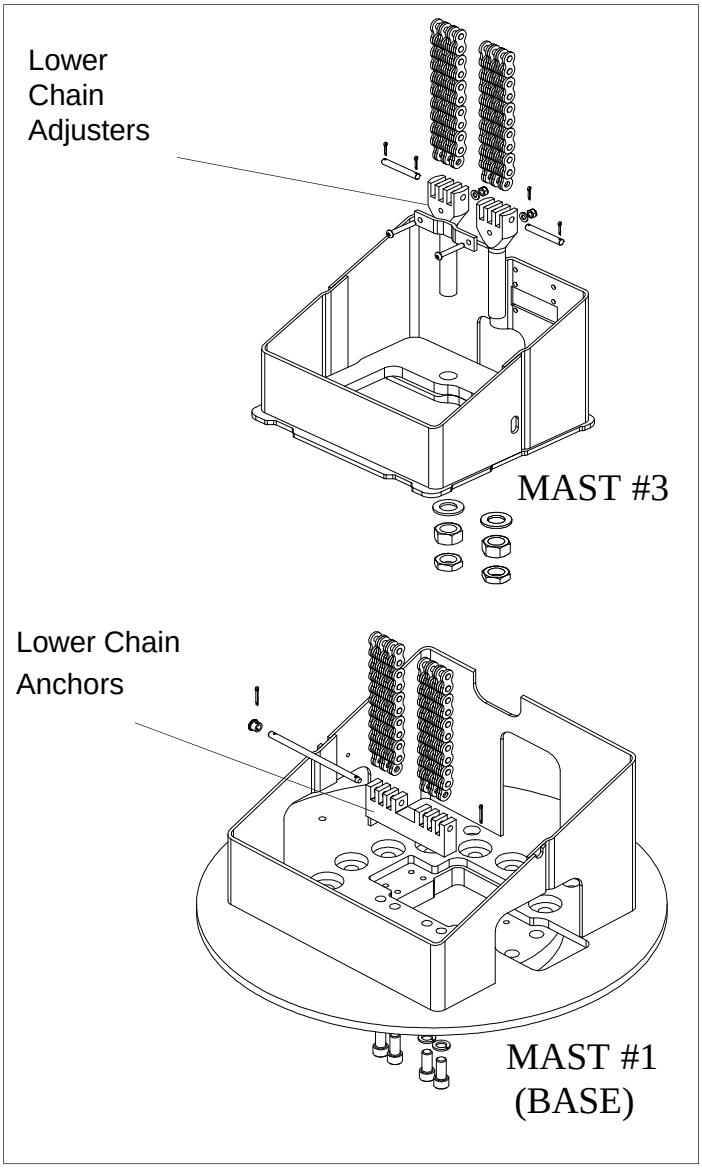


Figure 3-23: Lower Chain Ends

3.10 Wheels & Steering

STEERING ASSEMBLY

Steering on the MB20 & MB26 machines is via an hydraulic cylinder mounted on the front of the chassis.

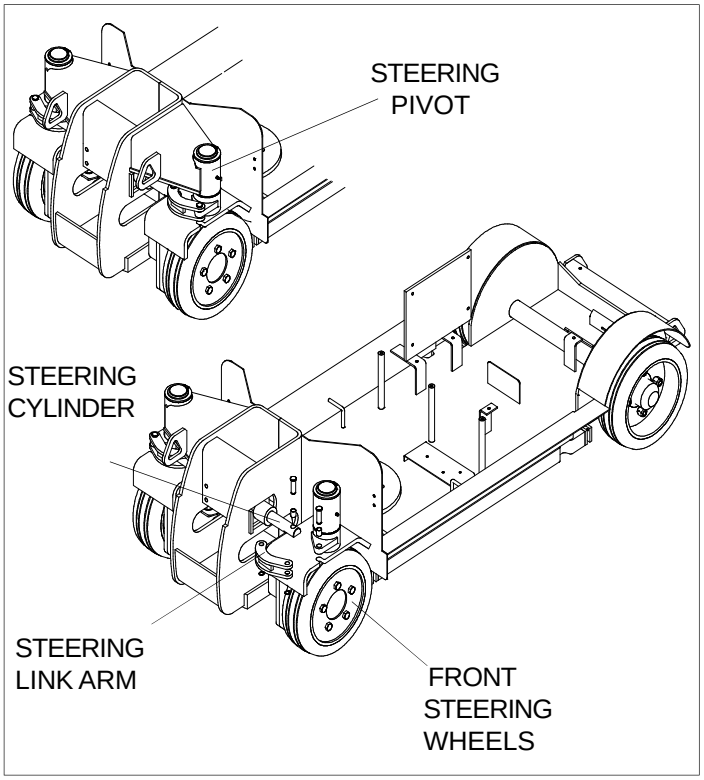


Figure 3-24: Front Steering Wheel

Two steering link arms provide extra tight turning ability and ensure correct geometry during a tight turn.

Each front wheel assembly (consisting of ; mounting frame, motor, wheel & tyre) can be removed as a unit.

To remove a wheel assembly proceed as follows:-

1. Using a forklift or overhead hoist (refer to the Operators Manual for guidelines to the safe handling of the complete machine) support the machine chassis on 4 wooden or concrete blocks with an individual support capacity of 1 tonne each. In order to allow the wheel assembly to be removed it is necessary to chock the chassis about 15cm above floor level.

2. Turn the wheel fully to expose the hose connector swivel fittings. Remove the 3 hose connections and plug all hose ends and motor fittings.

3. Remove the steering link link arm by disconnecting the circlips and tapping upwards on the two pins.

   Take the weight of the wheel assembly by supporting the wheel from below by means of a wooden block or car jack. This facilitates removal of the circlip.

   The unit weighs approximately **70kg.**

3. Remove the circlip from the pivot shaft and lower the assembly to the floor. The wheel, tyre and hydraulic motor may now be replaced as necessary.

4. Before re-assembling the unit, check that the grease nipple is free from dirt. Lubricate the pivot shaft and chassis pivot tube with grease. Lift the assembly into the pivot preferably using a forklift. The unit weighs approximately 70kg.

   Fit the spacer washer and a new circlip if necessary.

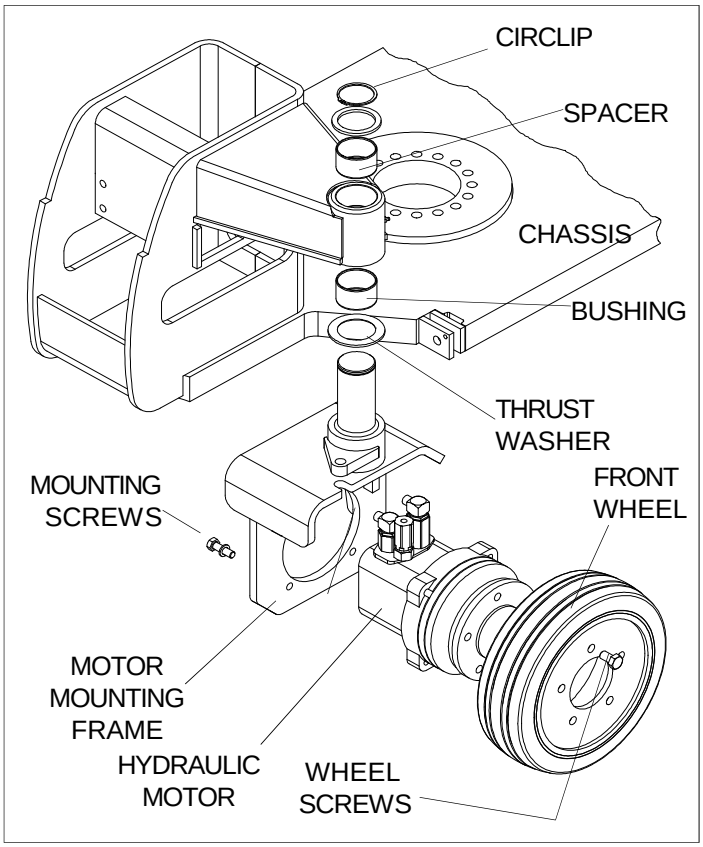


Figure 3-25: Front Wheel Assembly

5. **Tightening Torques:-**

   Motor mounting screws.....80 N-m

   Wheel mounting screws.....45 N-m

3.11 Hydraulic Tank, Oil & Filter

Fluid Level Check - every 50 hours

Check the oil level in the tank with the platform and jib fully lowered. Oil should be visible on the dipstick. If required, top up using hydraulic oil ISO Grade 46.

Topping up with the jib or mast raised could result in oil overflow during subsequent operation.

Filter Replacement - every 500 hours

It is strongly recommended to change the filter element in any case after each 500 hours work.

To replace the filter element undo the 4 screws at the top of the filter body. Refer to figure 3-26. The element is retained by means of the o-ring seal. Do not remove the replacement element wrapping until required - invisible contamination can cause damage to hydraulic components.

Oil Replacement - 3000 hours

Breakdown of lubricating capability of hydraulic oil may occur with time. It is recommended to completely change the oil after 3000 hours work.

When ingress of contamination such as dirt or water occurs the oil should be changed immediately according to the following instructions.

1. Operate the platform for 10-15 minutes to bring the hydraulic oil up to normal operating temperature.
2. Remove the inspection cover as shown in Fig. 3-26. Use a barrel pump or similar device to remove the oil from the tank. Alternatively the tank may be removed from the machine and the drain plug used to empty the oil.
3. The hydraulic tank has a capacity of 20 litres (5.3 US Gallons).
4. Clean the magnetic drain plug and re-install.
5. Disconnect the return hose and hose fitting from inlet port of the hydraulic return filter. Remove and replace the filter element as described above.
6. Fill the hydraulic reservoir with hydraulic oil (ISO VG 46) checking level with dipstick.
7. Recycle used oil as per local environmental regulations.

⚠ CAUTION ⚠

Wear safety gloves and safety glasses when handling hydraulic oil. Oil can cause irritation of the skin. The oil remains hot long after use.

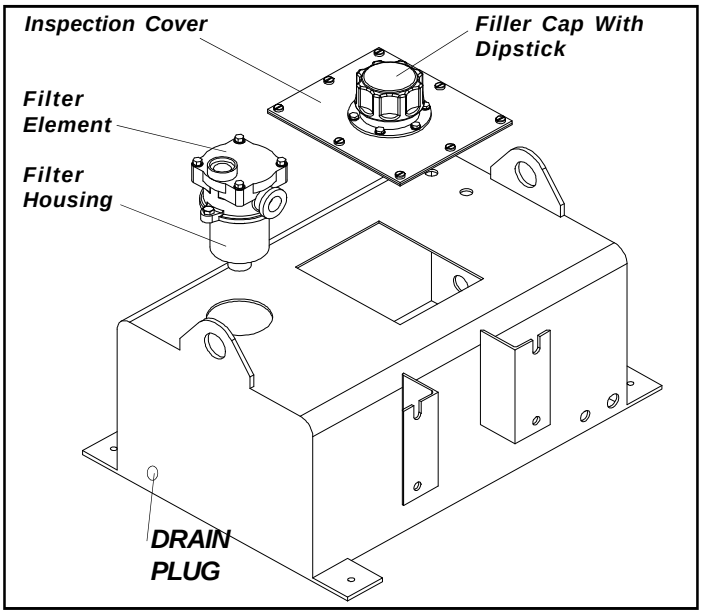
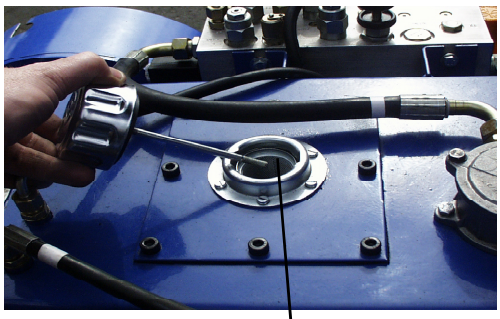


Figure 3-26: Hydraulic Oil Tank



Do not remove the filter gauze when filling

Figure 3-27: Oil Dip Stick

Check the hydraulic pressures whenever the pump, manifold or relief valve have been serviced or re-placed.

3.12 Hydraulic Valves

OPERATING PRINCIPLES

Control Valves

This machine is fitted with 3-way, 2-position and 4-way, 3-position cartridge type directional control valves. When the circuit is activiated and the solenoid activated, the spool shifts and allows oil to flow through the port and on to the desired activator (cylinder or motor). The spool is designed to allow oil to return from the activator to the tank at the same time. A built-in spring returns the spool to the neutral position as soon as the solenoid is de-energised. Each directional control valve consists of a cavity in the block, the valve body, a sliding spool and one or two solenoids.

Relief Valves

The primary function of a relief valve is to protect equipment from excessive pressures. The valve provides an alternative path back to tank for the oil if the actuator reaches its limit or if blockage problem arises in the circuit. The relief pressures are normally set about 20 to 30% higher than the load induced pressures to prevent loss of pressure energy and unnecessary heating of the oil.

Poppet Valves

These valves are similar in operation to the directional control valves except that they have a single solenoid. They are used to block or allow oil flow depending on the required logic. The functionality of these valves must be studied in conjunction with the Hydraulic Schematic in Section 5.0.

3.13 Pressure Settings

It is important to note some special features of the MB hydraulic circuits before embarking on pressure setting adjustments.

A. The circuits are fitted with 2 system relief valves. The primary or **Main Relief Valve** protects the pump from over-pressure while the secondary or **Lift System Relief Valve** is used to limit the lifting capacity of the platform.

B. A **Cross-Line Relief Valve** is fitted on the 'service' side of the slew control valve. This valve serves an important purpose. It limits the slewing pressure to that required for slewing only so that the jib cannot apply a large force to an external structure. This limit in turn prevents dangerous reaction torques on the structure which could cause tipping of the machine.

C. **Motion Control Valves** are fitted to the drive circuit. These valves (CT 8 & CT 9) prevent over-running of the drive and also prevent creeping of the machine while parked (assuming that the failsafe brakes are inoperable or have been previously dissengaged). **These valves are factory set and may not be adjusted under any circumstances**.

D. The function of the **Drive Motor Relief Valve** is to protect the circuit from excessive pressure build up during steering and driving of the machine. This relief valve (CT 25) is isolated during 'high traction' drive and serves no purpose. During 'standard drive' the motors are connected in series. Sharp steering combined with travel speed causes a build up of pressure between the hydraulic motors. The valve prevents excessive pressure build up between the lines. **This valve is factory set and may not be adjusted under any circumstances**.

MAIN RELIEF VALVE ADJUSTMENT *(Figure 3-19, 3-20)*

1. Operate the hydraulic system for 10-15 minutes to warm the oil.
2. Remove the rear chassis cover.
3. Insert a (zero-to-300 bar) pressure gauge into the high pressure gauge port on the Manifold Block.
4. Loosen the locknut on the Main relief valve (CT 10) and insert a 4 mm allen key into the hex head adjusting screw. Turn the key anti-clockwise about 2 full turns.
5. Carefully bring the machine to a halt against a solid obstruction and place a block of timber between the obstruction and the chassis.
6. Get a colleague to continuously drive the machine against the obstruction while the allen key is turned clockwise.
7. Continue turning the key until the pressure reads as follows.

   MB 20 : **220 bar** (3190 psi)
   MB 26 : **220 bar** (3190 psi)

8. Tighten locknut on main relief valve while holding the adjusting screw in position.

LIFT RELIEF VALVE ADJUSTMENT
(Figure 3-28, 3-29)

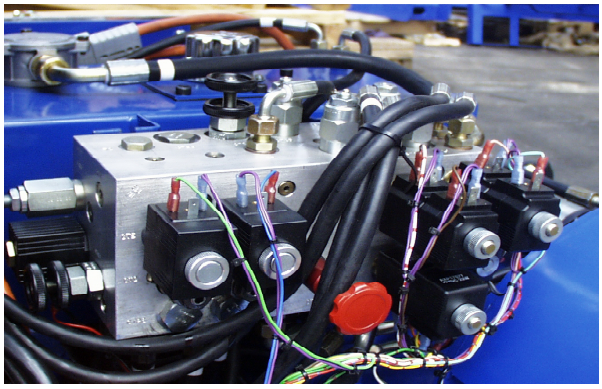
1. Operate the hydraulic system for 10-15 minutes to warm the oil.
2. Remove the rear chassis cover.
3. Insert a (zero-to-300 bar) pressure gauge into the high pressure gauge port on the Manifold Block.
4. Loosen the locknut on the Lift relief valve (CT 11) and insert a 4 mm allen key into the hex head adjusting screw. Turn the key anti-clockwise about 2 full turns.
5. Operate the Mast Down function until the mast is fully bottomed out.
6. Get a colleague to continuously operate the mast down function while the allen key is turned clockwise.
7. Continue turning the key until the pressure reads as follows :-

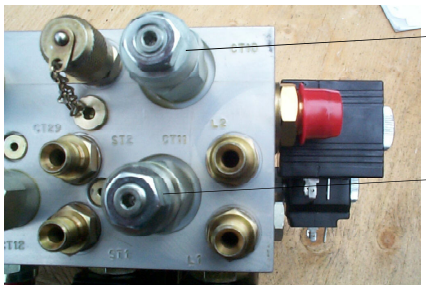
   MB 20 **155 bar** (2250 psi)
   MB 26 **180 bar** (2610 psi)
8. Tighten locknut on lift relief valve while holding the adjusting screw in position.

SLEW CROSS-LINE RELIEF VALVE ADJUSTMENT
(Figure 3-28, 3-29)

1. Operate the hydraulic system for 10-15 minutes to warm the oil.
2. Remove the rear chassis cover.
3. Insert a (zero-to-100 bar) pressure gauge into the high pressure gauge port on the Manifold Block.
4. Loosen the locknuts on both relief valve (CT 12 & CT 13) and insert a 4 mm allen key into the hex head adjusting screw. Turn the key anti-clockwise about 1 full turn.
5. Operate the Slew function until the mast strikes the mechanical slew stop.
6. Get a colleague to continuously operate the Slew function while the allen key is turned clockwise.
7. Continue turning the key until the pressure reads as follows :-

   MB 20 **50 bar** (725 psi)
   MB 26 **50 bar** (725 psi)
8. Tighten locknut on both relief valves while holding the adjusting screws in position.





TOP VIEW OF BLOCK

Figure 3-28: Main Relief Valves

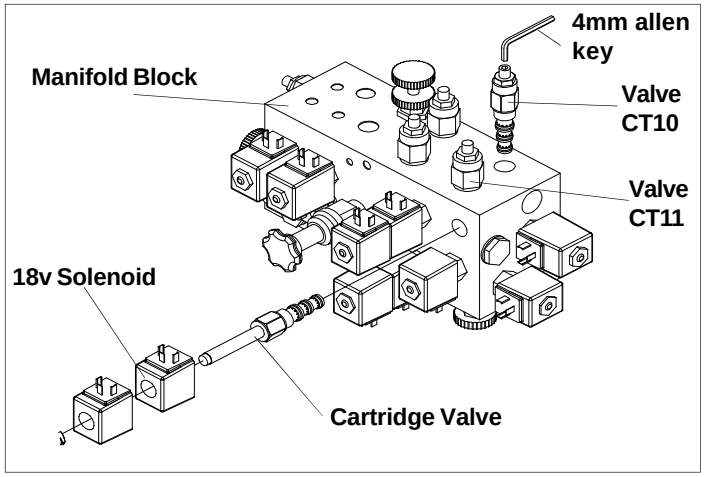


Figure 3-29: Exploded View of Valve Block

3.14 Manifold Block

The manifold block is suspended in position by means of two bolts on the tank bracket. Complete removal of the block is only necessary during a major overhaul of the hydraulic hoses or replacement of the block itself. Most hydraulic problems can be solved with the block in situation, however, access to or replacement of some of the cartridges may be facilitated by dislocating the block temporarily. To do this, simply pull upwards on the block and rotate in position.

Use the **Troubleshooting guides in Section 4.0** to ascertain the faulty cartridge and refer to the Hydaulic Function Legend in Section 5 for the designation and location of the suspect valve cartridge.

⚠ CAUTION ⚠

To avoid the risk of component damage the hydraulic hose ends should be tagged prior to disassembly.

Refer to the Hydraulic Schematic diagram

⚠ CAUTION ⚠

To avoid the risk of component damage the Valve Cartridges should be tagged before removal. Each cartridge contains a spool design appropriate to the specific function.

Refer to the Hydraulic Schematic diagram if in doubt.

CLEANING AND INSPECTION

Where an overhaul is required on the hydraulic system - for example as a result of major contamination of the system, it is necessary to thoroughly clean and inspect the valve block.

Wash the manifold block in parafin, kerosene or similar cleaning solvent and leave to drain. Blow out all ports with compressed air**.**

Take precautions against airborn debris when carrying out this task - Wear Safety Glasses.

Inspect the block for crack damage and check all ports for thread damage. Check the o-ring seal seats for score marks.

Check the spade connectors on the solenoid coils. Replace the coil if either of the outer connectors are broken (the central 'earth' spade connector is not used) As a precaution against damage to the coil spade connectors it is advisable to defer fitting the coils until the block has been secured and hosed up completely

ASSEMBLY

1. Install the cartridge valves, relief valves, overcentre valve, handwheel valves and screw-in plugs to their original positions.
2. Inspect each o-ring seal prior to fitting and replace as necessary. Do not fit the cartridge unless the o-ring seal is in good condition.
3. Install all port adaptors having checked all threads and inspected each bonded washer.
4. Apply the following torques to all components:-

Cartridge Valves	**20 Nm**
Relief Valves	**45 Nm**
Overcentre Valves	**45 Nm**
(Coil retainers	**4 Nm)**

BLOCK INSTALLATION

1. Refer to the exploded view of the block before connecting the hoses to the male adaptors on the underside.
2. Check the hose routing on the chassis floor before tightening the hose fittings.
3. Locate the two screws on the back of the block into the slots in the tank bracket. Tighten or loosen off these screws until a snug fit is made between the block and the tank bracket. It is not necessary to adjust these screws after the block is properly suspended.
4. Connect the hoses to their correct destina tions on the top and sides of the block.
5. Slip on the solenoids and secure lightly using the narrow nuts (and spacers where relevant).
6. Connect the solenoid leads to the spade connectors. If necessary, refer to the Electri cal Schematic section for the correct colour coding of these cables.
7. Check each function (Up/Down, Fwd/Rev and L/R) before proceeding.
8. Secure the chassis cover to the chassis.

3.15 Pump/Motor Unit

REMOVAL

1. Remove the chassis rear cover and, if possible, elevate the platform and jib and rotate through 90°. This is recommended to give more working space.

2. Drain or siphon off the hydraulic oil from the reservoir.

CAUTION

Isolate the battery power by disconnecting the battery supply at the 'battery disconnect' plug & socket. This is located in the chassis behind the aluminium controller base-plate. Failure to do this could result in electrical arcing at the motor terminals and damage to components.

The pump motor unit is located on the base of the chassis at the rear end.

3. Mark the hose ends and the motor cable terminals before removing the two hose connectors and the two electric terminals. Plug the hose ends to prevent ingress of contamination and oil loss.

WARNING

During these operations take care that screws, washers or other materials do not fall into the motor casing.

4. Using a large screwdriver, undo the pipe clamp clip (jubilee clip) holding the motor to the chassis. Remove the motor and service as required.

5. The pump is close-coupled to the motor and may be withdrawn by removing the 4 capscrews. Match mark the pump and motor casing to ensure correct orientation for re-assembly.

INSTALLATION

1. Lubricate the pump shaft with a Molybdenum based grease and attach to the motor. Take care to orientate the pump ports correctly relative to the motor terminals. Tighten the 4 capscrews to 27 Nm.

   Refit the hoses.

2. Check the tightness of the port adaptor flange screws.

WARNING

Be aware of the cavitation-induced damage caused to the pump if oil is not delivered to the suction port immediately.

3. Refill the reservoir. Check all operating functions and allow time for entrapped air to make its way to the reservoir return lines.

4. Fit the large diameter pipe clamp and rotate the pump motor unit until the terminals and pump hose adaptors are correctly orientated. Tighten the pipe clamp and fit the chassis cover(s).

3.16 Lift Cylinder (Figure 3-30)

REMOVAL

1. Ensure that the machine is on firm level ground, the Elevating Assembly is completely stowed, the Keyswitch is to the 'OFF' position and the Emergency Stop Button is pressed.
2. Remove the chassis covers from the machine.
3. Disconnect the manual emergency lowering cable and mechanism from the base of the fixed mast.
4. Using a 30mm open spanner, slacken off the chain adjusting anchors at the base of the mast.
5. Remove the 8mm dia. x 150mm long chain anchor pin. Use a 5mm bar and a mallet to drive out this pin. Leave the 5mm drive pin in position until ready to undo the chain from the top pulley.
6. Remove the jib-mount top cover plate to expose the main chain pulley assembly.
7. Remove the 4 No. M8 x 50 long cap head screws from the pulley shaft bearing blocks.
8. The pulley and shaft assembly may now be withdrawn from its seat. Take care to first remove the temporary 5mm pin from the bottom end and to fold the chain out over the mast sections. It is not necessary to remove the main chain adjusting anchors.
9. Move the cylinder to a prepared work area. It is important that clean assembly practices are observed, as seals and other hydraulic cylinder components are sensitive to contamination.

DISASSEMBLY

1. Unscrew the headcap and withdraw the rod and piston assembly from the barrel tube.
2. Unscrew the piston nut and remove piston and headcap from the cylinder rod.
3. Remove the piston static O-ring from the cylinder rod.
4. Remove the piston seal from the piston.
5. Remove the rod seal, rod wiper and static seal from the headcap.
6. Care should be taken to save the O-ring and all other seals for reassembly, if they have been deemed serviceable following the cleaning and inspection phase of maintenance.

CLEANING AND INSPECTION

1. Clean all metal parts in solvent and blow dry with filtered compressed air.
2. Check all threaded parts for stripped or damaged threads.
3. Check the bearing surfaces inside of the headcap, outer edge surface of the piston, inside of the cylinder barrel and the shaft for signs of scoring, pits, excessive wear or polishing. Scratches or pits deep enough to catch a fingernail are unacceptable. Polishing is a sign of uneven loading and if sufficiently polished the affected parts should be replaced.
4. Replace any parts or seals found to be unserviceable.

REASSEMBLY/SEAL REPLACEMENT

Note:
During seal replacement do not use sharp edged tools. Take care not to cut the seals, and allow at least one hour for the seals to elastically restore to their original shape before assembly.

1. Lubricate and install new rod seal, rod wiper and static seal on the headcap.
   NOTE: Multi-purpose lubricant should be used.
2. Install a new piston seal on the piston.
3. Install the headcap on the cylinder from the piston end.
4. Install the piston, piston nut and a new piston static O-ring on the cylinder rod. Screw nut to end of thread and secure with circlip.
5. Lubricate the piston seal and install the piston and rod assembly in the barrel tube.
6. Thread headcap onto barrel tube and hand tighten, then turn 1/4 turn further.
7. Install the lower cylinder Overcentre Valve.

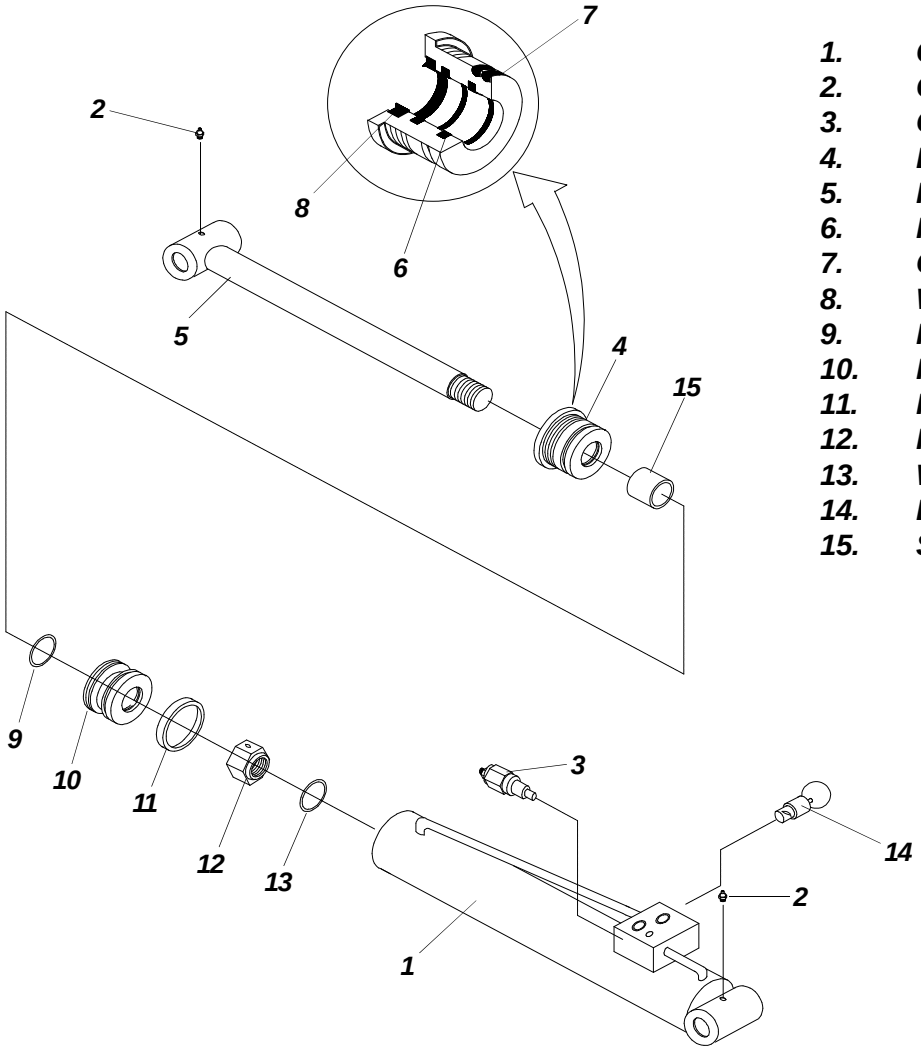
INSTALLATION

NOTE: Before installing the Lift Cylinder check the pivot pins and bearings for wear and replace if necessary.

⚠ CAUTION ⚠

The Main Lift Cylinder weighs 55kg, utilise appropriate lifting equipment to support the unit before removing pins

Note: Diagram below shoes a sample cylinder breakdown for the Upper Lift Cylinder. Component Breakdowns of the other cylinders are shown in the Illustrated Parts Breakdown.



1. *Cylinder Body*
2. *Grease Nipple*
3. *Overcentre Cartridge*
4. *End Cap*
5. *Rod And Pivot*
6. *Rod Seal*
7. *O-Ring*
8. *Wiper*
9. *Piston O-Ring*
10. *Piston Head*
11. *Piston Seal*
12. *Piston Locknut*
13. *Washer*
14. *Emergency Lowering Valve*
15. *Spacer*

Figure 3-30: Typical Hydraulic Cylinder Component Breakdown

3.17 Principles of Operation - Batteries

Electrical energy for the motor is supplied by four 6-Volt batteries wired in series to give a 24 volts DC supply. Each of these batteries consist of three cells supplying a maximum voltage of 2.2V each, i.e. 6.6V at each battery or 26.4V for the full battery pack.

Proper care and maintenance of the batteries will ensure maximum performance from the work platform.

BATTERY POTENTIAL

Batteries do not reach ***full*** potential until they have been through 50 charge/discharge cycles (however the rate at which the potential increases is exponential, and the batteries will normally have 95% potential after 15 charge/discharge cycles). Hence do not use a new battery in a battery pack that already has more than 15 cycles. Charge batteries at the end of each work shift or sooner if batteries have been discharged. A battery is considered to have a faulty cell if it has less than 80% of the potential of the other batteries in the pack while measured under load.

When ambient temperatures fall below 18ºC (65ºF) batteries cannot deliver their rated Ampere hours and so should be placed on charge as soon after use as possible.

BATTERY CELL EQUALISATION

Specific Gravity is a measurement of the strength of the electrolyte in a battery and is measured using a hydrometer. For a fully charged battery the temperature corrected reading should be about **1.28**.

Battery cells with specific gravity below **1.23** (after charging) are considered to be faulty and should be removed from the pack.

As the specific gravity is dependent on ambient temperature, the hydrometer reading must be temperature corrected.

Use the following Correction Chart.

Electrolyte Temperature		Temperature Corrected Specific Gravity, Fully Charged	
Fahrenheit	**Celsius**	**USA**	**Euro**
120	48.9	1291	1.29
110	43.3	1287	1.29
100	37.8	1283	1.28
90	32.2	1275	1.28
80	26.7	1275	1.28
70	21.1	1275	1.28
60	15.6	1267	1.27
50	10.0	1263	1.26
40	4.4	1259	1.26
30	-1.1	1255	1.26
20	-6.7	1251	1.25
10	-12.2	1247	1.25
5	-15.0	1245	1.25
0	-17.8	1243	1.24
-5	-20.6	1241	1.24
-10	-23.3	1239	1.24
-15	-26.1	1237	1.24
-20	-28.9	1235	1.24
-25	-31.7	1233	1.23
-30	-34.4	1231	1.23

Table 3-31: Specific Gravity Correction Chart

3.18 Battery Maintenance

BATTERY INSPECTION AND CLEANING

Check battery fluid level every day, especially if the work platform is being used in a warm, dry climate. Top up using distilled water only.

Tap water contains a high mineral content and will shorten the battery life.

⚠ WARNING ⚠

Danger of explosive gas mixture.
Keep sparks, flames and smoking materials away from batteries. Always wear safety glasses when working with or handling batteries. Battery fluid is highly corrosive. Rinse away any spilled fluid thoroughly with clean water.

Batteries should be inspected periodically for signs of cracked cases, electrolyte leakage and corrosion of the terminals. Inspect cables for abrasion or breaks in the insulation and for broken cable terminals.

Thoroughly clean batteries using a 'baking soda' solution where corrosion is visible or where electrolyte has overflowed during charging.

Take care to avoid the solution entering the cells. Rinse thoroughly with clean, warm water. Clean battery and cable contact surfaces to a bright metal finish whenever a cable is removed.

⚠ CAUTION ⚠

If battery water level is not maintained the batteries will not recharge fully. This will result in a low discharge rate and damage to the windings on the Motor/Pump unit and Warranty violation.

Basic Rule to achieve the maximum life cycle using deep-cycle traction batteries:-

- Use the machine until it shows signs of weak / slow performance.
- Allow the charger to charge the batteries until it automatically shuts off.
- Avoid intermittent charging as the batteries can develop a memory effect similar to NiCad batteries.

⚠ WARNING ⚠

DO charge batteries in a well-ventilated area.
DO NOT charge batteries in the vicinity of sparks or flames.
NEVER leave the charger operating unattended for more than two days.
NEVER disconnect cables from batteries when the charger is operating.
Permanent damage to batteries will result if they are not recharged immediately after discharging.
Keep the charger dry.

BATTERY CHARGING

Before charging check that:-

1. The correct mains voltage and current is available to the charger.
2. The extension cord is in good condition and is no longer than 8m (26 ft.) and is 1.5 mm sq. (12g a) or larger.
3. There is sufficient time to fully complete the charging cycle and that there will be no interuption in mains power supply.

⚠ CAUTION ⚠

Incorrect voltage selection will result in permanent damage to the charger unit and is a Warranty violation.

BATTERY FLUID LEVEL

1. Check battery fluid level. If electrolyte level is less than 10 mm above the top edge of the plates then distilled water must be added.
2. Connect battery charger lead to properly earthed outlet of correct voltage and frequency.
3. The Charger will turn on automatically after going through a self test sequence. LED's will indicate the status of charging.
4. The Charger Control Panel will indicate a fully charged battery pack

CELL EQUALISATION

The specific gravity should be checked at least once per month or once a week in low temperature areas. Check for correct fluid level, add distilled water as necessary, and connect the charger as per previous instructions. To do this, charge batteries as described above. After this initial charge, check the electrolyte level in all cells and add distilled water as necessary, and turn the charger on until a full charge is again indicated. During this time, the charging current will be low (approximately four Amps) as cells are equalizing.

After equalization, the specific gravity of each cell should be checked with a hydrometer. The **temperature corrected** specific gravity in this state should be **1.28**.

If any corrected readings are below **1.23**, the batteries contain bad cells and therefore the battery should be replaced.

Do not check the specific gravity in a cell to which water has just been added. If there is not enough electrolyte in a fully charged cell to obtain a sample for the hydrometer, add water and continue charging for one to two hours before checking again.

BATTERY CONDITION INDICATOR

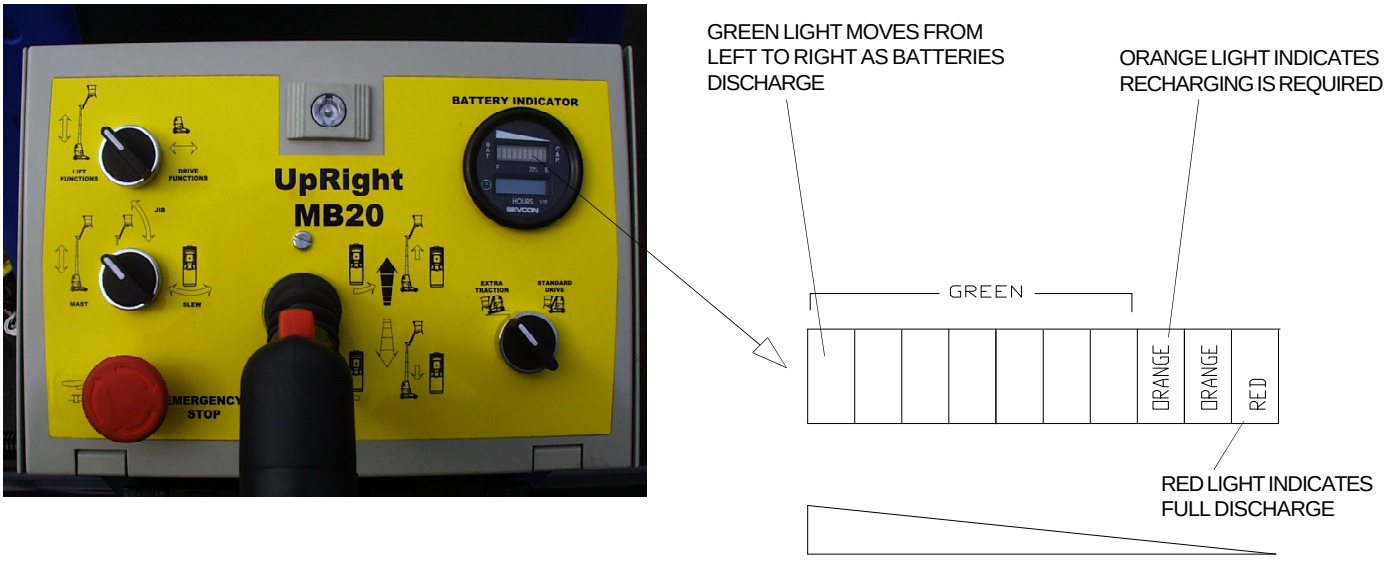


Figure 3-32: Battery Discharge Indicator

4.0 Introduction

The following section provides troubleshooting guide-lines to be used to locate and correct most of the operation problems which may occur. Problems which arise and which are not solved by the following corrective actions should be referred to a technically qualified person.
For further assistance contact the local distributor and if warranted the **UpRight Product Support** at:

UpRight Ireland @ Tel: +353-1-202-4100
Fax: +353-1-202-4105
UpRight Inc. U.S.A. @ Tel: +1-209-891-5200
Fax: +1-209-896-9244

Refer to the Operators Manual and to Sections 2 & 3 of this manual before proceeding.

GENERAL APPROACH

Each malfunction is followed by a listing of probable causes which will enable determination of the remedial action. The probable causes and remedial action should be followed in the order in which they are listed in the following tables.

There is no substitute for a thorough knowledge of and practical experience in the servicing and repair of related equipment and machines.

Note that the majority of problems will be related to the electrical and hydraulic systems. For this reason much attention has been paid to these areas in the troubleshooting charts. The lists are not guaranteed to include all possible causes and remedies. The immediately obvious causes and remedies are not necessarily listed.

The first approach is to establish whether the malfunction is due to lack of elecrical power to the solenoid or to lack of oil flow and pressure to the valve.

Time spent studying the hydraulic and electrical diagrams is time well spent. Understanding the logical steps in the hydraulic functions can only be achieved by learning the functions of all lines and valves in the diagram.

The electrical circuit, while complicated, can best befollowed by separating out the major areas with the aid of the circuit diagram layout. The 3 main items ;

[Controller+Battery+Pump/Motor+Charger]
[Lower Control Box+ Lower PCB]
&
[Upper Control Station+Joystick]

are drawn as separate and distinguishable blocks in the diagram. The multiple cable connections between them are not shown for clarity but can be followed by referencing the colour coding at both junctions.

The first approach, when troubleshooting the electrical diagram, is to establish the correct functionality of the [Controller+Battery+Pump/ Motor+Charger] block.

From there it is useful to follow the primary power line from the Fuse2 on to the emergency stop buttons on the lower and upper control stations and on to the key switch. This line is coloured red for convenience in the diagram.

The next step is to refer to the troubleshooting charts in Tables 5-1 & 5-2 below.

Refer to Section 6.2 for detailed Trouble Shooting information on the Pump/Motor Controller. Read and understand the Principles of Operation before commencing any trouble shooting.

⚠ WARNING ⚠

Ensure that the work platform is resting on a firm, level surface.
The elevating assembly must be supported by an overhead hoist when troubleshooting and servicing the electrical/hydraulic system

Troubleshooting

PROBLEM	PROBABLE CAUSE	REMEDY
All functions inoperable. Electric motor does not start	1.Blown main fuse1	Check the 475A fuse and replace if necessary
	2.Faulty Battery Charger	Connect charger to batteries and check the output voltage. If less than 24v, repair or replace. Check input voltage to charger. Check the internal charger protection fuse.
	3.Faulty Battery	Charge batteries overnight. Check individual cell voltage. Replace as necessary.
	4.Loose or broken battery leads	Check resistance and continuity of each individual lead. Replace as required.
	5.Emergency Stop buttons contacts failed	Disconnect cables to the switch. Check continuity across contacts. Replace.
	6.Blown controller fuse2	Remove the 7A fuse from its enclosure. Check continuity.
	7.Loose Upper Control Box Terminal	Unscrew connector, align locating tabs and reconnect
	8.Battery Disconnect plug loose	Check and reconnect. Check the internal steel points for pitting or damage
Electric motor starts but all functions are inoperable	1.Low hydraulic oil	Check and top up using ISO VG 46 hydraulic oil.
	2.Faulty hydraulic pump	Insert a pressure gauge in the G1 port of the valve block. Operate a function to the limit of stroke. Check that relief valve pressure develops. Repair or replace.
	3.Faulty controller	Check the 10mm cable terminals for tightness & Refer to 'flash fault' diagnoses in Section 6.
Electric motor continues to run when action has ceased	1.Line contactor malfunction (refer to KI in circuit diagram)	Check the contact faces. Fusing or arcing due to contamination destroys the contacts. Replace the unit.
Platform elevates very slowly or not at all	1.Leaking emergency lowering valves	Check the operating levers and cables. Check closure of the control knob at the base of the control valve block. Remove and replace the cylinder-mounted valves as necessary.

PROBLEM	PROBABLE CAUSE	REMEDY
Platform elevates very slowly or not at all ...cont'd.	2.Malfunction of the Line Contactor K1. Indicated as a '5 flash fault' on the controller's green LED.	Check the mechanical function of KI and also the solenoid coil on same.
	3. Thermal overload on the controller indicated as an '8 flash fault' on the LED.	Ensure that the controller has proper contact with the aluminium heat sink plate. Allow the system to cool down.
	4. Faulty lift valve solenoids	Test the voltage to the mast and jib solenoids. Swap around solenoids to isolate the problem. Solenoids are not serviceable.
	5. Platform overloaded	Remove excessive load. Check the pressure setting of the hydraulic 'lift limit' relief valve (CT11) on the block. This may only be reset at 215 kg payload in the platform.
	6. Incorrect controller speed settings	Check the programmed speed settings using the calibrator. This may be carried out by trained service personnel only.
	7. Low Battery Voltage indicated by the Upper Control BDI and/or by a '7 flash fault' on the controller LED	Check the battery cell voltages after recharging. Total battery pack voltage should exceed 18v. Charge the batteries or replace faulty battery unit.
Platform drifts down uncontrollably	1. Leaking emergency lowering / hose burst valves	Check the operating levers and cables. Check contamination within the valve. Check closure of the control knob (CT14) at the base of the control valve block. Remove and replace the cylinder-mounted valves as necessary.
	2. Cylinder piston seal internal leakage	Switch off all power functions. Disconnect the hose from the annular side of the cylinder and check for small oil flow. Oil flow indicates a faulty cylinder piston seal. Remove and repair the cylinder.
	3. Platform is overloaded	Remove excessive weight. The Safe Working Load is 215 kg for MB20 & MB26.

PROBLEM	PROBABLE CAUSE	REMEDY
Platform assembly will not slew	1. Faulty controller	Check the programmed slew speed setting. Check the continuity of slew speed enabling cable to the controller. Repair as necessary.
	2. Faulty slew solenoid	Check voltage at the electrical connections. Use a screw driver or similar component to check the magnetic effect of solenoid.
	3. Incorrect cross-line relief setting	Insert a pressure gauge in the G1 port of the valve block. Operate a slew function and measure the pressure. Provided the main relief pressure has been preset properly, the gauge should register 20-50 bar Reset or replace CT12 & CT13 thus preventing bybassing of oil.
	4. Faulty slew select switch	Disconnect the Bn & Gy cables to the slew switch in the upper control box. Check continuity across contacts. Replace the section or the complete switch assembly.
Platform assembly will not descend	1. Faulty controller	Check the programmed jib and mast speed settings. Check the continuity of jib & mast speed enabling cables to the controller. Repair as necessary.
	2. Faulty mast or jib solenoids	Check the voltage to the solenoid CT 6 for the mast functions and CT 14 for the jib function. Swap solenoids to confirm fault and replace if necessary.
	3. Mechanical blockage in masts	Check the mast overlap sections and lift chain pulleys for foreign bodies. Inspect the mast wear pads for damage and excessive wear, replace and lubricate as required. Remove the jib-mount dust plate and inspect the main internal lift chain for dislocation, looseness or damage.
Pothole bar does not retract during Drive	1. Mechanical blockage due to damage to pivots or pins	Remove and repair the pivot plates or replace the weldment if this is bent.
Pothole bar does not retract during Drive ....cont'd	2. Faulty pothole solenoid	Check the voltage to the solenoid CT 7. Check the cables feeding the solenoids. Swap solenoids to confirm fault and replace if necessary.
	3. Pothole cylinder malfunction	Check the hose connections to the cylinder. Check the cylinder rod-end pins and the cylinder mounting screws.
Pothole bar does not extend during Lift	1. Mechanical blockage due to damage to pivots or pins	Remove and repair the pivot plates or replace the weldment if this is bent.
	2. Faulty pothole solenoid	Check the voltage to the solenoid CT 15. Check the cables feeding the solenoids. Swap solenoids to confirm fault and replace if necessary. Check the correct function of the check valve CT 16.
	3. Pothole cylinder malfunction	Check the hose connections to the cylinder. Check the cylinder rod-end pins and the cylinder mounting screws.
Pothole bar does not remain extended during elevated Drive	1. Pothole cylinder malfunction	Check the cylinder pivot pins.
	2. Faulty pothole solenoid	Check that solenoids at CT 7 & CT 15 are energised sumiltaneously while the drive function is selected and the platform is elevated. Check the cables feeding these solenoids. Replace the solenoids if necessary. Check the valve cartridges for contamination.
Pothole bar drifts down when the machine is idle	1. Malfunction of check valve	Remove and service the check valve CT 16. Replace cartridge if in doubt.
Machine will not steer	1. Malfunction of joystick toggle switch	Remove and service the switch &/or joystick.
	2. Faulty steering solenoid & valve	Check that the solenoids at CT 1 are energised while the steering function is selected. Check the cables feeding these solenoids. Replace the solenoids if necessary. Check the valve cartridges for contamination.

PROBLEM	PROBABLE CAUSE	REMEDY
Machine will not steer ....cont'd	3. Faulty controller	Check the programmed steer speed setting. Check the continuity of the steer speed enabling cable to the controller. Repair or replace as necessary.
	4. Steer cylinder malfunction	Check the hose connections to the cylinder. Check the cylinder rod-end pins and the cylinder mounting bolts.
	5. Seized wheel mounting frame pivot(s)	Refer to the maintenance Section 3.8 for assembly and repair of the pivot and associated parts.
	6. Damaged steering link plates	Replace the steering link plates and associated pins and lock plates.
Machine will not drive	1. Thermal overload on the controller indicated as an '8 flash fault' on the LED.	Ensure that the controller has proper contact with the aluminium heat sink plate. Allow the system to cool down.
	2. Towing valve open	Locate the towing valve CT 21 on the valve block. Ensure that it is fully closed by turning clockwise.
	3. Hydraulic selector valve cartridge jammed	Locate the cartrige valve CT 3 on the valve block. Ensure that the internal spool is not contaminated and stuck in the 'Lift' position.
	4. Incorrect hose connections	Refer to the hydraulic diagram for correct connections of valve ports M1, M2, M3 & M4 to the motor ports. Incorrect connection may result in locking of wheels.
	5. Failsafe brake-circuit malfunction	Blocked brake line to either motor. Clear blockage and/ or replace hoses and fittings. Incorrect setting of cartridge valve CT 20 on the valve block. Open this valve fully for normal drive operation. Check the correct function of the check valves CT 30 and CT 17 on the valve block. These valve should open to allow brake chamber evacuation.
Machine will not drive ....cont'd	6. Faulty Drive solenoid	Check that solenoids at CT 4 & CT 5 are energised while the drive function is selected. Check the cables feeding these solenoids. Replace the solenoids if necessary. Check the valve cartridges for contamination.
	7. Malfunction of the overcentre valves	Check the valve cartridges CT 8 7 CT 9 for contamination or mal-adjustment. Too low a setting on the adjusters will prevent motion of the drives. Too high a setting will cause overrunning after attempting to halt the machine.
Machine travels in fast i.e. 'standard drive' mode only	1. Series-Parallel valve malfunction	Check that the cartridge valves CT 23 & CT 24 are not jammed in the energised position. Remove contamination and/or replace the cartridges.
Machine travels in slow i.e. 'high traction' mode only	1. Series-Parallel valve malfunction	Check that the solenoid on cartridge valves CT 23 & CT 24 are both energised simultaneously when 'high traction' is selected. Check wiring and connectors. Repair connections and replace solenoids as required.
Motor shaft seal extrudes	1. motor case pressure build-up	Check that the cartridge valve CT 24 is not jammed in the energised position while the circuit is in series ('standard drive') mode. Check that relief valve CT 25 is not incorrectly set. (Factory setting 50 bar). Prolonged tight turning of the machines during malfunction of CT 24 & CT 25 will cause build up of case pressure and subsequent shaft seal extrusion. Remove motor as per instructions in Section 3.8 and replace the shaft seal. this work may only be carried out by experienced hydraulic service personnel.

5.0 Hydraulic System

HYDRAULIC FUNCTION LEGEND

REFERENCE	NAME	FUNCTION	LOCATION
CT 1	Directional control valve - steering	Moves steering rod to left or right	Front face of block (double solenoid)
CT 2	Directional control valve - slew	Turns mast assembly left or right	Front face of block (double solenoid)
CT 3	Selector valve - Drive/Lift	Diverts oil to either the drive or lift part of the circuit	Right hand face of the block (single solenoid)
CT 4	Drive valve - Forward	Diverts oil to the drive motors	Front face of the block (single solenoid)
CT 5	Drive valve - Reverse	Diverts oil to the drive motors	Front face of the block (single solenoid)
CT 6	Directional control valve - Main Lift	Raises or lowers the mast lift cylinder	Front face of block (double solenoid)
CT 7	Poppet valve - Pothole bars	Extends the pothole cylinder	Right hand face of the block (single solenoid)
CT 8	Overcentre valve - Drive motors	Prevents overun of the drive motors. Piloted to CT9	Front face of the block (hex head)
CT 9	Overcentre valve - Drive motors	Prevents overun of the drive motors. Piloted to CT8	Front face of the block (hex head)
CT 10	Pressure relief valve - Main System	Protects the pump from excessive pressure	Top face of the block (hex head)
CT 11	Pressure relief valve - Lift System	Limits the jib lift to Safe Working Load	Top face of the block (hex head)
CT 12	Cross-line relief valve - Slew	Limits the slew motor pressure to 50 bar. Diverts excess oil to tank	Top face of the block (hex head)
CT 13	Cross-line relief valve - Slew	Limits the slew motor pressure to 50 bar. Diverts excess oil to tank	Top face of the block (hex head)
CT 14	Directional control valve - Jib	Raises or lowers the jib lift cylinder	Bottom face of the block (single solenoid)

HYDRAULIC FUNCTION LEGEND... CONT'D

REFERENCE	NAME	FUNCTION	LOCATION
CT 15	Poppet valve - Pothole bars	Retracts the pothole cylinder	Front face of block (single solenoid)
CT 16	Check valve - Pothole circuit	Traps oil in pothole circuit	Right hand face of block (screw-in hex head valve)
CT 17	Shuttle valve - Brake circuit	Provide high pressure to the braking circuit regardless of the drive direction	Left hand face of block (screw-in hex head valve)
CT 18	Throttle valve - Jib	Controls the rate of descent of the jib	Bottom face of block (screw-in hex head valve)
CT 19	Plunger pump - Brakes	Provides manual means of dissengaging brakes during an emergency	Front face of block (Red knob)
CT 20	Brake over-ride valve	Closing this, normally open valve, allows plunger pump pressure to the brake chambers prior to emergency towing	Top face of block (Black knob)
CT 21	Towing valve	Opening this, normally closed valve, allows bypassing of motor oil during emergency towing	Left hand face of block (Black knob)
CT 22 Brakes	Pressure reducing valve	Automatically limits the pressure in the brake chamber to 25 bar - regardless of the operating pressures	Left hand face of block (Hex head)
CT 23	Series/Parallel poppet valve	Switches between series and parallel connection of the motors	Left hand face of block (Single Solenoid)
CT 24	Series/Parallel poppet valve	Prevents oil entering the anti-peak relief valve (CT25) during parallel connection of the drive motors	Bottom face of block (Single Solenoid)
CT 25	Relief valve - series connection	Prevents damaging build up of pressures during a series- connected turn	Top face of block (Hex head)

HYDRAULIC FUNCTION LEGEND... CONT'D

REFERENCE	NAME	FUNCTION	LOCATION
CT 26	Check valve	Allows low pressure oil to bypass CT25 during anti-cavitation function	Bottom face of block (Hex head)
CT 27	Anti-Cavitation valve	Allows low pressure oil to fill the possible vacuum formed during a series-connected left turn	Front face of block (Hex head)
CT 28	Anti-Cavitation valve	Allows low pressure oil to fill the possible vacuum formed during a series-connected right turn	Front face of block (Hex head)
CT 29	Throttle valve - Steering	Controls the speed of operation of the steering cylinder	Top face of block (Hex head)
CT 30	Check valve - Brakes	Allows oil to bypass the pressure reducing valve during normal operation	Top face of block (Hex head)
CYL 1	Main Lift Cylinder	Raises or lowers the mast sections	Within the mast sections
CYL 2	Jib Lift Cylinder	Raises or lowers the Jib and Platform assembly	Between the jib structural members
CYL 3	Steering Cylinder	Turns the front wheels left or right	Front chassis extremity
CYL 4	Pothole Cylinder	Automatically raises or lowers the pothole protection bars	Under the hydraulic tank
BRK1, BRK2	Failsafe brakes	Spring applied, hydraulically released brakes	Within the drive motor housings
MB	Manifold block	Houses all the hydraulic valves	Connected to the hydraulic tank
FL1	Return-line filter	Filters the returning oil continuously to 25 microns	Flange-mounted to the hydraulic tank

REFERENCE	NAME	FUNCTION	LOCATION
FL2	Suction strainer/ filter	Filters the suction oil continuously to 40 microns	Screwed to inside of hydraulic tank (3/4")
MOT1 MOT2	Hydraulic motor	Drives the machine forward and backwards at various travel speed	Front end of chassis.
MOT3	Hydraulic motor	Drives the mast assembly through 360deg. (Slew)	Base of chassis. Coupled to the slew bearing assembly.
MP	Motor Pump Unit	Provides hydraulic pressure to the circuit	Chassis mounted towards the rear of the machine

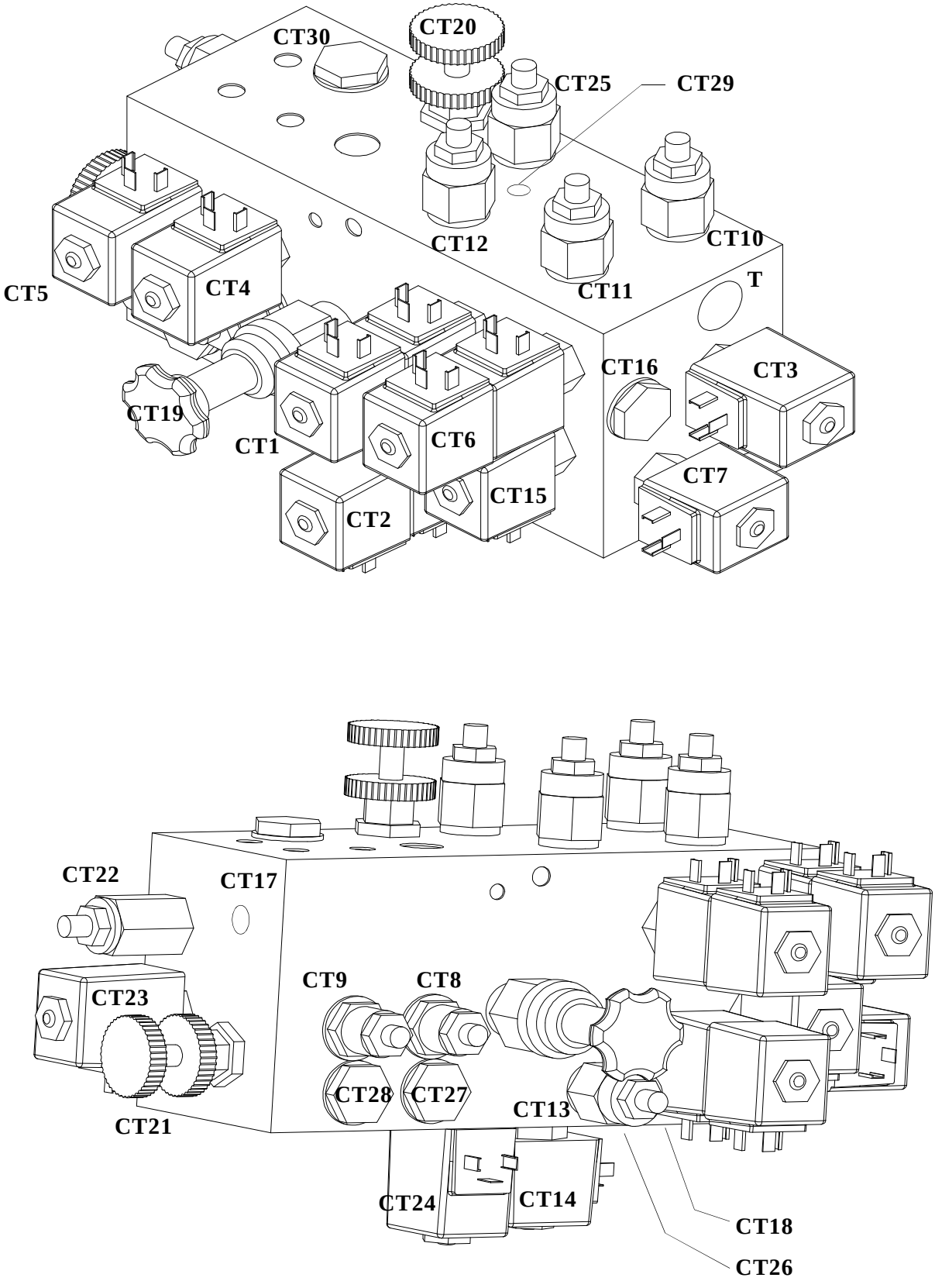
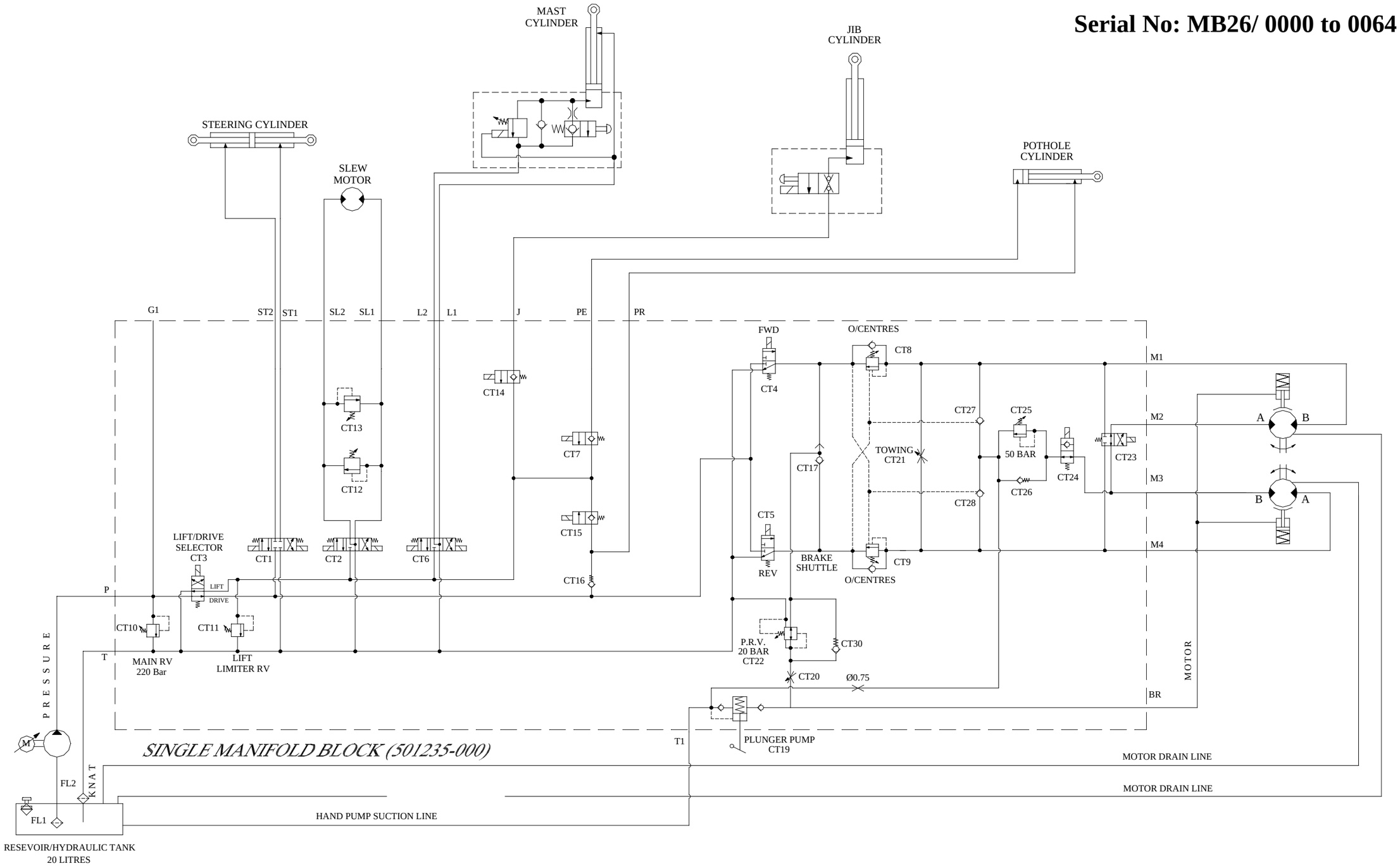


Figure 5-1: Manifold Block Exploded View

NOTES:

Serial No: MB20/ 0000 to 0040 incl.

Serial No: MB26/ 0000 to 0064 incl.



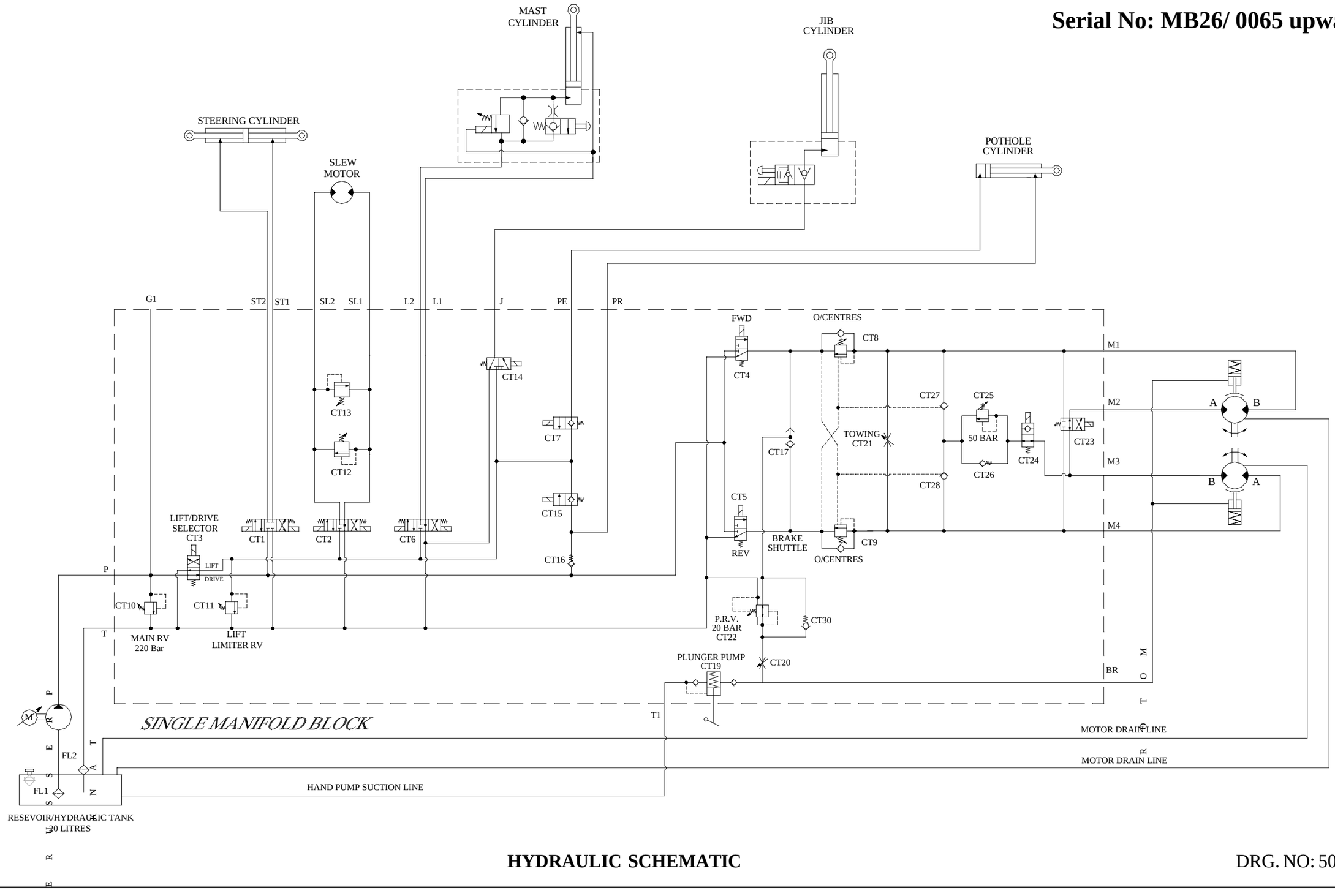
HYDRAULIC SCHEMATIC

DRG. NO: 501554-001

Hydraulic System

Serial No: MB20/ 0041 upwards

Serial No: MB26/ 0065 upwards



HYDRAULIC SCHEMATIC

DRG. NO: 501554-002

6.1 DC Motor Controller (MOS90)

CONTROLLER SPECIFICATIONS

The controllers used on the MB20/26 range of machines are rated for 24 volts DC at a maximum current of 475 Amps. The control circuit is protected by a 7Amp fuse.
The interconnecting components generally use a 0.75 mm^2 (AWG 20) cable and P.C.B's (Printed Circuit Boards). The P.C.B. connectors are of the MOLEX type.

OPERATING PRINCIPLES

UpRight machines deploy a motor speed controller to control the speed of the hydraulic pump. More conventional systems use a constant motor speed and proportional flow control to achieve the same result. This latter system however, suffers from power loss and hence reduced useful battery life.
The DC motor speed controller ensures that all the battery energy is transmitted to the particular hydraulic function and wastage is minimised. The other advantage of this system is that it offers soft stop-start and smooth control of all functions to the operator.
The controller is also programmable. Thus, as any of 8 functions are pre-selected by the operator, a signal is sent to the module and the motor turns at a predetermined speed or allows a maximum speed range to be set. Each speed, or speed range, may be set by means of an external calibrator.

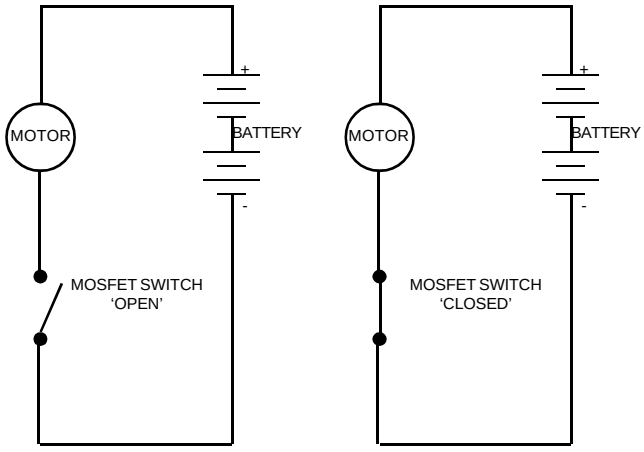
THE CONTROLLER ACTS AS A SWITCH

The DC motor controller has three connections: Battery Positive (B+), Battery Negative (B-) and Motor Field Negative (A).

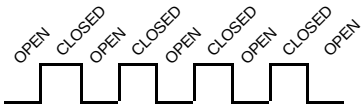
Battery positive (B+) is constantly connected via the main fuse to the electric motor. The motor controller is made up of high current capacity MOSFET semi-conductors and capacitors. Another section of the controller contains the low current control (integrated circuits).
The electonic device in effect 'Switches' the motor connections on and off internally. The motor shaft speed depends on the time during which the Battery Negative (B-) and Motor Field Negative (A) are connected.

- If (B-) and (A) are connected continuously - then the motor turns at 100% speed.
- If (B-) and (A) are not connected - then the motor turns at 0% speed.
- Intermediate connection times lead to inter mediate motor speed.

The electronic Switch has the ability to open and close very rapidly and is referred to as 'pulsing'.

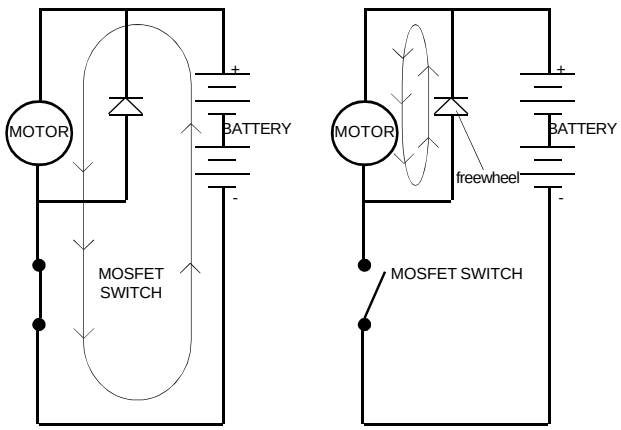


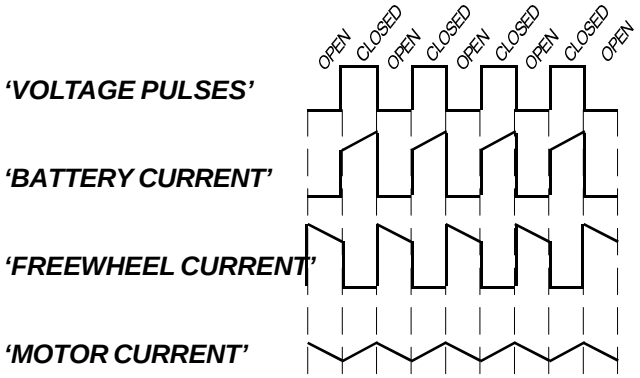
The resultant voltage pulses across the MOTOR is a square wave as shown below.



To improve efficiency a 'freewheel diode' is connected across the motor windings as shown below.

During the open switch period, the stored energy is dissipated as current flows through the diode. The energy is therefore utilised during this part of the cycle. The diagram below shows the case, for example, when the the periods of opened and closed switching are equal and the the motor shaft speed is 50% full speed.





During small displacement of the input signal from the control joystick, the MOSFET switches are open more often than closed and the motor and pump turns slowly.

During large displacement of the joystick the switches are closed more often and a high speed results.

The speed control is infinitely variable and it is significant that the voltage across the motor is 24v regardless of the input signal.

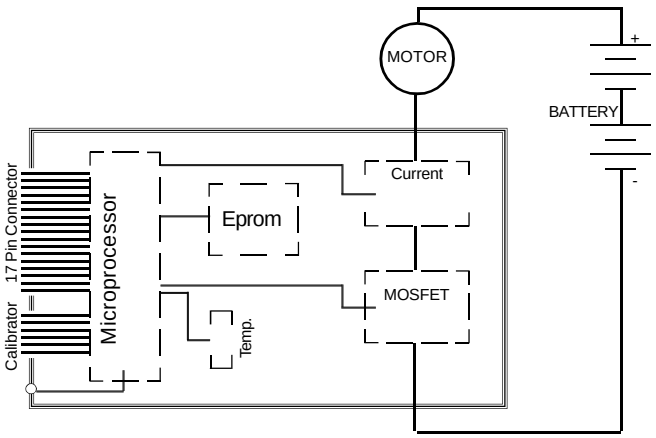


Figure 6-1: Simplified Control Circuit

6.2 Fault Finding

Things you should know about the Mosfet controller :-

- The MOS90 contains a single green diagnostics LED and a single red LED in the front panel.
- A continuous green LED light indicates that the MOS90 is powered up and working correctly.
- Check power supply if no green LED shows.
- The MOS90 is programmed to give a sequence of green flashing lights depending on the type of error diagnosed by the system. These are referred to as 'flash faults'. Table 6-1 is a trouble shooting chart showing the causes and remedies related to these flash faults.
- The MOS90 has a built-in **high temperature protection device** called **thermal cutback**. This cutback senses controller temperature at 80°C(175°F) and causes total shut down at 90°C (195°F). Performance between these temperature gradually deteriorates. Repeated operations at a temperature above 80°C is not recommended as this could damage the MOS90.
- The MOS90 also has a built-in **low voltage protection** or **low voltage cutout**. The low voltage cutout shuts the MOS90 down as soon as the input voltage falls below 14V. Low volt age cutout occurs instantaneously - thus all powered function cease immediately. Normal operations resume as soon as the supply voltage exceeds 14V.
- The MOS90 contains a B.D.I. system (Battery Discharge Indicator System), connected to a panel on the upper control box. Refer to Figure 3.24 Battery Maintenance on Batteries for details of this feature.

Type of Fault	Indicates	Possible Cause
No LED	MOS90 did not turn on	MOS90 did not receive an input voltage to PIN #6 or input voltage less than 14V.
1 Flash	EEPROM corrupted	The MOS90 is damaged by voltage a spike
2 Flash	Not applicable	Not Applicable
3 Flash	(a) Internal Short Circuit (b) Motor Open Circuit	The line contactor is not energised Motor burned out or bad contacts
4 Flash	Not applicable	Not applicable
5 Flash	Not applicable	Not applicable
6 Flash	Incorrect accelerator input	Bad connection on PIN #4 or PIN #14 input either >4.5V or < 2.4V
7 Flash	Battery voltage less than 14V	Battery needs recharging
8 Flash	Thermal Cutback	MOS90 Temperature too high

Table 6-1 :- Controller Flash Faults

The MOS90 contains a total of 10 internal switches. However, only 7 of these are utilised in the MB machines. The following table shows the function of each switch and the colour code and PIN # for each one.

Switch No.	Function Controlled	Factory Setting	PIN #	Wire Colour
1	Mast from Upper Controls	60%	8	Green
2	Slew from Upper Controls	50%	13	Turquoise
3	Jib from Upper Controls and Drive in the tilted mode	100%	12	White
4	Drive in the elevated mode	20%	4	Orange
5	Drive in the stowed position	100%	7	Grey
6	Mast from Lower Controls and Steering	50%	16	Pink
7	Jib & Slew from Lower Controls	25%	11	Brown
8	Not used			
9	Not used			
10	Not used			

Table 6-2 :- Controller Switch Designation

⚠ WARNING ⚠

RISK OF SERIOUS INJURY.
It is not permitted to alter the above % speed settings . Temporary adjustment of speeds using the calibrator may be used by authorised personnel only

6.3 Using The Calibrator

The calibrator is a speed-setting and diagnostic tool.

Only trained and authorised personnel may use the calibrator to adjust speed setting. Speed setting changes are normally confined to special maintenance and testing circumstances.

The calibrator front panel is made up of 20 LED segments and they are marked as shown opposite Typical speed setting and properties are shown on the following tables.

There are two arrow buttons and a selector button on the calibrator.

+ ARROW, to increase each increment
- ARROW, to decrease each increment
SELECT, to move between values

When **SELECT** is pressed, each LED segment will light in turn, stopping when the **SELECT** button is released. Each setting or 'personality' can then be incremented or decremented using the + or - buttons when the LED adjacent to that personality is lit.

When the **TEST** LED is lit, the operator can view the state of the MOS90 inputs. The first input displayed is the accelerator and can vary from0 - 100%. When the + button is pressed once the switch Input 1 is displayed. This will be seen as **'1OP'** until the switch 1 Input voltage changes, **'1CL'** will then be displayed. This is repeated for all the switch inputs.

The battery voltage, motor voltage, motor current and controller temperature are recorded for the last session and may be displayed on the calibrator. The corresponding fields are designated:-

BATT V
MOTOR V
MOTOR A
TEMP C

respectively.

On selection of a field, if the **+** button is held the maximum value is indicated. If the **-** button is held the lowest value is indicated.

When the Calibrator is first connected up, the recorded run time (minutes) is displayed. This is the total engaged time for the MOS90.

Pressing the **+** button displays the time in thousands of hours. Pressing the **-** button displays the time in hundreds of hours.

When the Controller is pulsing (i.e. when in use), the decimal point in the minutes display will flash to indicate that the run time is being incremented and stored in memory.

The **F.WEAK** setting is not used on the MB machines. The field marked **TIMER** on the calibrator is the pump acceleration delay. This is the time it takes from 0 to 100% acceleration.

The **X2** field on the Calibrator is **IMAX** on the pump controllers.

The **X3** field is not used.

The **X4** field on the Calibrator is the design voltage across a fully charged battery cell on the machine.

The **X5** field on the calibrator shows that cell voltage below which the machine will cut out and indicate full discharge.

TRACTION			PUMP	
IMAX	■	AMP	***SPEED1***	***1 %***
PLUG	■	AMP	***SPEED2***	***2 %***
ACCEL	■	SEC	***SPEED3***	***3 %***
CREEP	■	%VB	***SPEED4***	***4 %***
BYPASS	■	AMP	***SPEED5***	***5 %***
SPEED	■	%MAX	***SPEED6***	***6 %***
SPEED1	■	%	***SPEED7***	***7 %***
SPEED2	■	%	***SPEED8***	***8 %***
F.WEAK	■	AMP	CREEP	%VB
TIMER	■	SEC	RAMP	SEC
SEAT	■	SEC	EXTRA	%
X2	■		IMAX	AMP
X3	■			
X4	■			
X5	■			
BATT	■	V		
MOTOR	■	V		
MOTOR	■	AMP		
TEMP	■	C		

Table 6-3: Calibrator Legend

6.4 ELECTRICAL FUNCTION LEGEND

REFERENCE	NAME	FUNCTION	LOCATION
TILT ALARM	Tilt Alarm	Audable sound to signify that the machine is off level	Upper Control Station
DRIVE ALARM	Drive Alarm	Audable sound to signify that the machine is in motion	Chassis mounted
BATTERY	Battery Pack	24Volt electrical storage & power supply	Within the upper mast cover
CHARGER	Battery Charger	Charges the battery pack from a 220/ 240 volt AC supply	Within the upper mast cover
FUSE 1	400 Amp Fuse	Provides current overload protection for the electrical motor	Mounted on the controller base plate
FUSE 2	7 Amp Fuse	Provides current overload protection for the control circuitry	Line-mounted close to the controller base plate
HORN	Sounding horn	Button-activated audable alarm to warn bystanders	Chassis mounted
TILT SENSOR	Tilt sensor switch	If the chassis tilts more than 2 degrees, the normally energised output cable(w) is de-energised.	Mounted on the chassis pothole guards on left hand side
MOS 90	Motor Controller	By means of pre-programmed settimgs, adjusts the voltage to the pump/motor thereby adjusts the oil flow rate from the pump.	Mounted on the aluminium heat-sink plate on chassis left hand side
SW 1	Selector Switch	'Deadman' type switch to activate the lower control functions only	Mounted on the lower control panel on the mast cover left hand side
SW 2	Toggle Switch	3-position switch to activate the slew funcion. Left, Right & Neutral	Mounted on the lower control panel on the mast cover left hand side
SW 3	Toggle Switch	3-position switch to activate the jib funcion. Up, Down & Neutral	Mounted on the lower control panel on the mast cover left hand side
SW 4	Toggle Switch	3-position switch to activate the mast funcion. Up, Down & Neutral	Mounted on the lower control panel on the mast cover left hand side

ELECTRICAL FUNCTION LEGEND.....cont'd

REFERENCE	NAME	FUNCTION	LOCATION
SW 5	Limit Switch	N/O inductive type switch to sense the platform position. The fully lowered platform closes the contacts and energises relay coils K8, K9 & K10. Creep speed and pothole protection bar position are controlled by this limit switch.	Mounted on the fixed mast with the sensor mounted on the jib strut
SW 6	High/Low Selector	2-position switch to energise the hydraulic 'series/parallel' solenoids CT23 & CT24 thus switching to fast travel speed. The alternate switch position de-energises these solenoids and allows the machine to travel slowly up inclines and ramps etc.	Mounted on the upper control station and marked:- 'Extra Traction' & 'Standard Drive'
SW 7	Horn Button	Activates the warning horn	Mounted on the upper control station left hand side
SW 8	Lift/Drive Selector	4 sets of contactors one of which is N/O. In 'Lift' position allows mast functions and controls the pothole cylinder. In 'Drive' position disallows lift, and allows drive subject to platform height and level condition etc.	Mounted on the upper control station and marked:- 'Lift Functions & 'Drive Functions'
SW 9	Function Selector	3-position selector switch. Preselect either Mast, Jib or Slew to enable joystick control of the function and to enable the controller pre-programmed speed range for that function.	Mounted on the upper control station
SW 10	Key Switch	3-position key switch. Key 'Off and Out' position cuts power to all functions. Key 'On' sends power to lower controls, tilt alarm and jib limit switch. The momentary 'Emergency down' position enables jib down, mast down exclusively.	Mounted on the upper control station on the left hand side
EM 1	Emergency Stop	This primary emergency stop button is connected directly to the circuit fuse. Pressing the button cuts all electrical power.	Mounted on the lower control panel.
EM 2	Emergency Stop	This emergency stop button is electrically adjacent to and in series with EM1 above and has the same function.	Mounted on the upper control station.

ELECTRICAL FUNCTION LEGEND... CONT'D

REFERENCE	NAME	FUNCTION	LOCATION
B.D.I	Battery Indicator	Battery Discharge LED indicator. Green indicate degree of charge. Orange lights warns of approaching discharge. Red means no charge.	Upper control station
SOL1.. SOL14	Valve Block Solenoids	18 Volt solenoids which operate the various hydraulic valves on the main valve block.	Removable coils on the valve block cartridges in the chassis
SOL 15	Jib Cylinder Solenoid	18 Volt solenoids which operates the hydraulic valve on the jib cylinder.	Removable coil on the jib cylinder valve block. (remote from all other coils)
K1	Line contactor	The normally closed relay switches charge current to batteries. Energised coil switches battery current to pump motor unit	Mounted on the controller base plate
K2	BDI Relay	Relay coil is energised when the key is on. This powers up the B.D.I and energises relay coils K5, K12 & K15.	Mounted within enclosure on the lower PCB
K3	Tilt Relay	When the key is on and machine is level, this relay coil is energised. Off level de-energises the coil and energises the relay coils K14 & K18.	Mounted within enclosure on the lower PCB
K4	Tilt Relay	When the key is on and machine is level, this relay coil is energised. Off level de-energises the coil and prevents mast up and jib up from lower controls.	Mounted within enclosure on the lower PCB
K5	BDI Relay	With the key switched to momentary emergency down this relay coil is energised. Mast up and jib up from lower controls is allowed subject to level.	Mounted within enclosure on the lower PCB
K6	Tilt/Drive Relay	With the key on and the machine level this coil is energised allowing power to the reverse drive solenoid.	Mounted within enclosure on the lower PCB
K7	Tilt/Drive Relay	With the key on and the machine level this coil is energised allowing power to the forward drive solenoid.	Mounted within enclosure on the lower PCB

ELECTRICAL FUNCTION LEGEND... CONT'D

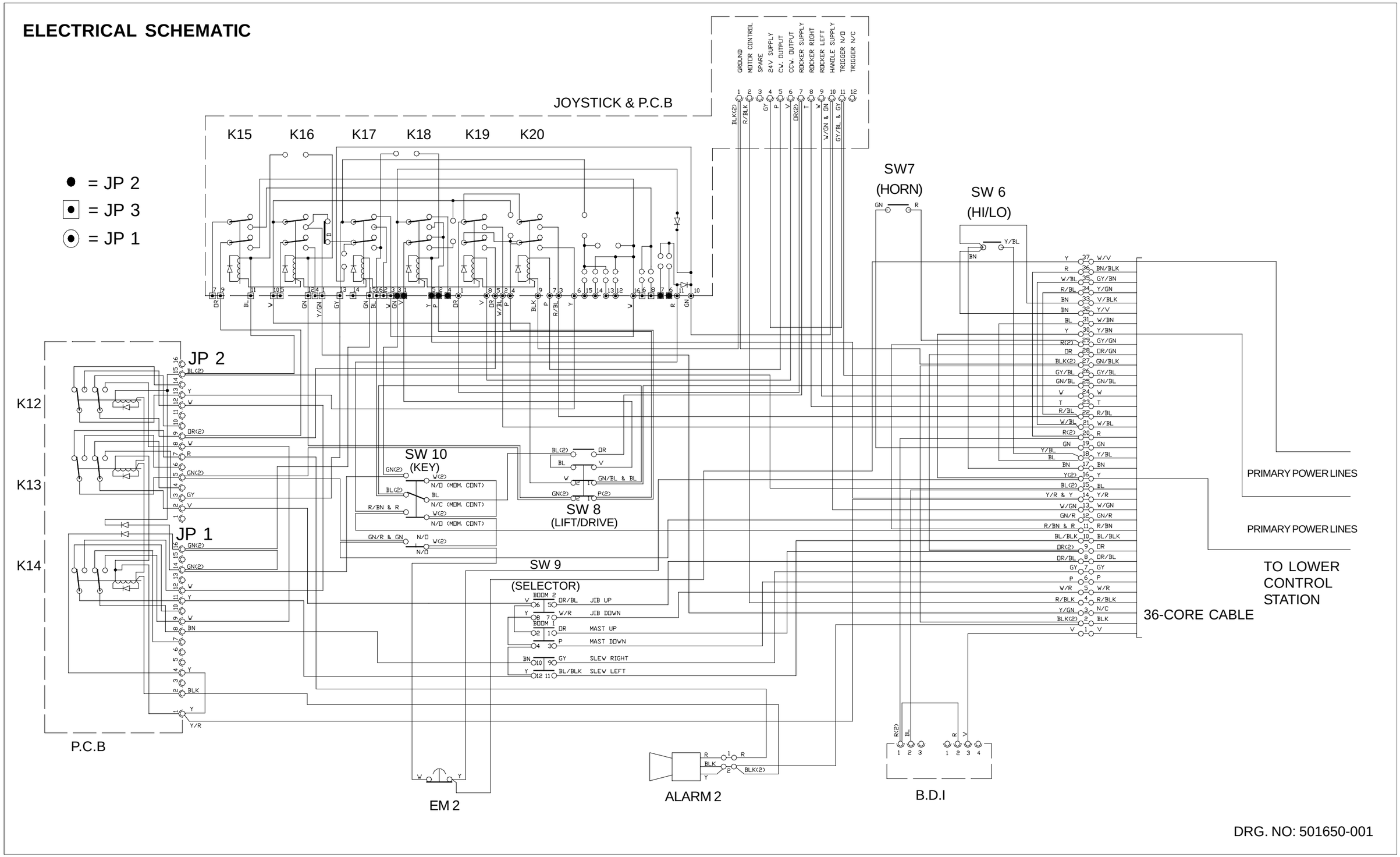
REFERENCE	NAME	FUNCTION	LOCATION
K8	Pothole Relay	With the jib and mast are fully lowered against the limit switch, this coil is energised allowing power to the pothole retract solenoid.	Mounted within enclosure on the lower PCB
K9	Raised/Drive Relay	With the jib and mast are fully lowered against the limit switch, this coil is energised enabling full travel speed forward.	Mounted within enclosure on the lower PCB
K10	Raised/Drive Relay	With the jib and mast are fully lowered against the limit switch, this coil is energised enabling full travel speed reverse.	Mounted within enclosure on the lower PCB
K11	Motion Relay	Energised by either forward or reverse on the joystick. The motion alarm is energised simultaneously.	Mounted within enclosure on the lower PCB
K12	Emergency Relay	Energised by momentary operation of the emergency key position.	Mounted on the small upper PCB
K13	Emergency Relay	Continuously energised coil while the machine is level. Off levelling causes the alarm to sound and jib and/or mast down functions only from upper controls.	Mounted on the small upper PCB
K14	Emergency Relay	Continuously energised coil while the machine is level. Off levelling causes the alarm to sound and dissallows slew operation from upper controls.	Mounted on the small upper PCB
K15	BDI Relay	Energised by momentary operation of the emergency key position.	Mounted on the joystick PCB
K16	Key-Switch Relay	Energised by momentary operation of the emergency key position when the selector switch SW 8 is on the default drive position.	Mounted on the joystick PCB
K17	Intermittent Relay	Energised by momentary operation of the emergency key position. Disallows drive but allows pump lift operations.	Mounted on the joystick PCB
K18	Tilt Relay	Continuously energised coil while the machine is level. Off levelling dissallows power to the upper controls joystick.	Mounted on the joystick PCB

ELECTRICAL FUNCTION LEGEND... CONT'D

REFERENCE	NAME	FUNCTION	LOCATION
K19	Fwd Drive Relay	Becomes energised on ccw operation of the joystick potentiometer and allows power to the forward drive solenoid.	Mounted on the joystick PCB
K20	Rev Drive Relay	Becomes energised on cw operation of the joystick potentiometer and allows power to the reverse drive solenoid.	Mounted on the joystick PCB
K21	Extra Traction Relay	Becomes energised during drive when the High/Low selector (SW 6) is positioned to 'Extra Traction'.	Mounted on the main lower PCB
D_b	Blocking Diodes	Solid state device to prevent current flow in one direction only. Used, for example, to enable a particular control speed setting from the upper station but to enable a different speed setting of the same function from the lower station.	Mounted on the main lower PCB
D_s	Suppresion Diodes	Solid state device to prevent current flow in one direction only. Used, in these cases to suppress the inductive currents from the solenoid coils.	Mounted on the main lower PCB
	Notes:-		
		1. For clarity, not every blocking or suppression diode is labelled on the diagram. In general these components are not serviceable.	
		2. The individual wires connecting between upper and lower stations and the controller are not shown. Continuity may be followed by noting the colour coding at the relevant terminals.	

NOTES:

ELECTRICAL SCHEMATIC

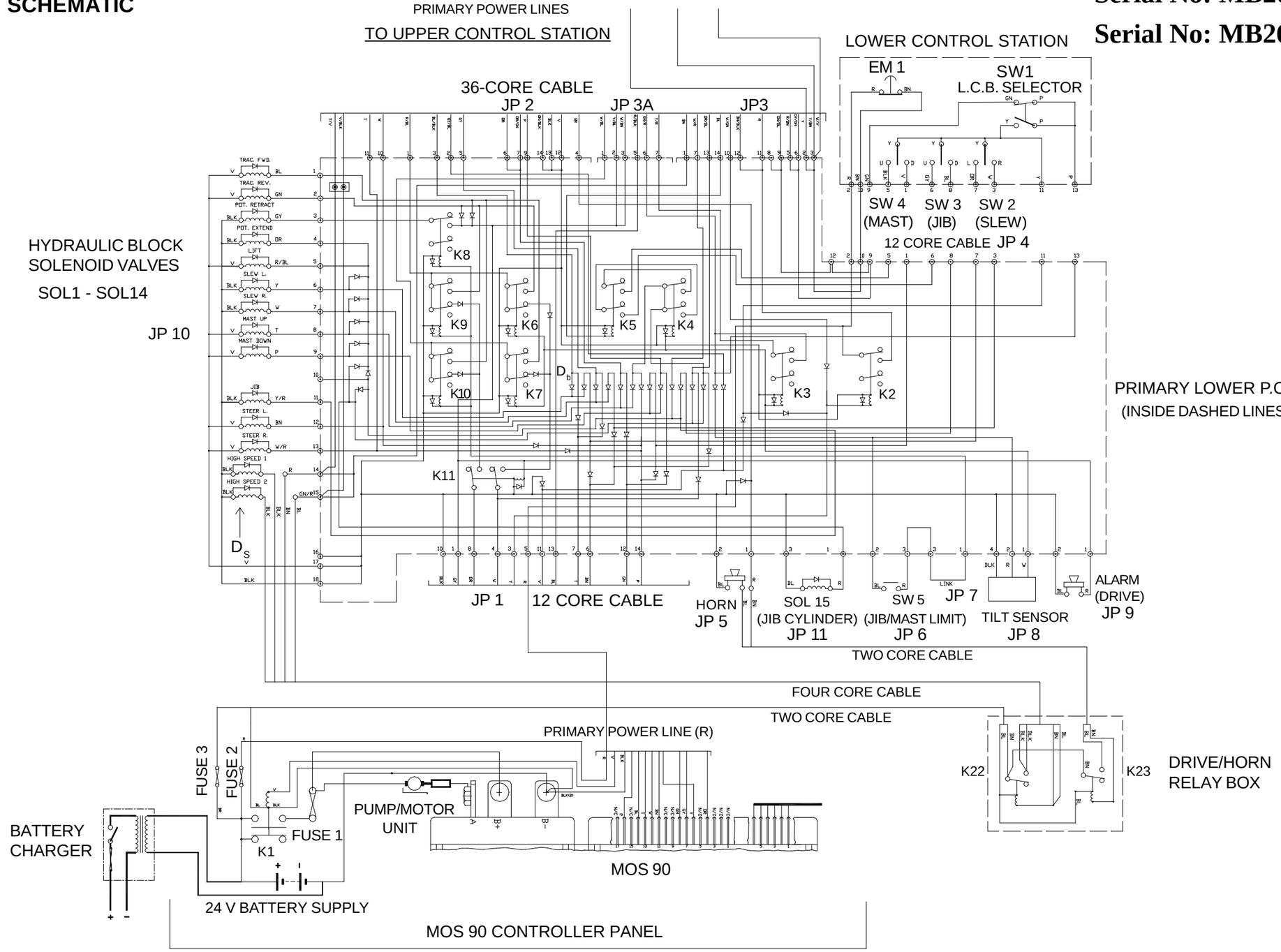


DRG. NO: 501650-001

ELECTRICAL SCHEMATIC

Serial No: MB20/ 0000 to 0040 incl.

Serial No: MB26/ 0000 to 0064 incl.

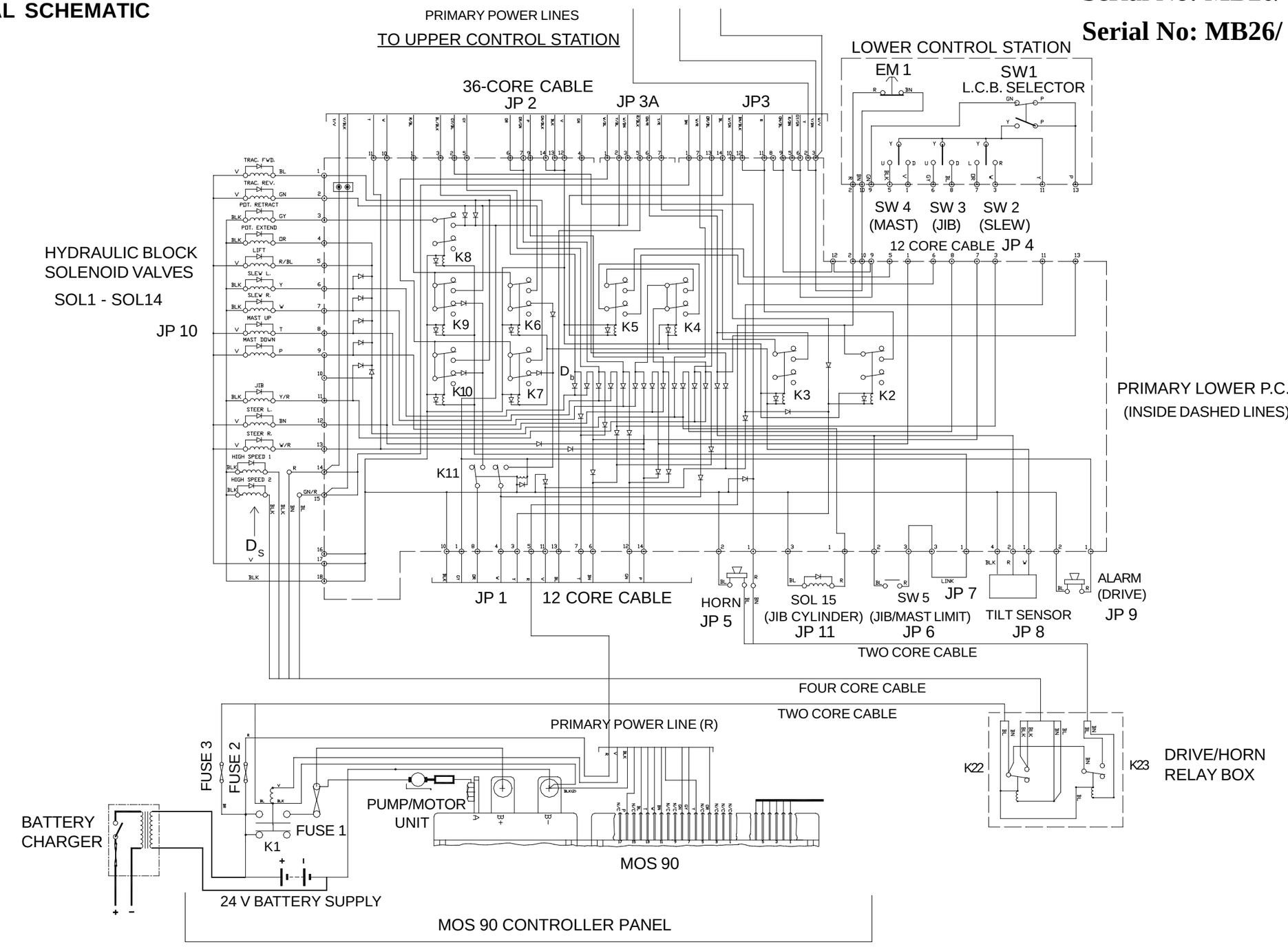


DRG. NO: 501650-002

ELECTRICAL SCHEMATIC

Serial No: MB20/ 0041 to 0081 incl.

Serial No: MB26/ 0065 to 0095 incl.

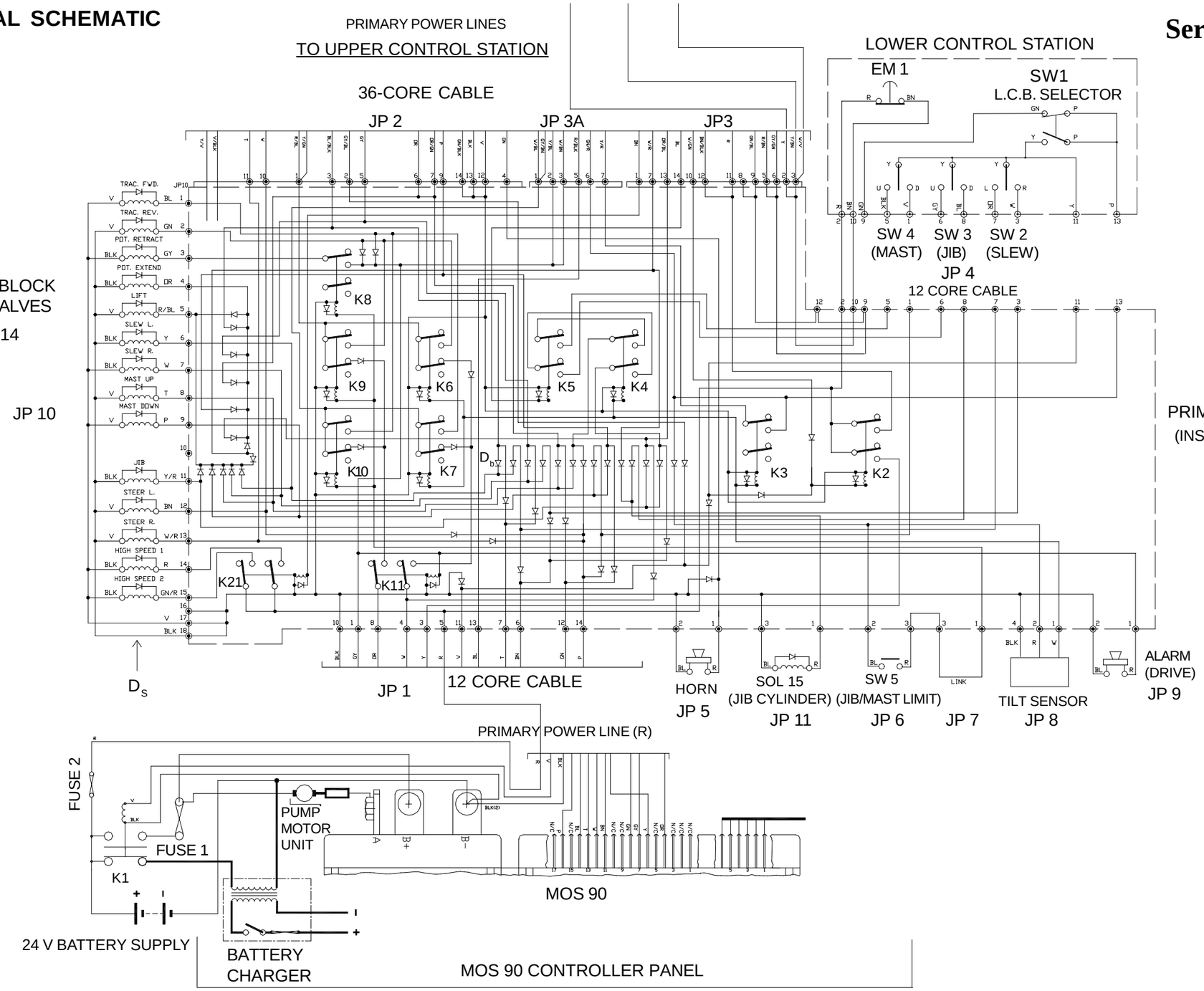


DRG. NO: 501650-003

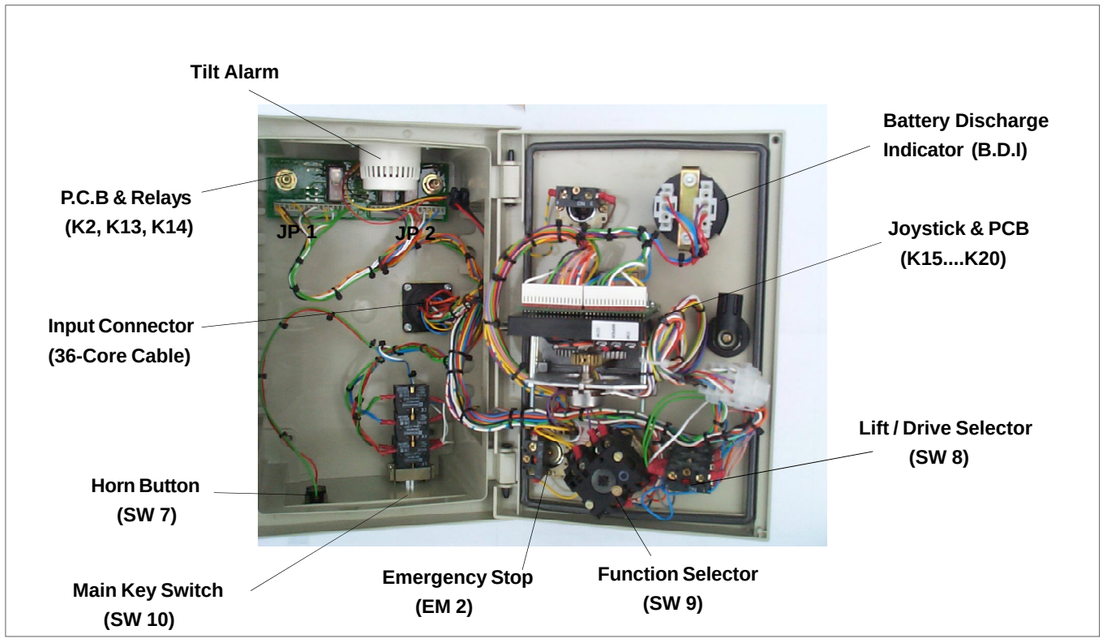
Serial No: MB20/ 0082 upwards.

Serial No: MB26/ 0096 upwards.

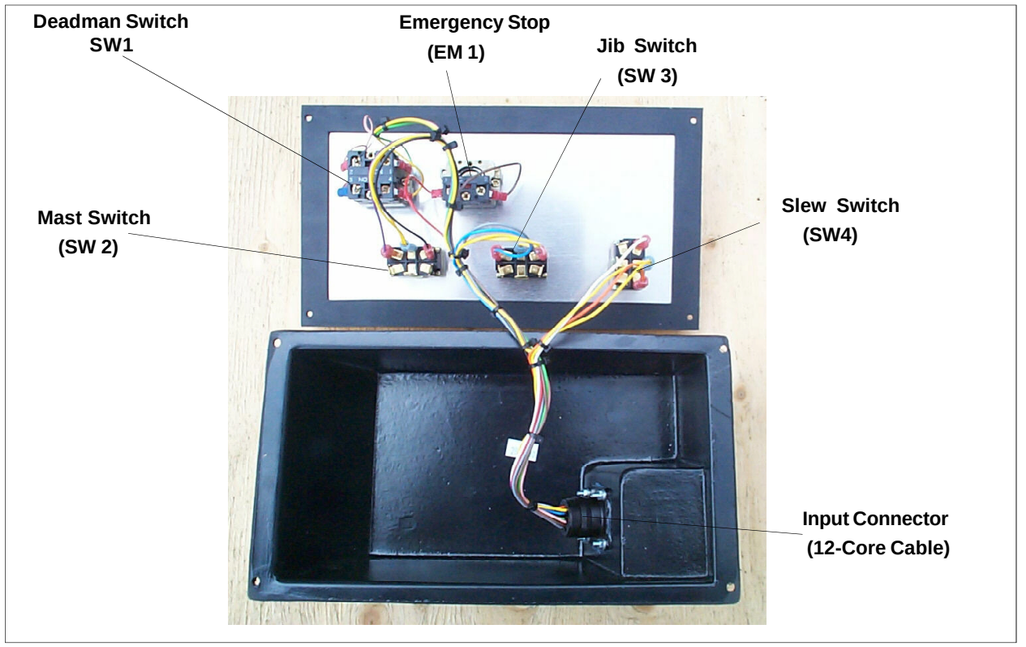
ELECTRICAL SCHEMATIC



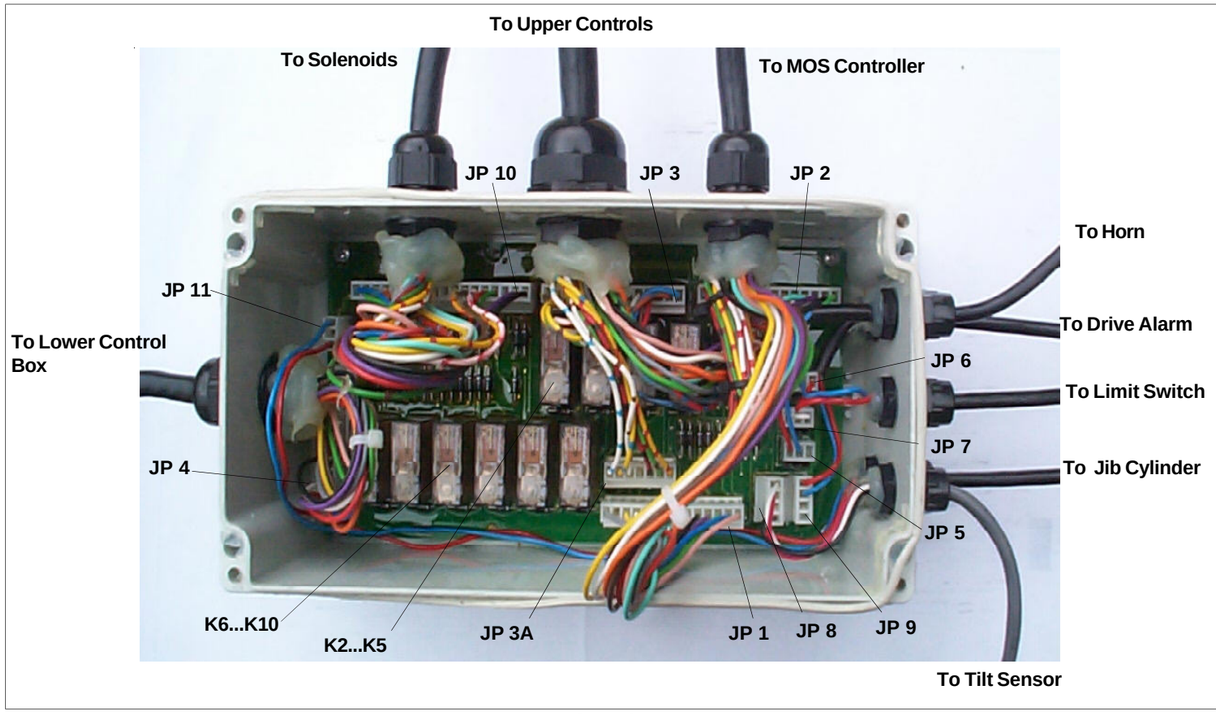
DRG. NO: 501650-004



Layout of Upper Control Box & PCB's



Layout of Lower Control Box & PCB's



Layout of Primary PCB

Electrical System

NOTES:

FINAL ASSEMBLY
MB20N, MB20 & MB26

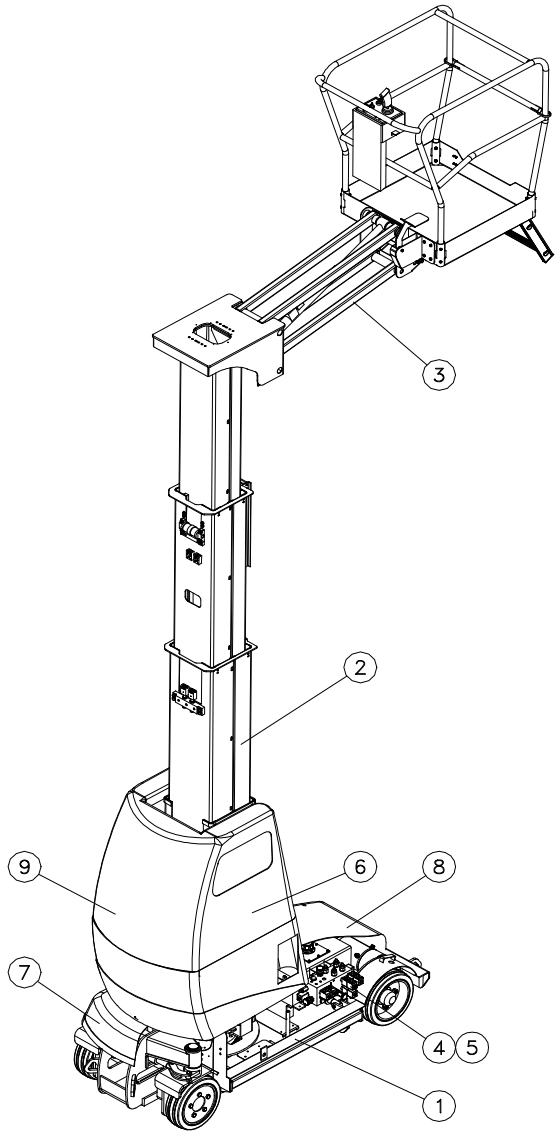
ITEM	DESCRIPTION
1	Chassis Assembly
2	Mast Assembly
3	Jib & Cage Assembly
4	Electrical Assembly
5	Hydraulic Assembly
6	Decal Assembly
7	Front Chassis Cover
8	Rear Chassis Cover
9	Mast/Ballast Cover

Note: Warranty is void if ballast is removed from the machine.

NOTE:

When selecting parts/partnumbers it is necessary to identify the machine type in question: MB20N
MB20
MB26
and hence identify the corresponding parts section.

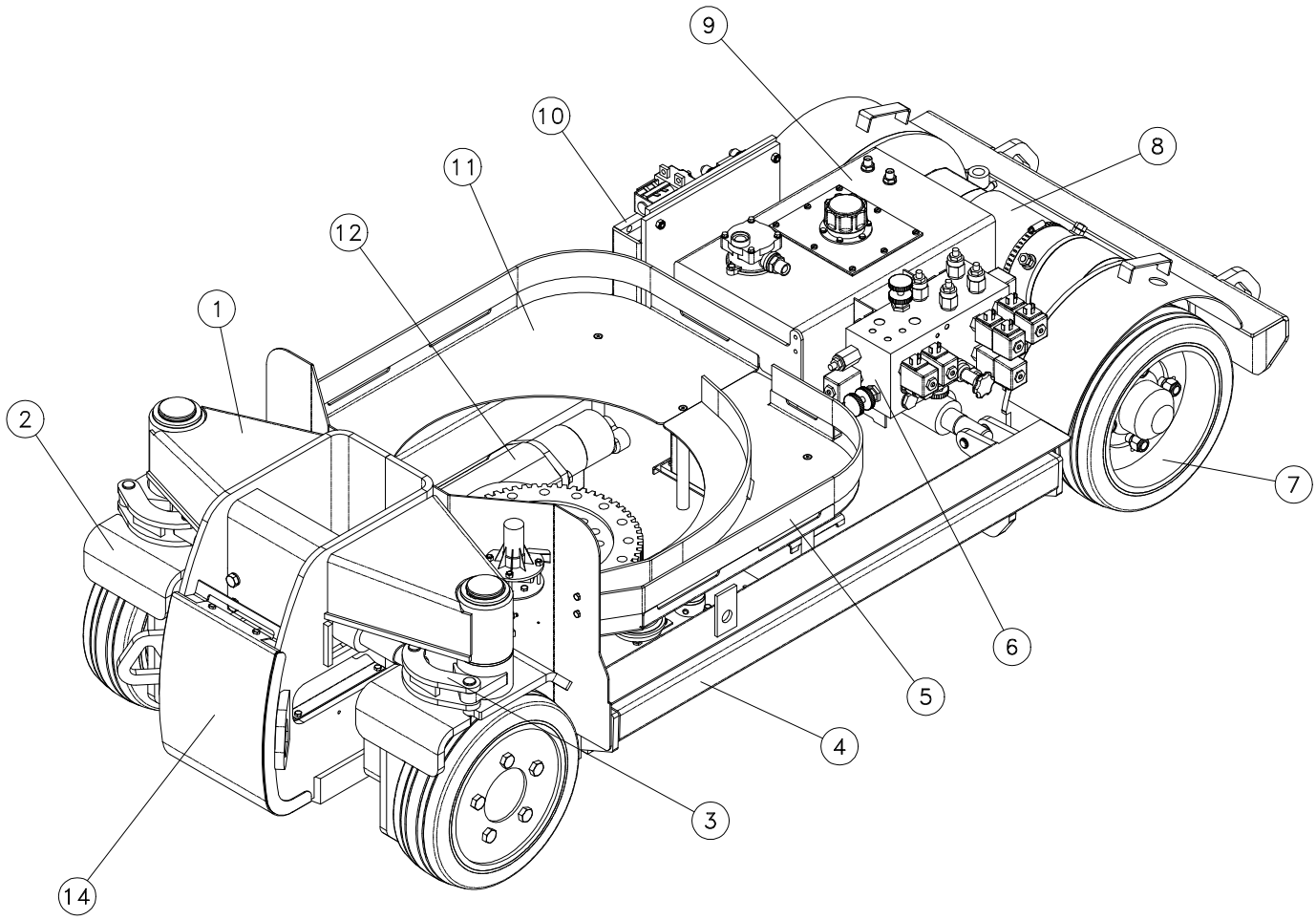
General Index to Parts



CHASSIS ASSEMBLY MB20N

ITEM	PART NO.	DESCRIPTION	QTY.
1	500715-000	CHASSIS WELDMENT	1
2	**REF.**	**FRONT WHEEL ASSEMBLY**	**1**
3	**REF.**	**STEERING ASSEMBLY**	**1**
4	**REF.**	**POTHOLE ASSEMBLY**	**1**
5	500840-000	CHAIN SLIDE PLATE - LH	1
6	**REF.**	**HYDRAULIC ASSEMBLY**	**1**
7	**REF.**	**REAR WHEEL ASSEMBLY**	**1**
8	**501599-000**	**PUMP / MOTOR UNIT**	**1**
9	**501234-000**	**HYDRAULIC TANK**	**1**
10	**REF.**	**ELECTRICAL ASSEMBLY**	**1**
11	500840-001	CHAIN SLIDE PLATE - RH	1
12	**REF.**	**SLEW BEARING**	**1**
13	501212-000	CHASSIS ENERGY CHAIN	1
14	501288-000	NOSE COVER (NARROW)	1

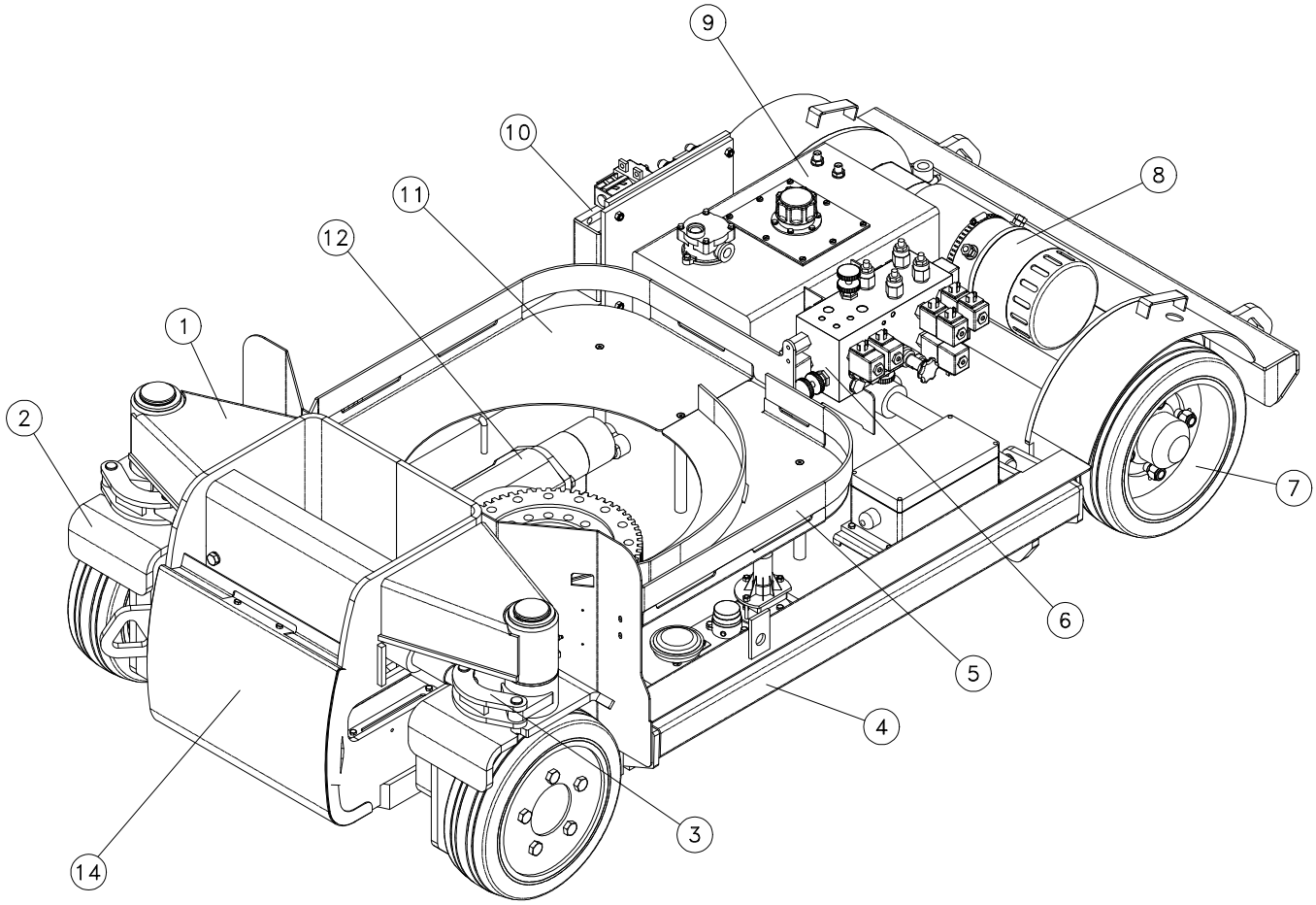
Note: Parts in bold type refer to parts breakdown on following pages.
Item 13 not shown for clarity.



CHASSIS ASSEMBLY MB20 & MB26

ITEM	PART NO.	DESCRIPTION	QTY.
1	500715-001	CHASSIS WELDMENT	1
2	**REF.**	**FRONT WHEEL ASSEMBLY**	**1**
3	**REF.**	**STEERING ASSEMBLY**	**1**
4	**REF.**	**POTHOLE ASSEMBLY**	**1**
5	500840-000	CHAIN SLIDE PLATE - LH	1
6	**REF.**	**HYDRAULIC ASSEMBLY**	**1**
7	**REF.**	**REAR WHEEL ASSEMBLY**	**1**
8	**501599-000**	**PUMP / MOTOR UNIT**	**1**
9	**501234-000**	**HYDRAULIC TANK**	**1**
10	**REF.**	**ELECTRICAL ASSEMBLY**	**1**
11	500840-001	CHAIN SLIDE PLATE - RH	1
12	**REF.**	**SLEW BEARING**	**1**
13	501212-000	CHASSIS ENERGY CHAIN	1
14	501288-001	NOSE COVER (WIDE)	1

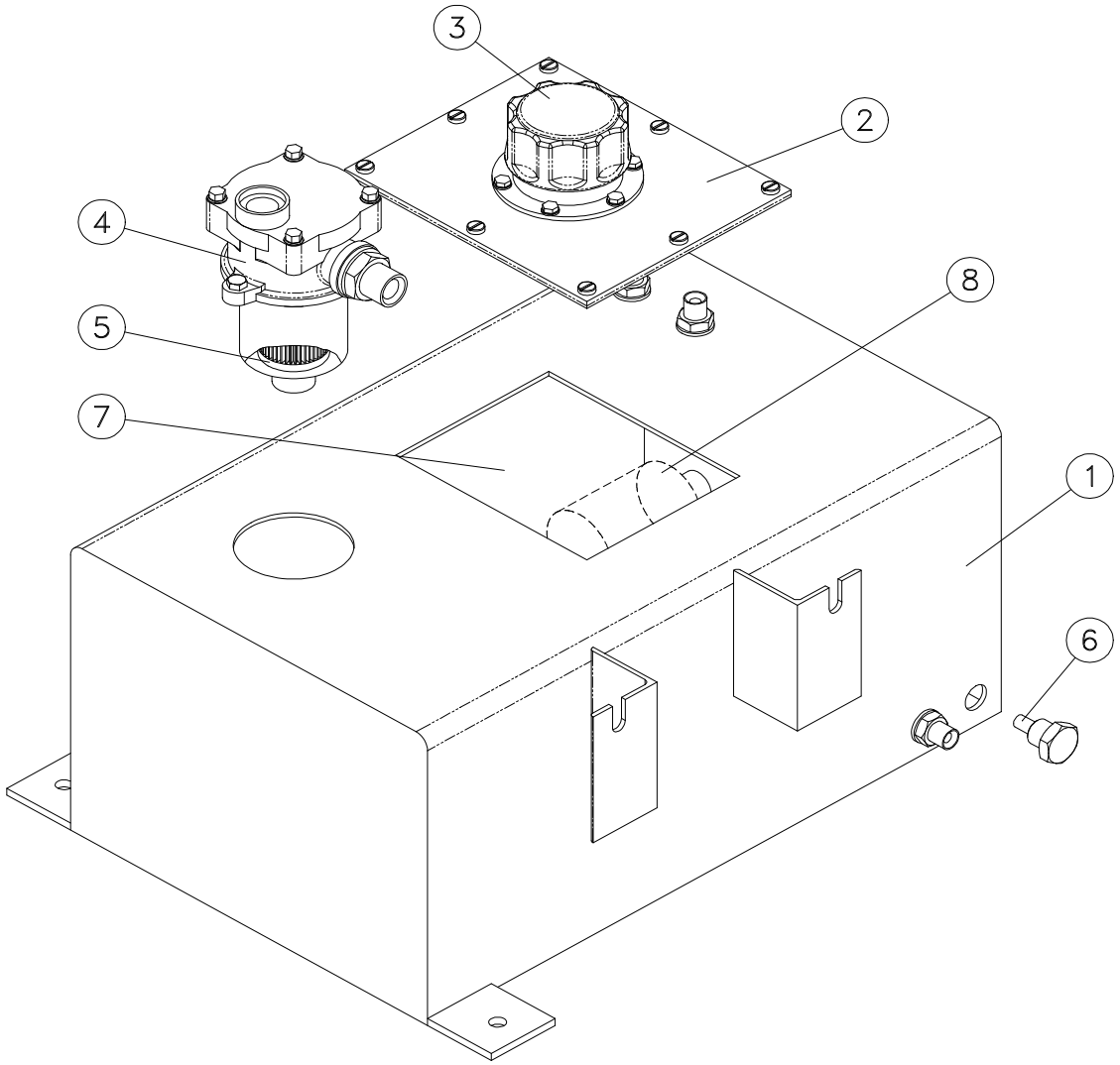
Note: Parts in bold type refer to parts breakdown on following pages.
Item 13 not shown for clarity.



HYDRAULIC TANK

501234-000

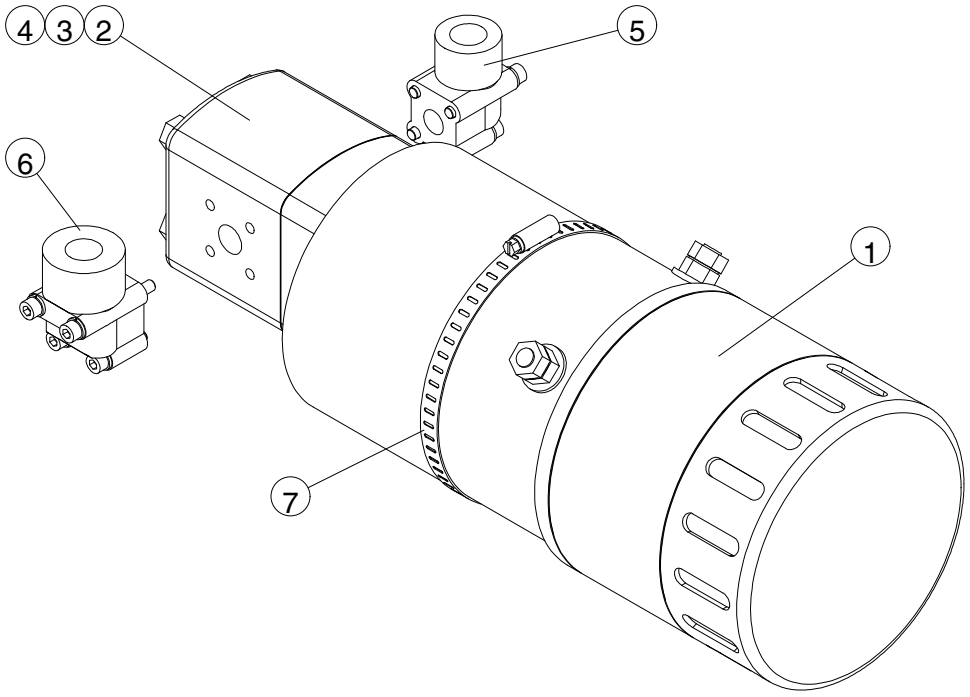
ITEM	PART NO.	DESCRIPTION	QTY.
1	500728-000	TANK WELDMENT	1
2	500728-001	INSPECTION LID & GASKET	1
3	057534-000	FILLER BREATHER CAP	1
4	057532-000	FILTER BODY	1
5	058074-000	REPLACEMENT FILTER CARTRIDGE	1
6	057108-000	DRAIN PLUG	1
7	057533-000	HYDRAULIC OIL I.S.O VG 46	20l
8	058359-000	SUCTION FILTER	1



HYDRAULIC PUMP-MOTOR UNIT

501599-000

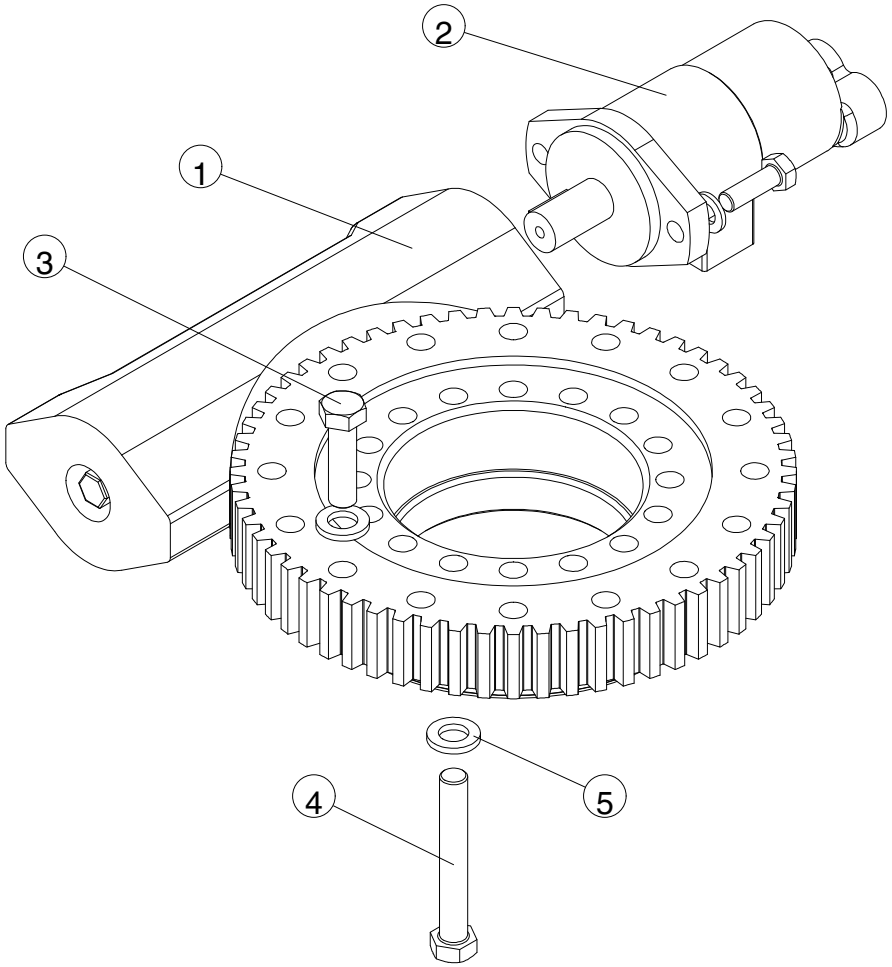
ITEM	PART NO.	DESCRIPTION	QTY.
1	501599-001	ELECTRIC MOTOR	1
2	058862-000	HYDRAULIC PUMP COMPLETE	1
3	058862-001	PUMP SEAL KIT	1
4	058847-000	DRIVE COUPLING	1
5	501232-002	PRESSURE PORT ADAPTOR KIT	1
6	501232-003	SUCTION PORT ADAPTOR KIT	1
7	058114-000	FIXING CLIP (HOSE CLIP)	1



SLEW BEARING

ITEM	PART NO.	DESCRIPTION	QTY.
1	501713-000	WORM DRIVE UNIT	1
2	500285-000	HYDRAULIC MOTOR	1
3	500280-057	BOLT 5/8" - 11 UNC x 2 1/4" Gr 10.9	16
4	500280-110	BOLT 5/8" - 11 UNC x 110mm Gr 10.9	16
5	500281-000	WASHER (HARDENED STEEL)	32

Item 3 secures slewing ring to mast assembly
Item 4 secures slewing ring to chassis

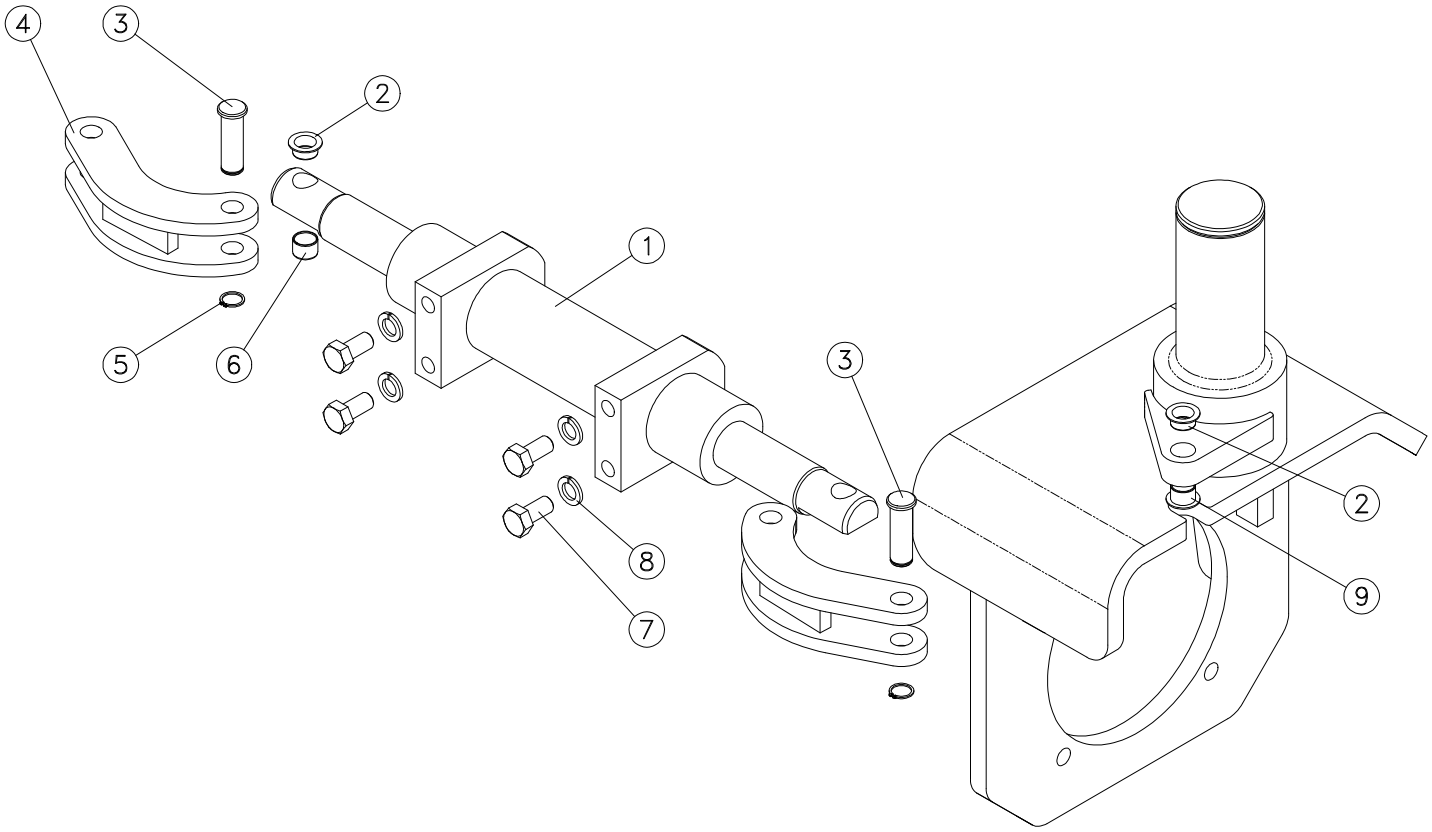


STEERING ASSEMBLY MB20N

ITEM	PART NO.	DESCRIPTION	QTY.
1	500782-000	STEERING CYLINDER - MB20N	1
2	501340-000	FLANGED BUSH (FMB1509DU)	4
3	501227-000	PIVOT PIN	4
4	500727-000	LINK ARM WELDMENT	1
5	501056-000	dia.15 EXTERNAL CIRCLIP	4
6	501439-000	PLAIN BUSH (MB1512DU)	2
7	058494-025	M12 x 25 HEX HD SCREW GRADE 8.8	4
8	056021-012	M12 SPRING WASHER	4
9	501067-000	FLANGED BUSH (FMB1512DU)	2

STEERING ASSEMBLY MB20 & MB26

ITEM	PART NO.	DESCRIPTION	QTY.
1	500782-001	STEERING CYLINDER	1
2	501340-000	FLANGED BUSH (FMB1509DU)	4
3	501227-000	PIVOT PIN	4
4	500727-000	LINK ARM WELDMENT	1
5	501056-000	dia.15 EXTERNAL CIRCLIP	4
6	501439-000	PLAIN BUSH (MB1512DU)	2
7	058494-025	M12 x 25 HEX HD SCREW GRADE 8.8	4
8	056021-012	M12 SPRING WASHER	4
9	501067-000	FLANGED BUSH (FMB1512DU)	2

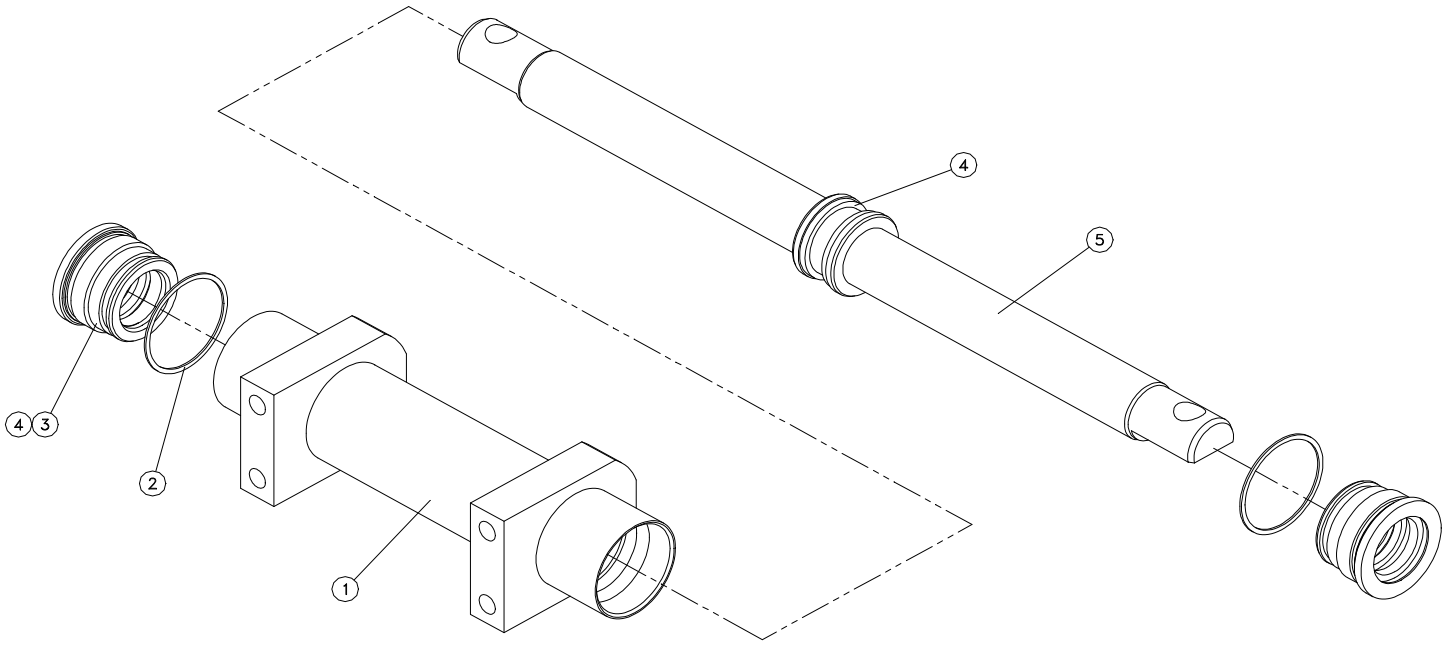


STEERING CYLINDER MB20N
500782-000

ITEM	PART NO.	DESCRIPTION	QTY.
1	-	CYLINDER BODY	1
2	-	WASHER TAB	2
3	-	BODY END CAP	2
4	500460-000	SEAL KIT	1
5	-	CYLINDER ROD	1

STEERING CYLINDER MB20 & MB26
500782-001

ITEM	PART NO.	DESCRIPTION	QTY.
1	-	CYLINDER BODY	1
2	-	WASHER TAB	1
3	-	BODY END CAP	2
4	500460-000	SEAL KIT	2
5	-	CYLINDER ROD	1

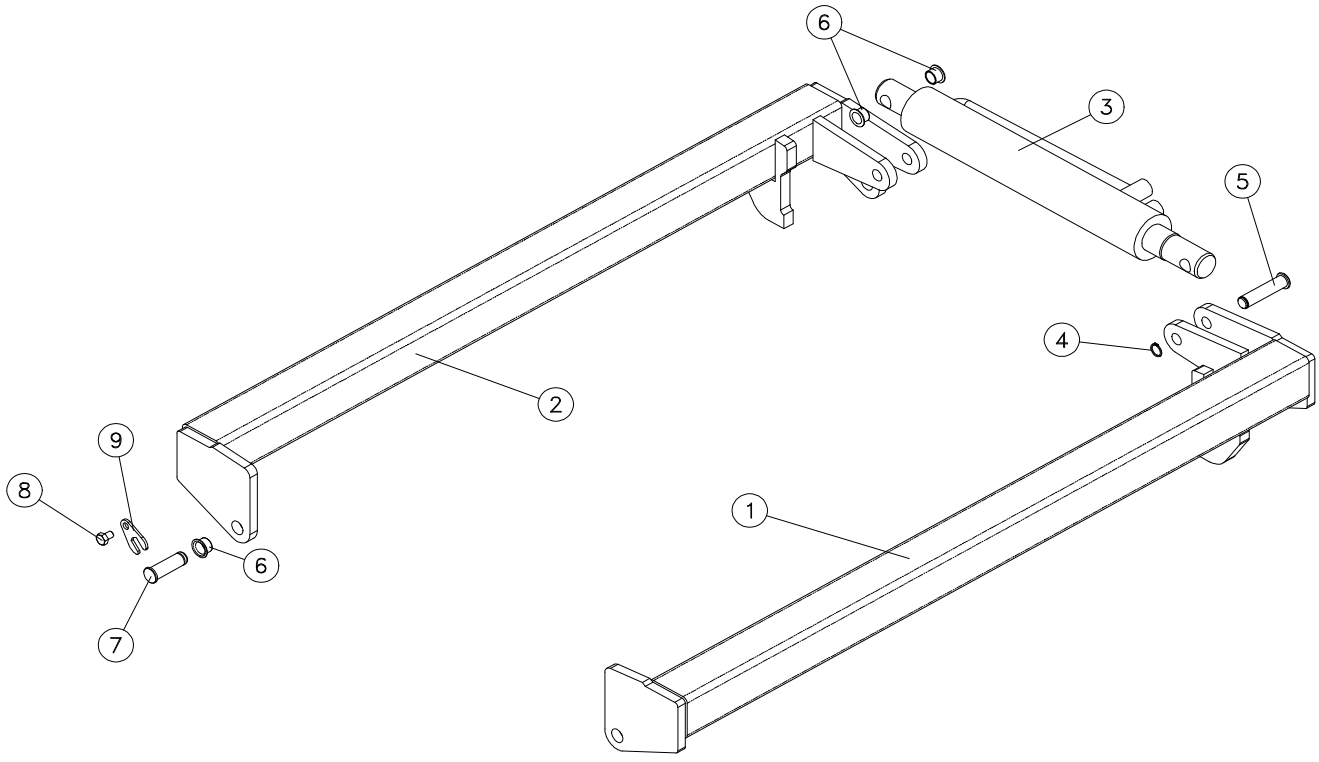


POTHOLE ASSEMBLY MB20N

ITEM	PART NO.	DESCRIPTION	QTY.
1	500726-000	POTHOLE WELDMENT - LH	1
2	500726-001	POTHOLE WELDMENT - RH	1
3	500783-000	POTHOLE CYLINDER - MB20N	1
4	501056-000	dia.15 EXTERNAL CIRCLIP	2
5	501226-000	PIVOT PIN	2
6	501067-000	FLANGED BUSH (FMB1512DU)	8
7	501225-000	PIVOT PIN	4
8	058492-012	M8 x 12 HEX HD SCREW - GRADE 8.8	4
9	500776-000	RETAINING PLATE	4

POTHOLE ASSEMBLY MB20 & MB26

ITEM	PART NO.	DESCRIPTION	QTY.
1	500726-000	POTHOLE WELDMENT - LH	1
2	500726-001	POTHOLE WELDMENT - RH	1
3	500783-001	POTHOLE CYLINDER	1
4	501056-000	dia.15 EXTERNAL CIRCLIP	2
5	501226-000	PIVOT PIN	2
6	501067-000	FLANGED BUSH (FMB1512DU)	8
7	501225-000	PIVOT PIN	4
8	058492-012	M8 x 12 HEX HD SCREW - GRADE 8.8	4
9	500776-000	RETAINING PLATE	4



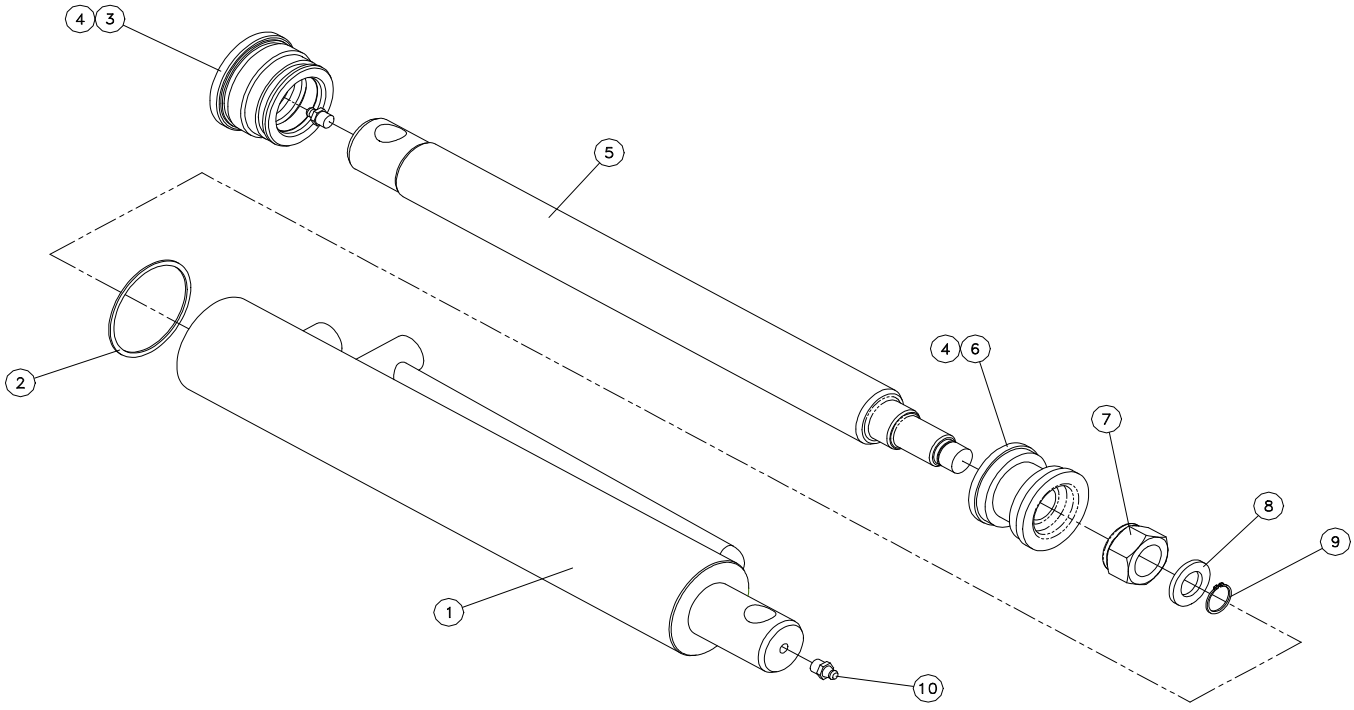
Illustrated Parts List

POTHOLE CYLINDER MB20N
500783-000

ITEM	PART NO.	DESCRIPTION	QTY.
1	-	CYLINDER BODY	1
2	-	WASHER TAB	1
3	-	BODY END CAP	1
4	500459-000	SEAL KIT	1
5	-	CYLINDER ROD	1
6	-	PISTON HEAD	1
7	-	LOCK NUT	1
8	-	WASHER	1
9	-	CIRCLIP	1
10	057048-000	M6 GREASE NIPPLE	2

POTHOLE CYLINDER MB20 & MB26
500783-001

ITEM	PART NO.	DESCRIPTION	QTY.
1	-	CYLINDER BODY	1
2	-	WASHER TAB	1
3	-	BODY END CAP	1
4	500459-000	SEAL KIT	1
5	-	CYLINDER ROD	1
6	-	PISTON HEAD	1
7	-	LOCK NUT	1
8	-	WASHER	1
9	-	CIRCLIP	1
10	057048-000	M6 GREASE NIPPLE	2



POTHOLE CYLINDER MB20N

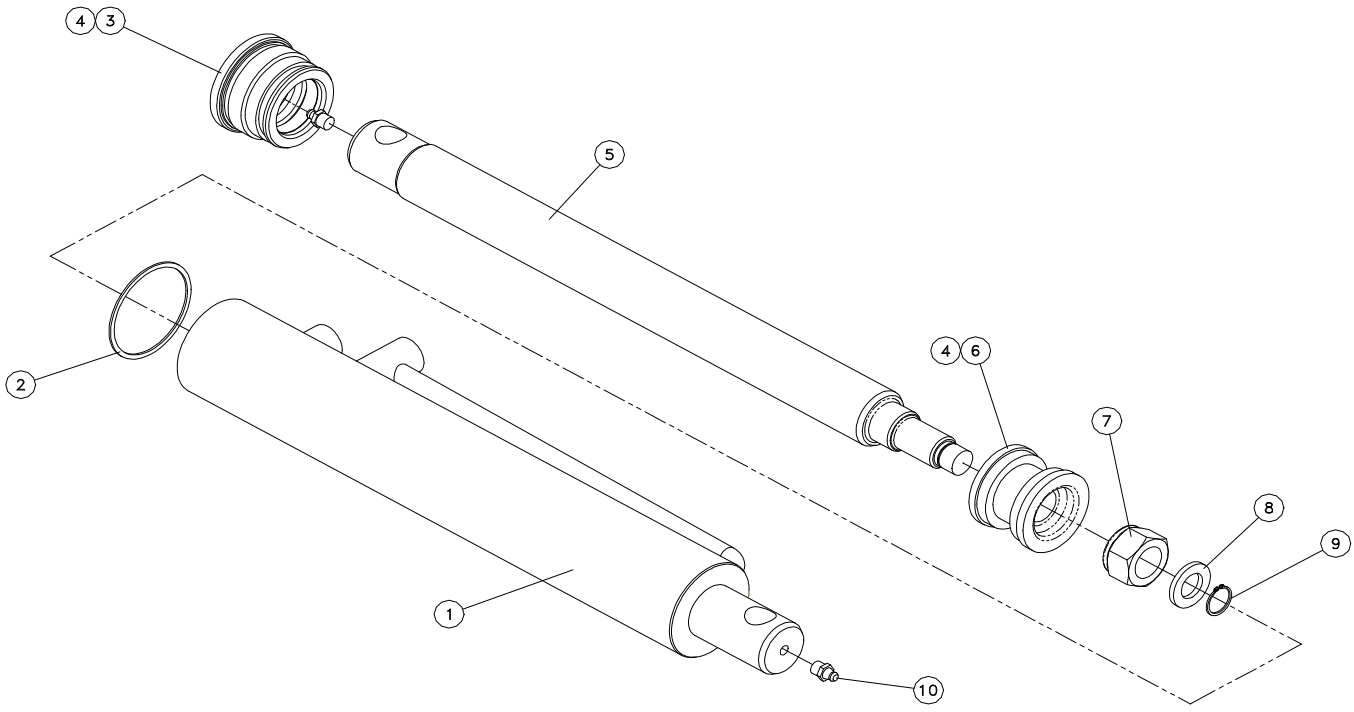
501610-000

ITEM	PART NO.	DESCRIPTION	QTY.
1	-	CYLINDER BODY	1
2	-	WASHER TAB	1
3	-	BODY END CAP	1
4	501663-000	SEAL KIT	1
5	-	CYLINDER ROD	1
6	-	PISTON HEAD	1
7	-	LOCK NUT	1
8	-	WASHER	1
9	-	CIRCLIP	1
10	057048-000	M6 GREASE NIPPLE	2

POTHOLE CYLINDER MB20 & MB26

501610-001

ITEM	PART NO.	DESCRIPTION	QTY.
1	-	CYLINDER BODY	1
2	-	WASHER TAB	1
3	-	BODY END CAP	1
4	501663-000	SEAL KIT	1
5	-	CYLINDER ROD	1
6	-	PISTON HEAD	1
7	-	LOCK NUT	1
8	-	WASHER	1
9	-	CIRCLIP	1
10	057048-000	M6 GREASE NIPPLE	2



Illustrated Parts List

FRONT WHEEL ASSEMBLY - LH (LEFT HAND SHOWN)

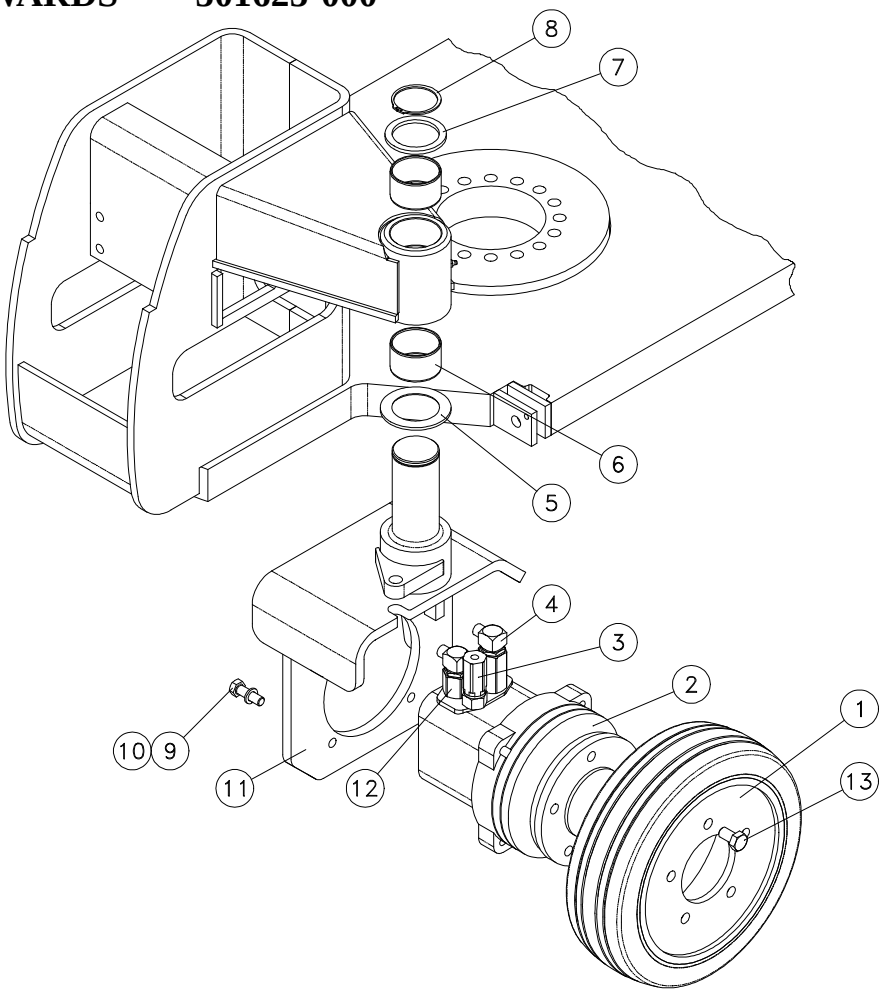
ITEM	PART NO.	DESCRIPTION	QTY.
1	501625-000	FRONT WHEEL	1
2	501233-000	WHEEL MOTOR - LH	1
3	501430-000	STRAIGHT SWIVEL FITTING	1
4	501268-001	SWIVEL FITTING - LONG	1
5	501066-000	TRUST WASHER	1
6	501068-000	KING PIN BUSH (MB6040DU)	2
7	500775-000	STEERING RETAINING WASHER	1
8	501055-000	dia.60 EXTERNAL CIRCLIP	1
9	056065-040	M12 x 40 HEX HD BOLT - GRADE 8.8	4
10	056021-012	M12 SPRING WASHER	4
11	500730-000	MOTOR MOUNT WELDMENT - LH	1
12	501268-000	SWIVEL FITTING - SHORT	1
13	501248-025	M14x1.5 x 25 HEX HD SCREW GR 10.9	5

FRONT WHEEL ASSEMBLY - RH

ITEM	PART NO.	DESCRIPTION	QTY.
1	501625-000	FRONT WHEEL	1
2	501233-001	WHEEL MOTOR - RH	1
3	501430-000	STRAIGHT SWIVEL FITTING	1
4	501268-001	SWIVEL FITTING - LONG	1
5	501066-000	TRUST WASHER	1
6	501068-000	KING PIN BUSH (MB6040DU)	2
7	500775-000	STEERING RETAINING WASHER	1
8	501055-000	dia.60 EXTERNAL CIRCLIP	1
9	056065-040	M12 x 40 HEX HD BOLT - GRADE 8.8	4
10	056021-012	M12 SPRING WASHER	4
11	500730-001	MOTOR MOUNT WELDMENT - RH	1
12	501268-000	SWIVEL FITTING - SHORT	1
13	501248-025	M14x1.5 x 25 HEX HD SCREW GR 10.9	5

NOTE: FRONT WHEEL

MB20 0001 - MB20 0079 = 500790-000
MB26 0001 - MB26 0103 = 500790-000
MB20 0079 ONWARDS = 501625-000
MB26 0103 ONWARDS = 501625-000

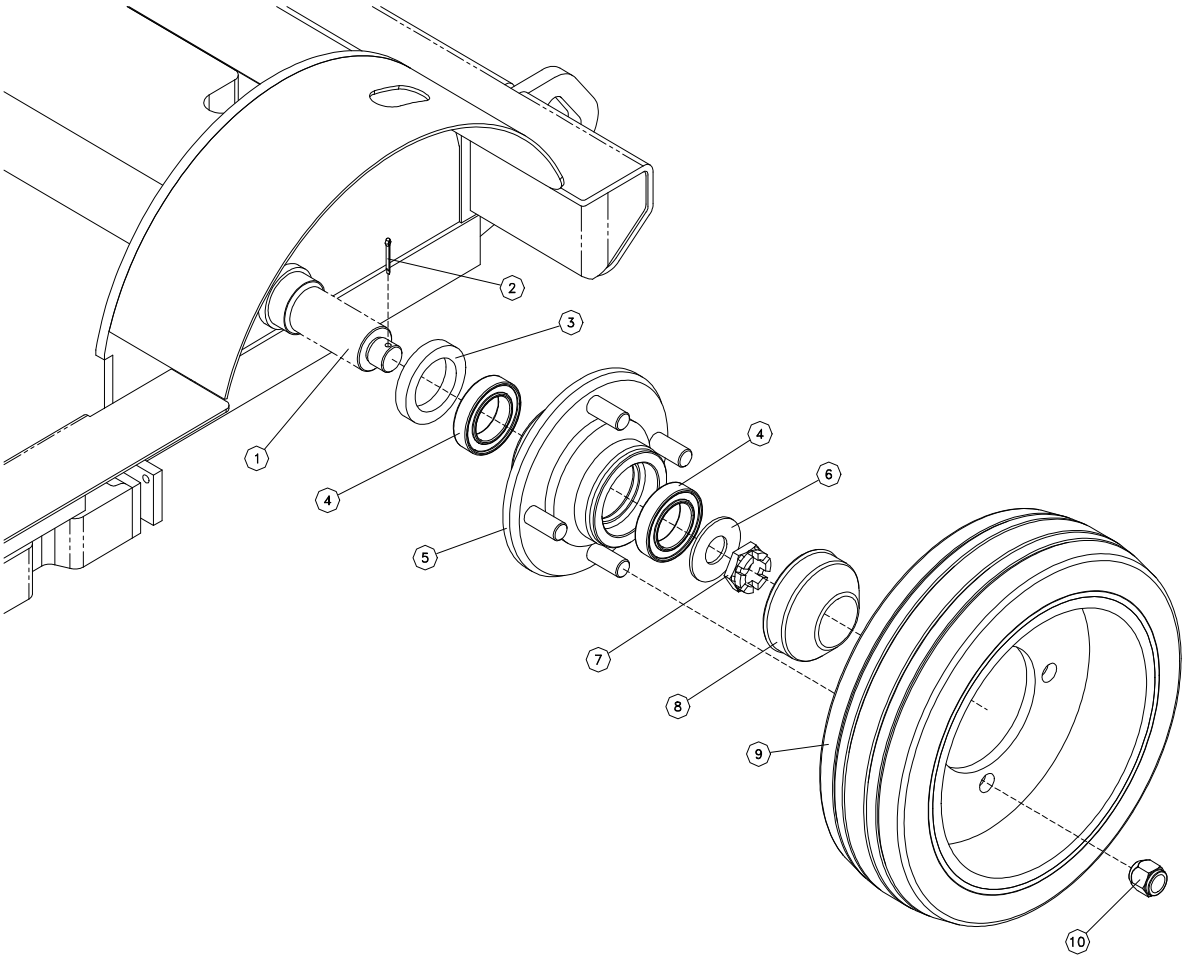


REAR WHEEL ASSEMBLY

ITEM	PART NO.	DESCRIPTION	QTY.
1	-	(NOT A SERVICABLE PART)	-
2	501577-000	dia.5 x 50 ROLL PIN	2
3	501657-000	OIL SEAL	2
4	-REF-	BEARING	2
5	-REF-	WHEEL HUB	2
6	056069-030	M30 WASHER	2
7	501366-000	M30 CASTLE NUT (MODIFIED)	2
8	501658-000	HUB CAP	2
9	501625-001	REAR WHEEL	2
10	500790-002	WHEEL NUT	8

NOTE: REAR WHEEL

MB20 0001 - MB20 0079 = 500790-001
MB26 0001 - MB26 0103 = 500790-001
MB20 0079 ONWARDS = 501625-001
MB26 0103 ONWARDS = 501625-001

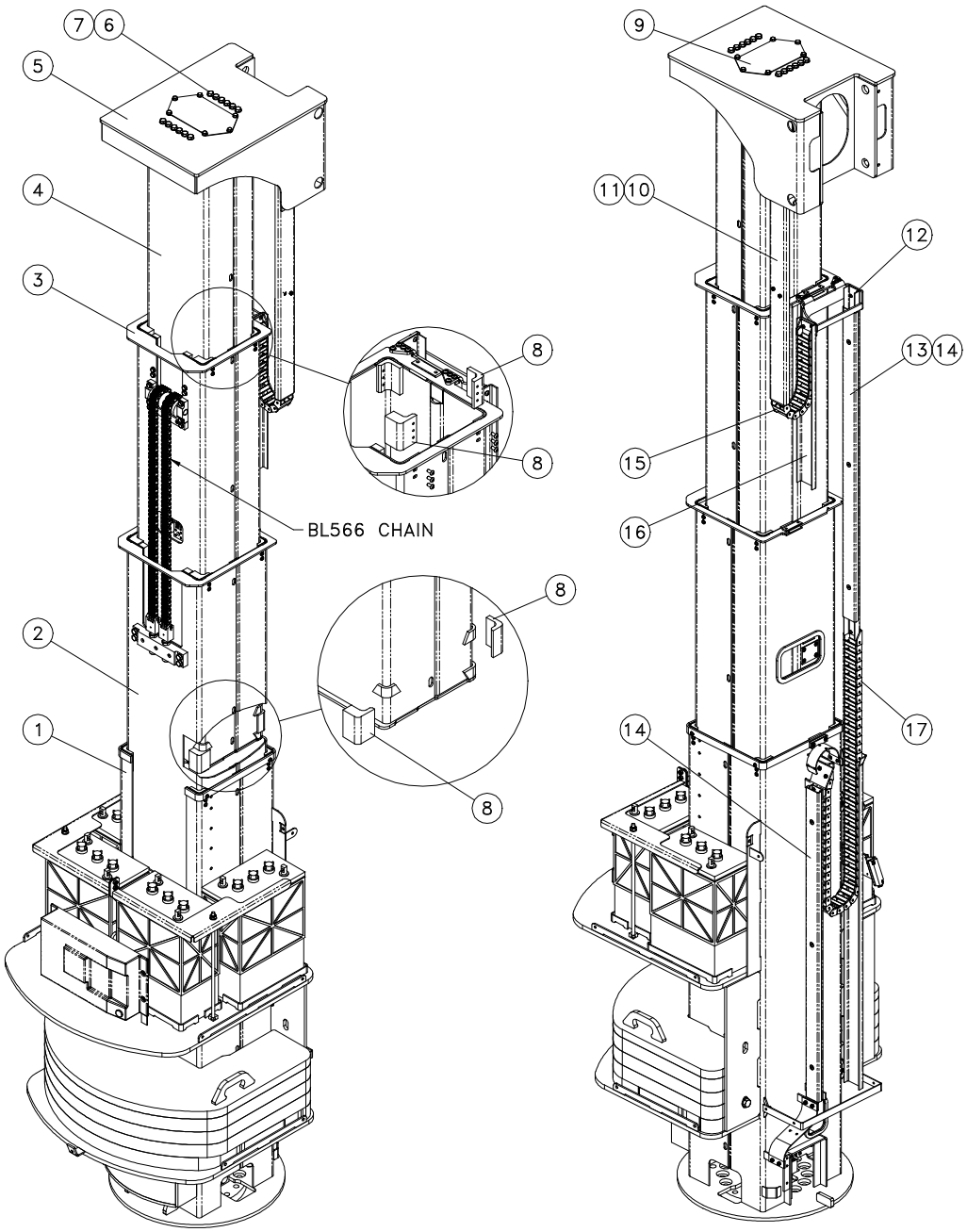


Illustrated Parts List

MAST ASSEMBLY MB20N & MB20

ITEM	Part No.	Description	QTY
1	500717-000	MAST #1 WELDMENT (FIXED MAST)	1
2	500718-000	MAST #2 WELDMENT	1
3	500719-000	MAST #3 WELDMENT	1
4	500720-000	MAST #4 WELDMENT (TOP MAST)	1
5	500721-000	JIB MOUNT WELDMENT	1
6	056060-050	M10 x 50 HEX HD BOLT GRADE 8.8	12
7	056069-010	M10 WASHER GRADE 8	12
8	501659-000	MB20 WEAR PAD KIT	1
9	500861-000	JIB MOUNT COVER PLATE	1
10	500871-001	SLIDE CHANNEL	1
11	500882-000	SLIDE CHANNEL COVER	1
12	501550-000	ENERGY CHAIN BRACKET WELDMENT	1
13	500875-000	LOWER GUIDE TRUNKING	1
14	501274-000	TRUNKING COVER	2

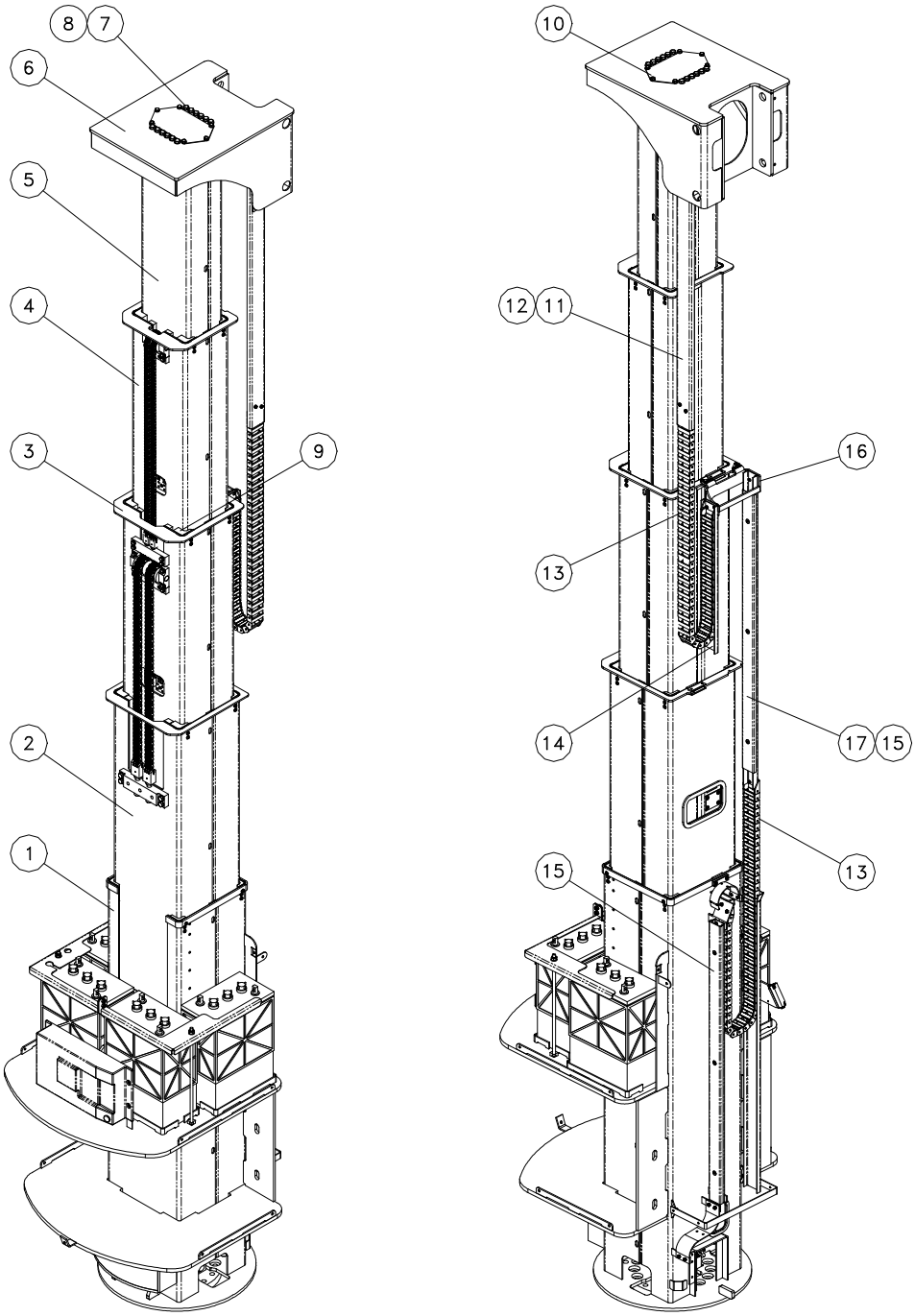
ITEM	Part No.	Description	QTY
15	501211-001	MAST ENERGY CHAIN - 27 LINKS	1
16	500871-002	SLIDE CHANNEL	1
17	501211-000	MAST ENERGY CHAIN - 50 LINKS	1



MAST ASSEMBLY MB26

ITEM	Part No.	Description	QTY
1	500717-000	MAST #1 WELDMENT (FIXED MAST)	1
2	500718-000	MAST #2 WELDMENT	1
3	500719-000	MAST #3 WELDMENT	1
4	500720-001	MAST #4 WELDMENT	1
5	500863-000	MAST#5 WELDMENT (TOP MAST)	1
6	500721-001	JIB MOUNT WELDMENT	1
7	056060-050	M10 X 50 HEX HEAD BOLT GRADE 8.8	12
8	056069-010	M10 WASHER GRADE 8	12
9	501659-001	WEAR PAD KIT	1
10	500861-000	JIB MOUNT COVER PLATE	1
11	500871-003	SLIDE CHANNEL	1
12	500882-001	SLIDE CHANNEL COVER	1
13	501211-000	MAST ENERGY CHAIN - 50 LINKS	2
14	500871-002	SLIDE CHANNEL	1

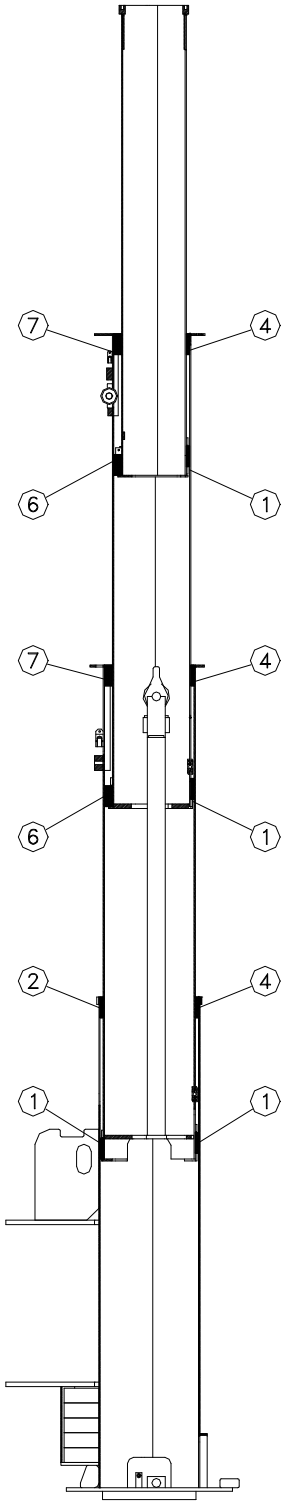
ITEM	Part No.	Description	QTY
15	501274-000	TRUNKING COVER	2
16	501550-000	ENERGY CHAIN BRACKET WELDMENT	1
17	500875-000	LOWER GUIDE TRUNKING	1



Illustrated Parts List

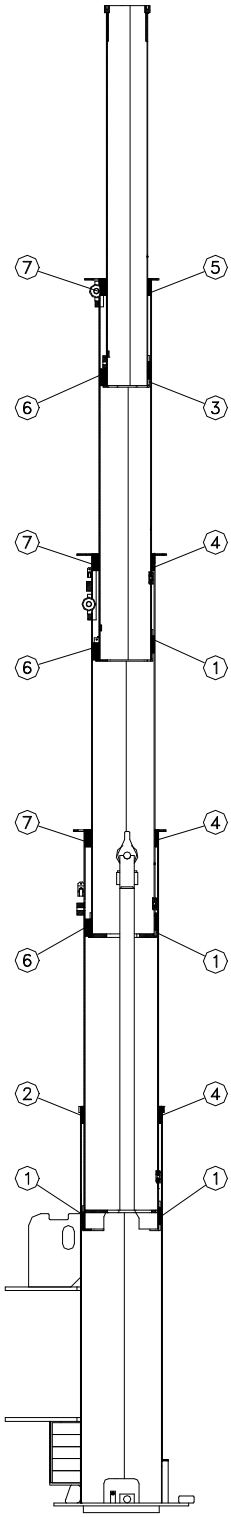
WEAR PAD KIT MB20N & MB20
501659-000

ITEM	PART NO.	DESCRIPTION	QTY.
1	500820-000	LOWER SLIDE 10mm	8
2	500820-001	UPPER SLIDE 10mm	2
3	500820-002	LOWER SLIDE 10mm MAST #5	0
4	500820-003	UPPER SLIDE 11mm	4
5	500820-004	UPPER SLIDE 11mm MAST #5	0
6	501299-000	LOWER SLIDE 26mm	4
7	501299-002	UPPER SLIDE 27mm	4
8	501253-016	M6 x 16 BUTTON HD SCREW	4
9	501253-012	M6 x 12 BUTTON HD SCREW	32



WEAR PAD KIT MB26
501659-001

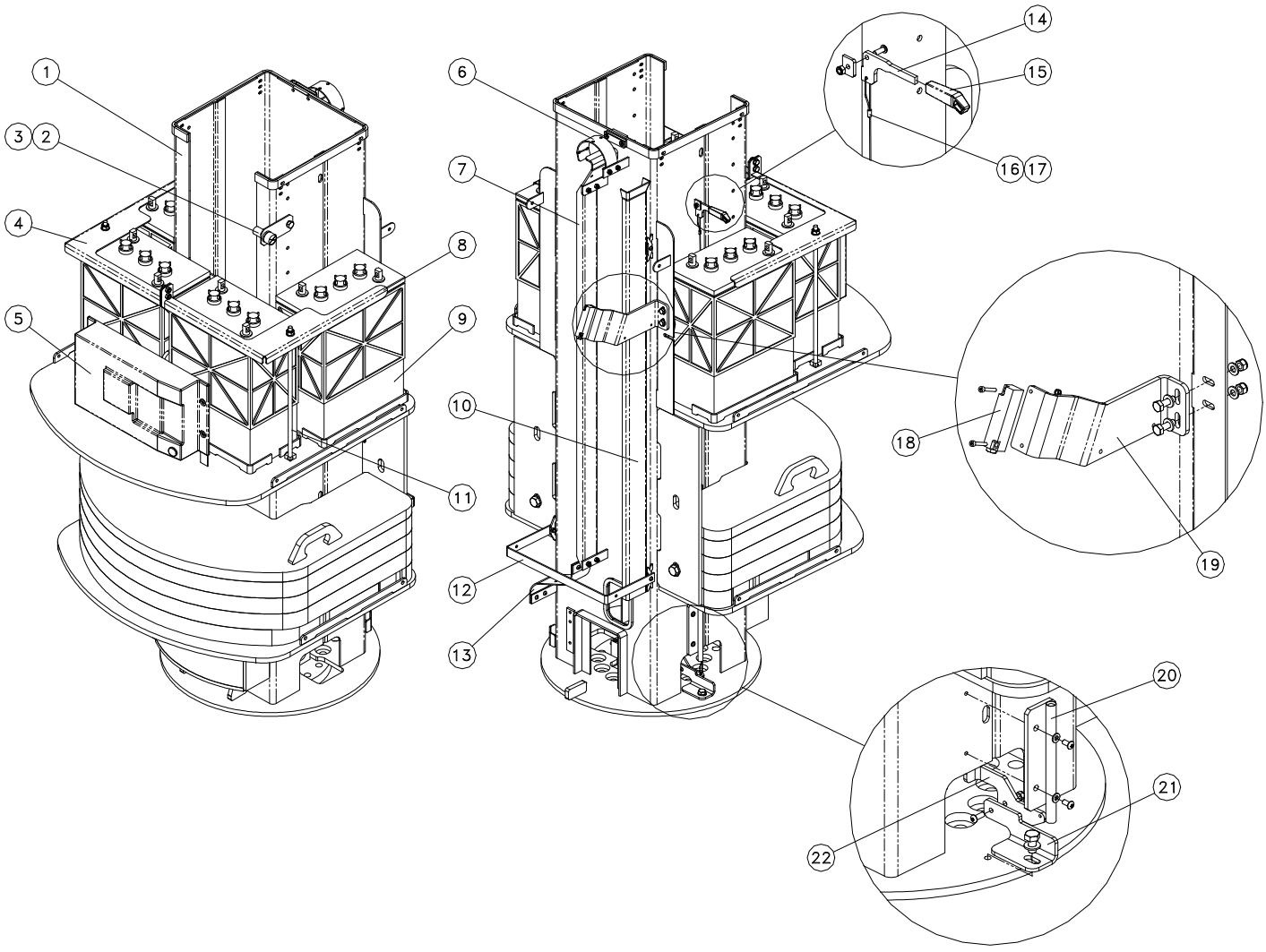
ITEM	PART NO.	DESCRIPTION	QTY.
1	500820-000	LOWER SLIDE 10mm	8
2	500820-001	UPPER SLIDE 10mm	2
3	500820-002	LOWER SLIDE 10mm MAST #5	2
4	500820-003	UPPER SLIDE 11mm	6
5	500820-004	UPPER SLIDE 11mm MAST #5	2
6	501299-000	LOWER SLIDE 26mm	6
7	501299-002	UPPER SLIDE 27mm	6
8	501253-016	M6 x 16 BUTTON HD SCREW	4
9	501253-012	M6 x 12 BUTTON HD SCREW	44



MAST #1 SUB-ASSEMBLY MB20N

ITEM	Part No.	Description	QTY
1	500717-000	MAST #1 WELDMENT	1
2	501575-000	BATTERY INDICATOR	1
3	501598-000	BATTERY INDICATOR MOUNTING PLATE	1
4	501422-000	BATTERY TIE DOWN PLATE - LH	1
5	501578-000	BATTERY CHARGER	1
6	500819-000	TOP HOSE GUIDE	1
7	500875-001	MAST #1 TRUNKING	1
8	501422-001	BATTERY TIE DOWN PLATE - RH	1
9	501237-001	BATTERY - 6V	4
10	500890-000	SLIDE CHANNEL WELDMENT	1
11	501423-000	BATTERY TIE DOWN BAR	2
12	501388-000	MAST COVER BRACKET	1
13	500885-000	BOTTOM HOSE GUIDE	1
14	501381-000	LEVER HAND ACTUATOR	1
15	501451-000	LEVER ACTUATOR COVER	1
16	501473-000	LEVER CABLE	1
17	53195-02	LEVER CABLE CRIMP	2

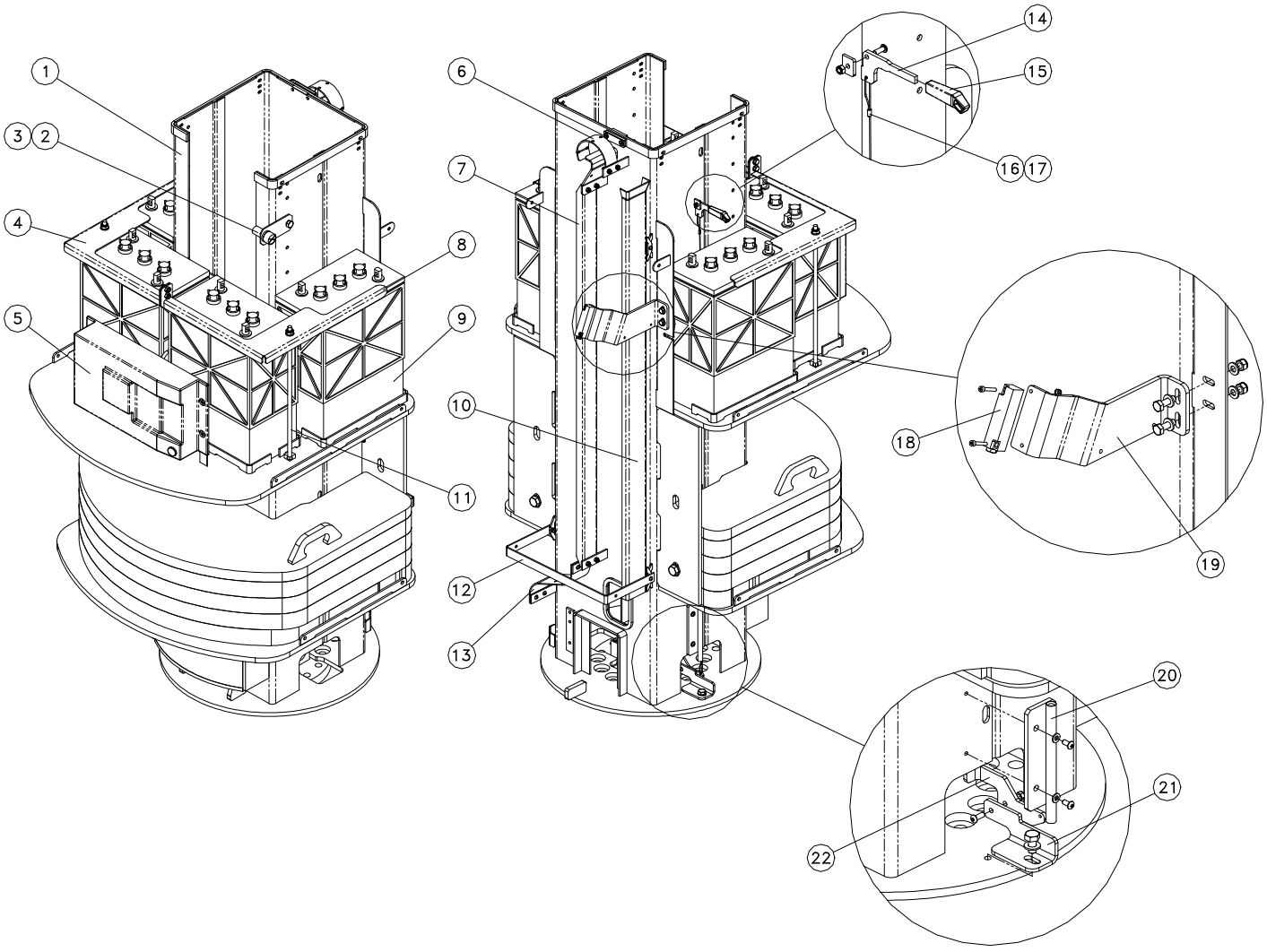
ITEM	Part No.	Description	QTY
18	501425-000	MAGNETIC LIMIT SWITCH	1
19	501393-000	SWITCH MOUNTING BRACKET	1
20	501383-000	LEVER WIRE GUIDE WELDMENT	1
21	REF.	LEVER PIVOT BRACKET	1
22	501382-000	LEVER ACTUATOR BRACKET	1



MAST #1 SUB-ASSEMBLY MB20

ITEM	Part No.	Description	QTY
1	500717-000	MAST #1 WELDMENT	1
2	501575-000	BATTERY INDICATOR	1
3	501598-000	BATTERY INDICATOR MOUNTING PLATE	1
4	501422-000	BATTERY TIE DOWN WELDMENT - LH	1
5	501578-000	BATTERY CHARGER	1
6	500819-000	TOP HOSE GUIDE	1
7	500875-001	MAST #1 TRUNKING	1
8	501422-001	BATTERY TIE DOWN WELDMENT - RH	1
9	501237-000	BATTERY - 6V	4
10	500890-000	SLIDE CHANNEL WELDMENT	1
11	501423-001	BATTERY TIE DOWN BAR	2
12	501388-000	MAST COVER BRACKET	1
13	500885-000	BOTTOM HOSE GUIDE	1
14	501381-000	LEVER HAND ACTUATOR	1
15	501451-000	LEVER ACTUATOR COVER	1
16	501473-000	LEVER CABLE	1
17	53195-02	LEVER CABLE CRIMP	2
18	501425-000	MAGNETIC LIMIT SWITCH	1

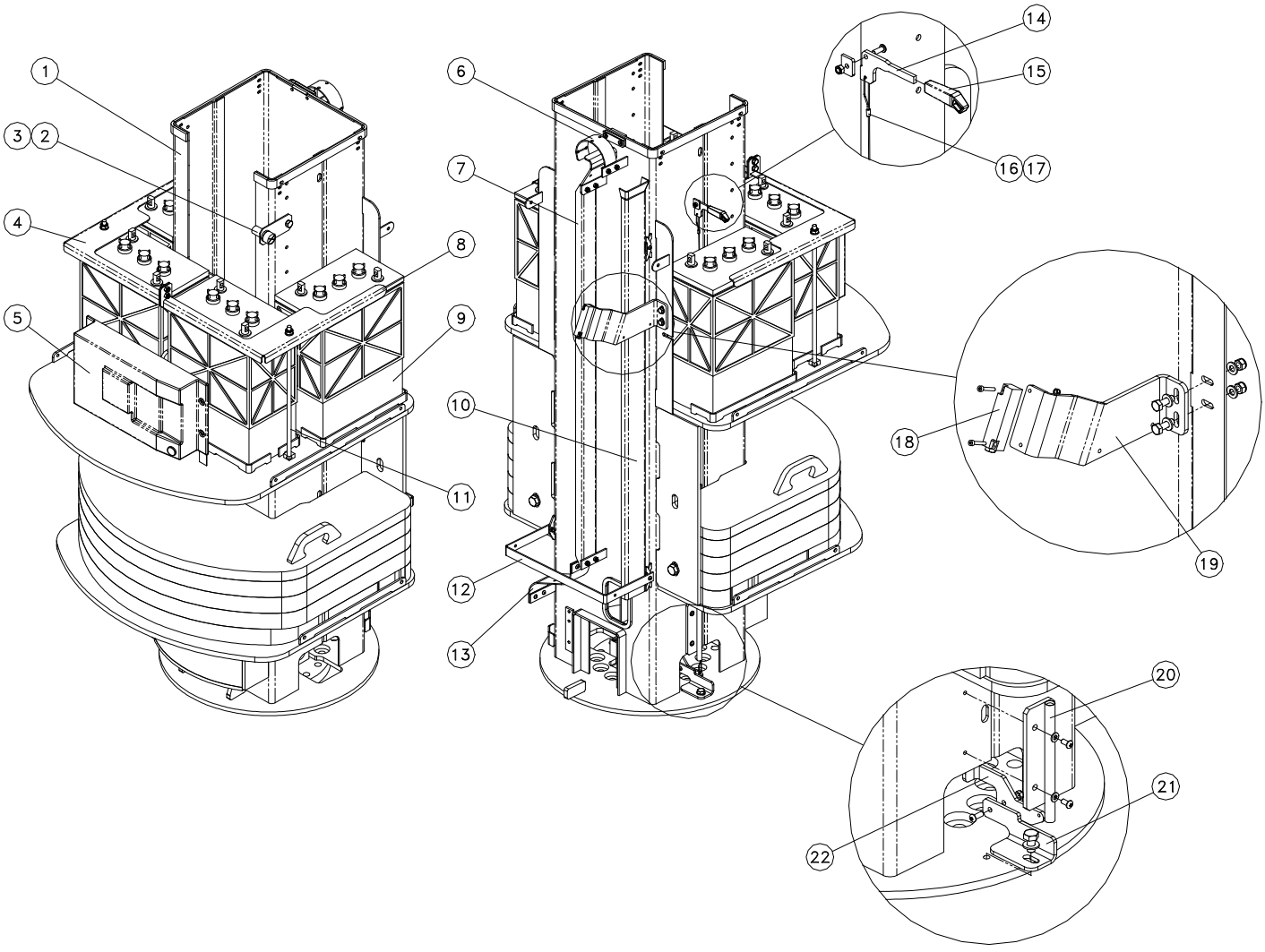
ITEM	Part No.	Description	QTY
19	501393-000	SWITCH MOUNTING BRACKET	1
20	501383-000	LEVER WIRE GUIDE WELDMENT	1
21	REF.	LEVER PIVOT BRACKET	1
22	501382-000	LEVER ACTUATOR BRACKET	1



MAST #1 SUB-ASSEMBLY MB26

ITEM	Part No.	Description	QTY
1	500717-000	MAST #1 WELDMENT	1
2	501575-000	BATTERY INDICATOR	1
3	501598-000	BATTERY INDICATOR MOUNTING PLATE	1
4	501422-000	BATTERY TIE DOWN PLATE - LH	1
5	501578-000	BATTERY CHARGER	1
6	500819-000	TOP HOSE GUIDE	1
7	500875-001	MAST #1 TRUNKING	1
8	501422-001	BATTERY TIE DOWN PLATE - RH	1
9	501237-001	BATTERY - 6V	4
10	500890-000	SLIDE CHANNEL WELDMENT	1
11	501423-000	BATTERY TIE DOWN BAR	2
12	501388-000	MAST COVER BRACKET	1
13	500885-000	BOTTOM HOSE GUIDE	1
14	501381-000	LEVER HAND ACTUATOR	1
15	501451-000	LEVER ACTUATOR COVER	1
16	501473-000	LEVER CABLE	1
17	53195-02	LEVER CABLE CRIMP	2

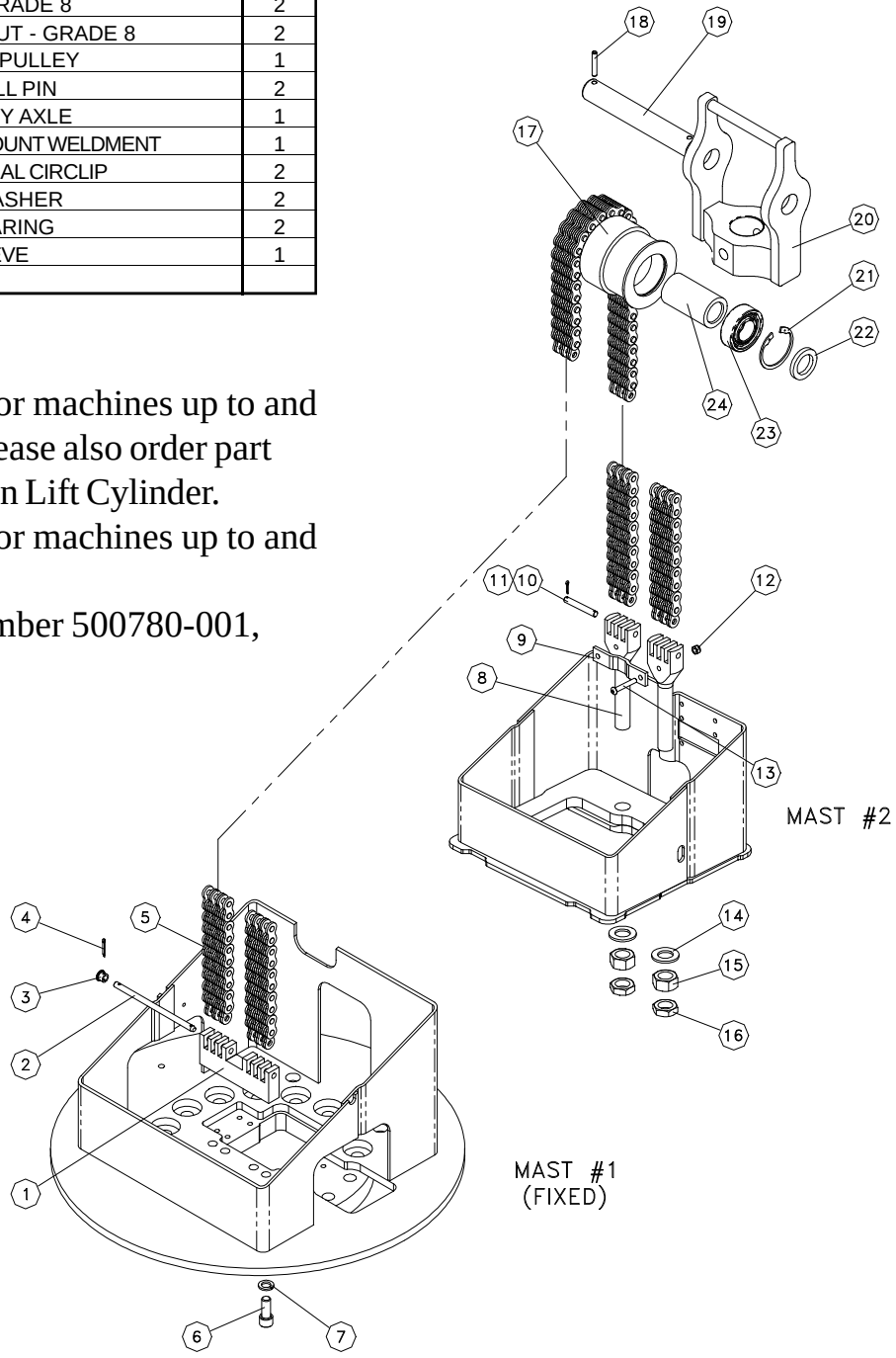
ITEM	Part No.	Description	QTY
18	501425-000	MAGNETIC LIMIT SWITCH	1
19	501393-001	SWITCH MOUNTING BRACKET	1
20	501383-000	LEVER WIRE GUIDE WELDMENT	1
21	REF	LEVER PIVOT BRACKET	1
22	501382-000	LEVER ACTUATOR BRACKET	1



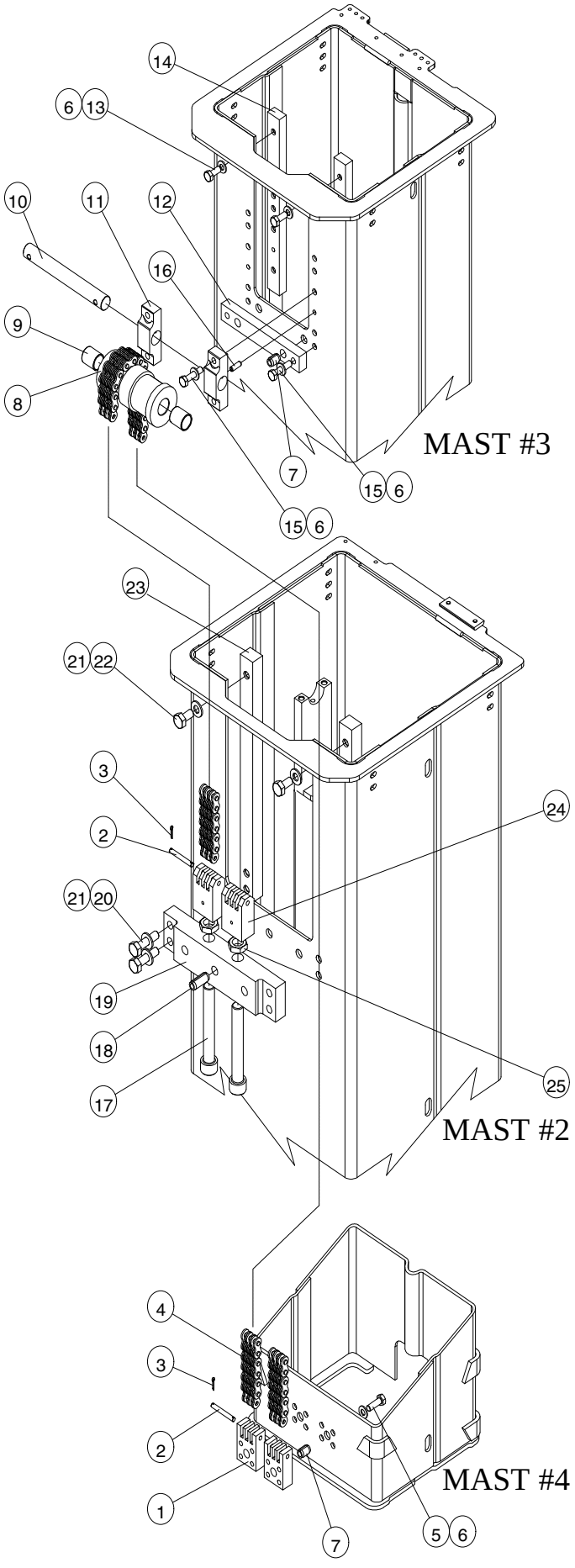
LOWER CHAIN GROUP
(BL666)

ITEM	PART NO.	DESCRIPTION	QTY.
1	501307-000	CHAIN ANCHOR BLOCK	1
2	501301-000	ANCHOR PIN	1
3	500858-000	KNOB	1
4	501563-025	dia.3 x 25 SPLIT PIN	2
5	501209-000	BL666 CHAIN COMPLETE	1
6	501247-030	M12 x 30 SOCKET HD CAP SCREW	1
7	056021-012	M12 SPRING WASHER	1
8	501310-000	TENSIONER FORK	2
9	501323-001	BL666 BRACE	1
10	501302-000	TENSIONER PIN	2
11	501244-012	dia.1.5 x 12 SPLIT PIN	4
12	056066-006	M6 NYLOCK NUT	2
13	501253-035	M6 x 35 BUTTON HD SCREW	2
14	056069-020	M20 WASHER - GRADE 8	2
15	056067-020	M20 NUT - GRADE 8	2
16	056067-520	M20 LOCK NUT - GRADE 8	2
17	501313-000	BL666 DUAL PULLEY	1
18	501057-020	dia.6 x 38 ROLL PIN	2
19	500853-000	BL666 PULLEY AXLE	1
20	500722-000	CYLINDER MOUNT WELDMENT	1
21	501432-000	dia.62 INTERNAL CIRCLIP	2
22	501291-000	BEARING WASHER	2
23	501342-000	ROLLER BEARING	2
24	501378-000	PULLEY SLEEVE	1

When ordering item 20 for machines up to and including MB20/0091 please also order part number 500780-000, Main Lift Cylinder.
When ordering item 20 for machines up to and including MB26/0082
please also order part number 500780-001, Main Lift Cylinder.

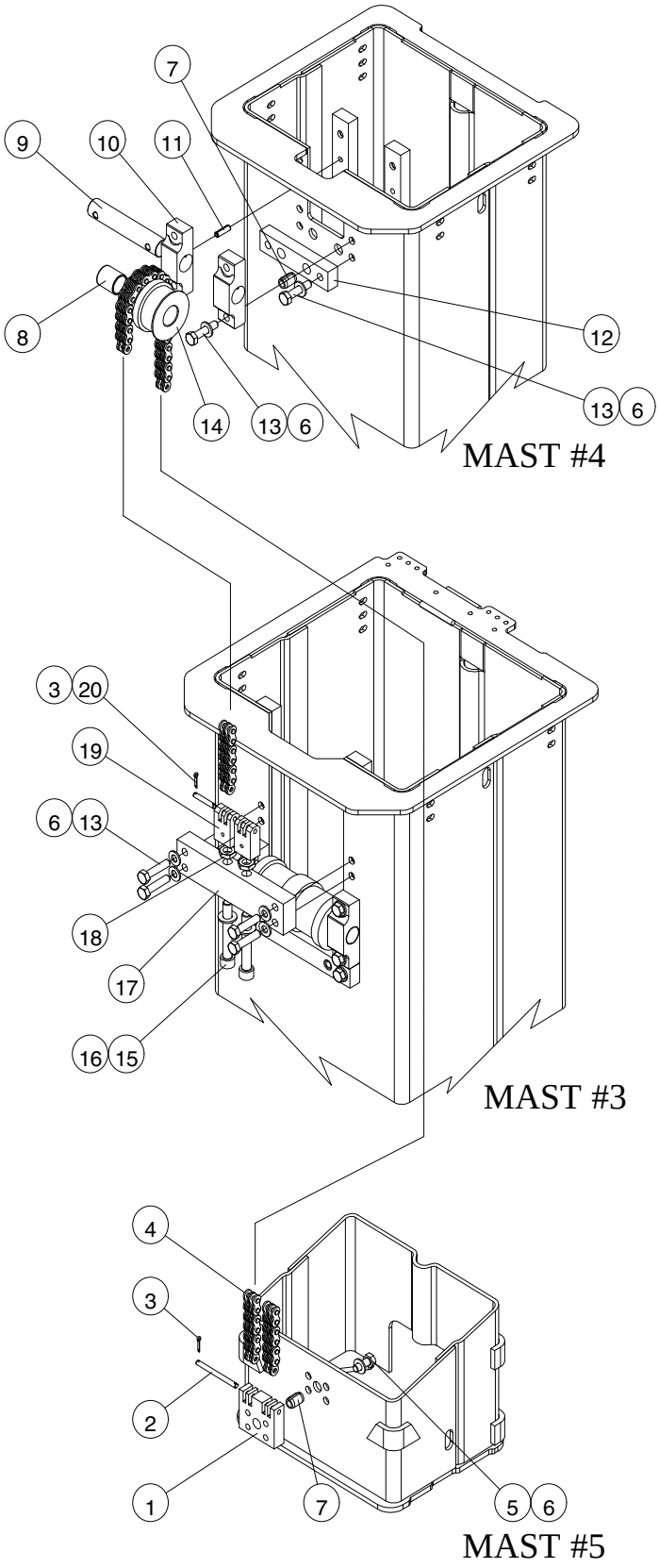


INTERMEDIATE CHAIN GROUP
(BL566)



ITEM	PART NO.	DESCRIPTION	QTY.
1	501311-000	ANCHOR BLOCK	2
2	501304-000	END PIN	4
3	501244-012	dia.1.5 x 12 SPLIT PIN	8
4	501208-000	BL566 CHAIN COMPLETE	2
5	058492-025	M8 x 25 HEX.HD SCREW - GRADE 8.8	8
6	056069-008	M8 WASHER - GRADE 8	20
7	500860-016	dia.12 x 18 ROLL PIN	4
8	501314-000	BL566 DUAL PULLEY	1
9	501064-000	PLAIN BUSHING (MB2025DU)	2
10	501303-000	PULLEY AXLE	1
11	501321-000	PULLEY MOUNT	2
12	501317-000	BASE MOUNT	1
13	058492-020	M8 x 20 HEX HD SCREWS - GRADE 8.8	6
14	501316-000	BACK MOUNT	2
15	056059-035	M8 x 35 HEX HD BOLT - GRADE 8.8	6
16	501057-020	dia.6 x 18 ROLL PIN	3
17	501431-100	M16 x 100 SOCKET HD CAP SCREW	2
18	500860-020	dia.12 x 30 ROLL PIN	3
19	500854-000	TENSIONER MOUNT	1
20		M10 X 40 HEX HD SCREW - GRADE 8.8	4
21	056069-010	M10 WASHER - GRADE 8	6
22	058493-020	M10 x 20 HEX HD SCREW - GRADE 8.8	2
23	501320-000	BACK MOUNT	2
24	501308-000	TENSIONER	2
25	056067-516	M16 LOCK NUT - GRADE 8	2

TOP CHAIN GROUP (MB26 ONLY)
(BL444)



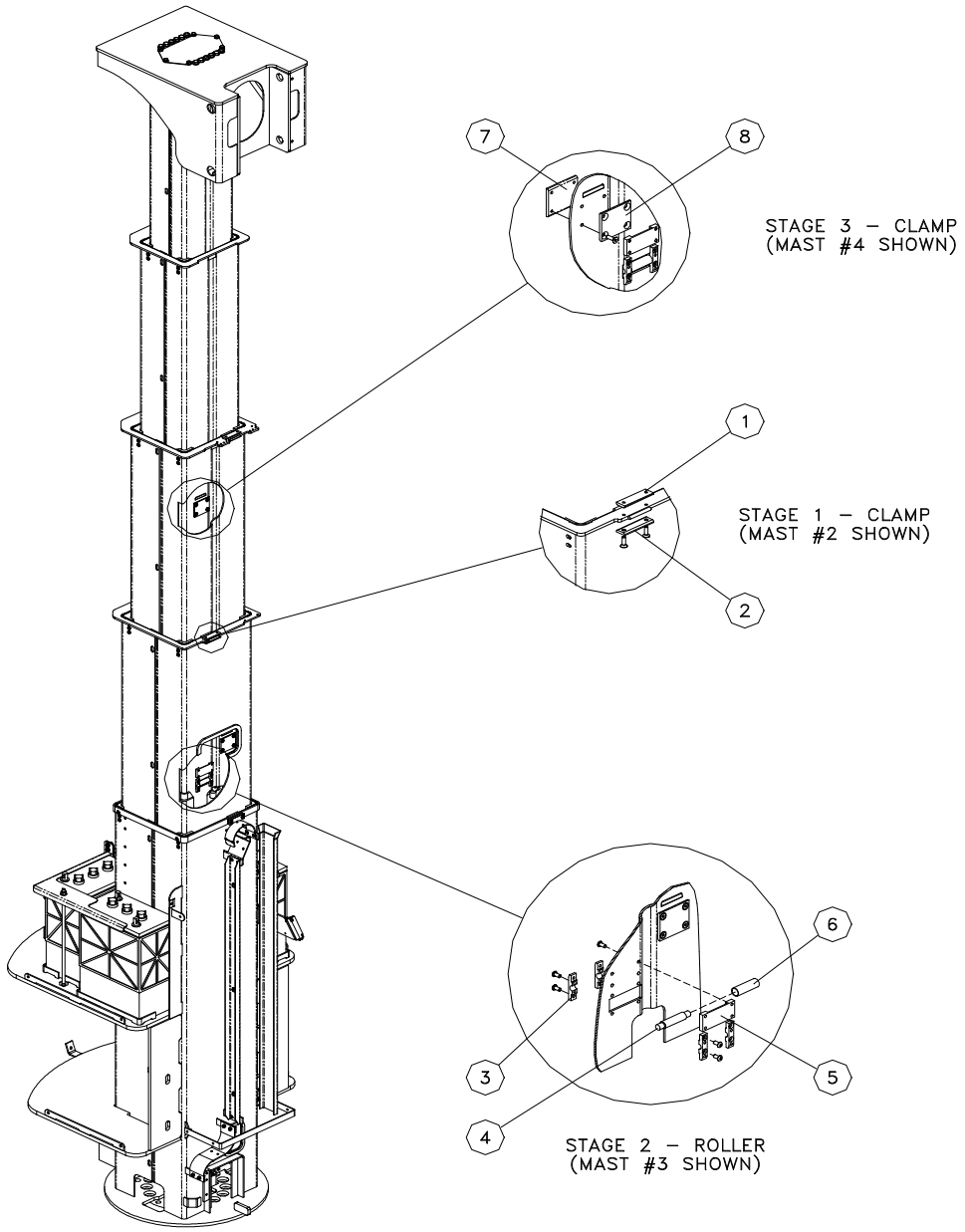
ITEM	PART NO.	DESCRIPTION	QTY.
1	501312-000	ANCHOR BLOCK	1
2	501305-000	ANCHOR PIN	2
3	501244-012	dia.1.5 x 12 SPLIT PIN	6
4	501207-000	BL444 CHAIN COMPLETE	2
5	058492-020	M8 x 20 HEX HD SCREW - GRADE 8.8	4
6	056069-008	M8 WASHER - GRADE 8	14
7	500860-016	dia.12 x 18 ROLL PIN	3
8	501064-000	PLAIN BUSHING (MB2025DU)	2
9	501303-001	PULLEY AXLE	1
10	501321-000	PULLEY MOUNT	1
11	501057-020	dia.6 x 20ROLL PIN	2
12	501319-000	BASE MOUNT	1
13	056059-035	M8 x 35 HEX HD BOLT - GRADE 8.8	10
14	501315-000	BL444 DUAL PULLEY	1
15	501571-070	M10 x 70 HEX HD BOLT - GRADE 12.9	2
16	056069-010	M10 WASHER - GRADE 8	2
17	501325-000	TENSIONER MOUNT	1
18	056067-510	M10 LOCK NUT - GRADE 8	2
19	501309-000	TENSIONER	2
20	501305-001	TENSIONER PIN	2

SEQUENCE STRAPS MB20N & MB20

ITEM	PART NO.	DESCRIPTION	QTY.
1	500851-000	STRAP CLIP - UPPER	2
2	500850-000	STRAP CLIP - LOWER	2
3	501287-000	ROLLER SUPPORT BLOCK	8
4	500852-000	STRAP CLIP SHAFT	2
5	500873-000	STRAP GUIDE	2
6	500849-000	STRAP BUSHING	2
7	501270-001	CLAMP PLATE - THREADED	2
8	501270-000	CLAMP PLATE - OUTER	2
9	501210-001	SEQUENCE STRAP	2

SEQUENCE STRAPS MB26

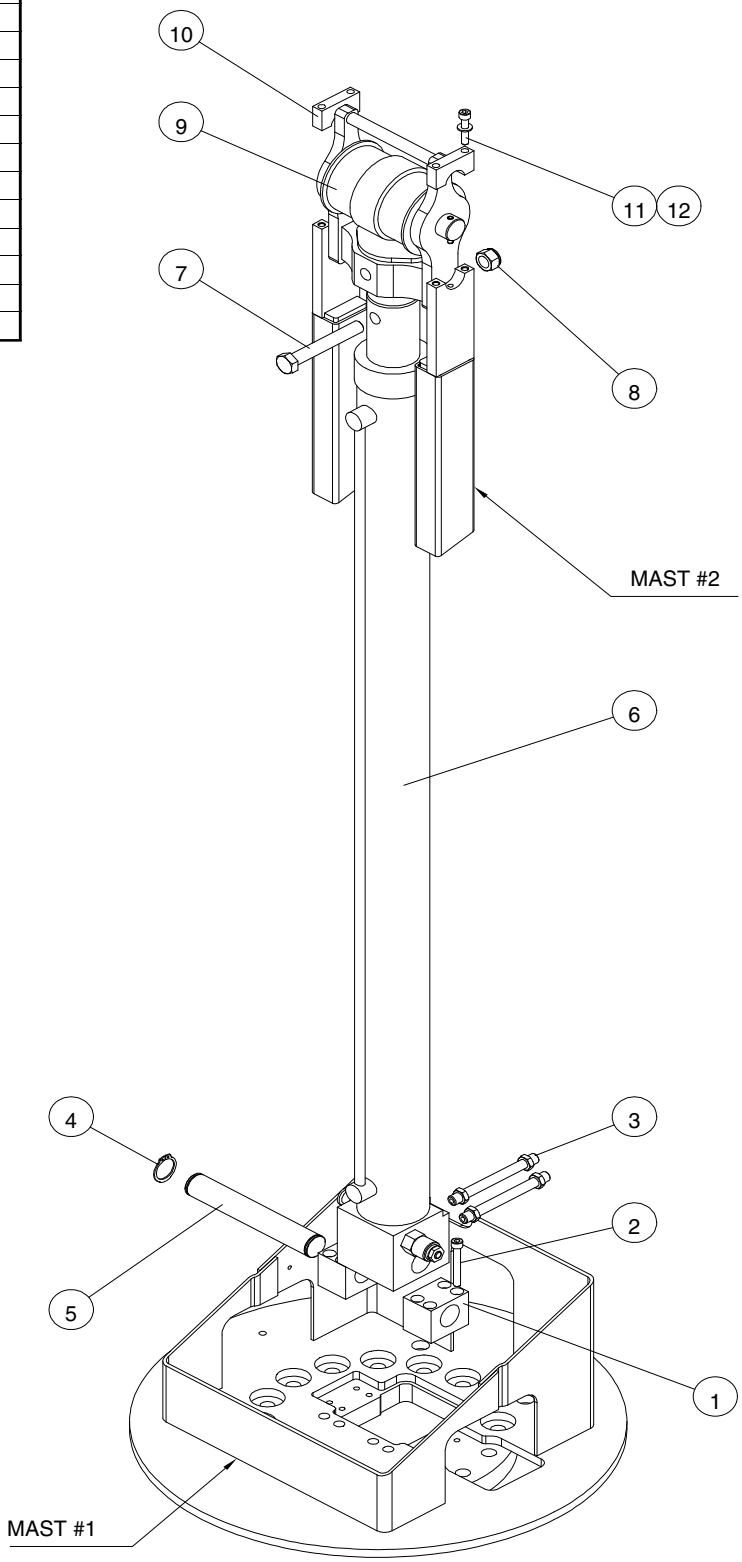
ITEM	PART NO.	DESCRIPTION	QTY.
1	500851-000	STRAP CLIP - UPPER	3
2	500850-000	STRAP CLIP - LOWER	3
3	501287-000	ROLLER SUPPORT BLOCK	12
4	500852-000	STRAP CLIP SHAFT	3
5	500873-000	STRAP GUIDE	3
6	500849-000	STRAP BUSHING	3
7	501270-001	CLAMP PLATE - THREADED	3
8	501270-000	CLAMP PLATE - OUTER	3
9	501210-001	SEQUENCE STRAP	3



MAIN LIFT CYLINDER MOUNTING

ITEM	PART NO.	DESCRIPTION	QTY.
1	500838-000	ANCHOR BLOCK	2
2	058503-060	M8 x 60 SOCKET HD CAP SCREW	8
3	500784-000	STANDPIPE ADAPTOR	2
4	057033-000	dia.30 EXTERNAL CIRCLIP	2
5	501324-000	ANCHOR PIN	1
6	500780-000	LIFT CYLINDER ASSEMBLY (MB20)	1
7	058480-100	M16 x 110 HEX HD BOLT - GRADE 10.9	1
8	056064-016	M16 NYLOCK NUT - GRADE 10	1
9	501445-001	CYLINDER MOUNT ASSEMBLY	1
10	500864-000	SHAFT CAP	2
11	058503-045	M8 x 45 SOCKET HD CAP SCREW	4
12	056069-008	M8 WASHER GRADE 8	4

Item 6 & 9 must be ordered together for machines MB20/0000 to MB20/0090 & MB26/0000 to MB26/0081 inclusive

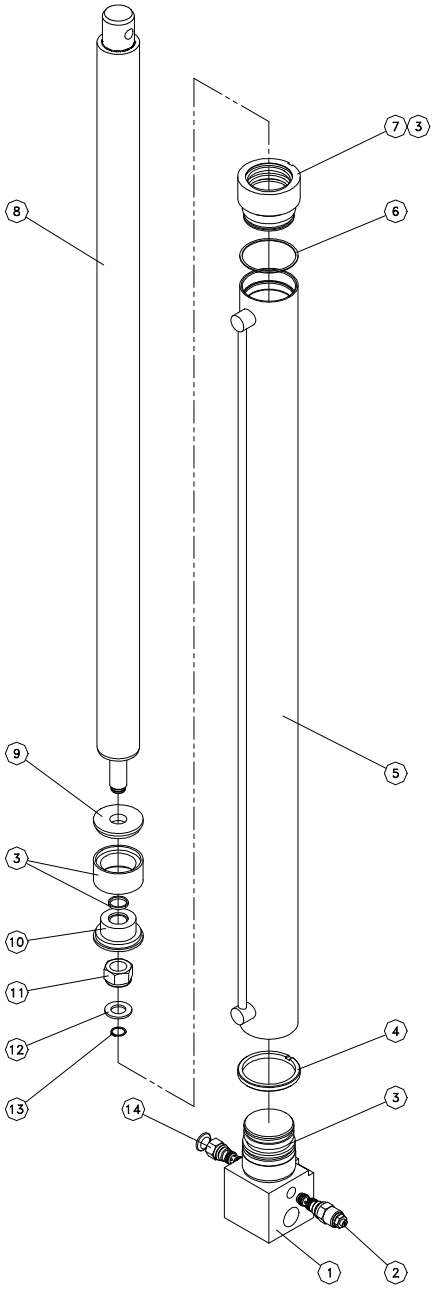


MAIN LIFT CYLINDER MB20N & MB20 500780-000

ITEM	PART NO.	DESCRIPTION	QTY.
1	-	BODY END BLOCK	1
2	058728-000	OVERCENTRE VALVE	1
3	501664-000	SEAL KIT	1
4	-	COLLOR LOCKING WASHER	1
5	-	CYLINDER BODY	1
6	-	WASHER TAB	1
7	-	ROD END CAP	1
8	-	CYLINDER ROD	1
9	-	PISTON HEAD CAP	1
10	-	PISTON HEAD	1
11	-	NYLOCK NUT	1
12	-	WASHER	1
13	-	CIRCLIP	1
14	500397-000	EMERGENCY LOWERING VALVE	1

MAIN LIFT CYLINDER MB26 500780-001

ITEM	PART NO.	DESCRIPTION	QTY.
1	-	BODY END BLOCK	1
2	058728-000	OVERCENTRE VALVE	1
3	501664-000	SEAL KIT	1
4	-	COLLOR LOCKING WASHER	1
5	-	CYLINDER BODY	1
6	-	WASHER TAB	1
7	-	ROD END CAP	1
8	-	CYLINDER ROD	1
9	-	PISTON HEAD CAP	1
10	-	PISTON HEAD	1
11	-	NYLOCK NUT	1
12	-	WASHER	1
13	-	CIRCLIP	1
14	500397-000	EMERGENCY LOWERING VALVE	1



Illustrated Parts List

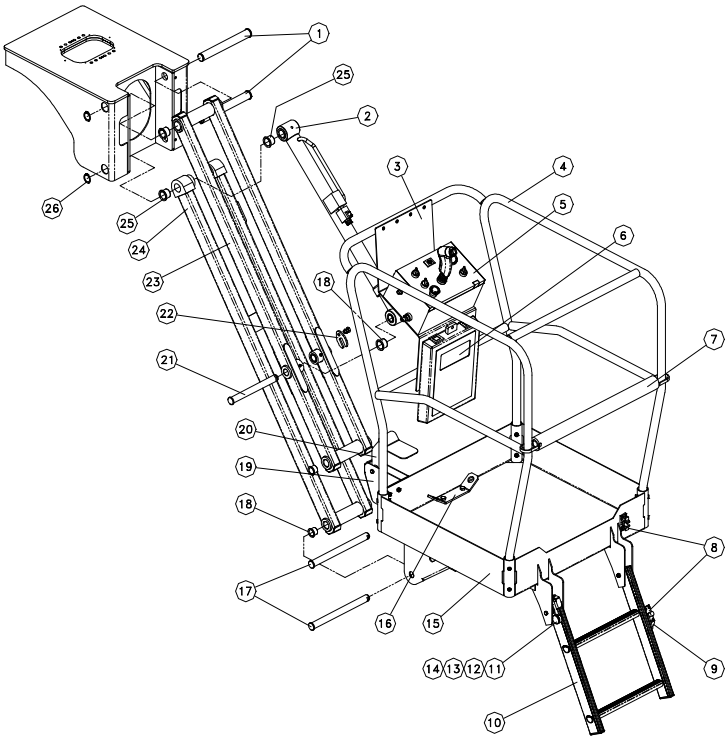
JIB & CAGE ASSEMBLY
MB20N & MB20

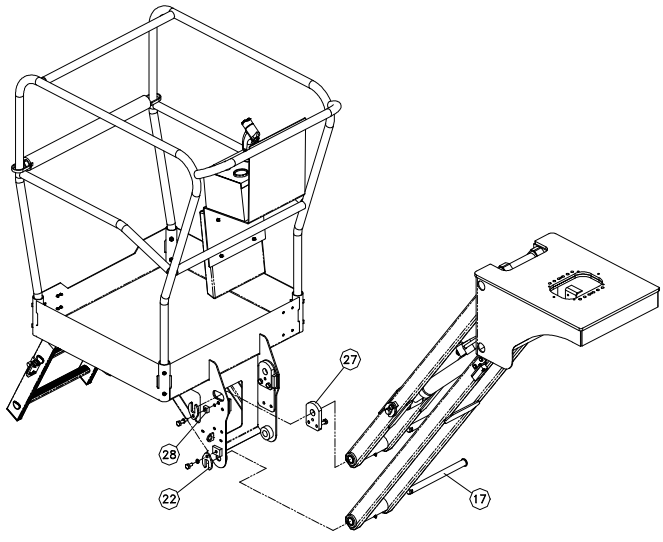
ITEM	PART NO.	DESCRIPTION	QTY.
1	501231-000	PIVOT PIN (JIB MOUNT)	2
2	see page 26	JIB CYLINDER ASSY	1
3	500761-000	UPPER CTRL BOX MOUNTING PLATE	1
4	501450-000	CAGE RAIL WELDMENT	1
5	501504-000	UPPER CONTROL BOX ASSEMBLY	1
6	010076-000	OPERATOR'S MANUAL HOLDER	1
7	500810-000	DROP BAR ASSEMBLY	1
8	501352-000	LADDER CATCH	1
9	501351-000	LADDER CATCH BRACKET	1
10	501350-000	LADDER	1
11	501357-000	HINGE BRACKET WELDMENT	1
12	501358-000	ROPE PULL BRACKET	1
13	501353-000	WIRE ROPE	1
14	501354-000	LADDER CRIMP	4
15	500725-000	CAGE BASE WELDMENT	1
16	057094-000	HARNESS ANCHOR	1
17	501230-000	PIVOT PIN - CAGE CONNECT	2
18	500078-000	FLANGED BUSH	8
19	501356-000	FOOT-PEDAL MOUNTING	1
20	501355-000	FOOT-PEDAL WELDMENT	1
21	501269-000	PIV0T PIN - JIB CYLINDER ROD	0
22	058056-000	LOCK PLATE	2
23	500723-000	JIB TIE WELDMENT	1
24	500724-000	JIB STRUT WELDMENT	1
25	057054-000	FLANGED BUSH	8
26	057033-000	dia.30 EXTERNAL CIRCLIP	2

JIB & CAGE ASSEMBLY
MB26

ITEM	PART NO.	DESCRIPTION	QTY.
1	501231-000	PIVOT PIN (JIB MOUNT)	2
2	see page 26	JIB CYLINDER ASSY	1
3	500761-000	UPPER CTRL BOX MOUNTING PLATE	1
4	501450-000	CAGE RAIL WELDMENT	1
5	501504-001	UPPER CONTROL BOX ASSEMBLY	1
6	010076-000	OPERATOR'S MANUAL HOLDER	1
7	500810-000	DROP BAR ASSEMBLY	1
8	501352-000	LADDER CATCH	1
9	501351-000	LADDER CATCH BRACKET	1
10	501350-000	LADDER	1
11	501357-000	HINGE BRACKET WELDMENT	1
12	501358-000	ROPE PULL BRACKET	1
13	501353-000	WIRE ROPE	1
14	501354-000	LADDER CRIMP	4
15	500725-001	CAGE BASE WELDMENT	1
16	057094-000	HARNESS ANCHOR	1
17	501230-000	PIVOT PIN - CAGE CONNECT	2
18	500078-000	FLANGED BUSH	8
19	501356-000	FOOT-PEDAL MOUNTING	1
20	501355-000	FOOT-PEDAL WELDMENT	1
21	501269-000	PIV0T PIN - JIB CYLINDER ROD	1
22	058056-000	LOCK PLATE	3
23	500723-001	JIB TIE WELDMENT	1
24	500724-001	JIB STRUT WELDMENT	1
25	057054-000	FLANGED BUSH	8
26	057033-000	dia.30 EXTERNAL CIRCLIP	2

WHEN ORDERING PART 500725-000 OR PART 500725-001 AN ADDITIONAL ORDER MUST BE PLACED FOR 2 X 501603-000 & 2 X 501620-000 IF ORDERING FOR MACHINES WITH A SERIAL NUMBER PRIOR TO MB20 0068 (OR) MB26 0042.



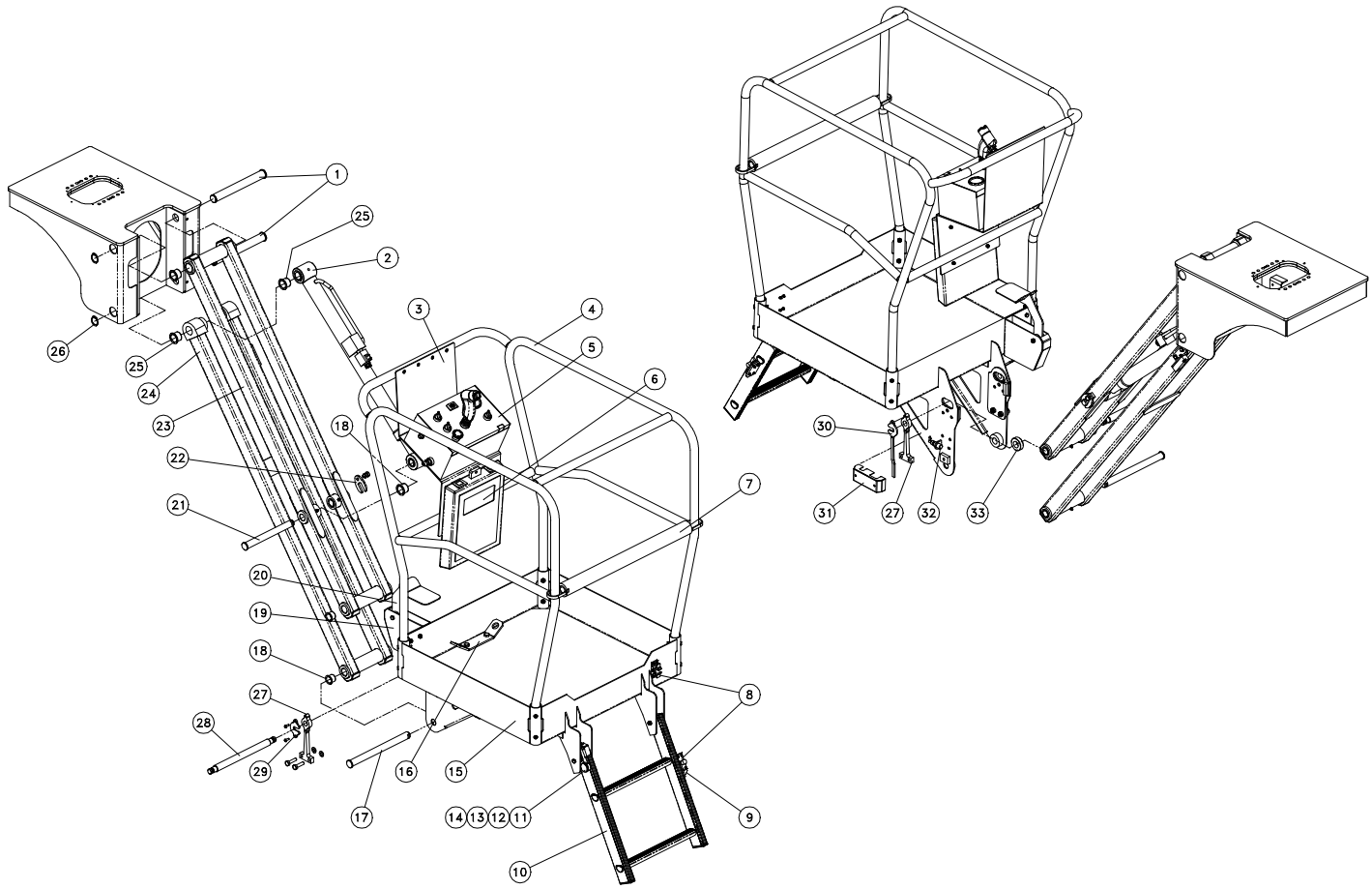


JIB & CAGE OVERLOAD ASSEMBLY MB20N & MB20

ITEM	PART NO.	DESCRIPTION	QTY.
1	501231-000	PIVOT PIN (JIB MOUNT)	2
2	see page 26	JIB CYLINDER ASSY	1
3	500761-000	UPPER CTRL BOX MOUNTING PLATE	1
4	501450-000	CAGE RAIL WELDMENT	1
5	501504-000	UPPER CONTROL BOX ASSEMBLY	1
6	010076-000	OPERATOR'S MANUAL HOLDER	1
7	500810-000	DROP BAR ASSEMBLY	1
8	501352-000	LADDER CATCH	1
9	501351-000	LADDER CATCH BRACKET	1
10	501350-000	LADDER	1
11	501357-000	HINGE BRACKET WELDMENT	1
12	501358-000	ROPE PULL BRACKET	1
13	501353-000	WIRE ROPE	1
14	501354-000	LADDER CRIMP	4
15	500725-000	CAGE BASE WELDMENT	1
16	057094-000	HARNESS ANCHOR	1
17	501230-000	PIVOT PIN - CAGE CONNECT	2
18	500078-000	FLANGED BUSH	8
19	501356-000	FOOT-PEDAL MOUNTING	1
20	501355-000	FOOT-PEDAL WELDMENT	1
21	501269-000	PIV0T PIN - JIB CYLINDER ROD	0
22	058056-000	LOCK PLATE	2
23	500723-000	JIB TIE WELDMENT	1
24	500724-000	JIB STRUT WELDMENT	1
25	057054-000	FLANGED BUSH	8
26	057033-000	dia.30 EXTERNAL CIRCLIP	2
27	501583-000	CAGE OVERLOAD BEAM	2
28	501230-001	PIVOOT PIN (CAGE OVERLOAD)	2
29	501605-000	OVERLOAD PIN RETAINER	1
30	501584-000	OVERLOAD STRIKER BAR	1
31	501606-000	OVVERLOAD COVER GUARD	1
32	501611-000	PROXIMITY SWITCH	1
33	501621-000	OVERLOAD PIN SPACER	2

JIB & CAGE OVERLOAD ASSEMBLY MB26

ITEM	PART NO.	DESCRIPTION	QTY.
1	501231-000	PIVOT PIN (JIB MOUNT)	2
2	see page 26	JIB CYLINDER ASSY	1
3	500761-000	UPPER CTRL BOX MOUNTING PLATE	1
4	501450-000	CAGE RAIL WELDMENT	1
5	501504-001	UPPER CONTROL BOX ASSEMBLY	1
6	010076-000	OPERATOR'S MANUAL HOLDER	1
7	500810-000	DROP BAR ASSEMBLY	1
8	501352-000	LADDER CATCH	1
9	501351-000	LADDER CATCH BRACKET	1
10	501350-000	LADDER	1
11	501357-000	HINGE BRACKET WELDMENT	1
12	501358-000	ROPE PULL BRACKET	1
13	501353-000	WIRE ROPE	1
14	501354-000	LADDER CRIMP	4
15	500725-001	CAGE BASE WELDMENT	1
16	057094-000	HARNESS ANCHOR	1
17	501230-000	PIVOT PIN - CAGE CONNECT	2
18	500078-000	FLANGED BUSH	8
19	501356-000	FOOT-PEDAL MOUNTING	1
20	501355-000	FOOT-PEDAL WELDMENT	1
21	501269-000	PIV0T PIN - JIB CYLINDER ROD	0
22	058056-000	LOCK PLATE	2
23	500723-001	JIB TIE WELDMENT	1
24	500724-001	JIB STRUT WELDMENT	1
25	057054-000	FLANGED BUSH	8
26	057033-000	dia.30 EXTERNAL CIRCLIP	2
27	501583-000	CAGE OVERLOAD BEAM	2
28	501230-001	PIVOOT PIN (CAGE OVERLOAD)	2
29	501605-000	OVERLOAD PIN RETAINER	1
30	501584-000	OVERLOAD STRIKER BAR	1
31	501606-000	OVVERLOAD COVER GUARD	1
32	501611-000	PROXIMITY SWITCH	1
33	501621-000	OVERLOAD PIN SPACER	2

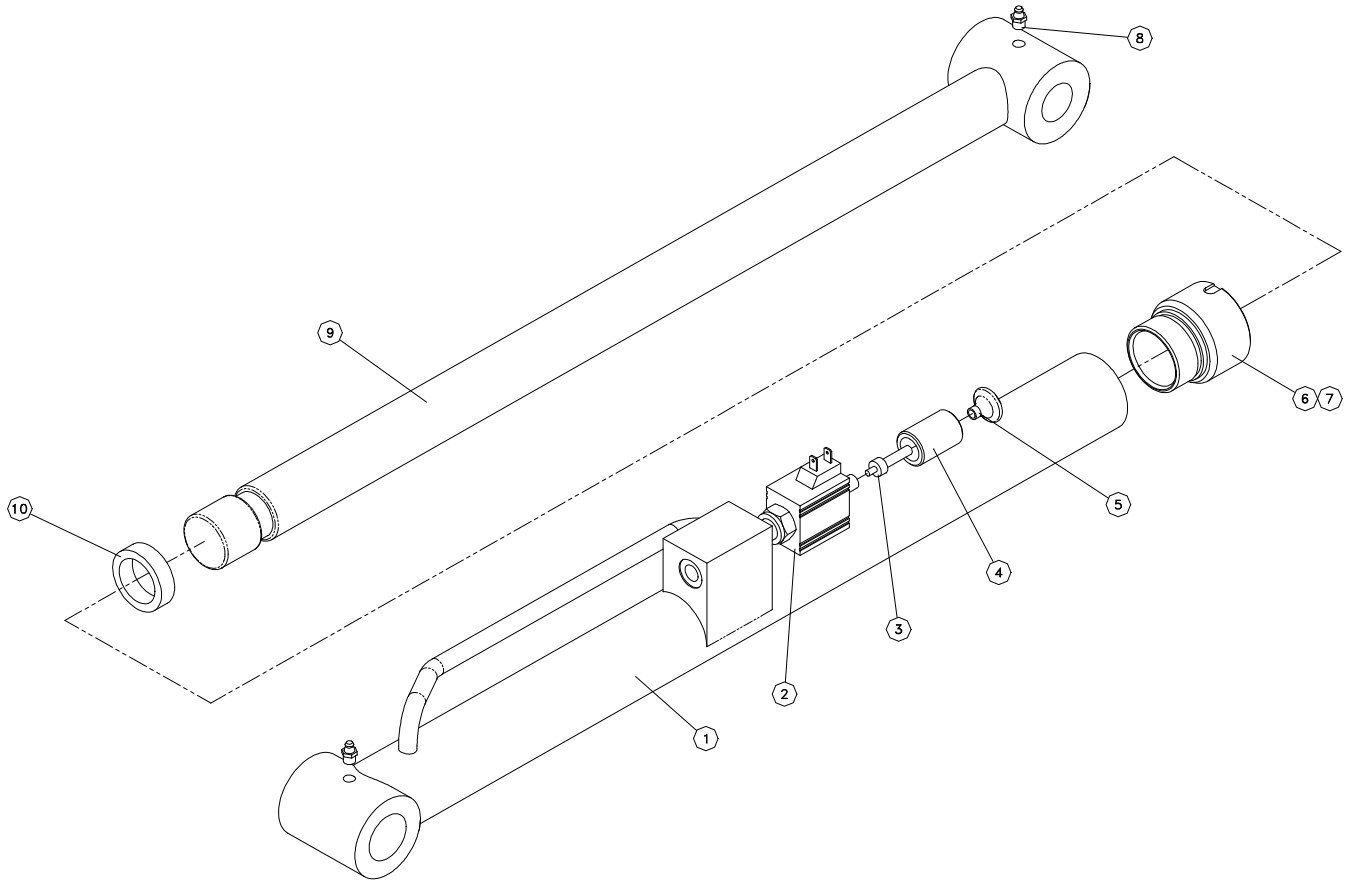


JIB CYLINDER MB20N & MB20
500781-000
MB20/0000 TO MB20/0040

ITEM	PART NO.	DESCRIPTION	QTY.
1	-	CYLINDER BODY	1
2	501482-000	HYDRAULIC VALVE	1
3	501454-000	RELEASE PLUNGER	1
4	501456-000	RELEASE PLUNGER HOUSING	1
5	501474-000	RELEASE KNOB	1
6	-	ROD END CAP	1
7	501662-000	Seal Kit	1
8	058819-001	M8 GREASE NIPPLE	2
9	-	CYLINDER ROD	1
10	-	BEARING RING	1

JIB CYLINDER MB26
500781-001
MB26/0000 TO MB26/0064

ITEM	PART NO.	DESCRIPTION	QTY.
1	-	CYLINDER BODY	1
2	501482-000	HYDRAULIC VALVE	1
3	501454-000	RELEASE PLUNGER	1
4	501456-000	RELEASE PLUNGER HOUSING	1
5	501474-000	RELEASE KNOB	1
6	-	ROD END CAP	1
7	501662-000	Seal Kit	1
8	058819-001	M8 GREASE NIPPLE	2
9	-	CYLINDER ROD	1
10	-	BEARING RING	1

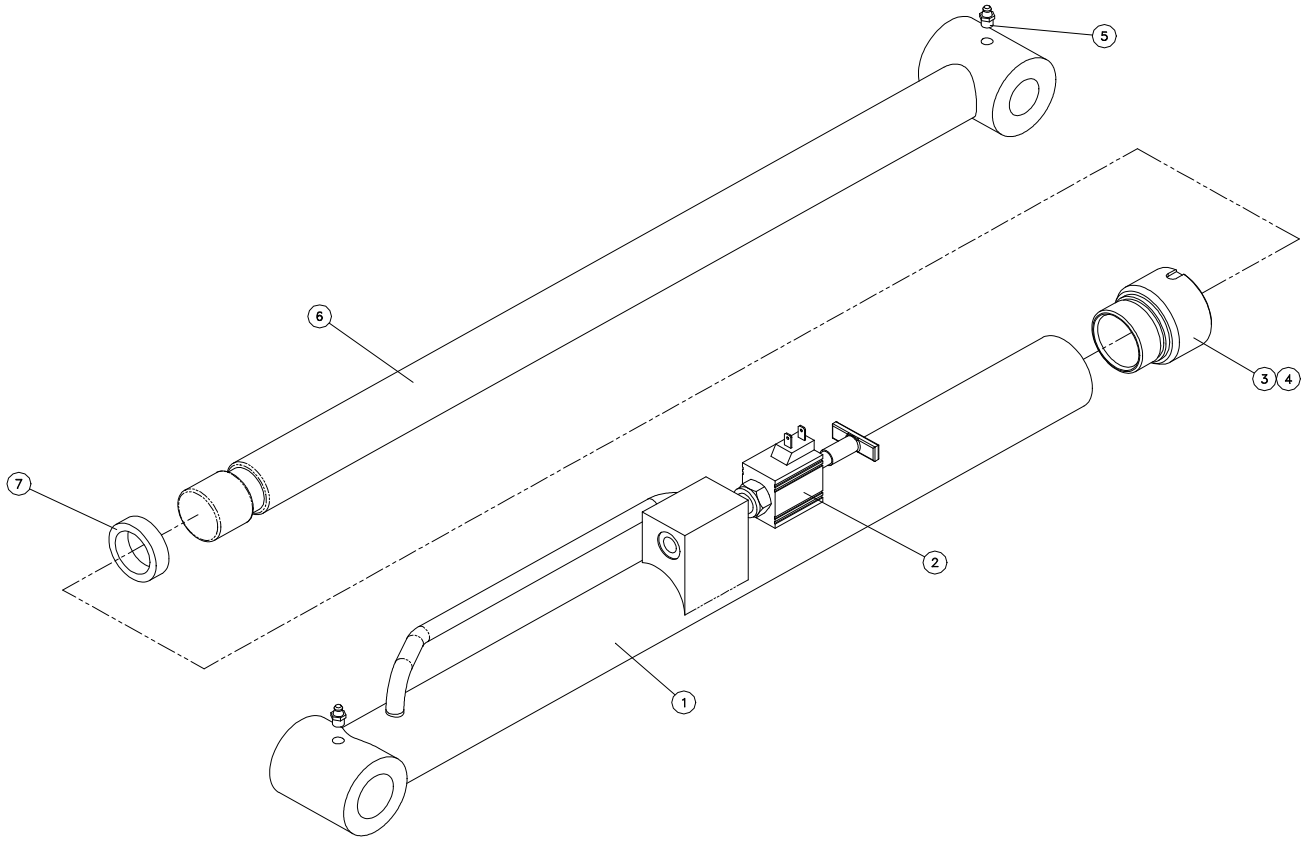


JIB CYLINDER MB20N & MB20
501480-000
MB20/0041 ONWARDS

ITEM	PART NO.	DESCRIPTION	QTY.
1	-	CYLINDER BODY	1
2	501483-000	HYDRAULIC VALVE	1
3	-	ROD END CAP	1
4	501662-000	SEAL KIT	1
5	058819-001	M8 GREASE NIPPLE	2
6	-	CYLINDER ROD	1
7	-	BEARING RING	1

JIB CYLINDER MB26
501480-001
MB26/0065 ONWARDS

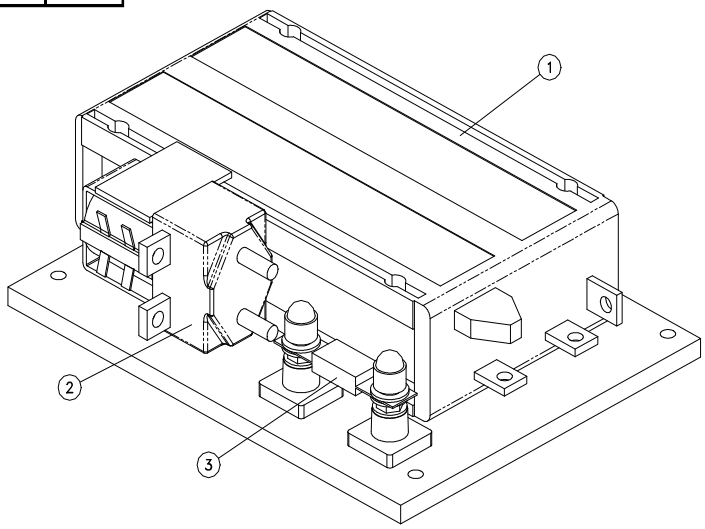
ITEM	PART NO.	DESCRIPTION	QTY.
1	-	CYLINDER BODY	1
2	501483-000	HYDRAULIC VALVE	1
3	-	ROD END CAP	1
4	501662-000	SEAL KIT	1
5	058819-001	M8 GREASE NIPPLE	2
6	-	CYLINDER ROD	1
7	-	BEARING RING	1



MOTOR CONTROLLER

501660-000

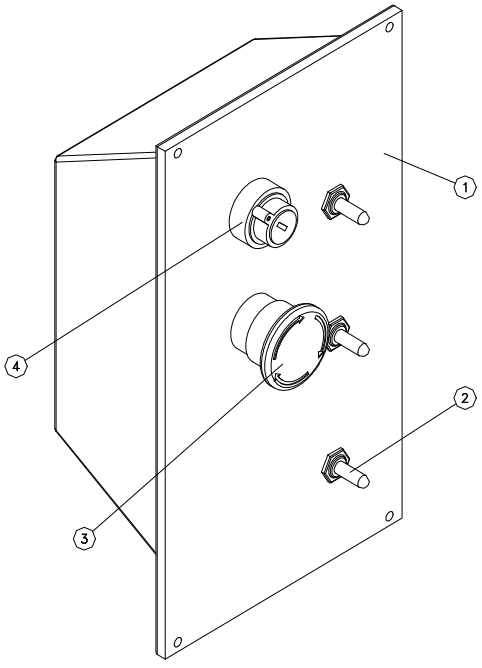
ITEM	PART NO.	DESCRIPTION	QTY.
1	501523-000	MOS90 CONTROLLER UNIT	1
2	501656-000	LINE CONTACTOR RELAY	1
3	058921-000	MAIN FUSE 325AMP	1



LOWER CONTROL BOX

501503-000

ITEM	PART NO.	DESCRIPTION	QTY.
1	501271-000	LOWER CONTROLS DECAL	1
2	057311-000	TOGGLE SWITCH	3
3	057309-000	EMERGENCY STOP BUTTON	1
4	501521-000	KEY SWITCH	1



PCB ENCLOSURE ASSEMBLY MB20N & MB20

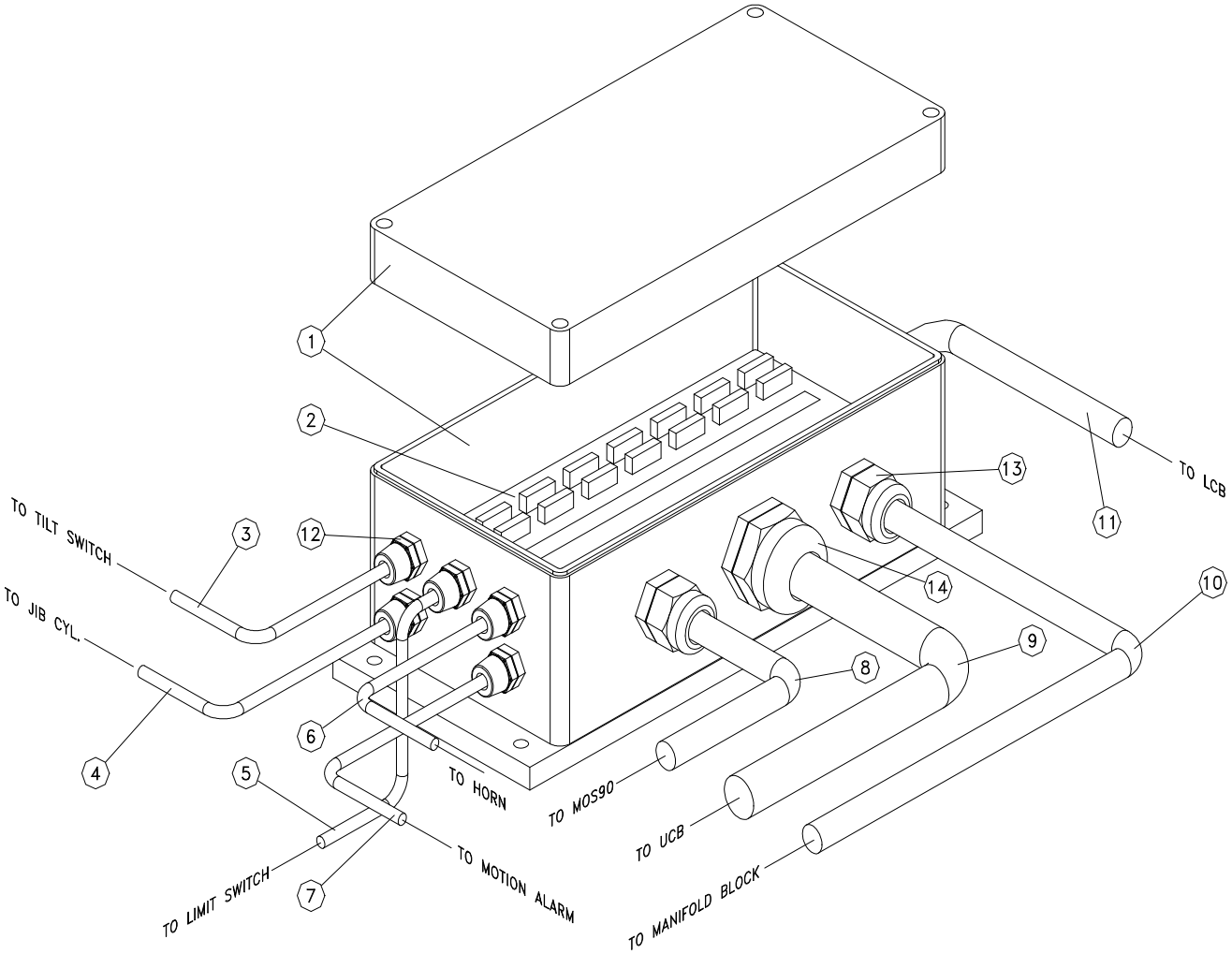
501524-000
MB20/0000 TO MB20/0040

ITEM	PART NO.	DESCRIPTION	QTY.
1	501585-000	PCB ENCLOSURE	1
2	501500-000	PRINTED CIRCUIT BOARD (PCB)	1
3	501513-000	WIRING HARNESS - TILT SWITCH	1
4	501519-000	WIRING HARNESS - JIB CYLINDER	1
5	501515-000	WIRING HARNESS - LIMIT SWITCH	1
6	501512-000	WIRING HARNESS - HORN	1
7	501514-000	WIRING HARNESS - MOTION ALARM	1
8	501511-000	WIRING HARNESS - MOS 90	1
9	501505-000	WIRING HARNESS - UCB	1
10	501510-000	WIRING HARNESS - MANIFOLD BLOCK	1
11	501507-000	WIRING HARNESS - LCB	1
12	057308-000	CABLE GLAND - SMALL	1
13	057332-000	CABLE GLAND - MEDIUM	1
14	057332-001	CABLE GLAND - LARGE	1

PCB ENCLOSURE ASSEMBLY MB26

501524-001
MB26/0000 TO MB26/0064

ITEM	PART NO.	DESCRIPTION	QTY.
1	501585-000	PCB ENCLOSURE	1
2	501500-000	PRINTED CIRCUIT BOARD (PCB)	1
3	501513-000	WIRING HARNESS - TILT SWITCH	1
4	501519-000	WIRING HARNESS - JIB CYLINDER	1
5	501515-000	WIRING HARNESS - LIMIT SWITCH	1
6	501512-000	WIRING HARNESS - HORN	1
7	501514-000	WIRING HARNESS -MOTION ALARM	1
8	501511-000	WIRING HARNESS - MOS 90	1
9	501506-000	WIRING HARNESS - UCB	1
10	501510-000	WIRING HARNESS - MANIFOLD BLOCK	1
11	501507-000	WIRING HARNESS - LCB	1
12	057308-000	CABLE GLAND - SMALL	1
13	057332-000	CABLE GLAND - MEDIUM	1
14	057332-001	CABLE GLAND - LARGE	1



PCB ENCLOSURE ASSEMBLY MB20N & MB20

501585-000

MB20/0041 ONWARDS

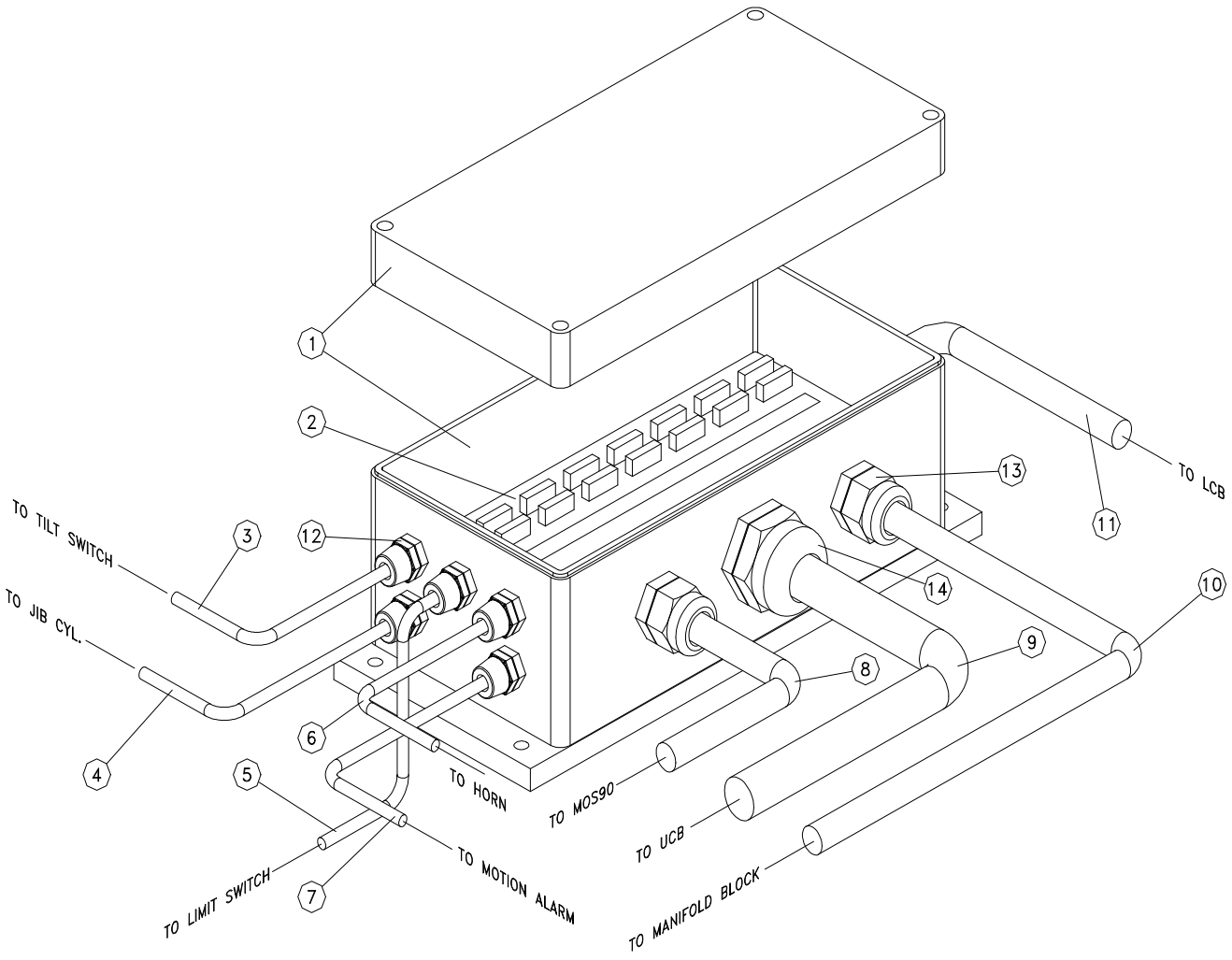
ITEM	PART NO.	DESCRIPTION	QTY.
1	501371-000	PCB ENCLOSURE	1
2	501481-000	PRINTED CIRCUIT BOARD (PCB)	1
3	501513-000	WIRING HARNESS - MB20 & MB26	1
4	501519-000	WIRING HARNESS - MB20 & MB26	1
5	501515-000	WIRING HARNESS - MB20 & MB26	1
6	501512-000	WIRING HARNESS - MB20 & MB26	1
7	501514-000	WIRING HARNESS - MB20 & MB26	1
8	501511-000	WIRING HARNESS - MB20 & MB26	1
9	501505-000	WIRING HARNESS - MB20 ONLY	1
10	501510-000	WIRING HARNESS - MB20 & MB26	1
11	501507-000	WIRING HARNESS - MB20 & MB26	1
12	057308-000	CABLE GLAND - SMALL	1
13	057332-000	CABLE GLAND - MEDIUM	1
14	057332-001	CABLE GLAND - LARGE	1

PCB ENCLOSURE ASSEMBLY MB26

501585-001

MB26/0065 ONWARDS

ITEM	PART NO.	DESCRIPTION	QTY.
1	501371-000	PCB ENCLOSURE	1
2	501481-000	PRINTED CIRCUIT BOARD (PCB)	1
3	501513-000	WIRING HARNESS - MB20 & MB26	1
4	501519-000	WIRING HARNESS - MB20 & MB26	1
5	501515-000	WIRING HARNESS - MB20 & MB26	1
6	501512-000	WIRING HARNESS - MB20 & MB26	1
7	501514-000	WIRING HARNESS - MB20 & MB26	1
8	501511-000	WIRING HARNESS - MB20 & MB26	1
9	501506-000	WIRING HARNESS - MB26 ONLY	1
10	501510-000	WIRING HARNESS - MB20 & MB26	1
11	501507-000	WIRING HARNESS - MB20 & MB26	1
12	057308-000	CABLE GLAND - SMALL	1
13	057332-000	CABLE GLAND - MEDIUM	1
14	057332-001	CABLE GLAND - LARGE	1



UPPER CONTROL BOX MB20N & MB20

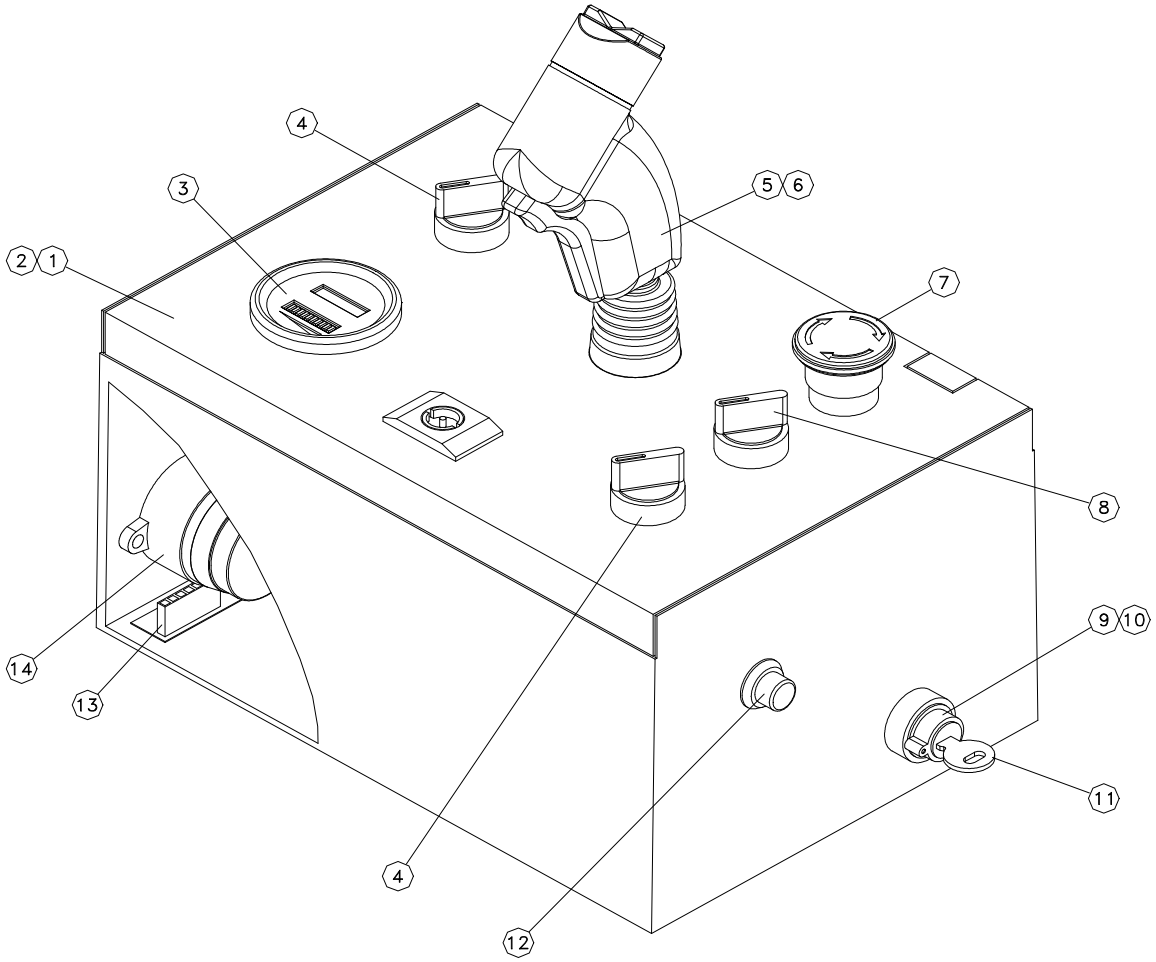
501504-000

ITEM	PART NO.	DESCRIPTION	QTY.
1	501561-000	UPPER BOX ENCLOSURE (UCB)	1
2	501272-000	DECAL	1
3	501522-000	HOUR METER / BATTERY INDICATOR	1
4	058807-000	2-POSITION SELECTOR SWITCH	2
5	058804-000	JOYSTICK	1
6	501501-000	JOYSTICK PRINTED CIRCUIT BOARD	1
7	057309-000	EMERGENCY STOP SWITCH	1
8	501665-000	3-POSITION SELECTOR SWITCH	1
9	057310-000	UCB KEYSWITCH	1
10	058186-000	ON/OFF/EMERGENCY DECAL	1
11	057238-000	KEY	1
12	057588-000	HORN BUTTON	1
13	501502-000	UCB PRINTED CIRCUIT BOARD	1
14	057328-000	AUDIBLE ALARM	1
15	501562-000	SOCKET	1

UPPER CONTROL BOX MB26

501504-001

ITEM	PART NO.	DESCRIPTION	QTY.
1	501561-000	UPPER BOX ENCLOSURE (UCB)	1
2	501272-001	DECAL	1
3	501522-000	HOUR METER / BATTERY INDICATOR	1
4	058807-000	2-POSITION SELECTOR SWITCH	2
5	058804-000	JOYSTICK	1
6	501501-000	JOYSTICK PRINTED CIRCUIT BOARD	1
7	057309-000	EMERGENCY STOP SWITCH	1
8	501665-000	3-POSITION SELECTOR SWITCH	1
9	057310-000	UCB KEYSWITCH	1
10	058186-000	ON/OFF/EMERGENCY DECAL	1
11	057238-000	KEY	1
12	057588-000	HORN BUTTON	1
13	501502-000	UCB PRINTED CIRCUIT BOARD	1
14	057328-000	AUDIBLE ALARM	1
15	501562-000	SOCKET	1

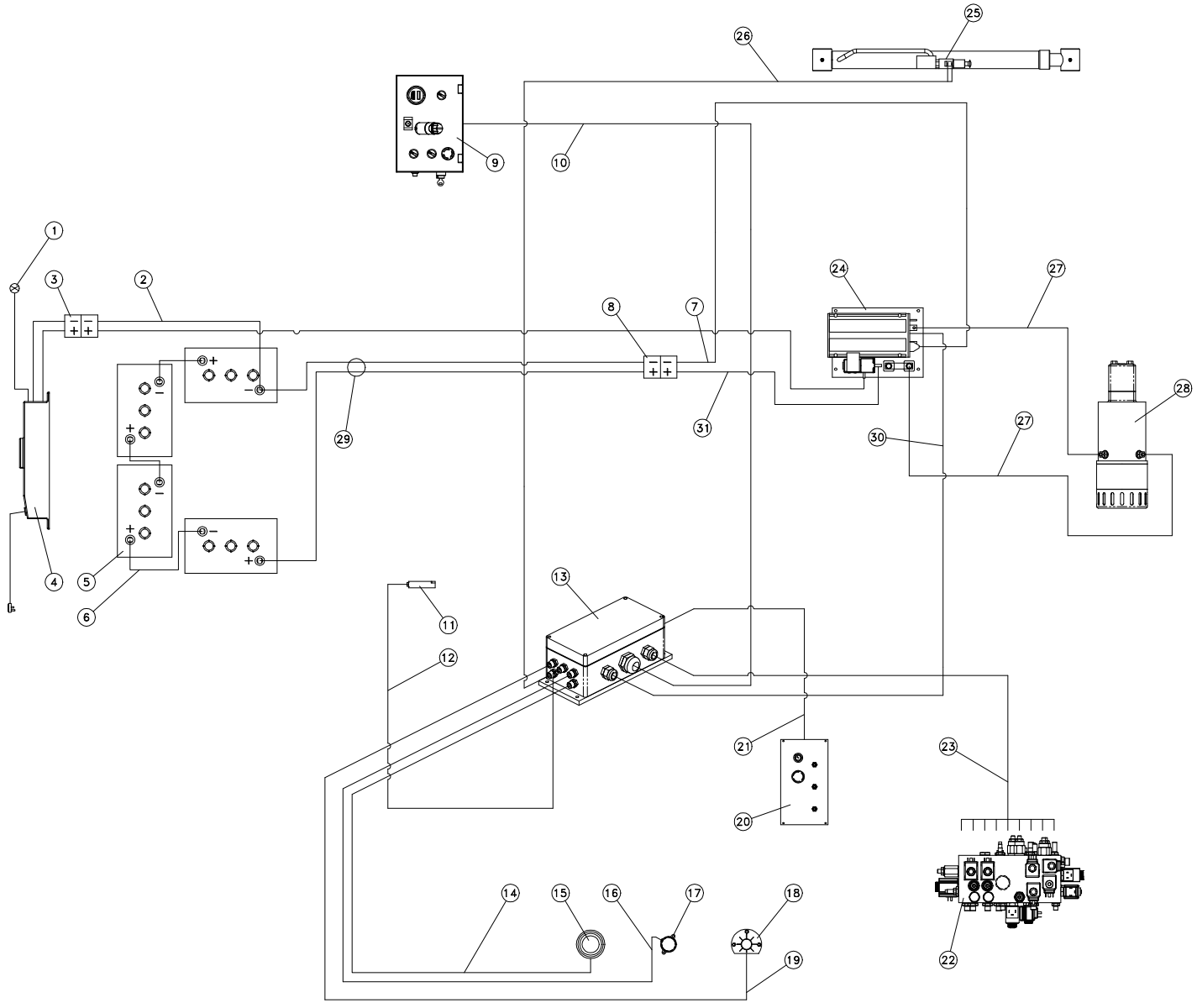


ELECTRICAL COMPONENT ASSEMBLY

500705-000

ITEM	PART NO.	DESCRIPTION	QTY.
1	501575-000	BATTERY CHARGER INDICATOR	1
2	501622-000	HARNESS - CHARGER CABLE	1
3	058783-000	CHARGER DISCONNECT PLUG	1
4	501578-000	BATTERY CHARGER	1
5	REF.	6v BATTERY	4
6	057185-000	BATTERY CABLE	1
7	501516-000	MOS TO BATT. DISCONNECT (LONG)	1
8	058937-000	BATTERY DISCONNECT PLUG	1
9	501504-000	UPPER CONTROL BOX ASSEMBLY	1
10	501505-000	HARNESS - UCB TO PCB MB20	1
	501506-000	HARNESS - UCB TO PCB MB26	1
11	501425-000	MAGNETIC LIMIT SWITCH	1
12	501515-000	HARNESS - LIMIT SWITCH	1
13	REF.	PCB BOX ASSEMBLY	1
14	501512-000	HARNESS - HORN	1
15	057586-000	HORN UNIT	1
16	501514-000	HARNESS - MOTION ALARM	1
17	057328-000	MOTION ALARM UNIT	1
18	058912-000	TILT SENSOR SWITCH	1
19	501513-000	HARNESS - TILT SENSOR	1
20	501503-000	LOWER CONTROL BOX ASSEMBLY	1
21	501507-000	HARNESS - LOWER CONTROL BOX	1
22	501471-000	MANIFOLD BLOCK ASSEMBLY	1
23	501510-000	HARNESS - MANIFOLD BLOCK	1
24	501523-000	MOTOR CONTROLLER (MOS90)	1
25	501482-000	JIB CYLINDER SOLENOID	1
26	501519-000	HARNESS - JIB SOLENOID	1
27	501520-000	ELECTRIC MOTOR CABLE SET	2
28	501599-000	ELECTRIC MOTOR	1
29	501623-000	HARNESS - BATTERY DISCONNECT	1
30	501511-000	MOS 90 CABLE	1
31	501517-000	MOS TO BATT. DISCONNECT (SHORT)	1

ELECTRICAL COMPONENT ASSEMBLY



HYDRAULIC VALVE BLOCK

501235-000 MB20/0000 - 0040
MB26/0000 - 0064

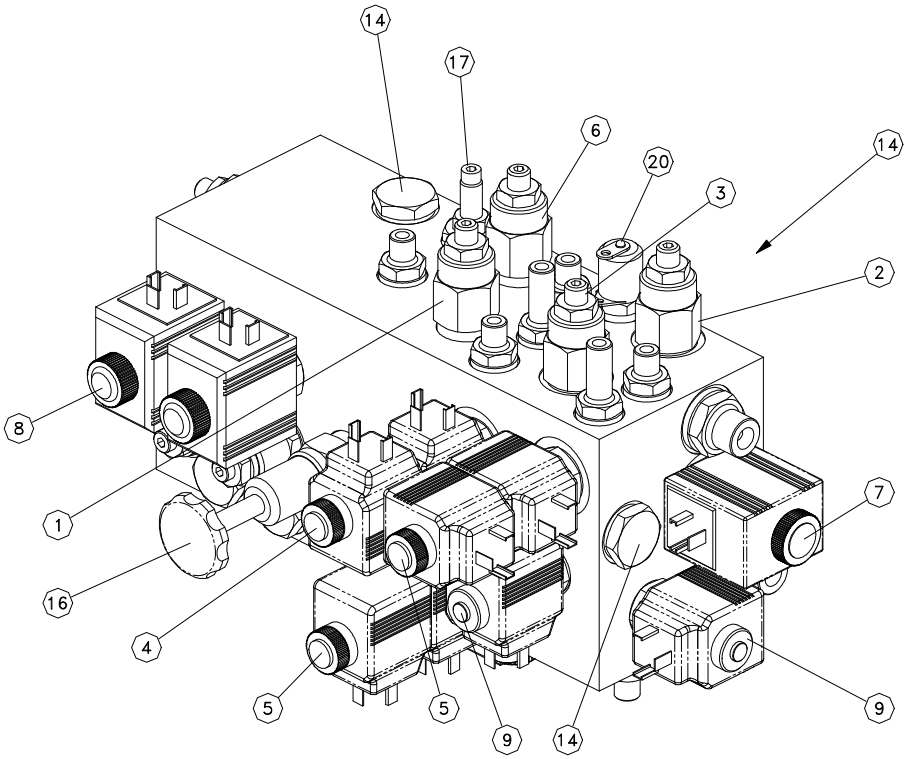
ITEM	PART NO.	DESCRIPTION	QTY.
1	058722-001	RELIEF CARTRIDGE CT12 & CT13	2
2	058722-002	RELIEF CARTRIDGE CT10	1
3	058722-003	RELIEF CARTRIDGE CT11	1
4	058723-000	SOLENOID CARTRIDGE CT1	1
5	058726-002	SOLENOID CARTRIDGE CT2 & CT6	2
6	501486-000	RELIEF CARTRIDGE CT25	1
7	501526-000	SOLENOID CARTRIDGE CT3	1
8	501527-000	SOLENOID CARTRIDGE CT4 & CT5	2
9	501528-000	SOLENOID CARTRIDGE CT7 & CT15	2
10	501529-000	SOLENOID CARTRIDGE CT14	1
11	501530-000	SOLENOID CARTRIDGE CT23	1
12	501531-000	SOLENOID CARTRIDGE CT24	1
13	501532-000	O/CENTRE CARTRIDGE CT8 & CT9	2
14	501533-000	CHECK CARTRIDGE CT16,CT30,CT26	3
15	501534-000	SHUTTLE CARTRIDGE CT17	1
16	501535-000	HAND PUMP CT19	1
17	501485-000	NEEDLE CARTRIDGE CT20 & CT21	2
18	501537-000	PRESSURE REDUCER CT22	1
19	501539-000	P.O CHECK CARTRIDGE CT27 & CT28	2
20	057109-000	FILLER CAP , FILTER ASSY	1
21	057377-000	ADAPTORS 1/2” x 1/2”	1
22	057122-000	ADAPTORS 3/8” x 3/8”	7
23	057358-000	ADAPTORS 1/4” x 1/4”	10

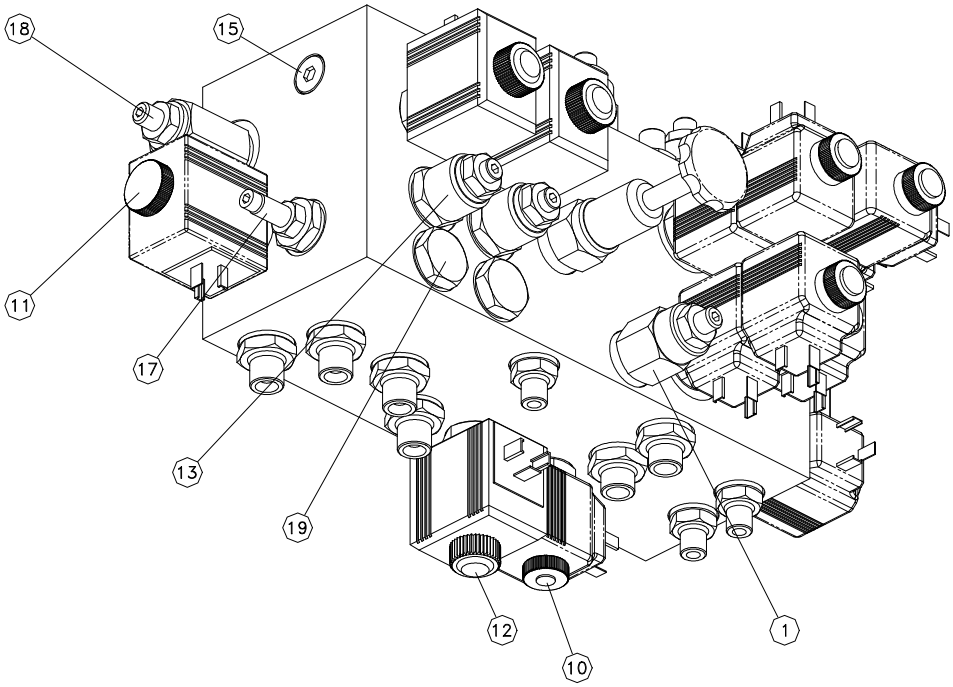
501471-000 MB20/0041 - ONWARDS
MB26/0065 - ONWARDS

ITEM	PART NO.	DESCRIPTION	QTY.
1	058722-001	RELIEF CARTRIDGE CT12 & CT13	2
2	058722-002	RELIEF CARTRIDGE CT10	1
3	058722-003	RELIEF CARTRIDGE CT11	1
4	058723-000	SOLENOID CARTRIDGE CT1	1
5	058726-002	SOLENOID CARTRIDGE CT2 & CT6	2
6	501486-000	RELIEF CARTRIDGE CT25	1
7	501526-000	SOLENOID CARTRIDGE CT3	1
8	501527-000	SOLENOID CARTRIDGE CT4 & CT5	2
9	501528-000	SOLENOID CARTRIDGE CT7 & CT15	2
10	501479-000	SOLENOID CARTRIDGE CT14	1
11	501530-000	SOLENOID CARTRIDGE CT23	1
12	501531-000	SOLENOID CARTRIDGE CT24	1
13	501532-000	O/CENTRE CARTRIDGE CT8 & CT9	2
14	501484-000	CHECK CARTRIDGE CT16,CT30,CT26	3
15	501534-000	SHUTTLE CARTRIDGE CT17	1
16	501535-000	HAND PUMP CT19	1
17	501485-000	NEEDLE CARTRIDGE CT20 & CT21	2
18	501537-000	PRESSURE REDUCER CT22	1
19	501539-000	P.O CHECK CARTRIDGE CT27 & CT28	2
20	057109-000	FILLER CAP , FILTER ASSY.	1
21	057377-000	ADAPTORS 1/2” x 1/2”	1
22	057122-000	ADAPTORS 3/8” x 3/8”	7
23	057358-000	ADAPTORS 1/4” x 1/4”	10
24	501697-000	BULKHEAD FITTING L1 & ST2	2

HYDRAULIC VALVE BLOCK

VIEW FROM ABOVE





VIEW FROM BELOW

Illustrated Parts List

HYDRAULIC COMPONENT ASSEMBLY

MB20

ITEM	PART NO.	DESCRIPTION	QTY.
1	501233-000	WHEEL MOTOR LEFT HAND	1
2	501371-000	HOSE(TEE TO MOTOR BRAKE,LH)	1
3	501372-000	HOSE (WHEEL MOTOR,LH)	2
4	501373-001	HOSE(CASE DRAIN TO RES. LH)	1
5	501372-001	HOSE(WHEEL MOTOR, RH)	2
6	501268-000	SWIVEL FITTING - SHORT	2
7	501233-000	SWIVEL FITTING - STRAIGHT	2
8	501268-001	SWIVEL FITTING - LONG	2
9	501233 -001	WHEEL MOTOR RIGHT HAND	1
10	501373-000	HOSE (CASE DRAIN TO RES. RH)	1
11	501371-001	HOSE (TEE TO MOTOR BRAKE RH)	1
12	500782-001	STEERING CYLINDER	1
13	501374-001	HOSE (STEERING CYLINDER,RH)	1
14	501494-000	HOSE(STEERING CYLINDER,LH)	1
15	058352-000	TEE PIECE - 1/4" EQUAL	1
16	500285-000	SLEW MOTOR	1
17	501359-000	HOSE (SLEW MOTOR)	2
18	501234-000	RESERVOIR	1
19	501364-000	HOSE(RETURN ,BLOCK TO FILTER)	1
20	501366-000	HOSE(JIB CYLINDER)	1
21	501363-000	HOSE(EMERGENCY LETDOWN)	1
22	501361-000	HOSE(RES. TO PUMP,SUCTION)	1
23	REF.	HYDRAULIC MANIFOLD ASSEMBLY	1
24	500780-001	MAIN LIFT CYLINDER	1
25	500784-00	STANDPIPE ADAPTOR	2
26	501365-000	HOSE (LIFT CYLINDER)	2
27	501366-000	HOSE (JIB CYLINDER)	1
28	501481-001	JIB CYLINDER	1
29	501610-000	POTHOLE CYLINDER	1
30	501360-000	HOSE (POTHOLE CYLINDER)	2
31	501362-000	HOSE (PUMP -BLOCK,PRESSURE)	1
32	501232-000	PUMP-MOTOR UNIT	1

MB20N

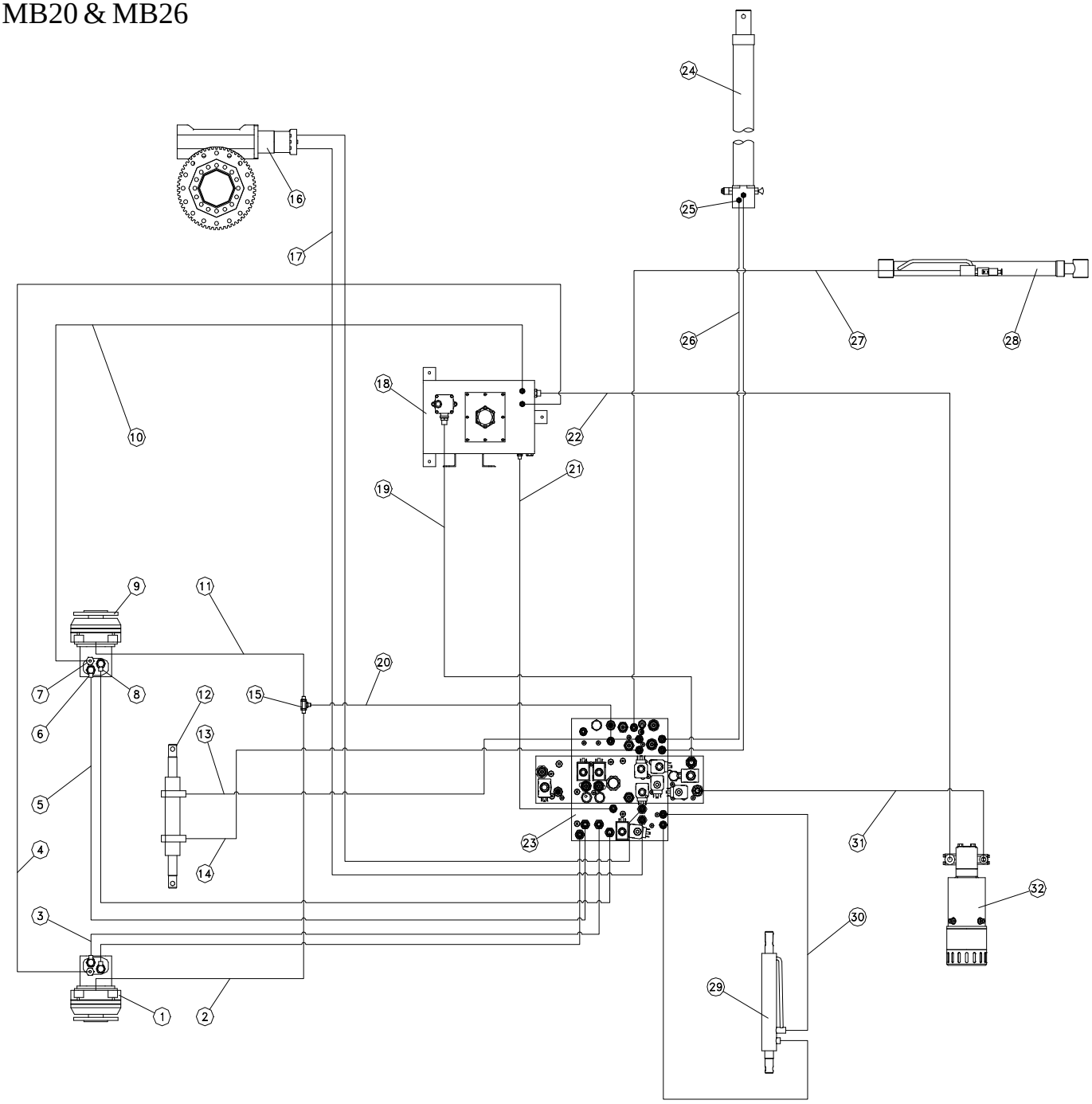
ITEM	PART NO.	DESCRIPTION	QTY.
1	501233-000	WHEEL MOTOR LEFT HAND	1
2	501367-000	HOSE(TEE TO MOTOR BRAKE,LH)	1
3	501368-000	HOSE (WHEEL MOTOR,LH)	2
4	501369-001	HOSE(CASE DRAIN TO RES. LH)	1
5	501368-001	HOSE(WHEEL MOTOR, RH)	2
6	501268-000	SWIVEL FITTING - SHORT	2
7	501233-000	SWIVEL FITTING - STRAIGHT	2
8	501268-001	SWIVEL FITTING - LONG	2
9	501233 -001	WHEEL MOTOR RIGHT HAND	1
10	501369-000	HOSE (CASE DRAIN TO RES. RH)	1
11	501367-001	HOSE (TEE TO MOTOR BRAKE RH)	1
12	500782-001	STEERING CYLINDER	1
13	501370-001	HOSE (STEERING CYLINDER,RH)	1
14	501370-000	HOSE(STEERING CYLINDER,LH)	1
15	058352-000	TEE PIECE - 1/4" EQUAL	1
16	500285-000	SLEW MOTOR	1
17	501359-000	HOSE (SLEW MOTOR)	2
18	501234-000	RESERVOIR	1
19	501364-000	HOSE(RETURN ,BLOCK TO FILTER)	1
20	501366-000	HOSE(JIB CYLINDER)	1
21	501363-000	HOSE(EMERGENCY LETDOWN)	1
22	501361-000	HOSE(RES. TO PUMP,SUCTION)	1
23	REF.	HYDRAULIC MANIFOLD ASSEMBLY	1
24	500780-001	MAIN LIFT CYLINDER	1
25	500784-00	STANDPIPE ADAPTOR	2
26	501365-000	HOSE (LIFT CYLINDER)	2
27	501366-000	HOSE (JIB CYLINDER)	1
28	501481-001	JIB CYLINDER	1
29	501610-000	POTHOLE CYLINDER	1
30	501360-000	HOSE(POTHOLE CYLINDER)	2
31	501362-000	HOSE (PUMP -BLOCK,PRESSURE)	1
32	501232-000	PUMP-MOTOR UNIT	1

MB26

ITEM	PART NO.	DESCRIPTION	QTY.
1	501233-000	WHEEL MOTOR LEFT HAND	1
2	501371-000	HOSE(TEE TO MOTOR BRAKE,LH)	1
3	501372-000	HOSE (WHEEL MOTOR ,LH)	2
4	501373-001	HOSE (CASE DRAIN TO RES. RH)	1
5	501372-001	HOSE (WHEEL MOTOR ,RH)	2
6	501268-000	SWIVEL FITTING - SHORT	2
7	501233-000	SWIVEL FITTING - STRAIGHT	2
8	501268-001	SWIVEL FITTING - LONG	2
9	501233 -001	WHEEL MOTOR RIGHT HAND	1
10	501373-000	HOSE(CASE DRAIN TO RES. RH)	1
11	501371-001	HOSE(TEE TO MOTOR BRAKE, RH)	1
12	500782-001	STEERING CYLINDER	1
13	501374-001	HOSE(STEERING CYLINDER, RH)	1
14	501494-000	HOSE(STEERING CYLINDER, LH)	1
15	058352-000	TEE PIECE- 1/4" EQUAL	1
16	500285-000	SLEW MOTOR	1
17	501359-000	HOSE (SLEW MOTOR)	1
18	501234-000	RESERVOIR	1
19	501364-000	HOSE(BLOCK TO RES. FILTER,RETURN)	1
20	501336-000	HOSE(BLOCK TO TEE)	1
21	501363-000	HOSE(EMERGENCY PUMP LETDOWN)	1
22	501361-000	HOSE(RES TO PUMP, SUCTION)	1
23	REF.	HYDRAULIC MANIFOLD ASSEMBLY	1
24	500780-001	MAIN LLIFT CYLINDER	1
25	500784-000	STANDPIPE ADAPTOR	2
26	501365-000	HOSE(LIFT CYLINDER)	2
27	501366-001	HOSE (JIB CYLINDER)	1
28	501481-000	JIB CYLINDER	1
29		POTHOLE CYLINDER	1
30	501360-000	HOSE (POTHOLE CYLINDER)	2
31	501362-000	HOSE(PUMP TO BLOCK, PRESSURE)	1
32	501232-000	PUMP MOTOR UNIT	1

HYDRAULIC COMPONENT ASSEMBLY

MB20 & MB26

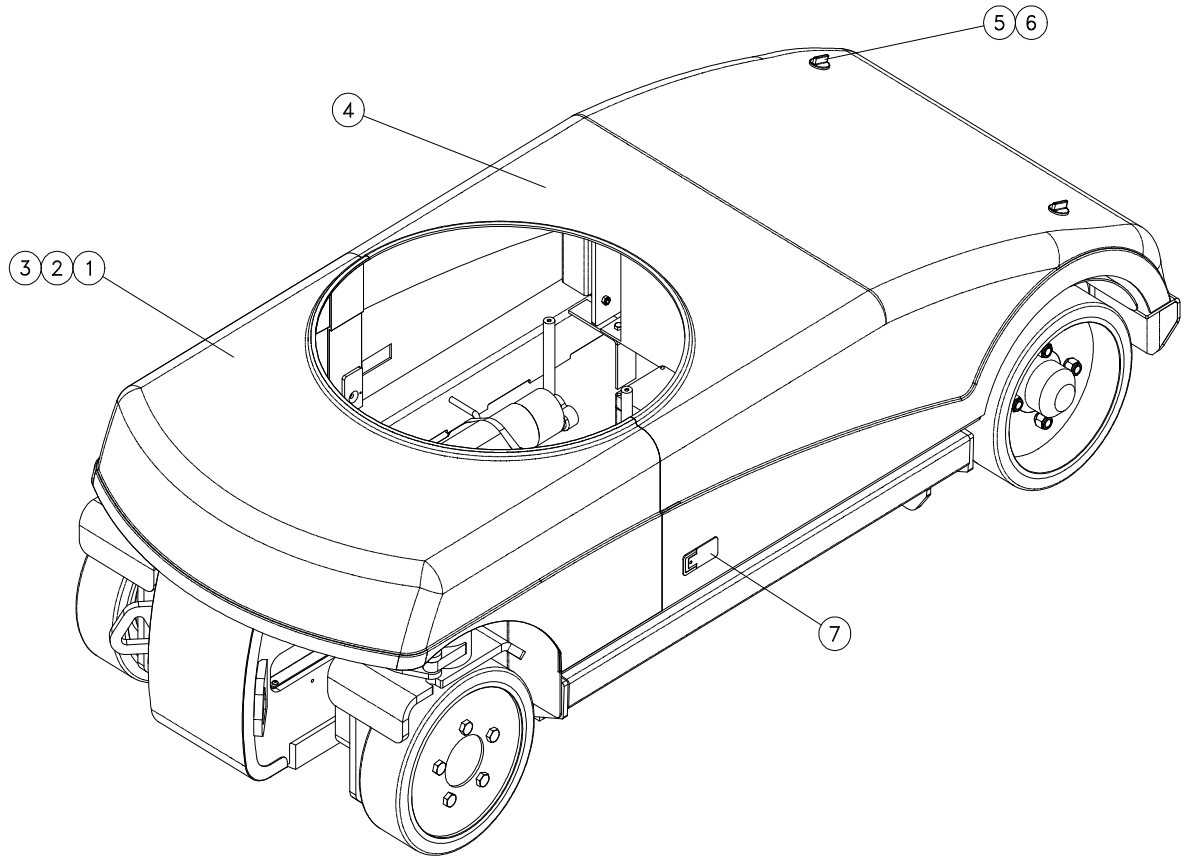


CHASSIS COVER MB20N

ITEM	PART NO.	DESCRIPTION	QTY.
1	501202-001	FRONT CHASSIS COVER - COMPLETE	1
2	500409-001	CAPTIVE SCREW	2
3	500409-003	CAPTIVE SCREW RECEPTACLE	2
4	501202-000	REAR CHASSIS COVER - COMPLETE	1
5	500465-001	COMPRESSION LATCH	2
6	500259-001	SPUR WASHER	2
7	501348-000	LIFT & TURN LATCH	2

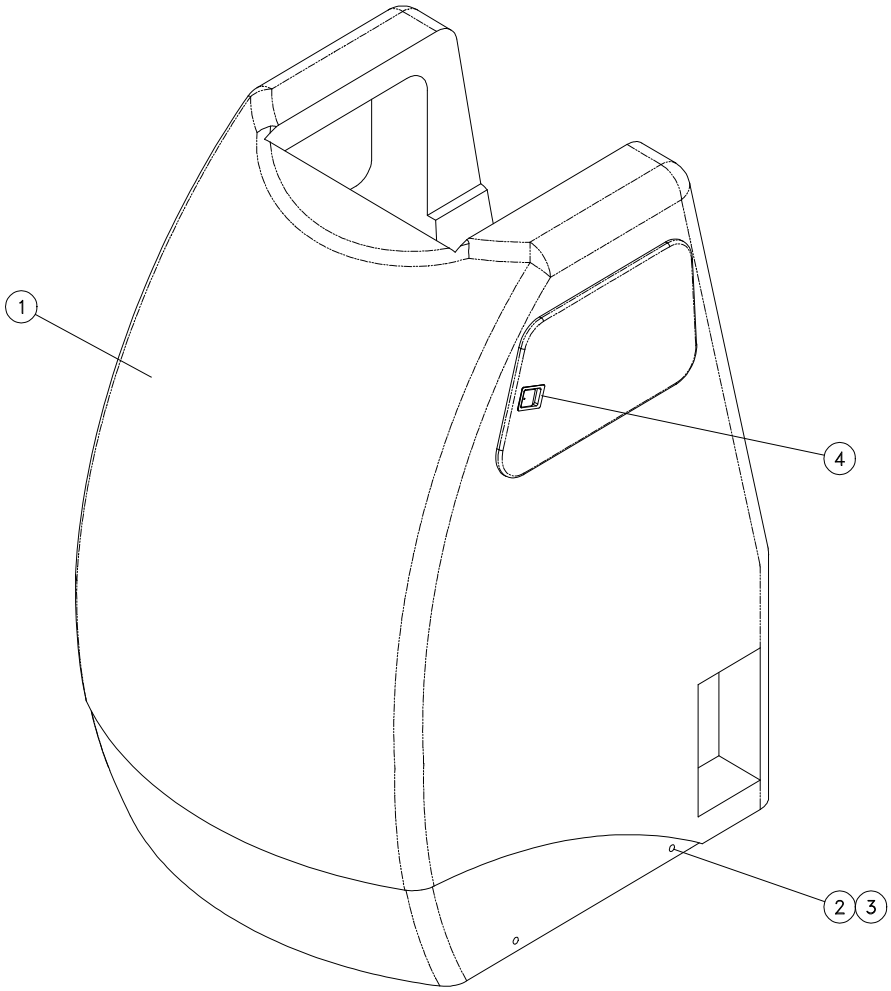
CHASSIS COVER MB20 & MB26

ITEM	PART NO.	DESCRIPTION	QTY.
1	501202-003	FRONT CHASSIS COVER - COMPLETE	1
2	500409-001	CAPTIVE SCREW	2
3	500409-003	CAPTIVE SCREW RECEPTACLE	2
4	501202-002	REAR CHASSIS COVER - COMPLETE	1
5	500465-001	COMPRESSION LATCH	2
6	500259-001	SPUR WASHER	2
7	501348-000	LIFT & TURN LATCH	2

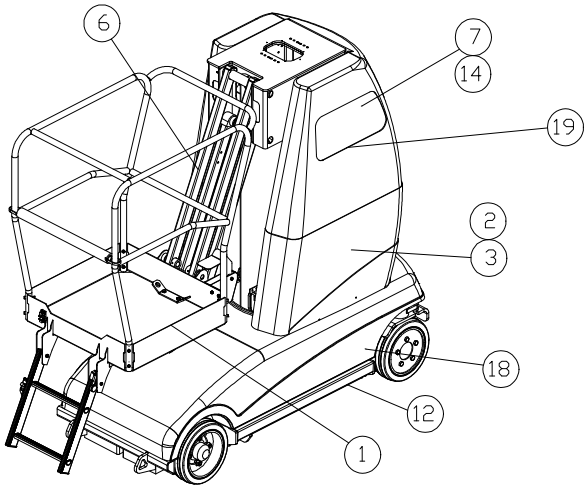


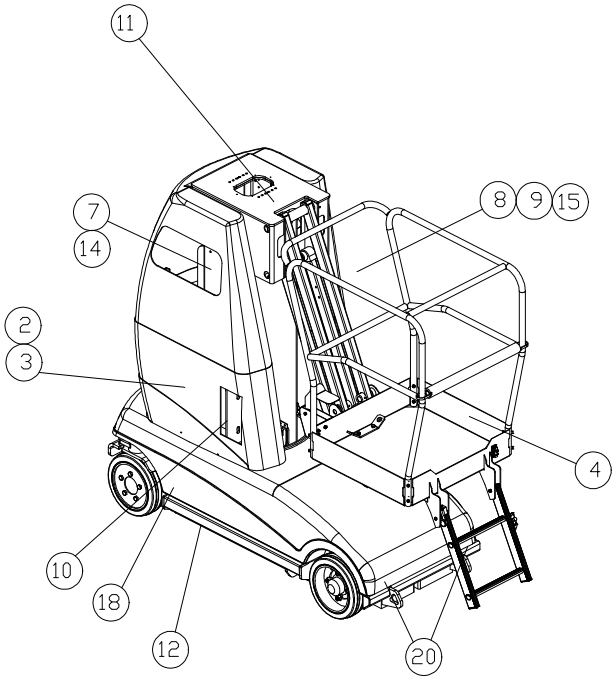
MAST COVER

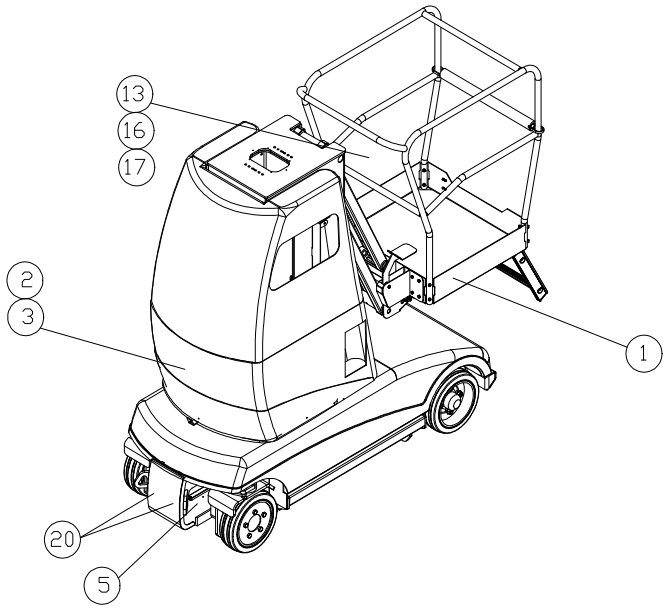
ITEM	PART NO.	DESCRIPTION	QTY.
1	501203-000	MAST COVER - COMPLETE	1
2	501346-000	CAPTIVE SCREW	4
3	501347-001	CAPTIVE SCREW RECEPTACLE	4
4	-REF-	SLAM ACTION PADDLE LATCH	2



MB20N DECALS







MB 20N ENGLISH (EUROPEAN) DECAL OPTION

ITEM	PART No	DESCRIPTION	QTY
1	501345-000	MB 20N CAGE DECAL	2
2	501343-000	MB 20N BALLAST COVER DECAL	3
3	501344-000	MAST BOOM DECAL	3
4	057392-000	S.W.L. LARGE	1
5	501273-000	NAME PLATE (EURO)	1
6	057382-000	EMERGENCY LOWERING DECAL	1
7	057429-000	BATTERY FLUID LEVEL	2
8	057692-000	IMPORTANT BEFORE USING	1
9	501272-000	UPPER CONTROL BOX	1
10	501271-000	LOWER CONTROL BOX	1
11	058860-000	PINCH POINT	3
12	057385-000	HAZARD TAPE (1000mm LONG)	4
13	058181-000	WARNING: 3-POINT DECAL	1
14	057430-000	EXPLOSION HAZZARD	2
15	058186-000	EM. DOWN / OFF / ON	1
16	501582-000	OPERATORS MANUAL	1
17	501376-000	SERVICE AND PARTS MANUAL	1
18	501453-000	POTHOLE CRUSHING HAZARD	3
19	501455-000	MAST EMERGENCY LOWERING	1
20	058531-000	LIFT / TOW POINT	4

MB 20N ENGLISH (AMERICAN) DECAL OPTION

ITEM	PART No	DESCRIPTION	QTY
1	501345-000	MB 20N CAGE DECAL	2
2	501343-000	MB 20N BALLAST COVER DECAL	3
3	501344-000	MAST BOOM DECAL	3
4	058761-001	S.W.L. LARGE (425 lbs)	1
5	501273-001	NAME PLATE (USA)	1
6	057382-000	EMERGENCY LOWERING DECAL	1
7	057429-000	BATTERY FLUID LEVEL	2
8	058539-000	IMPORTANT BEFORE USING	1
9	501272-000	UPPER CONTROL BOX	1
10	501271-000	LOWER CONTROL BOX	1
11	058537-000	PINCH POINT	1
12	057385-000	HAZARD TAPE (1000mm LONG)	4
13	058181-000	WARNING: 3-POINT DECAL	1
14	057430-000	EXPLOSION HAZZARD	2
15	058186-000	EM. DOWN / OFF / ON	1
16	501582-000	OPERATORS MANUAL	1
17	501376-000	SERVICE AND PARTS MANUAL	1
18	501453-000	POTHOLE CRUSHING HAZARD	3
19	501455-000	MAST EMERGENCY LOWERING	1
20	058531-000	LIFT / TOW POINT	4
21	058538-000	HAZZARDS DECAL	1
22	058532-000	HYDRAULIC FLUID	1
23	057426-000	HARNESS ATTACHEMENT	1
24	058530-000	MEETS ANSI 92.5	1
25	057425-001	INSTRUCTIONS ENCLOSED	1
26	057434-000	ONLY UPRIGHT COMPONANTS	1
27	057424-001	CRUSHING HAZZARD	2
28	058533-000	DO NOT ADJUST SWITCHES	1
29	058534-000	BATTERIES ARE BALLAST	2

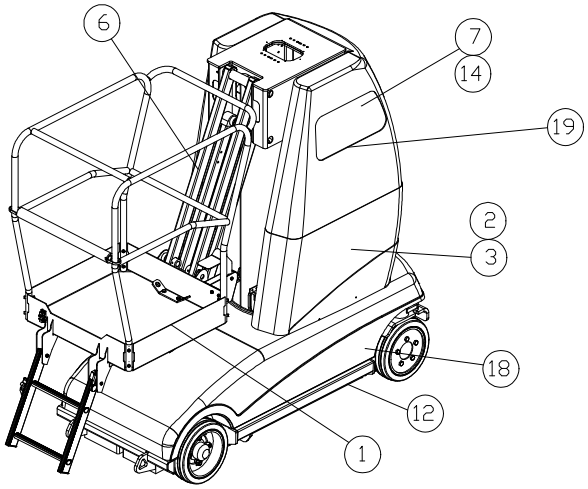
MB 20N FRENCH DECAL OPTION

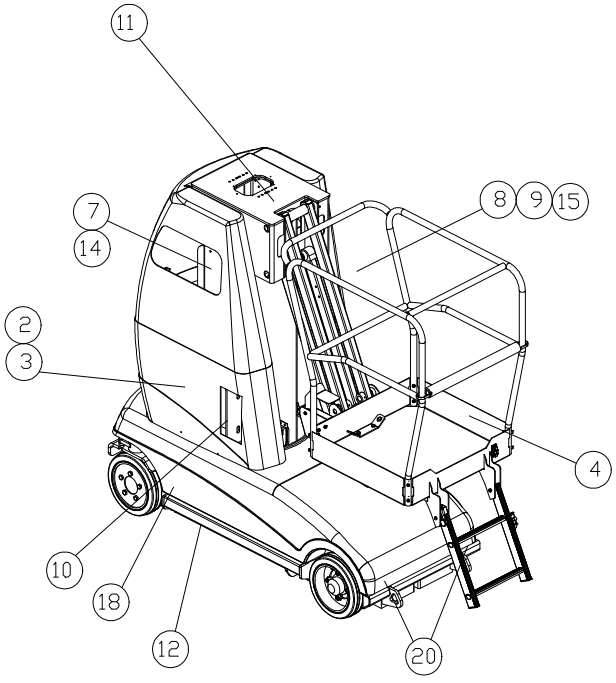
ITEM	PART No	DESCRIPTION	QTY
1	501345-000	MB 20N CAGE DECAL	2
2	501343-000	MB 20N BALLAST COVER DECAL	3
3	501344-000	MAST BOOM DECAL	3
4	057392-001	S.W.L. LARGE	1
5	501273-000	NAME PLATE	1
6	057382-001	EMERGENCY LOWERING DECAL	1
7	057429-001	BATTERY FLUID LEVEL	2
8	058016-001	IMPORTANT BEFORE USING	1
9	501272-000	UPPER CONTROL BOX	1
10	501271-000	LOWER CONTROL BOX	1
11	058860-000	PINCH POINT	1
12	057385-000	HAZARD TAPE (1000mm LONG)	4
13	058181-001	WARNING: 3-POINT DECAL	1
14	057430-001	EXPLOSION HAZZARD	2
15	058186-001	EM. DOWN / OFF / ON	1
16	501582-002	OPERATORS MANUAL	1
17	501376-000	SERVICE AND PARTS MANUAL	1
18	501453-001	POTHOLE CRUSHING HAZARD	3
19	501455-001	MAST EMERGENCY LOWERING	1
20	058531-000	LIFT / TOW POINT	4

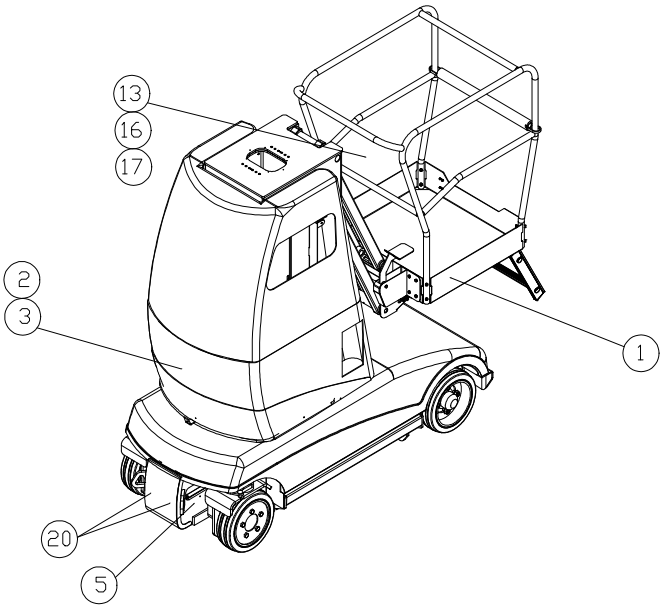
MB 20N GERMAN DECAL OPTION

ITEM	PART No	DESCRIPTION	QTY
1	501345-000	MB 20N CAGE DECAL	2
2	501343-000	MB 20N BALLAST COVER DECAL	3
3	501344-000	MAST BOOM DECAL	3
4	057507-031	S.W.L. LARGE	1
5	501273-000	NAME PLATE	1
6	057507-002	EMERGENCY LOWERING DECAL	1
7	057507-024	BATTERY FLUID LEVEL	2
8	057507-025	IMPORTANT BEFORE USING	1
9	501272-001	UPPER CONTROL BOX	1
10	501271-000	LOWER CONTROL BOX	1
11	058860-000	PINCH POINT	1
12	057385-000	HAZARD TAPE (1000mm LONG)	4
13	058181-002	WARNING: 3-POINT DECAL	1
14	057507-026	EXPLOSION HAZZARD	2
15	058186-002	EM. DOWN / OFF / ON	1
16	501582-002	OPERATORS MANUAL	1
17	501376-000	SERVICE AND PARTS MANUAL	1
18	501453-002	POTHOLE CRUSHING HAZARD	3
19	501455-002	MAST EMERGENCY LOWERING	1
20	058531-000	LIFT / TOW POINT	4

MB26 DECALS







MB 26 ENGLISH (EUROPEAN) DECAL OPTION

ITEM	PART No	DESCRIPTION	QTY
1	501345-001	MB 26 CAGE DECAL	2
2	501343-001	MB 26 BALLAST COVER DECAL	3
3	501344-000	MAST BOOM DECAL	3
4	057392-000	S.W.L. LARGE	1
5	501273-002	NAME PLATE (EURO)	1
6	057382-000	EMERGENCY LOWERING DECAL	1
7	057429-000	BATTERY FLUID LEVEL	2
8	057692-000	IMPORTANT BEFORE USING	1
9	501272-001	UPPER CONTROL BOX	1
10	501271-000	LOWER CONTROL BOX	1
11	058860-000	PINCH POINT	3
12	057385-000	HAZARD TAPE (1000mm LONG)	4
13	058181-000	WARNING: 3-POINT DECAL	1
14	057430-000	EXPLOSION HAZZARD	2
15	058186-000	EM. DOWN / OFF / ON	1
16	501582-000	OPERATORS MANUAL	1
17	501376-000	SERVICE AND PARTS MANUAL	1
18	501453-000	POTHOLE CRUSHING HAZARD	3
19	501455-000	MAST EMERGENCY LOWERING	1
20	058531-000	LIFT/TOW POINT	4

MB 26 ENGLISH (AMERICAN) DECAL OPTION

ITEM	PART No	DESCRIPTION	QTY
1	501345-001	MB 26 CAGE DECAL	2
2	501343-001	MB 26 BALLAST COVER DECAL	3
3	501344-000	MAST BOOM DECAL	3
4	058761-001	S.W.L. LARGE (425 lbs)	1
5	501273-003	NAME PLATE (USA)	1
6	057382-000	EMERGENCY LOWERING DECAL	1
7	057429-000	BATTERY FLUID LEVEL	2
8	058539-000	IMPORTANT BEFORE USING	1
9	501272-000	UPPER CONTROL BOX	1
10	501271-000	LOWER CONTROL BOX	1
11	058537-000	PINCH POINT	1
12	057385-000	HAZARD TAPE (1000mm LONG)	4
13	058181-000	WARNING: 3-POINT DECAL	1
14	057430-000	EXPLOSION HAZZARD	2
15	058186-000	EM. DOWN / OFF / ON	1
16	501375-000	OPERATORS MANUAL	1
17	501376-000	SERVICE AND PARTS MANUAL	1
18	501453-000	POTHOLE CRUSHING HAZARD	3
19	501455-000	MAST EMERGENCY LOWERING	1
20	058531-000	LIFT / TOW POINT	4
21	058538-000	HAZZARDS DECAL	1
22	058532-000	HYDRAULIC FLUID	1
23	057426-000	HARNESS ATTACHEMENT	1
24	058530-000	MEETS ANSI 92.5	1
25	057425-001	INSTRUCTIONS ENCLOSED	1
26	057434-000	ONLY UPRIGHT COMPONANTS	1
27	057424-001	CRUSHING HAZZARD	2
28	058533-000	DO NOT ADJUST SWITCHES	1
29	058534-000	BATTERIES ARE BALLAST	2

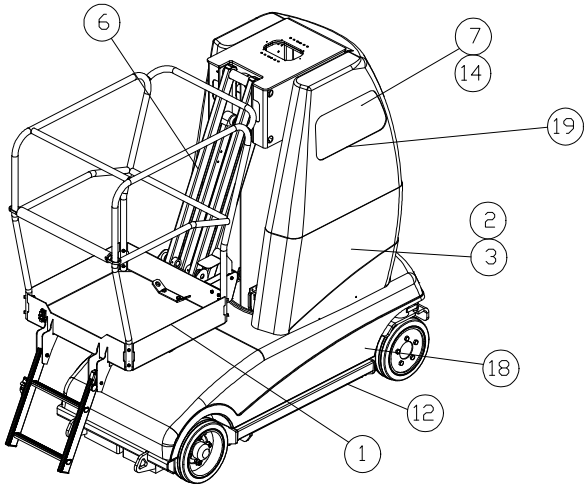
MB 26 FRENCH DECAL OPTION

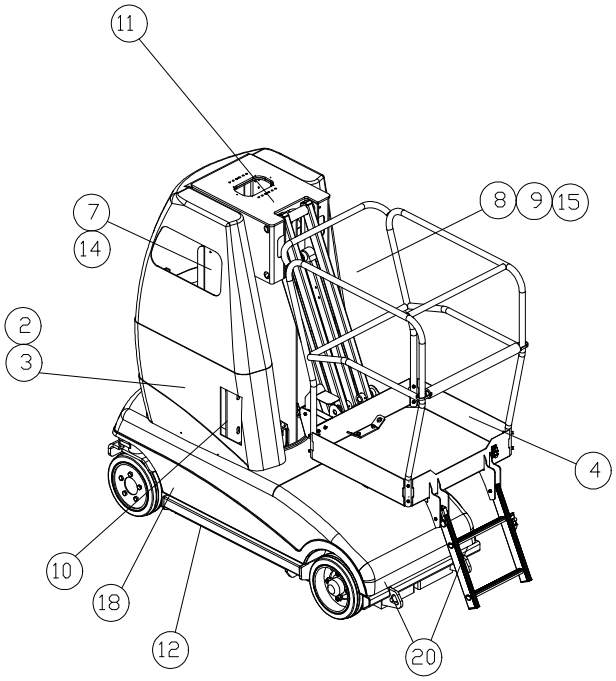
ITEM	PART No	DESCRIPTION	QTY
1	501345-001	MB 20 CAGE DECAL	2
2	501343-001	MB 20 BALLAST COVER DECAL	3
3	501344-000	MAST BOOM DECAL	3
4	057392-001	S.W.L. LARGE	1
5	501273-002	NAME PLATE	1
6	057382-001	EMERGENCY LOWERING DECAL	1
7	057429-001	BATTERY FLUID LEVEL	2
8	058016-001	IMPORTANT BEFORE USING	1
9	501272-001	UPPER CONTROL BOX	1
10	501271-000	LOWER CONTROL BOX	1
11	058860-000	PINCH POINT	1
12	057385-000	HAZARD TAPE (1000mm LONG)	4
13	058181-001	WARNING: 3-POINT DECAL	1
14	057430-001	EXPLOSION HAZZARD	2
15	058186-001	EM. DOWN / OFF / ON	1
16	501582-002	OPERATORS MANUAL	1
17	501376-000	SERVICE AND PARTS MANUAL	1
18	501453-001	POTHOLE CRUSHING HAZARD	3
19	501455-001	MAST EMERGENCY LOWERING	1
20	058531-000	LIFT / TOW POINT	4

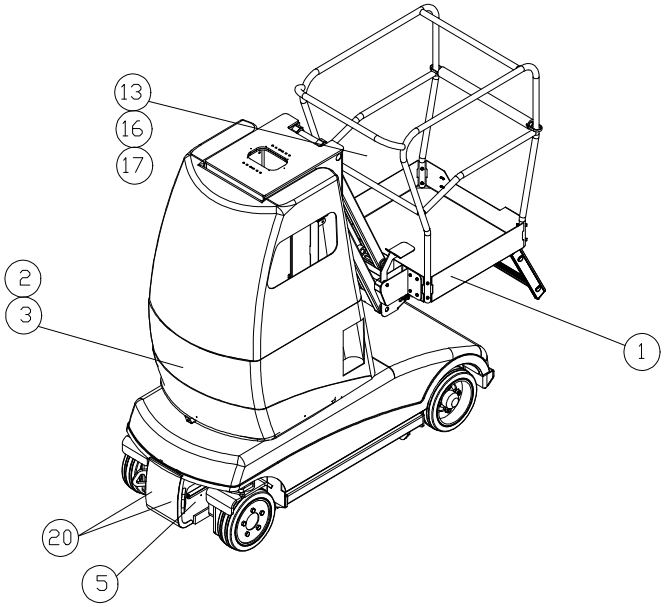
MB 26 GERMAN DECAL OPTION

ITEM	PART No	DESCRIPTION	QTY
1	501345-001	MB 26 CAGE DECAL	2
2	501343-001	MB 26 BALLAST COVER DECAL	3
3	501344-000	MAST BOOM DECAL	3
4	057507-031	S.W.L. LARGE	1
5	501273-002	NAME PLATE	1
6	057507-002	EMERGENCY LOWERING DECAL	1
7	057507-024	BATTERY FLUID LEVEL	2
8	057507-025	IMPORTANT BEFORE USING	1
9	501272-001	UPPER CONTROL BOX	1
10	501271-000	LOWER CONTROL BOX	1
11	058860-000	PINCH POINT	1
12	057385-000	HAZARD TAPE (1000mm LONG)	4
13	058181-002	WARNING: 3-POINT DECAL	1
14	057507-026	EXPLOSION HAZZARD	2
15	058186-002	EM. DOWN / OFF / ON	1
16	501582-002	OPERATORS MANUAL	1
17	501376-000	SERVICE AND PARTS MANUAL	1
18	501453-002	POTHOLE CRUSHING HAZARD	3
19	501455-002	MAST EMERGENCY LOWERING	1
20	058531-000	LIFT / TOW POINT	4

MB20 DECALS







MB 20 ENGLISH (EUROPEAN) DECAL OPTION

ITEM	PART No	DESCRIPTION	QTY
1	501345-002	MB 20 CAGE DECAL	2
2	501343-002	MB 20 BALLAST COVER DECAL	3
3	501344-000	MAST BOOM DECAL	3
4	057392-000	S.W.L. LARGE	1
5	501273-004	NAME PLATE (EURO)	1
6	057382-000	EMERGENCY LOWERING DECAL	1
7	057429-000	BATTERY FLUID LEVEL	2
8	057692-000	IMPORTANT BEFORE USING	1
9	501272-000	UPPER CONTROL BOX	1
10	501271-000	LOWER CONTROL BOX	1
11	058860-000	PINCH POINT	3
12	057385-000	HAZARD TAPE (1000mm LONG)	4
13	058181-000	WARNING: 3-POINT DECAL	1
14	057430-000	EXPLOSION HAZZARD	2
15	058186-000	EM. DOWN / OFF / ON	1
16	501582-000	OPERATORS MANUAL	1
17	501376-000	SERVICE AND PARTS MANUAL	1
18	501453-000	POTHOLE CRUSHING HAZARD	3
19	501455-000	MAST EMERGENCY LOWERING	1
20	058531-000	LIFT / TOW POINT	4

MB 20 ENGLISH (AMERICAN) DECAL OPTION

ITEM	PART No	DESCRIPTION	QTY
1	501345-002	MB 20 CAGE DECAL	2
2	501343-002	MB 20 BALLAST COVER DECAL	3
3	501344-000	MAST BOOM DECAL	3
4	058761-001	S.W.L. LARGE (425 lbs)	1
5	501273-005	NAME PLATE (USA)	1
6	057382-000	EMERGENCY LOWERING DECAL	1
7	057429-000	BATTERY FLUID LEVEL	2
8	058539-000	IMPORTANT BEFORE USING	1
9	501272-000	UPPER CONTROL BOX	1
10	501271-000	LOWER CONTROL BOX	1
11	058537-000	PINCH POINT	1
12	057385-000	HAZARD TAPE (1000mm LONG)	4
13	058181-000	WARNING: 3-POINT DECAL	1
14	057430-000	EXPLOSION HAZZARD	2
15	058186-000	EM. DOWN / OFF / ON	1
16	501582-000	OPERATORS MANUAL	1
17	501376-000	SERVICE AND PARTS MANUAL	1
18	501453-000	POTHOLE CRUSHING HAZARD	3
19	501455-000	MAST EMERGENCY LOWERING	1
20	058531-000	LIFT / TOW POINT	4
21	058538-000	HAZZARDS DECAL	1
22	058532-000	HYDRAULIC FLUID	1
23	057426-000	HARNESS ATTACHEMENT	1
24	058530-000	MEETS ANSI 92.5	1
25	057425-001	INSTRUCTIONS ENCLOSED	1
26	057434-000	ONLY UPRIGHT COMPONANTS	1
27	057424-001	CRUSHING HAZZARD	2
28	058533-000	DO NOT ADJUST SWITCHES	1
29	058534-000	BATTERIES ARE BALLAST	2

MB 20 FRENCH DECAL OPTION

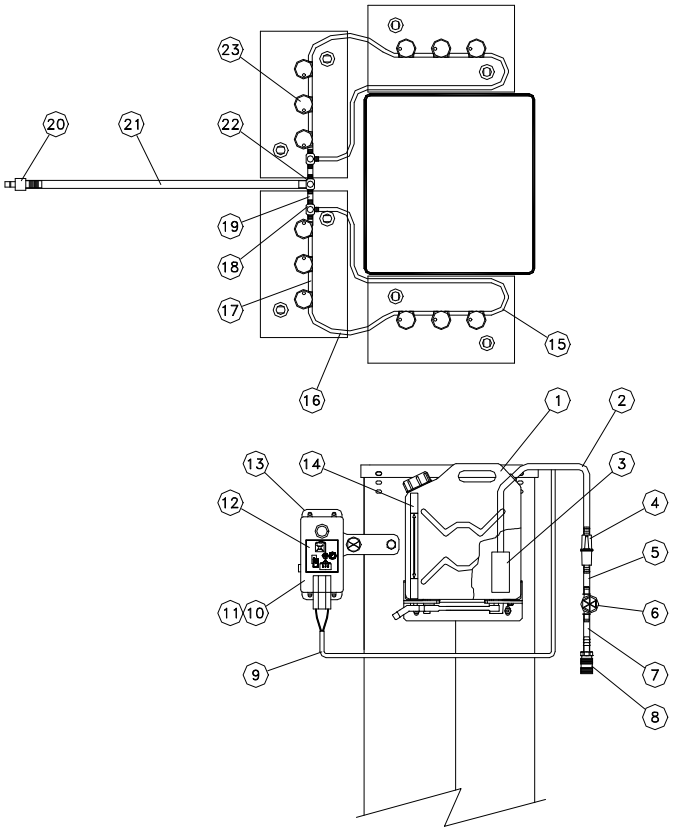
ITEM	PART No	DESCRIPTION	QTY
1	501345-002	MB 20 CAGE DECAL	2
2	501343-002	MB 20 BALLAST COVER DECAL	3
3	501344-000	MAST BOOM DECAL	3
4	057392-001	S.W.L. LARGE	1
5	501273-004	NAME PLATE	1
6	057382-001	EMERGENCY LOWERING DECAL	1
7	057429-001	BATTERY FLUID LEVEL	2
8	058016-001	IMPORTANT BEFORE USING	1
9	501272-001	UPPER CONTROL BOX	1
10	501271-000	LOWER CONTROL BOX	1
11	058860-000	PINCH POINT	1
12	057385-000	HAZARD TAPE (1000mm LONG)	4
13	058181-001	WARNING: 3-POINT DECAL	1
14	057430-001	EXPLOSION HAZZARD	2
15	058186-001	EM. DOWN / OFF / ON	1
16	501582-002	OPERATORS MANUAL	1
17	501376-000	SERVICE AND PARTS MANUAL	1
18	501453-001	POTHOLE CRUSHING HAZARD	3
19	501455-001	MAST EMERGENCY LOWERING	1
20	058531-000	LIFT / TOW POINT	4

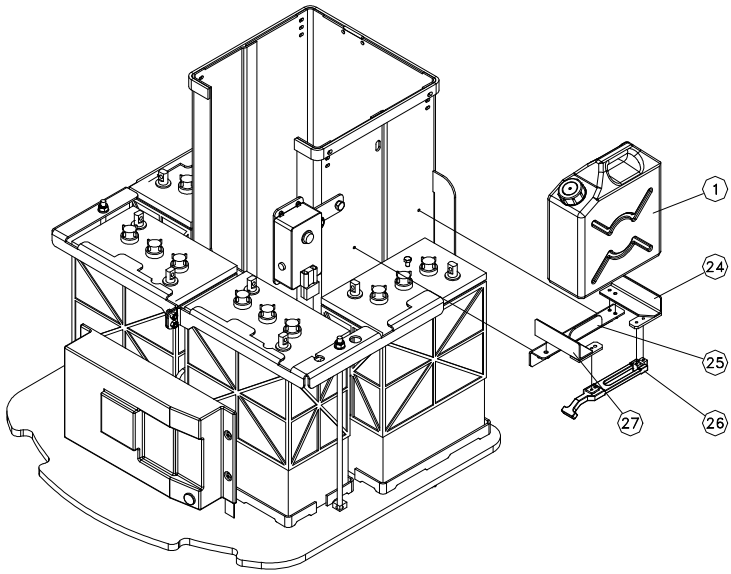
MB 20 GERMAN DECAL OPTION

ITEM	PART No	DESCRIPTION	QTY
1	501345-002	MB 20 CAGE DECAL	2
2	501343-002	MB 20 BALLAST COVER DECAL	3
3	501344-000	MAST BOOM DECAL	3
4	057507-031	S.W.L. LARGE	1
5	501273-004	NAME PLATE	1
6	057507-002	EMERGENCY LOWERING DECAL	1
7	057507-024	BATTERY FLUID LEVEL	2
8	057507-025	IMPORTANT BEFORE USING	1
9	501272-001	UPPER CONTROL BOX	1
10	501271-000	LOWER CONTROL BOX	1
11	058860-000	PINCH POINT	1
12	057385-000	HAZARD TAPE (1000mm LONG)	4
13	058181-002	WARNING: 3-POINT DECAL	1
14	057507-026	EXPLOSION HAZZARD	2
15	058186-002	EM. DOWN / OFF / ON	1
16	501582-002	OPERATORS MANUAL	1
17	501376-000	SERVICE AND PARTS MANUAL	1
18	501453-002	POTHOLE CRUSHING HAZARD	3
19	501455-002	MAST EMERGENCY LOWERING	1
20	058531-000	LIFT / TOW POINT	4

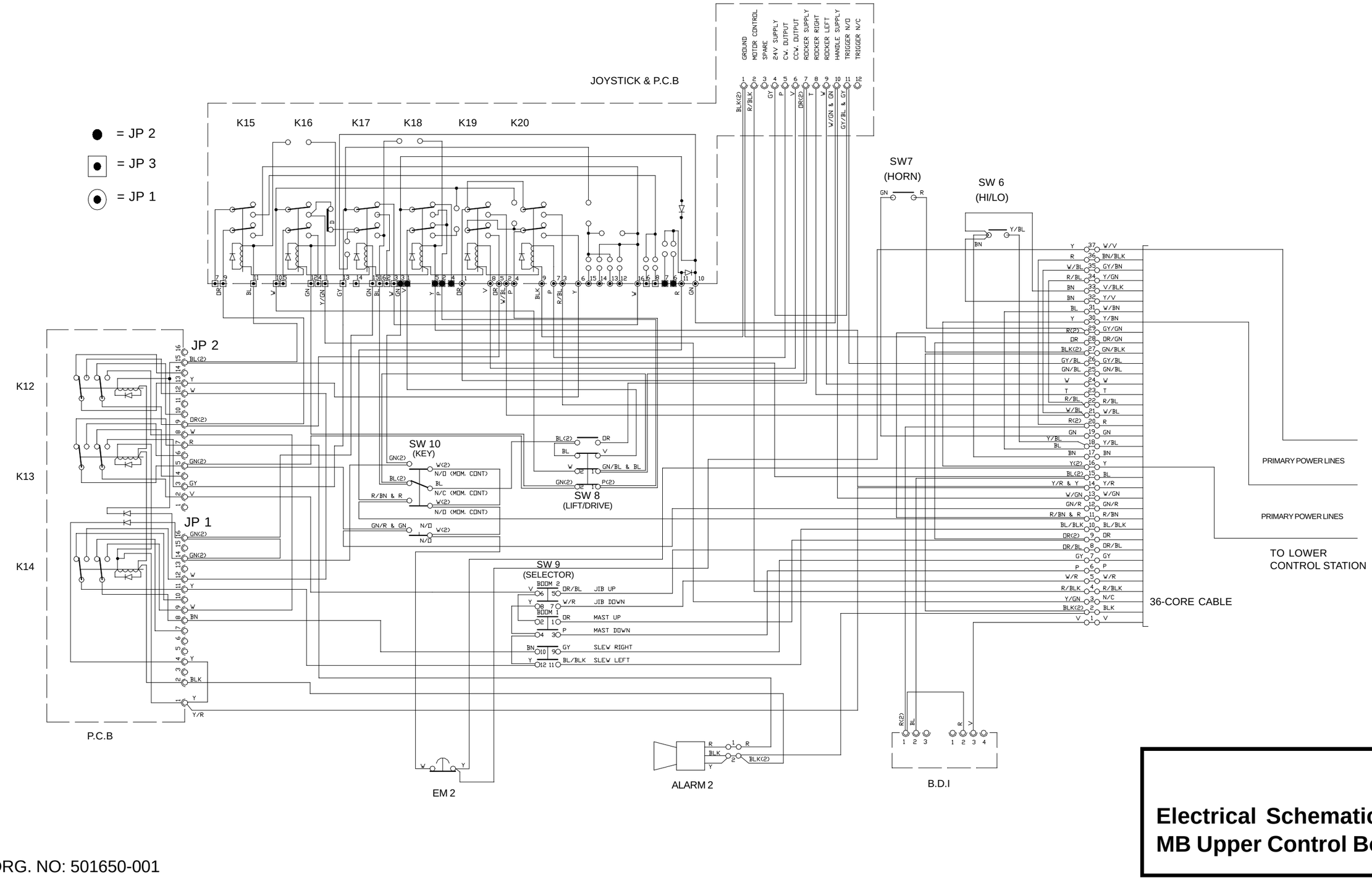
WATER REFILL SYSTEM

ITEM	PART NO.	DESCRIPTION	QTY.
1	501624-000	BATTERY WATER CONTAINER	1
2	501630-000	PVC HOSE (10mm)	1
3	501632-000	SUBMERSIBLE PUMP	1
4	501627-000	BATTERY WATER REFILL	1
5	501666-000	PVC HOSE 10mm X 30mm LG	1
6	501628-000	WATER FLOW INDICATOR	1
7	501631-000	PVC HOSE (10mm)	1
8	501629-000	FEMALE COUPLING (10mm)	1
9	501633 -000	WIRING HARNESS (WATER PUMP)	1
10	501636-000	CONTROL BOX	1
11	501667-000	FUSE, CONTROL BOX	1
12	500643-000	OPERATING DECAL	1
13	501649-000	MOUNTING PLATE	1
14	501644-000	WATER FILL DECAL	1
15	501647-000	PVC HOSE 6mm X 590mm LG	2
16	501646-000	PVC HOSE 6mm X 230mm LG	2
17	501645-000	PVC HOSE 6mm X 55mm LG	8
18	501641-000	T-PIECE 6 X 6 X 6	2
19	501648-000	PVC HOSE 6mm X 30mm LG	4
20	501638-000	MALE COUPLING(10mm)	1
21	501639-000	PVC HOSE 10mm X 545mm LG	1
22	501640-000	T-PIECE 10 X 6 X 6	1
23	501642-000	BATTERY FLOAT CAP	12
24	501590-000	FIXED ANGLE BRACKET	1
25	501588-000	MOUNTING ANGLE	1
26	501591-000	DRAW LATCH	1
27	501589-000	HINGE ANGLE BRACKET	1





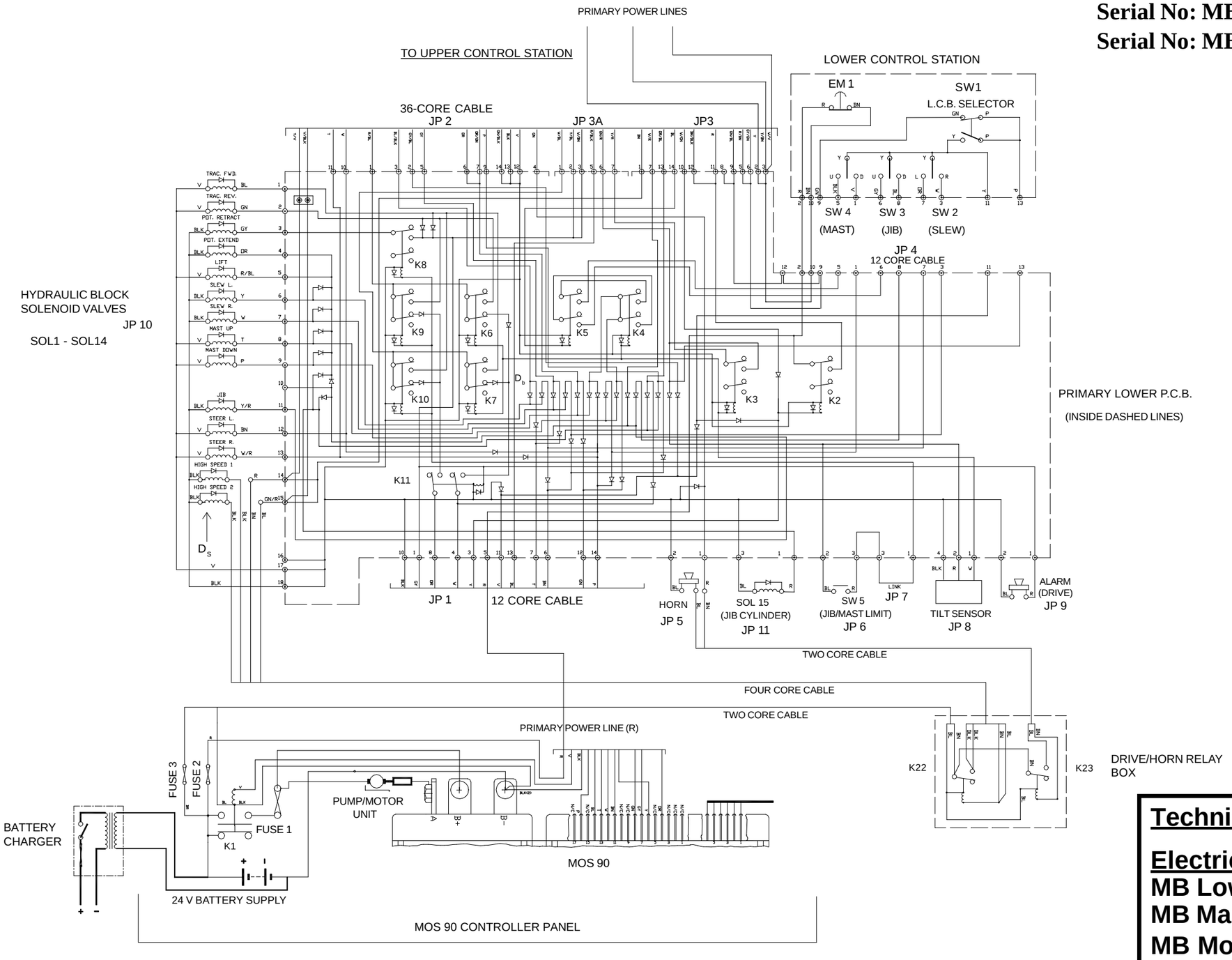
Electrical Schematics



DRG. NO: 501650-001

Electrical Schematic
MB Upper Control Box

Serial No: MB20/ 0000 to 0040 incl.
Serial No: MB26/ 0000 to 0064 incl.

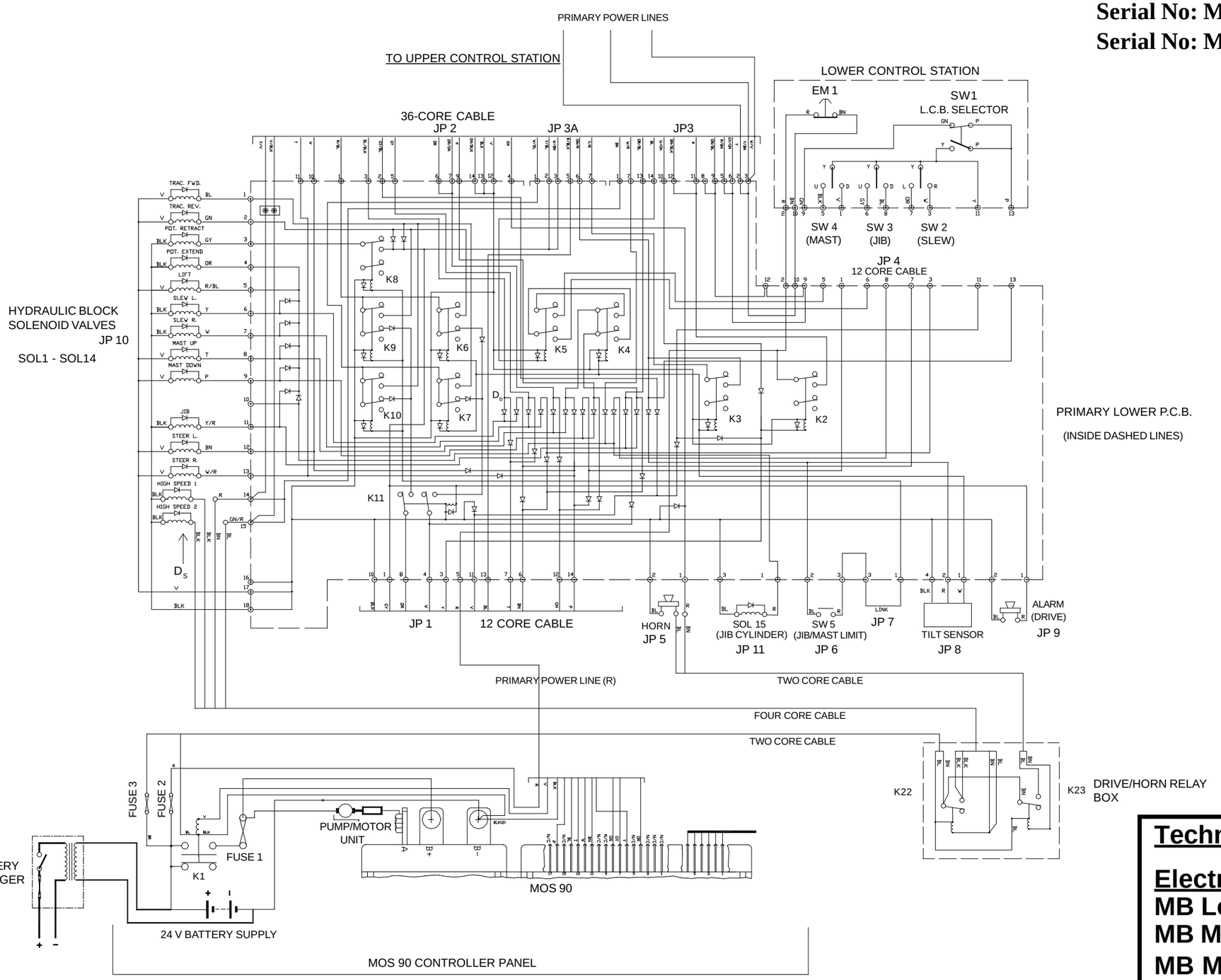


Technician's Print

Electrical Schematic
MB Lower Control Box
MB Main PCB Box
MB Mos 90 Controller

DRG. NO: 501650-002

Serial No: MB20/ 0041 to 0081 incl.
Serial No: MB26/ 0065 to 0095 incl.



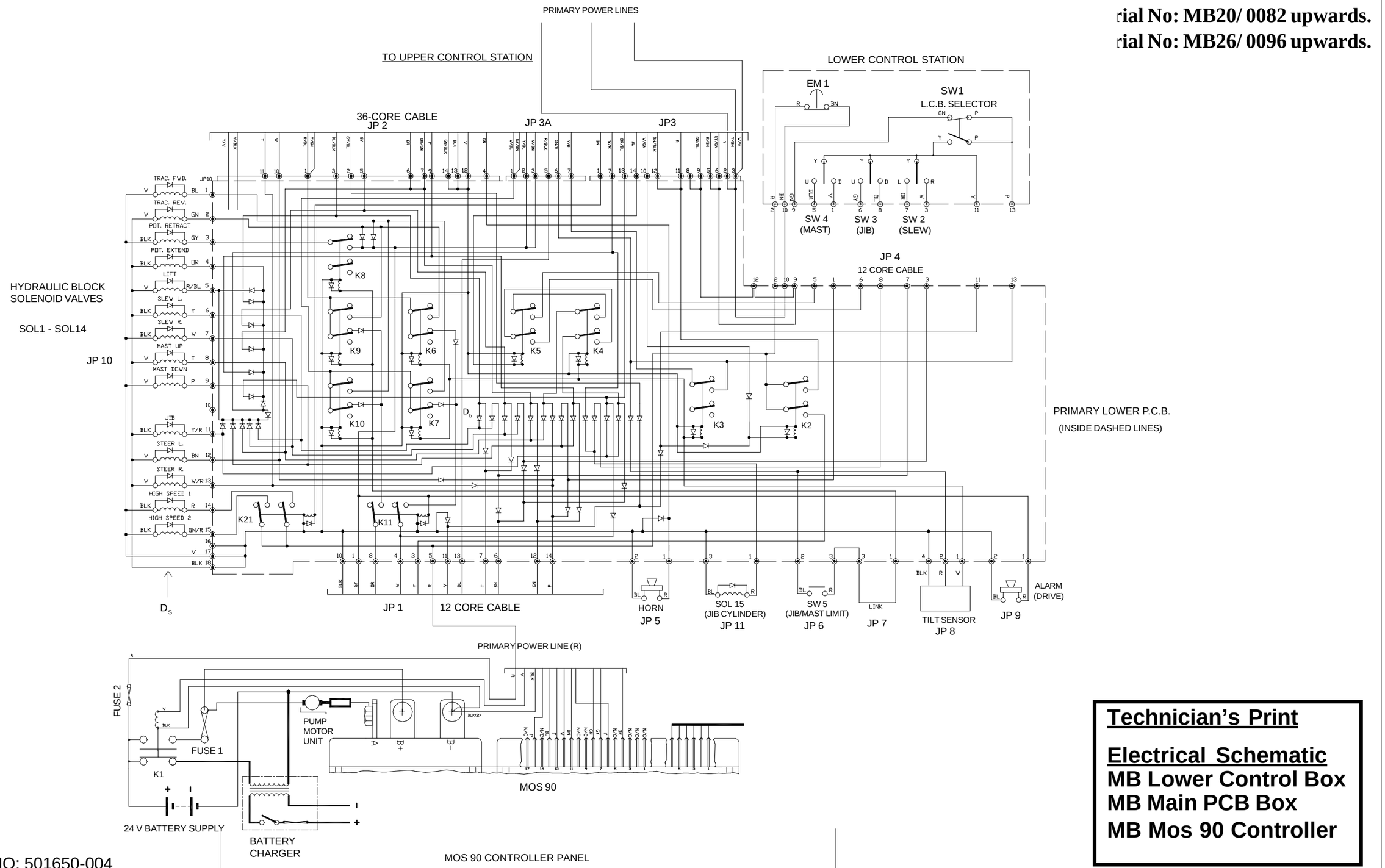
Technician's Print

Electrical Schematic
MB Lower Control Box
MB Main PCB Box
MB Mos 90 Controller

DRG. NO: 501650-003

rial No: MB20/ 0082 upwards.

rial No: MB26/ 0096 upwards.



DRG. NO: 501650-004

Technician's Print

Electrical Schematic

MB Lower Control Box

MB Main PCB Box

MB Mos 90 Controller

Local Distributor:

Lokaler Vertiebshändler:

Distributeur local:

El Distribuidor local:

Il Distributore locale:

USA

TEL: +1 (559) 443 6600
FAX: +1 (559) 268 2433

Europe

TEL: +44 (0) 845 1550 058
FAX: +44 (0) 195 2299 948

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