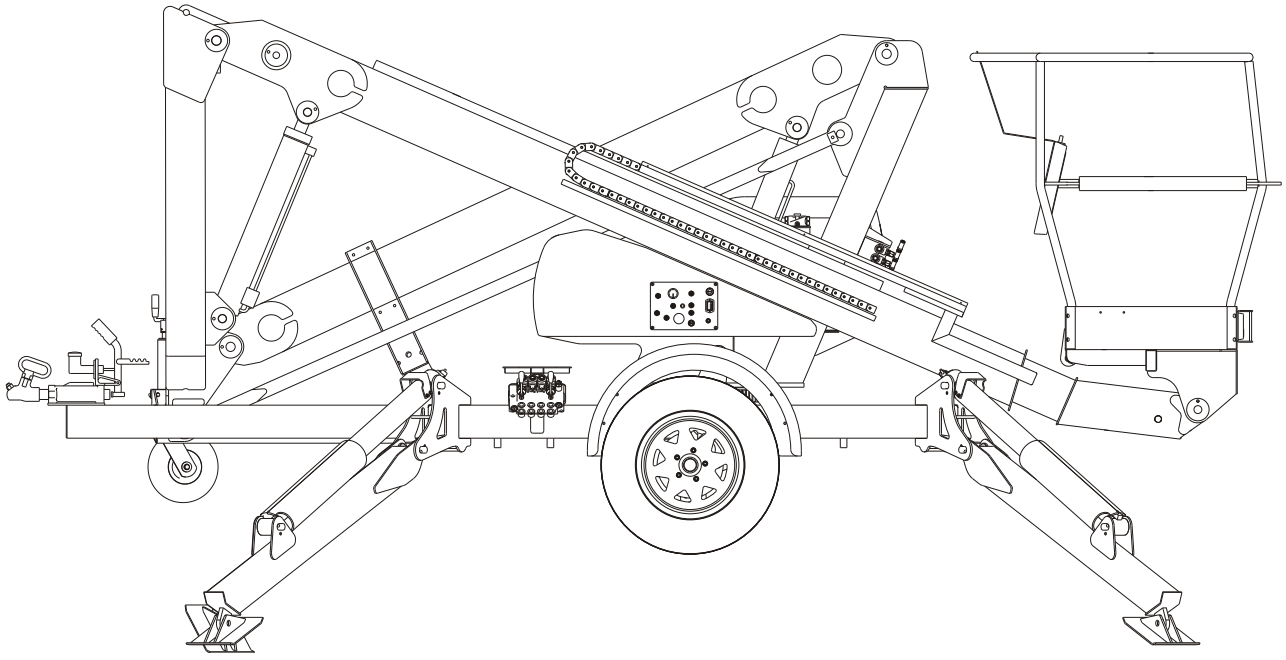
Snorkel
NEW ZEALAND

Maintenance and Repair Parts

MHP14AT
MHP13AT

Engine Powered
Gasoline, Diesel,
Battery Electric,
Bi-Energy Options



P/N 13225B
January 2010 Rev B
From Serial Number NZ090915

LIMITED WARRANTY

Snorkel warrants each new machine manufactured and sold by it to be free from defects in material and workmanship for a period of one (1) year from date of delivery to a Customer or for one year after the machine has been placed in first service in a Dealer rental fleet, whichever comes first. Any part or parts which, upon examination by the Snorkel Service Department, are found to be defective, will be replaced or repaired, at the sole discretion of Snorkel, through its local Authorized Dealer at no charge.

Snorkel further warrants the structural components; specifically, the mainframe chassis, turntable, booms and scissor arms, of each new machine manufactured by it to be free from defects in material and workmanship for an additional period of four (4) years. Any such part or parts which, upon examination by the Snorkel Service Department, are found to be defective will be replaced or repaired by Snorkel through its local Authorized Dealer at no charge; however, any labor charges incurred as a result of such replacement or repair will be the responsibility of the Customer or Dealer.

The Snorkel Service Department must be notified within forty-eight (48) hours of any possible warranty situation during the applicable warranty period. Personnel performing warranty repair or replacement must obtain specific approval by Snorkel Service Department prior to performing any warranty repair or replacement.

Customer and Dealer shall not be entitled to the benefits of this warranty and Snorkel shall have no obligations hereunder unless the "Pre-Delivery and Inspection Report" has been properly completed and returned to the Snorkel Service Department within ten (10) days after delivery of the Snorkel product to Customer or Dealer's rental fleet. Snorkel must be notified, in writing, within ten (10) days, of any machine sold to a Customer from a Dealer's rental fleet during the warranty period.

At the direction of the Snorkel Service Department, any component part(s) of Snorkel products to be replaced or repaired under this warranty program must be returned freight prepaid to the Snorkel Service Department for inspection. All warranty replacement parts will be shipped freight prepaid (standard ground) from the Snorkel Service Department or from Snorkel's Vendor to Dealer or Customer.

REPLACEMENT PARTS WARRANTY

Any replacement or service part made or sold by Snorkel is not subject to the preceding **Limited Warranty** beyond the normal warranty period of the machine upon which the part was installed.

THIS WARRANTY EXCLUDES AND SNORKEL DOES NOT WARRANT:

1. Engines, motors, tires and batteries which are manufactured by suppliers to Snorkel, who furnish their own warranty. Snorkel will, however, to the extent permitted, pass through any such warranty protection to the Customer or Dealer.
2. Any Snorkel product which has been modified or altered outside Snorkel's factory without Snorkel's written approval, if such modification or alteration, in the sole judgment of Snorkel's Engineering and/or Service Departments, adversely affects the stability, reliability or service life of the Snorkel product or any component thereof.
3. Any Snorkel product which has been subject to misuse, improper maintenance or accident. "Misuse" includes but is not limited to operation beyond the factory-rated load capacity and speeds. "Improper maintenance" includes but is not limited to failure to follow the recommendations contained in the Snorkel Operation, Maintenance, Repair Parts Manuals. Snorkel is not responsible for normal maintenance, service adjustments and replacements, including but not limited to hydraulic fluid, filters and lubrication.
4. Normal wear of any Snorkel component part(s). Normal wear of component parts may vary with the type application or type of environment in which the machine may be used; such as, but not limited to sandblasting applications.
5. Any Snorkel product that has come in direct contact with any chemical or abrasive material.
6. Incidental or consequential expenses, losses, or damages related to any part or equipment failure, including but not limited to freight cost to transport the machine to a repair facility, downtime of the machine, lost time for workers, lost orders, lost rental revenue, lost profits or increased cost.

This warranty is expressly in lieu of all other warranties, representations or liabilities of Snorkel, either expressed or implied, unless otherwise amended in writing by Snorkel's President, Vice President-Engineering, Vice President-Sales or Vice President-Marketing.

SNORKEL MAKES NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION OF THIS LIMITED WARRANTY. SNORKEL MAKES NO IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND DISCLAIMS ALL LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO INJURY TO PERSONS OR PROPERTY.

The Customer shall make all warranty claims through its local Authorized Dealer and should contact the Dealer from whom the Snorkel product was purchased for warranty service. Or, if unable to contact the Dealer, contact the Snorkel Service Department for further assistance.

Effective July 1995

Printed in New Zealand

Table of Contents

General Specifications

10.9m Height Restriction Kit

Maintenance Information

Table of Contents

Section 1. - Repair Parts

Section 2. - Hydraulics

Section 3. - Electrical

Section 4. - Options

■ General Specifications MHP14AT

SPECIFICATIONS	MHP14AT	
Nominal working height	13.5m	44.3'
Maximum height to basket floor	11.5m	37.7'
Maximum outreach	6.4m	21.0'
Maximum width of base Stabilisers retracted Stabilisers extended	 1.6m 3.6m	 5.2' 11.8'
Safe working load (unrestricted)	215kg	474lbs
Platform size	1.15 x 0.70m	3.8' x 2.3'
Platform construction	Steel	Steel
Travelling height	2m	6.6'
Overall length	4.7m	15.4'
Maximum towing speed	80km/h	50mph
Turntable rotation	540° Non continuous	
Trailer tongue weight (approximately)	Less than 100kg	Less than 225lbs
Maximum rated axle capacity	2000kg	4409lbs
Insulation rating	Nil (on standard models)	
Weight	1460kg (Petrol model)	3218lbs (Petrol model)

■ Engine Specifications

Engine Make	Honda (gasoline)
Model	GX 160
Engine type	4-stroke, over head valve, 1 cylinder
Displacement	163 cm^3 (9.9 cu-in)
Bore x Stroke	68 x 45 mm (2.7 x 1.8 in)
Max. output	4 kW/4,000 rpm
Max. torque	1.1 kg-m (8.0 ft-lb)/ 2500 rpm
Fuel	gasoline
Fuel Grade	automotive gasoline (unleaded or lowleaded preferred)
Fuel consumption	230 g/PSh
Cooling system	Forced air
Ignition system	Transistor magneto
PTO shaft rotation	Counterclockwise
Oil Capacity	0.60 litres (0.60 US qt, 0.53 Imp qt)
Oil Grade	SAE 10W-30

■ General Specifications MHP13AT

SPECIFICATIONS	MHP13AT	
Nominal working height	12.9m	42.3'
Maximum height to basket floor	10.9m	35.8'
Maximum outreach	6.4m	21.0'
Maximum width of base Stabilisers retracted Stabilisers extended	 1.6m 3.6m	 5.2' 11.8'
Safe working load (unrestricted)	215kg	474lbs
Platform size	1.15 x 0.70m	3.8' x 2.3'
Construction	Steel	Steel
Travelling height	2m	6.6'
Overall length	4.7m	15.4'
Maximum towing speed	80km/h	50mph
Turntable rotation	540° Non continuous	
Trailer tongue weight (approximately)	Less than 100kg	Less than 225lbs
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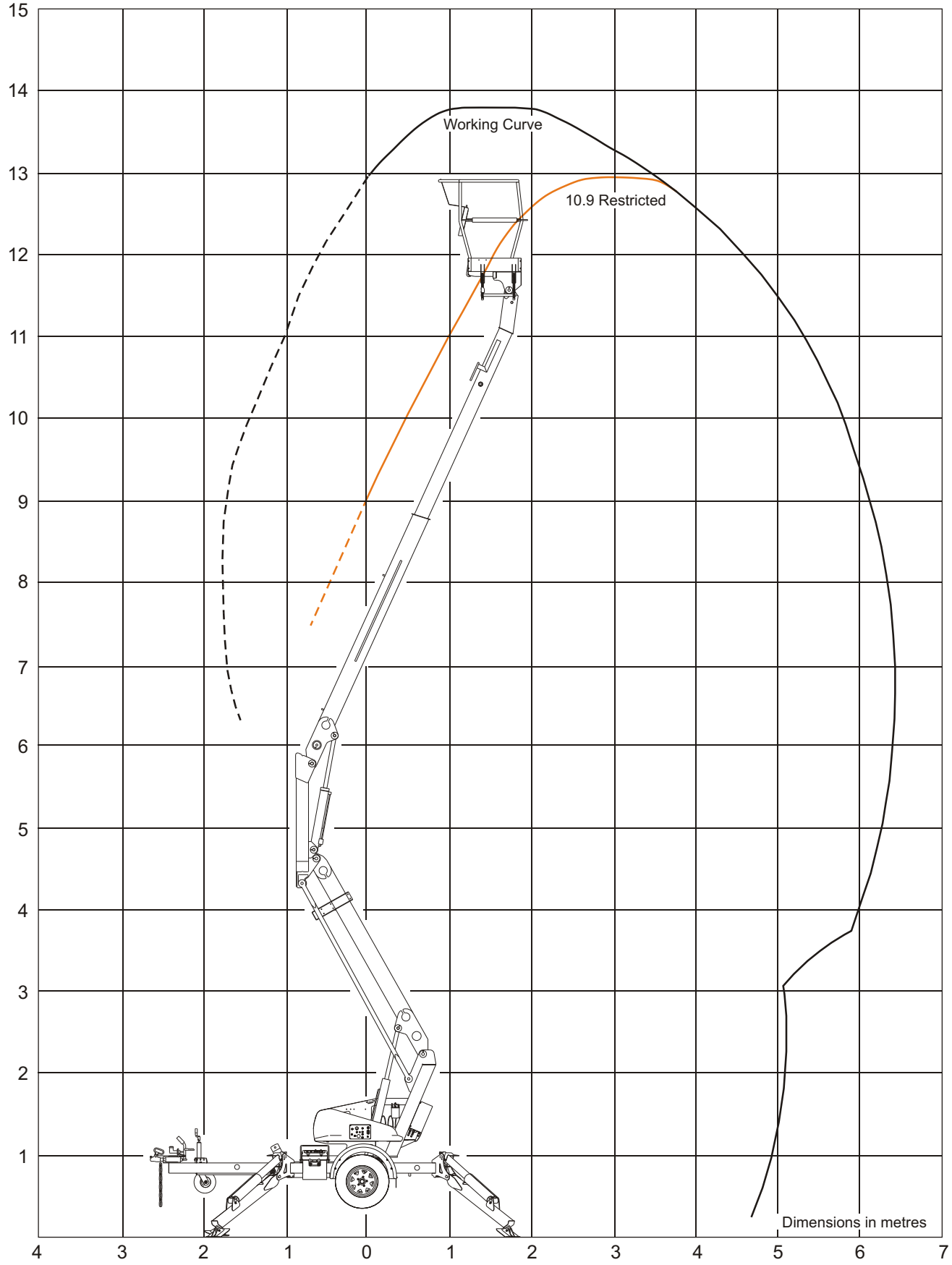
■ Working Envelope MHP14AT, MHP13AT



■ Introduction

Units built for the Australian market may be fitted with a 10.9m height restriction kit.

This kit is fitted to allow the maximum height to the platform floor to be restricted to10.9m from the ground.

This is to allow the unit to be operated by unlicensed operators in accordance with Australian legislation.

⚠IMPORTANT

If this machine is fitted with a 10.9m kit you must ENSURE that you read and understand the information in this section.

■ Signage

If the machine is fitted with a 10.9m kit the decal below will be attached to the base/column adjacent to the height lockout switch.

WARNING

THIS MACHINE IS FITTED WITH A 10.9 METRE RESTRICTION KIT

SELECTION / OPERATION OF A BOOM LENGTH IN EXCESS OF 11M REQUIRES THE OPERATOR TO HOLD A WP CERTIFICATE OF COMPETENCY

13205

Figure 1 - Decal

■ Operation

When the 10.9m function is selected, via the key switch mounted at the base, the unit operates normally until a micro switch at the knuckle is activated by a cam.

This then powers a solenoid valve that shuts off oil to the upper lift cylinders and prevents the upper boom raising any further.

Note - Control Box Changes

An altered control box layout was introduced in late 2009. These altered control boxes will be phased in gradually. Consequently some machines will have the lockout switch located in the lower right of the control box (Figure 2) while others will have the switch located in the upper left of the control box (Figure 3).

The key switch ❶ allows the unit to operate normally so the platform floor height is 12.8m (15m working height) when the **DISABLED** position ❸ on the key switch is selected (see Figure 2 / Figure 3).

When the key switch is placed in the **ENABLED** position ❷ the unit is restricted to a platform floor height of 10.9m (see Figure 2 / Figure 3). The key can only be removed in the disabled position thus effectively 'locking' the machine into the restricted mode.

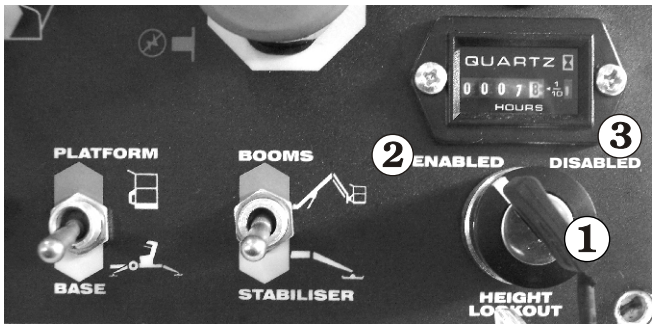


Figure 2 - Key Switch, Original Layout

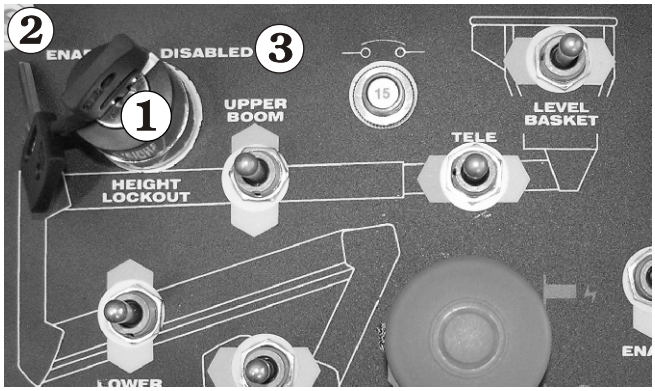


Figure 3 - Key Switch, Later Layout

⚠IMPORTANT

In order to operate this machine in the unrestricted mode (DISABLED) the operator is required to hold a WP Certificate of Competency.

⚠WARNING

The use of a machine fitted with a 10.9m height restriction kit, in the unrestricted (DISABLED) mode by an uncertified operator is a breach of Australian law.

10.9 Height Restriction

⚠IMPORTANT

If a machine is fitted with a 10.9m height restriction kit, and the machine is to be made available for hire,
IT IS THE RESPONSIBILITY OF THE HIRE COMPANY OR OWNER
to establish that the person hiring the machine, or the person who will be operating the machine, has a WP class Certificate of Competency.

If they do not have such a qualification the machine must be restricted to 10.9m operation and the key must be removed thus locking the unit in that mode prior to the hiree removing the machine.

■ Operation In Unrestricted Mode

If the machine is being operated in the unrestricted (DISABLED) mode, by a suitably qualified operator, the key MUST be switched to restricted (ENABLED) mode and the key removed from the switch any time that the qualified operator leaves the machine.

As previously stated this effectively 'locks' the machine into the 10.9m mode thus preventing any unqualified person from operating the machine in the unrestricted mode.

■ Tamper Protection

In order to reduce the likelihood of the machine being tampered with to gain the extra height by an unqualified operator, a tamper protection device is installed on the machine.

This consists of a lockwire and lead seal and the owner must check this on a regular basis to ENSURE that the protective device is in place.

⚠WARNING

If the seal is broken the owner of the machine must:

1. **ENSURE that the 10.9m lockout function still operates correctly.**
2. **Replace the seal.**
3. **ENSURE that the machine continues to meet the requirements of the relevant Australian legislation.**

■ About this Manual:

This Maintenance and Repair Parts manual covers current production machines only.

While Snorkel has attempted in every way to confirm that all information in this manual is correct, improvements are being constantly made to the machine that may not be reflected in this manual.

NOTE:

It is recommended that you record the serial and model number of your machine (see page 10 of this chapter). This information is found on the serial number placard.

■ Manual Organization

The Repair Parts Manual consists of five sections with an individual table of contents preceding sections 1 through 4.

Subassemblies and detailed parts are identified by index numbers on the illustrations that correspond to the item numbers on the parts listing. When requesting any part, always specify complete part number, description, model and serial number of your unit.

The following is a general description of each section and its contents.

❑ General Specifications

The section immediately preceding, contains information relating to the general specifications of the MHP14AT / MHP13AT.

❑ Maintenance

The pages immediately following, contain information as to the maintenance schedules - lubricants and procedures for proper lubrication of the unit.

❑ Repair parts and illustrations

Repair Parts (Section 1), contains parts listings and illustrations for general mechanical repair parts of all major installations and subassemblies of the unit.Hydraulics

❑ Hydraulics

(Section 2), contains parts listings and illustrations of hydraulic components installations including hydraulic schematics and individual components such as cylinders, controls valves and solenoid operated valves.

❑ Electrical

Electrical (Section 3), contains listings and illustrations of electrical components installations including wiring schematics.

❑ Options

Options (Section 4), contains parts listings and illustrations of optional installations that may be installed on your unit.

❑ Parts index - Page locator

The parts index - page locator, identifies the component by name and directs you to the section and page number where you may find information for that part such as its part order number, etc.

■ Maintenance and Schematics

❑ Maintenance information

The parts drawings located in the repair parts sections, are designed for use as a guide for proper disassembly of the machine and components as well as for parts replacement. Always refer to the hydraulic system installation drawings and the electrical wiring diagram before removing or disassembling associated parts.

⚠CAUTION

Do not attempt to disconnect or remove any hydraulic line before reading and understanding all text concerning the system hydraulics. In most cases, disassembly of the machine will be obvious from the illustration.

⚠IMPORTANT

DO NOT modify this ariel platform without prior written consent of Snorkel Engineering Department.

Modification may void the warranty, adversely affect stability, or affect the operational characteristics of the ariel platform.

When disassembling or reassembling components, complete the procedural steps in sequence. Do not partially disassemble or assemble one part, then start on another. Always check your work to assure that nothing has been overlooked.

The following list is a gentle reminder when disassembling or assembling the machine.

- ✓ Always be conscious of weight.
- ✓ Never attempt to lift heavy objects without the aid of a mechanical device.
- ✓ Do not allow heavy objects to rest in an unstable condition.
- ✓ Always make sure work platform is in stowed position - blocked or the weight removed by a suitable lifting device before disconnecting the hydraulic hose from the motor/pump unit to the lift cylinder.
- ✓ When raising a portion of the machine, be sure that adequate blocking is properly positioned - Do not depend on lifting device to hold and secure weight.
- ✓ If a part resists removal, check to see if all fasteners, electrical wiring, hydraulic lines, etc., have been removed or that other parts are not interfering.

Parts should be thoroughly inspected before restoring to service at the time of reassembly. Burrs, nicks or scratches may be removed from machined surfaces by honing or polishing with #600 crocus cloth, followed by a thorough cleaning in an approved cleaning solvent, and blown dry with compressed air. Do not alter the contour of any part. If this operation does not restore the part to a serviceable condition, replace the part.

Replace all O-rings, seals, and gaskets at reassembly. Use new roll pins or cotter pins. Dip all packing rings and seals in hydraulic oil before reassembling in cylinder and manifold installations. Replace any part having imperfect threads. In general, units that have been disassembled can be reassembled by reversing the order of disassembly.

Remember that the service life of a machine can be increased by keeping dirt and foreign materials out of the vital components. Precautions have been taken to safeguard against this; shields, covers, seals and filters are provided to keep air and oil supplies clean; however, these items must be maintained on a scheduled basis in order to function properly.

At any time air or oil lines are disconnected, clean surrounding areas as well as the opening and fittings themselves. As soon as a line or component is disconnected, cap or cover all openings to prevent the entry of dirt or foreign materials.

New parts should remain in their container until they are ready to be used.

Clearly mark or tag hydraulic lines and electrical wiring connections when disconnecting or removing them from unit. This will assure that they are correctly reinstalled.

Proper assembly is critical to the successful rebuilding of any unit. Carefully inspect any parts which are to be reused. If in doubt, replace.

"SAFETY FIRST" is a good slogan.

Replace any guards and protective devices that have been removed to carry out maintenance and repair work.

■ Maintenance schedules

Snorkel has established a Preventive Maintenance Schedule that includes:

- ✓ Daily Maintenance (Operator's Inspection)
- ✓ 90 Day or 150 Hour (frequent) Maintenance
- ✓ Yearly or 500 Hour (annual) Maintenance,

These schedules should ensure the detection of any defective, damaged or improperly secured parts and provide information regarding lubrication and other minor maintenance items.

The Maintenance Schedule following, outlines the requirements of these maintenance checks for each time interval. The Operator's Pre-operational inspection must be performed by a trained operator. All other maintenance and inspections must be performed by a trained service technician only.

Note that the 90 Day or 150 hour (frequent) and yearly or 500 hour (annual) Maintenance, require use of the Preventive Inspection Maintenance Checklist to pinpoint all inspection items. Retain a copy of these forms for your records.

They also require that all placards and decals on the unit are to be inspected.

All placards and decals must be in place and legible. Use the placards installation drawing and parts listing in the repair parts section 1 of this manual to check these placards and decals.

Snorkel recommends that you make additional copies of the Preventive Inspection Maintenance Checklist forms for your use in performing these

⚠ DANGER

Failure to perform the Preventive Maintenance at the intervals outlined in the Maintenance Schedule may result in a unit being operated with a defect that could result in INJURY or DEATH of the unit operator. DO NOT allow a unit to be operated that has been found to be defective.

Repair all defects before returning the unit to service.

■ Daily Maintenance

❑ Pre-operational Inspection

Item	Service Required
Engine fuel level	Look to see that the fuel tank is full
Fuel tank cap	Check to see that the cap is tight
Engine oil level	Check oil level (between dipstick lines)
Fuel leaks	Visually inspect (hoses and connections)
Engine cooling	Check that grills are not blocked
Wiring harnesses	Visually inspect (installation, condition)
Battery terminals	Visually inspect (no corrosion)
Battery fluid level	Check fluid level (1/4" or 6 mm below filler neck)
Hydraulic oil level	Visually inspect level (between lines on decal)
Hydraulic oil leaks	Visually inspect (hoses, tubes)
Tyres and wheels	Visually inspect (condition)
Tyre pressure	Check pressure (measure)
Bolts and fasteners	Visually inspect (condition)
Structural damage and welds	Visually inspect (weld cracks, dents)
Lanyard anchor points	Visually inspect (condition)
Platform gravity gate	Check condition and operation
Platform guardrails	Visually inspect (condition)
Flashing light (option)	Visually inspect (operation)
Ground control switches	Actuate and inspect for proper operation
Ground control valve levers	Check operation (causes correct motion)
Ground emergency lower	Check operation (causes correct motion)
Platform control box switches	Actuate and inspect for proper operation
Platform emergency lower	Check operation (causes correct motion)
RCD/ELCB AC outlet (option)	Check operation
Platform work lights (option)	Check operation
Placards and decals	Visually inspect (installation, condition)
Platform entry ladder	Visually inspect (condition)

Note:

Refer to the Operator Manual, Chapter 7 Pre-operational Inspection for details of this procedure.

At the start of each work day (or 8 hour shift), an MHP14AT / MHP13AT qualified operator must perform the Pre-operational Inspection as listed in the table above.

The purpose of the Pre-operational Inspection is to keep the MHP14AT / MHP13AT in proper working condition and to detect signs of malfunction at the earliest possible time.

The MHP14AT / MHP13AT should be in the STOWED POSITION and the **Master Key Switch** set to OFF before you begin this inspection.

Defective parts and/or equipment malfunctions jeopardize the safety of the operator and other personnel, and can cause damage to the machine.

⚠DANGER

DO NOT operate an MHP14AT / MHP13AT that is known to be damaged or malfunctioning.

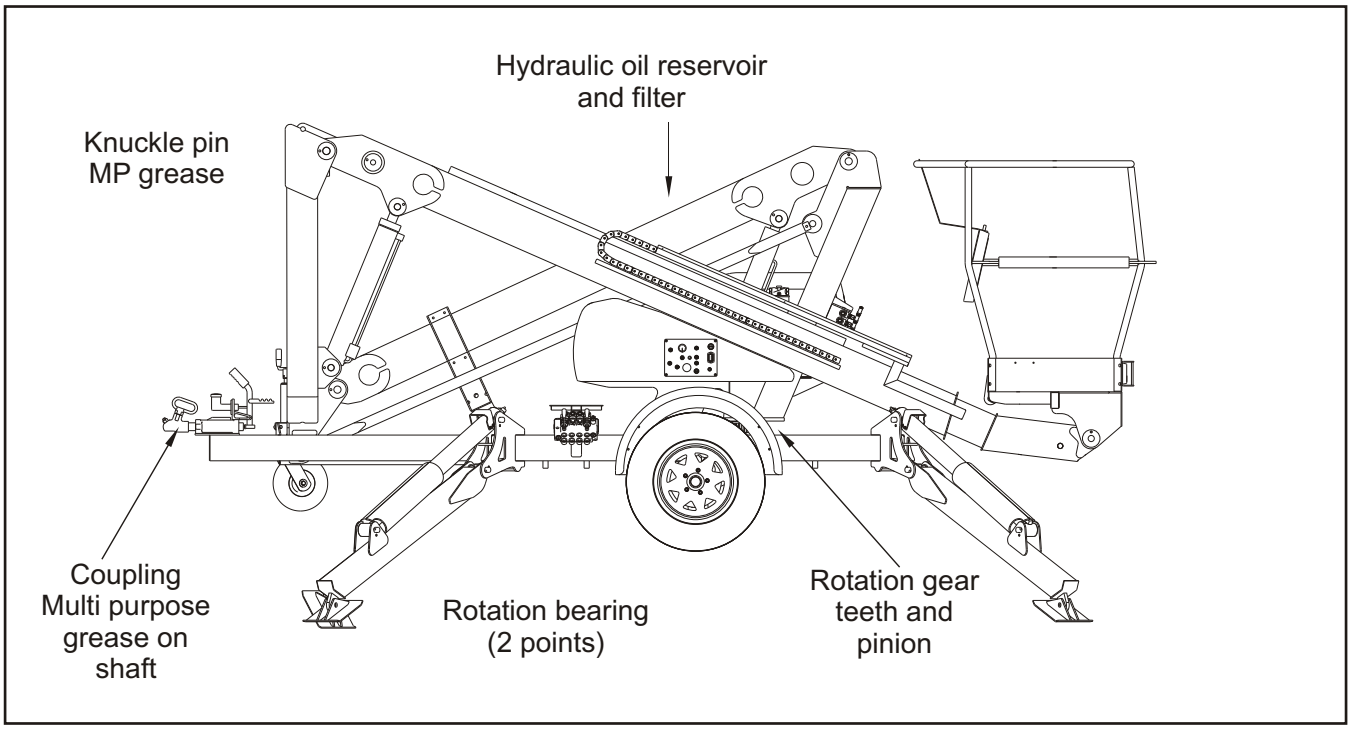
Repair all equipment damage or malfunctions, before placing the MHP14AT / MHP13AT into service.

■ 90 Day or 150 Hour Maintenance (Trained Service Technician)

Components	Service Required	Recommended Lubricant or Further Instructions
Daily maintenance	Perform maintenance as per schedule	
Preventive inspection maintenance checklist	Perform inspection, complete form	Retain copy of checklist
Placards and decals inspection	Inspect using drawing and parts listing in section 1 (repair parts)	Replace any missing or unreadable decals/placards
Rotation bearing	Lubricate	Conoco Super Sta #2 Above 32° Mobilgrease CM-P Below 32° Mobilgrease CM-L
Rotation bearing teeth & pinion	Lubricate	Conoco Super Sta #2 Above 32° Mobilgrease CM-P Below 32° Mobilgrease CM-L
Platform rotator	Check smooth operation	Repair or replace if not working properly
Platform controls	Check smooth operation & speeds	
Battery	Check specific gravity	1.260/1.275 at 27° C.
Hydraulic filter	Check condition	Replace if dirty
Engine RPM	Check for proper engine RPM (3000)	See engine manufactures owner's manual
Engine oil	Replace per engine owners manual	

■ Yearly or 500 Hour Maintenance (Trained Service Technician)

Components	Service Required	Recommended Lubricant or Further Instructions
90 day or 150 hour maintenance	Perform maintenance per schedule	
Hydraulic oil reservoir	Clean and replace fluid	Shell Tellus 32 or similar
Hydraulic filter	Replace	After 1st. 50 hours, thereafter at recommended interval
Hydraulic pressures	Check pressures	
Wheel bearings	Clean and re-pack	EP Grease



The illustration locates the lubrication points of the MHP14AT / MHP13AT.

■ Lubricants

To obtain maximum life of any industrial equipment, a well planned maintenance programme should be followed. The information provided on these and preceeding pages is intended to provide guidelines for proper lubrication, however, some operating conditions will require more frequent checks and lubrication than listed - for example applications with much dust or moisture will require modification of the schedule to fit that particular application.

The use of high grade lubricants and fluids should be encouraged. Sources of these lubricants may be from almost any of the oil companies. Those listed are typical and any lubricant with equal specifications may be used. However if in doubt regarding the use of lubricants other than those listed, contact Snorkel.

❑ Pressure gun application

Service all fittings as indicated in the Maintenance Schedule and lubrication illustration. Wipe away all excess lubricant from exposed surfaces. Over lubrication can collect dirt and foreign matter which acts as an abrasive. Lubrication of accessory equipment should be in accordance with the manufacturer's recommendations.

❑ Rotation bearing

Rotation bearing. Pressure gun lubricate bearing at recommended interval using lubricant as outlined in the maintenance schedule. Rotate while lubricating.

❑ Rotation gear teeth and pinion

Rotation gear teeth and pinion. Gear teeth and gear box pinion should be lubricated with a open gear grease.

❑ Engines

Engine. Refer to the engine manufacturer's instruction manual or consult your local engine service representative if engine adjustments or repairs are needed. The engine MUST be operated in accordance with manufacturer's instructions and serviced at recommended intervals.

❑ Hydraulic oil reservoir

Hydraulic oil reservoir. The fluid level should be kept between the low and full marks on the dipstick and should be checked with all cylinders fully retracted and the platform in stowed position.

The interior of the reservoir should be wiped out and cleaned each time the hydraulic oil is changed.

It is absolutely necessary that only new, clean hydraulic oil is added.

⚠CAUTION

If it becomes necessary to add or use an oil other than the recommended fluid, it is important that it be compatible and equivalent to the factory fill. Local oil suppliers can generally furnish this information.

If questions still remain, contact Snorkel for further information.

❑ Filling hydraulic system

This procedure must be followed when starting up a new machine or after any major service affecting the hydraulic system when a considerable volume of oil may have been drained from the system.

⚠IMPORTANT

It is most important that the machine is not operated unless the lower boom cylinder is completely filled with oil.

It is also advisable to follow this procedure if there is any doubt about the condition of the machine, i.e. if it has been standing idle for more than a week, or as a safeguard, when a new operator is taking charge of the machine.

NOTE - Air in Oil

If a cylinder is empty, filling it will cause the level in the reservoir to fall and may result in air being discharged from the cylinder into the tank.
In this event, when the cylinder is fully extended the engine should be stopped to allow the air to separate from the oil (about five minutes is sufficient) and the oil topped up again before restarting the engine.

1. Fill the reservoir with the recommended hydraulic oil. Leave the filler cap off so that any drop in the oil can be seen.
2. Lower the stabiliser legs to the operating position.
3. Raise the lower boom halfway.
4. Lower the lower boom and raise the hydraulic legs.
5. Check the oil level as in ❶.
6. Lower stabiliser legs to operating position.
7. Raise the lower boom fully then raise the upper boom fully.
8. Rotate the turntable through 360 .
9. Lower all booms and raise the hydraulic legs.
10. Check the oil level as in ❶.

The machines hydraulic system is now correctly filled.

NOTE - Oil Seals:

It is best to leave oil seals undisturbed if the machine is operating satisfactorily. If replacement of seals is necessary, extreme care must be taken not to damage the surface of the seals, cylinder bore or the chrome plated piston shaft.

- Absolute cleanliness is essential.

⚠CAUTION

At all times when a cylinder is stripped down make sure that the cylinder bore and the piston rod are not damaged in any way. Particular care is necessary that the cylinder head nut is not allowed to drop off the head and damage the chromium plated shaft.

If questions still remain, contact Snorkel for further information.

■ Battery

Battery. The battery will have longer life if the water level is maintained and it is kept charged. The unit will have better starting characteristics with a fully charged battery.

In cold weather the battery should be maintained at full charge to keep from freezing. An extremely low or dead battery can freeze in cold weather. Make sure connections are clean and tight.

Make sure charging equipment is operating properly.

⚠DANGER

Lead-acid batteries contain sulfuric acid which will damage eyes or skin on contact. When working around batteries, ALWAYS wear a face shield to avoid acid in eyes.

If acid contacts eyes, flush immediately with clear water and get medical attention.

Wear rubber gloves and protective clothing to keep acid off skin, if acid contacts skin, wash off immediately with clear water.

Lead-acid batteries produce flammable and explosive gases. NEVER allow smoking, flames or sparks around batteries.

■ Preventive inspection maintenance 90 day or 150 hour checklist|

OK	OK - No Service Required
✔	Corrective Action Required
X	Corrected, (Record description of corrective action).

Serial Number _____

Inspection Procedures Codes
(1) Weld cracks, dents and/or rust
(2) Installation
(3) Leaks
(4) Operation
(5) Condition
(6) Tightness
(7) Residue buildup
(8) See placards and decals inspection chart

Check	OK	✔	X
Chassis			
Structural (1)			
Tires (5)			
Tire pressure (45psi, 310kpa) (5)			
Hydraulic tubes and hoses (3,5)			
Decals and placards (2,8)			
Wheel nuts (6) Torque 95lbft 130Nm			
Lubrication points			
Pins, pin keepers (2)			
Slew ring bolts (2,6)			
Turntable			
Structural (1)			
Swivel mount assembly (2,3)			
Hydraulic tubes and hoses (3,5)			
Cowling (5, 6)			
Wire harness (2,5)			
System pressure (Max 2500 psi)			
Lubrication points			
Emergency bleed down valve (4,3)			
Engine (2,4)			
Engine charging system (4)			
Engine air filter (5)			
Hydraulic pump (4)			
Engine oil (5)			
Electric choke (4)			
Hydraulic oil reservoir (2,3,5)			
Hydraulic oil reservoir filler/breather cap (2,6)			
Hydraulic oil reservoir fluid level (5)			
Hydraulic oil filter (3,4)			
Pins, pin keepers (2)			
Lower Booms			
Structural (1)			
Boom lift cylinder pins (2,6)			
Boom lift cylinder and holding valve (3,4)			
Hydraulic tubes and hoses (3,5)			
Electrical Wires (5,2)			
Telescopic Booms			
Structural (1)			
Hydraulic tubes and hoses (3, 5)			
Upper Booms			
Structural (1)			
Electrical wires (5)			
Hydraulic hoses and tubes (3,5)			
Decals and Placards (2,8)			

Check	OK	✔	X
Boom lift cylinder pins			
Boom lift holding valve) (3,4)			
Platform			
Structural (1)			
Decals and placards (2,8)			
Platform gate (4)			
Platform mounting bolts (2,6)			
Correct operator's manual in document holder (2)			
Correct operation of tail lights, indicators (4)			
Battery			
Battery terminals (6,7)			
Battery electrolyte level (5)			
Fuel Tank			
Fuel tank (3,5)			
Fuel tank cap (2,3,4,5)			
Ground Control Station			
Station selector switch @ ground controls platform controls DO NOT work (4)			
Station selector switch @ platform controls ground controls DO NOT work (4)			
Cold start (4) Choke			
Keyed master switch (4)			
Boom speed rheostat switch (4)			
Turntable rotation (4)			
Upper boom lift UP - DOWN (4)			
Lower boom lift UP - DOWN (4)			
Tele boom IN - OUT (4)			
Emergency stop (4)			
Stabiliser controls (4)			
Emergency lower upper boom (4)			
Emergency lower lower boom (4)			
Interlocks			
Booms will not raise with legs stowed (4)			
Legs will not raise with booms up (4)			
Platform Control Station			
Foot switch / Enable switch (4)			
Enable switch / Foot switch, functions OPERATE when engaged (4)			
Enable switch / Foot switch, functions DO NOT operate when NOT ENGAGED (4)			
Start switch (4)			
Cold start (4) Choke			
Boom speed rheostat switch (4)			
Turntable rotation (4)			
Upper boom lift UP - DOWN (4)			
Lower boom lift UP - DOWN (4)			
Tele boom IN - OUT (4)			
Emergency stop (4)			
Emergency lower (4)			
Platform level UP - DOWN (4)			
Platform rotation - manual (4)			

Check	OK	✔	X
Optional Equipment			
Battery disconnect switch (4)			
Air line to platform (2,4)			
Dual fuel system (2,4)			
Platform work lights (2,4)			
Flashing light (2,4)			
Spare Wheel (2,5)			

Check	OK	✔	X
10.9m height lockout kit (2,4)			
Battery isolate switch (2,4)			
Platform foot switch (2,4)			

Corrective Action Required

Note: If correction action is required on any item, attach sheet indicating problem and action taken.

All items have been properly checked and tested and found to be operating satisfactory or necessary corrective action has been completed.

Inspected By: _____ Date _____

■ Torque chart

NOM SIZE X PITCH	TENSILE STRESS AREA A_s (mm^2)	PROPERTY CLASS 8.8			PROPERTY CLASS 10.9		
		CLAMP LOAD W (N)	TORQUE (N.m)		CLAMP LOAD W (N)	TORQUE (N.m)	
			DRY k=0.20	LUBED k=0.15		DRY k=0.20	LUBED k=0.15
M3 x 0.5	5.03	2 200	1.32	0.99	2 990	1.79	1.34
M3.5 x 0.6	6.78	2 960	2.07	1.55	4 030	2.82	2.11
M4 x 0.7	8.78	3 830	3.07	2.30	5 220	4.17	3.13
M5 x 0.8	14.2	6 200	6.20	4.65	8 430	8.43	6.33
M6 x 1	20.1	8 770	10.5	7.90	11 950	14.3	10.8
M8 x 1.25	36.6	15 975	25.6	19.2	21 750	34.8	26.1
M8 x 1	39.2	17 100	27.4	20.5	23 275	37.3	27.9
M10 x 1.5	58.0	25 325	51	38.0	34 450	69	52
M10 x 1.25	61.2	26 725	53	40.1	36 350	73	55
M12 x 1.75	84.3	36 800	88	66	50 075	120	90
M12 x 1.25	92.1	40 200	96	72	54 700	130	98
M14 x 2	115	50 200	140	105	68 300	190	145
M14 x 1.5	125	54 550	155	115	74 250	210	155
M16 x 2	157	68 525	220	165	93 250	300	225
M16 x 1.5	167	72 900	235	175	99 200	320	240
M20 x 2.5	245	106 950	430	320	145 550	580	435
M20 x 1.5	272	118 750	475	355	161 550	650	485
M24 x 3	353	154 100	740	555	209 700	1 010	755
M24 x 2	384	167 600	805	605	228 100	1 100	820
M27 x 3	459	200 350	1 080	810	272 650	1 470	1 100
M27 x 2	496	216 500	1 170	875	294 600	1 590	1 150
M30 x 3.5	561	244 900	1 470	1 100	333 250	2 000	1 500
M30 x 3	580	253 150	1 520	1 140	344 500	2 070	1 550
M30 x 2	621	271 050	1 630	1 220	368 850	2 210	1 660
M33 x 3.5	694	302 950	2 000	1 500	412 250	2 720	2 040
M33 x 2	761	332 200	2 200	1 640	452 050	2 980	2 240
M36 x 4	817	356 600	2 570	1 930	485 300	3 490	2 620
M36 x 3	865	377 600	2 720	2 040	513 800	3 700	2 780
M39 x 4	976	426 000	3 320	2 490	579 750	4 520	3 390
M39 x 3	1 028	448 700	3 500	2 630	610 650	4 760	3 570
M42 x 4.5	1 121	489 300	4 110	3 080	665 850	5 590	4 200
M42 x 3	1 206	526 400	4 420	3 320	716 350	6 020	4 510
M45 x 4.5	1 306	570 050	5 130	3 850	775 750	6 980	5 240
M45 x 3	1 398	610 250	5 490	4 120	830 400	7 470	5 610
M48 x 5	1 473	642 950	6 170	4 630	874 950	8 400	6 300
M48 x 3	1 604	700 150	6 720	5 040	952 800	9 150	6 860

Grade marking 

■ To order service or repair parts

When placing an order for service or repair parts, please have the following information available for your machine.

- ✓ Machine model number
- ✓ Machine serial number
- ✓ Snorkel part number
- ✓ Description of part
- ✓ Quantity of parts required
- ✓ Your purchase order number
- ✓ Address for order to “Ship To”
- ✓ Your desired shipment method

All correspondence relative to this unit, such as field reports, discrepancy reports, requests for service information, etc., should be directed to:

Snorkel New Zealand
36 Bruce Road
P.O. Box 1041
Levin 5510
New Zealand

Phone: +64 06 368-9168
Fax: +64 06 368-9164

Attention: Parts Department

❑ ANSI and OSHA compliance

All owners and users of the aerial platform must read, understand, and comply with all applicable regulations. Ultimate compliance to OSHA regulations is the responsibility of the user and their employer.

ANSI publications clearly identify the responsibilities of all personnel who may be involved with the aerial platform. A reprint of the “Manual of Responsibilities for Dealers, Owners, Users, Operators, Lessors and Lessees of ANSI/SIA A92.5-1992 Boom-Supported Elevating Work Platforms” is available from Snorkel dealers or from the factory upon request.

Copies are also available from:

Scaffold Industry Association
20335 Ventura Blvd. Suite 310
Woodland Hills, CA 91364-2471 USA

❑ Manuals

Manuals are available from Snorkel to support any of the machines that we produce.

The specific manuals for MHP14AT / MHP13AT are as follows:

- ✓ Operator’s Manual
  Snorkel part number - 13225A

- ✓ Repair Parts Manual
  Snorkel part number - 13225B

Record machine information here:

Model number*

_____

Serial number*

_____

Date of purchase

_____

Purchased from

_____

Snorkel dealer or distributor

_____

* This information is found on the serial number placard attached to your machine.

■ Stability Testing MHP14AT / MHP13AT

❑ Introduction

The purpose of this test is to assess if the MHP 14AT / MHP13AT meets the requirements of AS 1418-10 2004 Appendix G Stability Calculations. The situation for minimum stability is with the booms at maximum outreach over the drawbar, with the maximum rated load in the platform, a manual force pulling toward the drawbar and maximum wind load acting on the back of the machine.

Since this testing involves taking the machine to the edge of its stability envelope care must be taken to ensure the test is failsafe i.e. the machine can not tip over if it fails the test. To this end the rated load is to be hung from the Test Weight Harness and the test weight is suspended 200mm above the ground during the test. If the machine starts to tip over the test weight will contact the ground, reducing the overturning moment, so that the machine can not continue to tip over.

❑ Equipment

- MHP14AT / MHP13AT
- Spirit level
- Rope
- Pulley
- Test weights & harness
- Ratchet tie down

❑ Setup and Procedure

The Test Weight harness location is at the rear edge of the platform. The test load for a standard machine is 215kg.

The manual force is 400N with an additional multiplication factor of 1.1 giving 440N or 45kg. The line of action of this force is such that it produces the greatest overturning moment. That is the line of action of the force is perpendicular to a line joining the top rail of the platform to the tipping line (see Figure 1).

The wind load is assumed to act at the centre of area of the elevated components. The overturning moment from the wind is used to find an equivalent force along the line of action of the manual force. The calculated force due to wind is 20.7kg

The load simulating the wind and manual force is therefore 65.5kg.

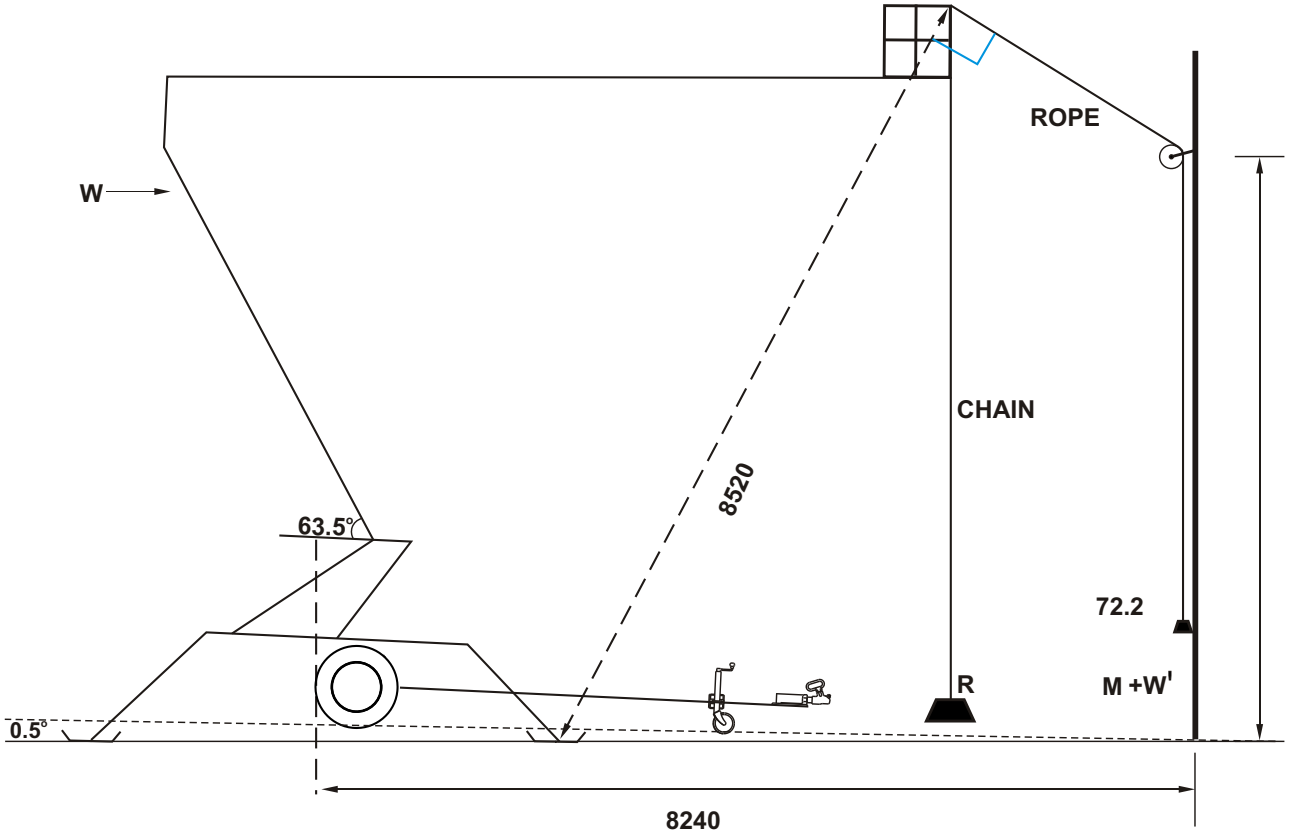
The test procedure is as follows (Refer Figure 2).

1. Set the pulley on the pole such that a line joining the foot and rear top edge of the basket makes a right angle with the rope to the pulley (see Figure 1 over page).
2. Raise the machine on the stabilisers to maximum height.
3. Level the machine laterally using the spirit level.
4. Level the machine fore and aft such that it is 0.5 deg drawbar down from level. (This simulates a poor setup by the end user).
5. Slew the booms until the rear of the basket is pointing towards the pole.
6. Tie the rope from the pulley around the top rail of the platform on the basket centre line.
7. Attach the Test Weight Harness and the Test Weight to the platform.
8. Raise the booms to maximum outreach (lower boom fully up and top boom horizontal). The Test load must be between 100 and 200mm above ground.
9. Attach a ratchet tie down to the rope coming from pulley. Attach the other end to the Load simulating the wind and manual force.
10. Raise the Load simulating the wind and manual force with the ratchet tie down until the load is between 100 and 200mm above the ground. Ensure that the loads are not swinging i.e. the loads are static. (If both ‘rear’ legs lift clear of the ground STOP the test and release the ratchet).

❑ Pass Criteria

The machine can be assessed as meeting the requirements of AS 1418-10 2004 Appendix G Stability Calculations if the Test Load and the Load simulating the wind and manual force can be raised clear of the ground simultaneously while maintaining at least 3 point contact i.e. not more than 1 stabiliser foot off the ground.

❑ **Figure 1**



RATED LOAD R = 215kg
STANDARD MACHINE

MANUAL FORCE M = 45kg

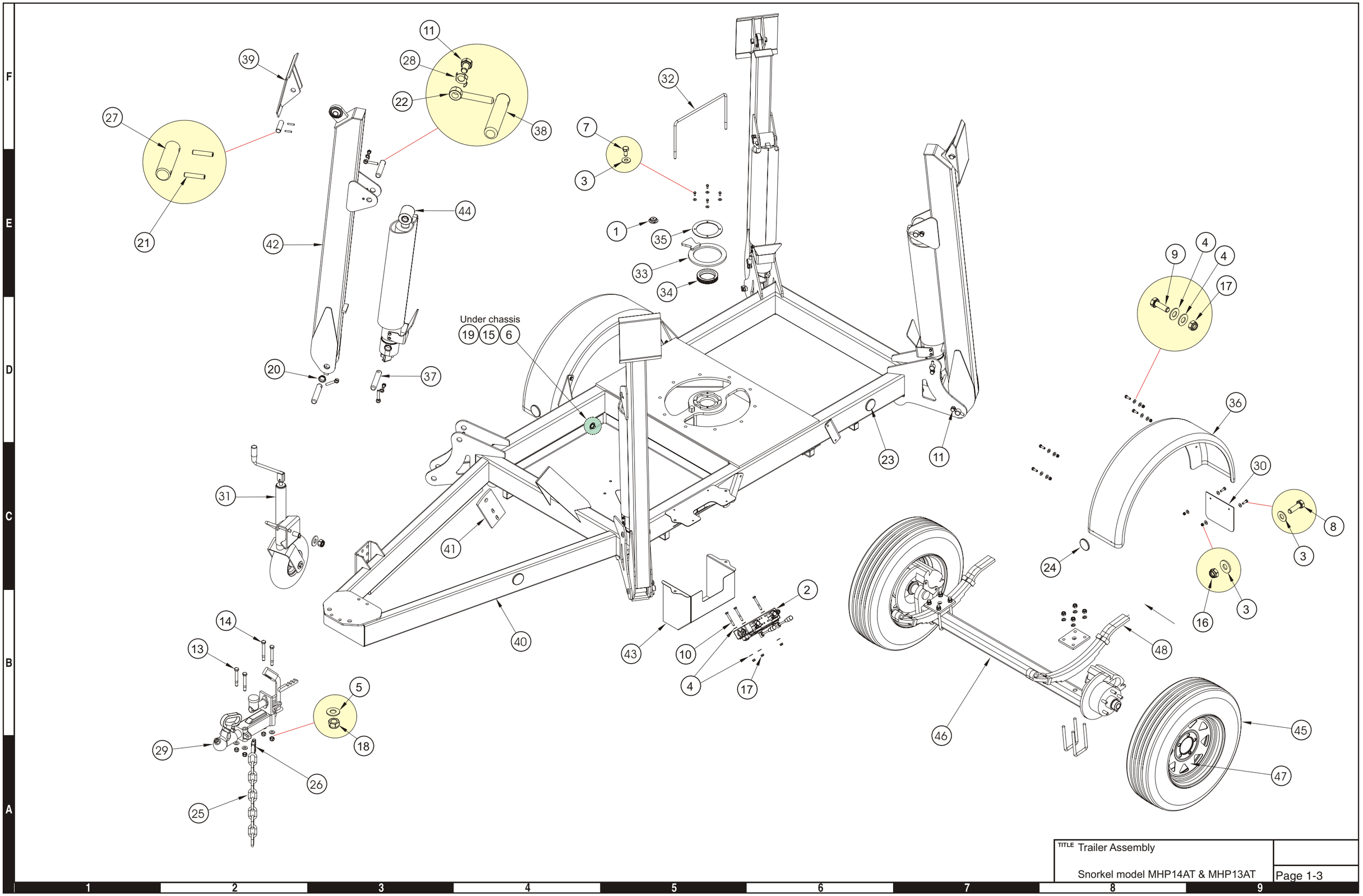
WIND FORCE W = 20.7kg

LOAD ON PULLEY = 65.5kg

Section 1. - Repair Parts

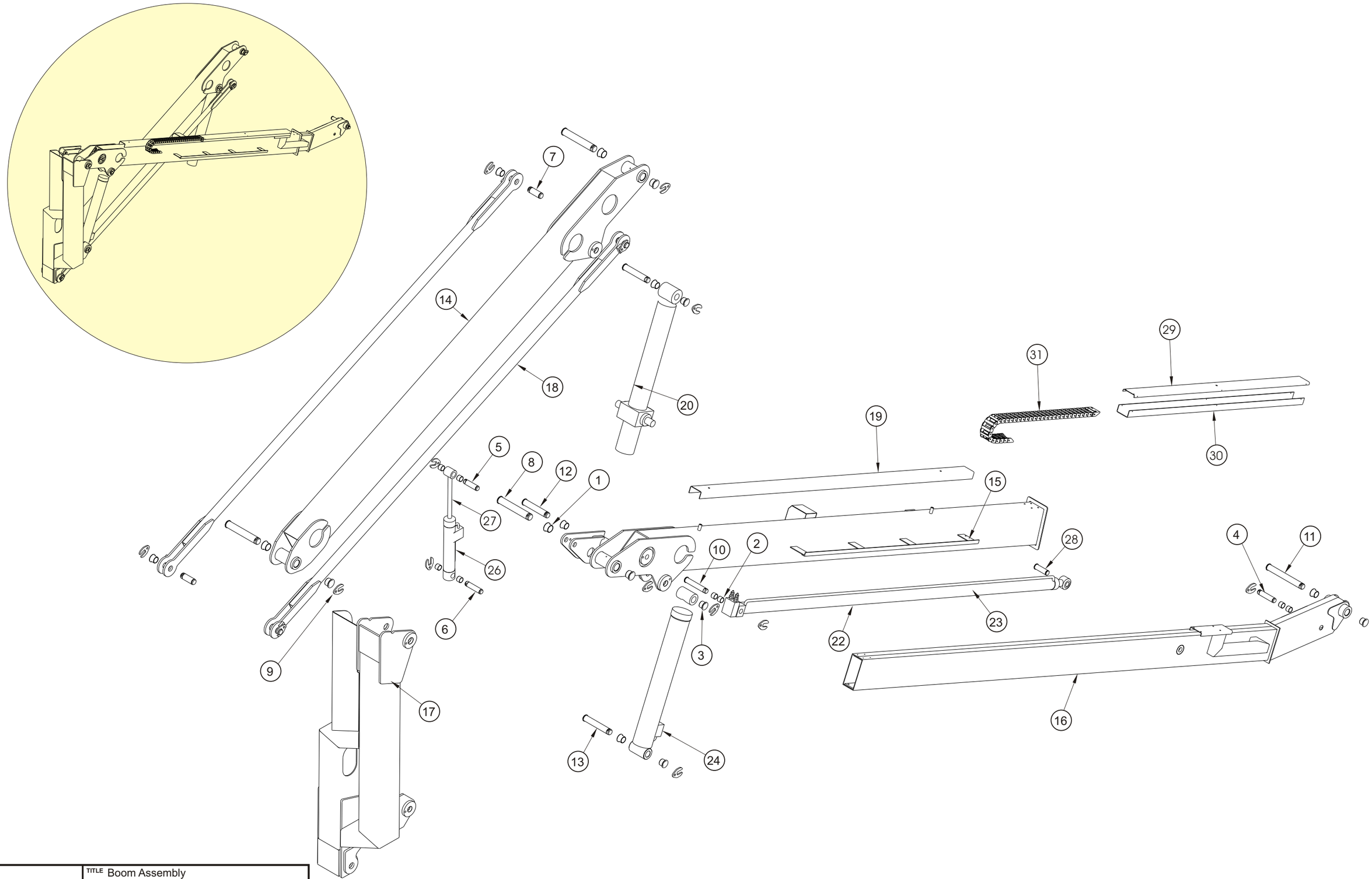
Trailer assembly

Item	Part No	Qty	Description
	13216A	1	Trailer assembly
1.	1273	1	Level bubble
2.	1651	1	Casappa valve
3.	3603-06	10	Washer, plain, M6 x 16, ZP
4.	3603-08	21	Washer, plain, M8 x 19, ZP
5.	3603-12	4	Washer, plain, M12 x 24, ZP
6.	3603-16	4	Washer, plain, M16 x 30, ZP
7.	3610-06012	4	Bolt, M6 x 12, C8.8, ZP
8.	3610-06020	2	Bolt, M6 x 20, C8.8, ZP
9.	3610-08025	8	Bolt, M6 x 25, C8.8, ZP
10.	3610-08065	3	Bolt, M8 x 65, C8.8, ZP
11.	3610-10016	12	Bolt, M10 x 16 C8.8, ZP
13.	3610-12090	2	Bolt, M12 x 90, C8.8, ZP
14.	3610-12100	2	Bolt, M12 x 100, C8.8, ZP
15.	3610-16090	2	Bolt, M16 x 90, C8.8, ZP
16.	3611-06	4	Nut, nylock, M6, C8.8, ZP
17.	3611-08	10	Nut, nylock, M8, C8.8, ZP
18.	3611-12	4	Nut, nylock, M12, C8.8, ZP
19.	3611-16	2	Nut, nylock, M16, C8.8, ZP
20.	3626-5	8	Flanged permaglide bush
21.	3633-3	8	Roll pin
22.	8626	12	Pin keeper
23.	9875-1	4	Reflector lens, orange
24.	9875	2	Reflector lens, white
25.	9973-1	1	Chain
26.	10993-1	1	Hammer lock
27.	11369	4	Pin, dual tension
28.	11492-3	11	Tab washer
29.	11572	1	Tow coupling, 50mm
30.	11585-3	2	Mudflap
31.	12771	1	Jockey wheel
32.	12418-1	1	Valve bank guard
33.	12420	1	Slew stop traveller
34.	12439	1	Trim panel
35.	12444	1	Slew traveller hold down
36.	12475	2	Plastic mudguard, 15 inch
37.	12741	8	Pin, 25mm x 135mm
38.	12742	4	Pin, 25mm x 115mm
39.	12790	4	Foot plate weldment
40.	13216	1	Trailer weldment MHP14AT, MHP13AT
41.	13216-5	1	Boom rest guide
42.	13223	4	Stabiliser leg weldment
43.	13295	1	Leg valve cover
44.	12336A	4	Leg cylinder assembly
45.	12772-2	2	Tyre, 185 x 14, 8ply
46.	12701	1	Axle assembly
47.	12772-1	2	Wheel rim
48.	12703	1	Spring kit (pair)



TITLE Trailer Assembly

Snorkel model MHP14AT & MHP13AT



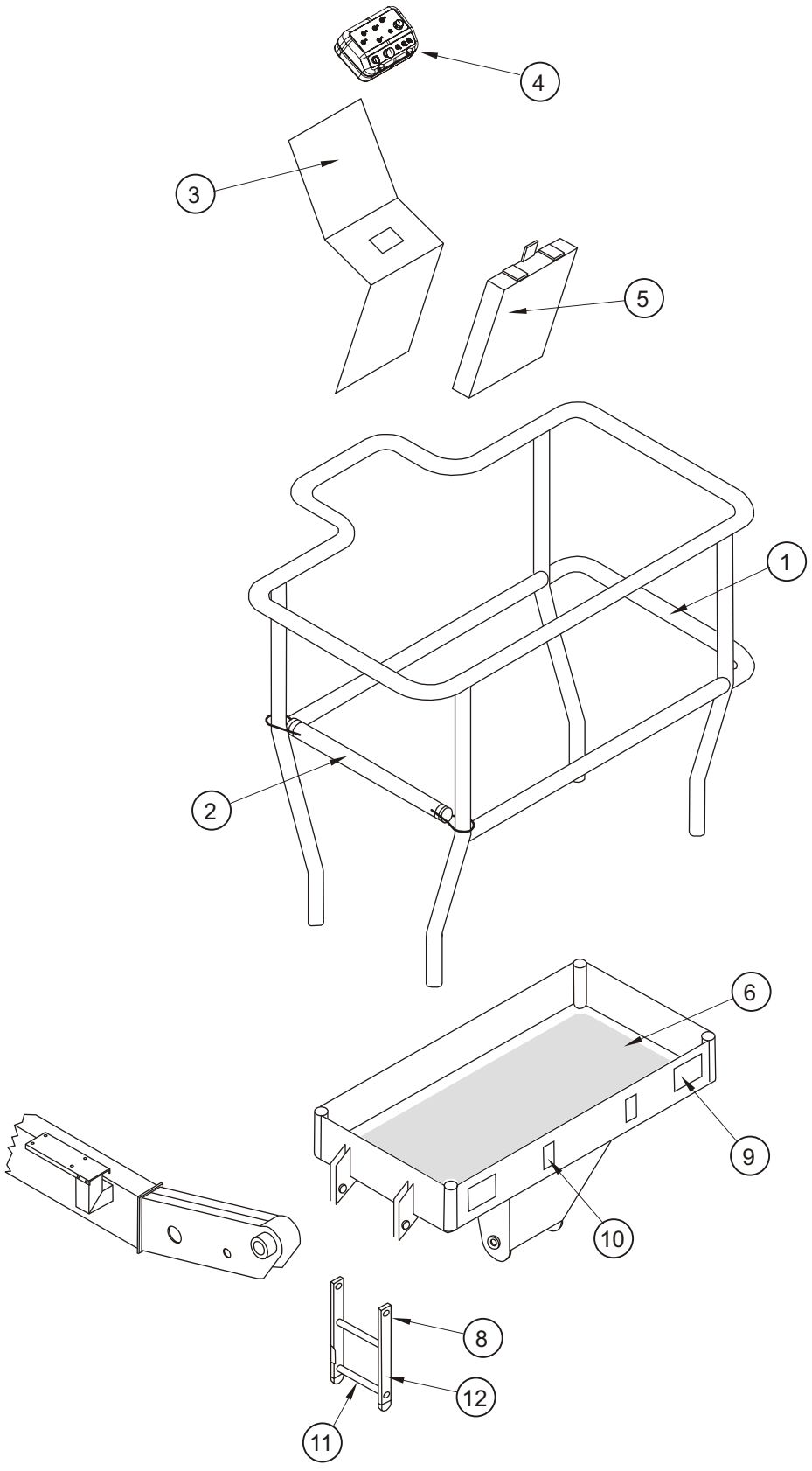
TITLE Boom Assembly

Snorkel model MHP14AT, MHP13AT

Item	Part No	Qty	Description
1.	057046-000	6	Bush
2.	057047-000	8	Bush
3.	057054-000	12	Bush
4.	058053-001	1	Pin
5.	058053-004	2	Pin
6.	058053-005	1	Pin
7.	058054-002	4	Pin
8.	058055-006	3	Pin
9.	058056-000	14	Pin lock plate
10.	058065-006	1	Pin
11.	058066-001	1	Pin
12.	058066-005	2	Pin
13.	058066-007	1	Pin
14.	058413-000	1	Lower boom weldment
15.	058414-001	1	Outer boom
16.	058415-001	1	Inner boom
17.	058416-000	1	Turret weld
18.	058417-000	2	Lower level rod
19.	058457-000	1	Cover, outer boom
20.	504504-000	1	Lower cylinder assembly
22.	058461-000	1	Tele cylinder assembly
24.	504505-000	1	Upper cylinder assembly
26.	058734-000	1	Master level cylinder assembly
28.	500254-000	1	Pin
29.	500265-000	1	Cover for energy chain support channel
30.	500266-000	1	Energy chain support channel
31.	500468-000	1	Energy chain, complete

Platform assembly

Item	Part No	Qty	Description
1.	057521-001	1	Basket rail
2.	057524-000	1	Drop bar rail
3.	500973-000	1	Control box mounting plate
4.	13251	1	Upper control box
5.	010076-000	1	Manual holder
6.	057346-000	1	Platform floor weldment
8.	057347-001	1	Ladder
9.	13056-3	2	Tail light
10.	13056-2	2	Licence plate light
11.	13375-2	1	Bottom rung
12.	12554-6	2	Step hanger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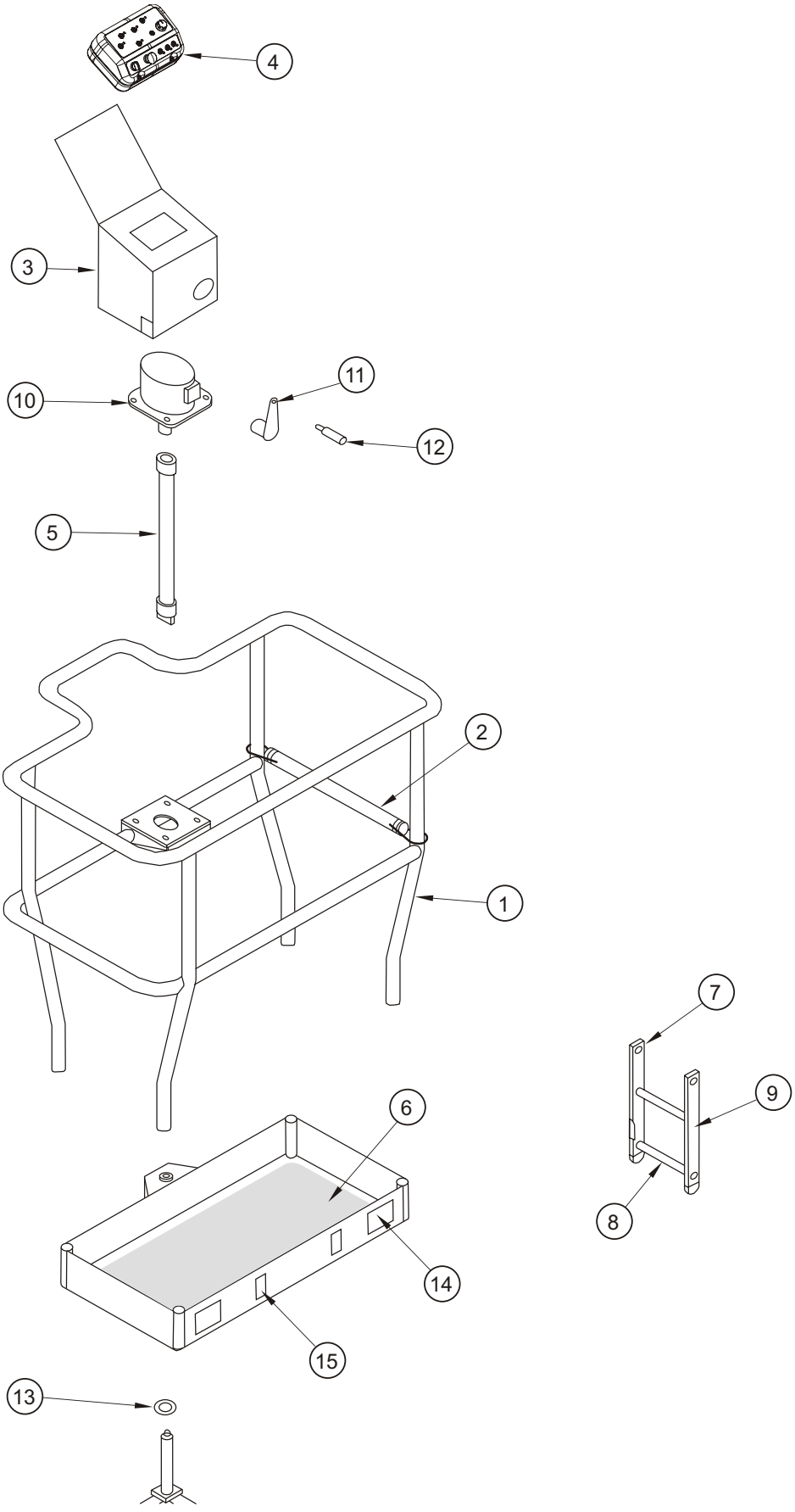
Platform rotator assembly

Item	Part No.	Qty	Description
1.	057521-001	1	Basket rail
2.	057525-000	1	Drop bar rail
3.	500973-000	1	Control box mounting plate
4.	13251	1	Upper control box
5.	500905-030	1	Drive shaft
6.	501970-000	1	Rotator floor weldment
7.	13375-1	1	Ladder
8.	13375-2	1	Bottom rung
9.	12554-6	2	Step hanger
10.	500922-000	1	Gearbox
11.	500905-034	1	Handle
12.	500985-000	1	Rotating handle
13.	500942-000	1	Thrust washer
14.	13056-3	2	Tail light
15.	13056-2	2	Licence plate light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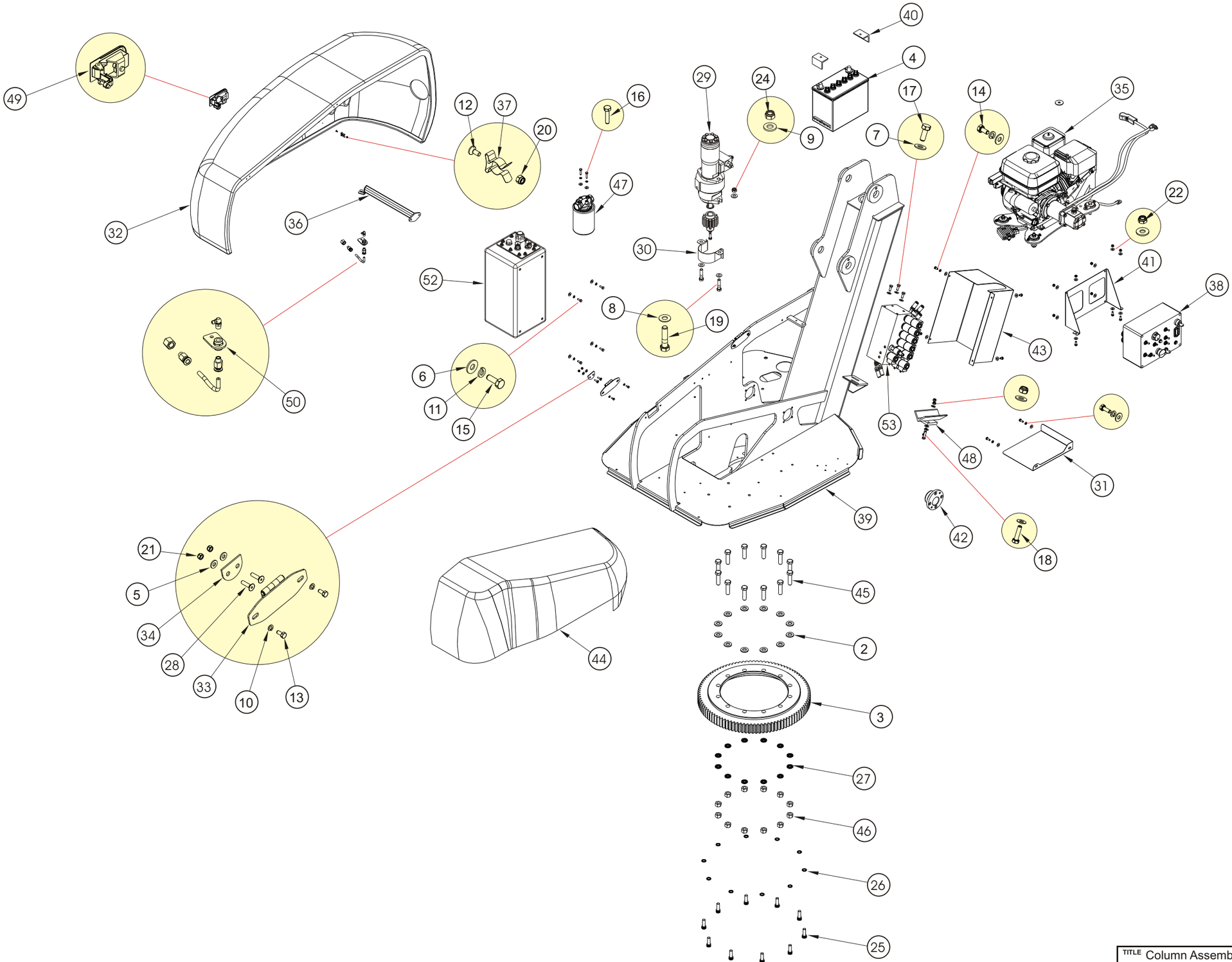
Column assembly

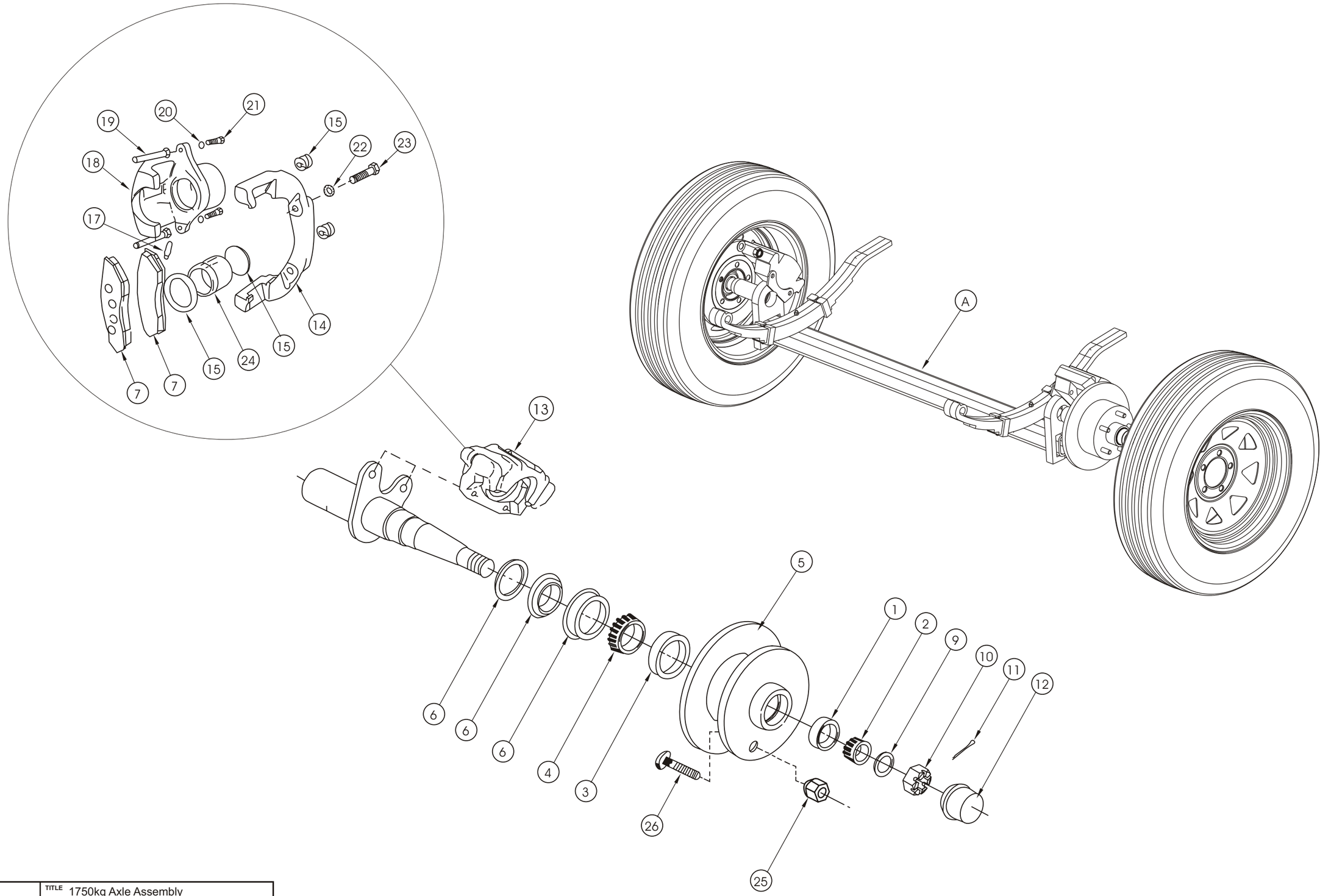
Item	Part No	Qty	Description
	13219A	1	Column assembly, MHP14AT, MHP13AT
2.	1034-120	12	Washer, M16, Galv and hardened
3.	1067	1	Slew ring
4.	1288	1	Battery
5.	3603-05	4	Washer, flat, M5 x 12.5, ZP
6.	3603-06	23	Washer, flat, M6 x 16, ZP
7.	3603-08	8	Washer, flat, M8 x 19
8.	3603-12	2	Washer, flat, M12 x 24, ZP
9.	3603-12HD	2	Washer, flat, M12 HD, Galv
10.	3605-05	4	Washer, spring, M5
11.	3605-06	12	Washer, spring, M6
12.	3606-03008	1	Screw, countersunk, socket head
13.	3610-05010	4	Bolt, M5 x 10, C4.9
14.	3610-06012	4	Bolt, M6 x 12, C8.8, ZP
15.	3610-06016	9	Bolt, M6 x 16, C8.8, ZP
16.	3610-06025	2	Bolt, M6 x 25, C8.8, ZP
17.	3610-08020	3	Bolt, M8 x 20, C8.8, ZP
18.	3610-08030	2	Bolt, M8 x 30, C8.8, ZP
19.	3610-12050	2	Bolt, M12 x 50, C8.8, ZP
20.	3611-03	1	Nut, nyloc, M3
21.	3611-05	4	Nut, nyloc, M5
22.	3611-06	7	Nut, nyloc, M6, C8.8, ZP
23.	3611-08	3	Nut, nyloc, M8, C8.8, ZP
24.	3611-12	2	Nut, nyloc, M12, C8.8, ZP
25.	3613-12035	10	Cap screw, M12 x 35
26.	3631-12	10	Washer, disc lock
27.	3631-16	12	Washer, disc lock
28.	3660-05020	4	Screw, countersunk, M5 x 20, SS
29.	11943	1	Slew drive and brake assembly
30.	12381-25	1	Pinion gear guard
31.	12381-40	1	Heat deflector
32.	12388-2	1	Cover, hydraulic side
33.	12392	2	Hinge weldment
34.	12392-2	2	Cover hinge spacer
35.	12413	1	Engine assembly
36.	12414-11	1	Stay, side mount, right hand
37.	12440	1	Tool clip
38.	12521	1	Enclosure, lower control box
39.	13219	1	Column weldment
40.	13219-10	2	Battery clamp
41.	13219-5	1	Lower control box mount
42.	13277	1	Eccentric cylinder bush
43.	13303	1	Rear cover
44.	13253	1	Cover, control side
45.	60020-028N	12	UNF Hex bolt
46.	60021-016	12	UNF nut
47.	301440	1	Oil filter
48.	13366	1	Boom rest
49.	5510014	1	Latch, side cover
50.	12483A	1	Remote grease nipple assembly
52.	13237A	1	Hydraulic oil tank assembly
53.	13269	1	Main valve block



1	2	3	4	5	6	7	8	9

TITLE Column Assembly

Snorkel Model MHP14AT & MHP13AT

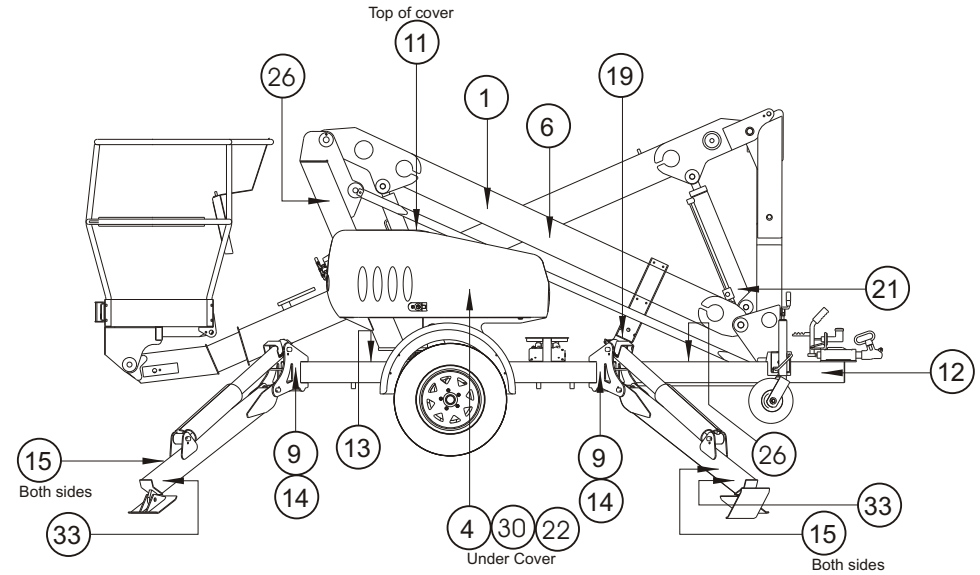


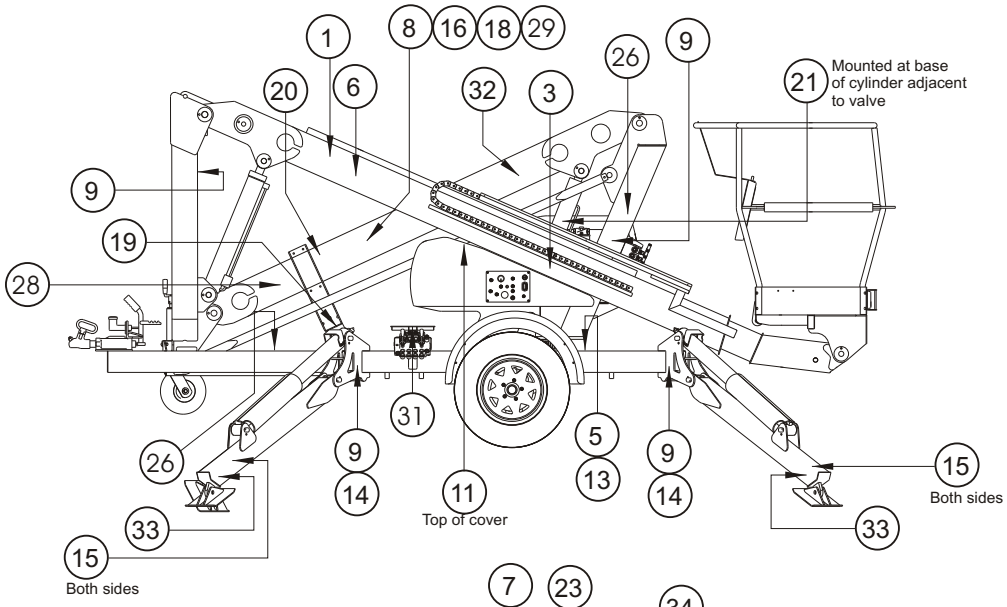
TITLE 1750kg Axle Assembly
Hydraulic, Disc Brakes
Snorkel Model MHP14AT & MHP13AT

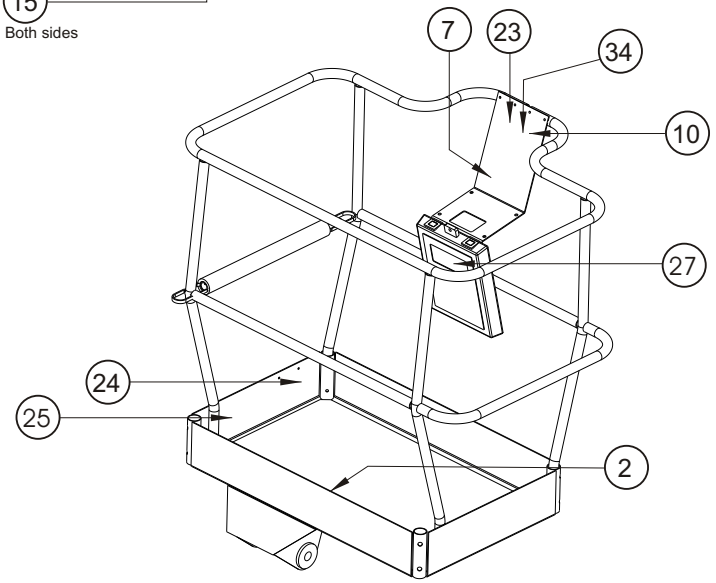
Item	Part No	Qty	Description
A.	12701	Ref	Axle assembly
1.	11570-10	2	Wheel bearing kit (Includes 1,2,3,4)
2.		Ref	Wheel bearing
3.		Ref	Wheel bearing
4.		Ref	Wheel bearing
5.	12362-1	1	Wheel hub
6.	9297-7	2	Seal kit, hub
7.	12362-2	1 Pair	Brake pads
9.	1033-008	2	Nut kit (Includes 10,11)
10.		Ref	Washer
11.		Ref	Split pin
12.	9922-7	2	Grease cap
13.	2045-001	Ref	Caliper assembly, (Includes items -14 to 24)
14.	9945-9	2	Anchor plate
15.	2045K	Ref	Seal kit, caliper
17.	2045-003	2	Bleed screw
18.	2045-13	2	Housing
19.	2045-5	4	Guide pin
20.	3605-08	4	Spring washer M8
21.	3610-08030	4	Set screw M8 x 30 HT
22.	60005-013	2	Lockwasher
23.	3610-12035	2	Set screw M12 x 35 HT
24.	2045-010	2	Piston
25.	1649-042	10	Wheel nut, UNF 7/16”
26.	1649-034	10	Wheel stud, UNF 7/16”

Placards and decals

Item	Part No	Qty	Description
1.	569295	2	Decal, Snorkel logo
2.	0150448	1	Decal, Lanyard attachment
3.	0072531	1	Decal, Electrocution hazard
4.	12814	1	Decal, Hydraulic fluid
5.	12883-2	1	Placard, Serial number plate
6.	13228	2	Decal, MHP14AT logo
	13228-1	2	Decal, MHP13AT logo
7.	1843	1	Decal, Warning, New Zealand only
	9428	1	Decal, Electric hazard, Australia only
8.	300699	1	Decal, Operators checklist
9.	45198-6	6	Decal, Do not disable limit switch
10.	45198-7	1	Decal, Wind speed rating
11.	302559	2	Decal, Danger pinch point
12.	12424	1	Decal, Towing speed
13.	7856-45	2	Decal, Tyre pressure
14.	0083426	4	Decal, Lifting and tie down
15.	9223-3	8	Chevron, Warning stripes (8 pcs)
16.	013-0025	1	Decal, Warning with stabilisers
17.	9751	1	Decal, New Zealand made logo
18.	12545	1	Decal, Auto stabiliser operation
19.	13111	2	Decal, Danger pinch point (small)
20.	1772-002K	1	Decal, Fit boom cradle lock pin
21.	13276	2	Decal, Emergency bleed down valve operation
22.	007-1925	1	Decal, Gasoline
23.	0323897	1	Decal, Danger must not operate
24.	12423-215	1	Decal, Rated load
25.	99228-1	1	Decal, Caution safety harness
26.	015-0602	4	Decal, Danger keep clear descending boom
27.	56242-6	1	Decal, Operator manual enclosed
28.	13205	1	Decal, 10.9m height restriction
29.	13183	1	Decal, Remove from towing vehicle before operating
30.	302950	1	Decal, Hydraulic oil level
31.	13272	1	Decal, Manual stabilisers only
32.	12617	1	Decal, Approved lift method
33.	0080650	4	Decal, Shackle foot point
34.	13373	1	Decal, Emergency lower from platform (gradually introduced from serial number NZ091204)


Top of cover
11
26
1
19
6
21
12
15
Both sides
9
13
9
26
14
14
33
33
4
30
22
Under Cover
15
Both sides


1
8
16
18
29
26
9
20
6
32
3
21
Mounted at base of cylinder adjacent to valve
9
19
28
31
5
26
9
9
15
14
11
13
14
Both sides
Top of cover
33
33
15
Both sides


7
23
34
10
27
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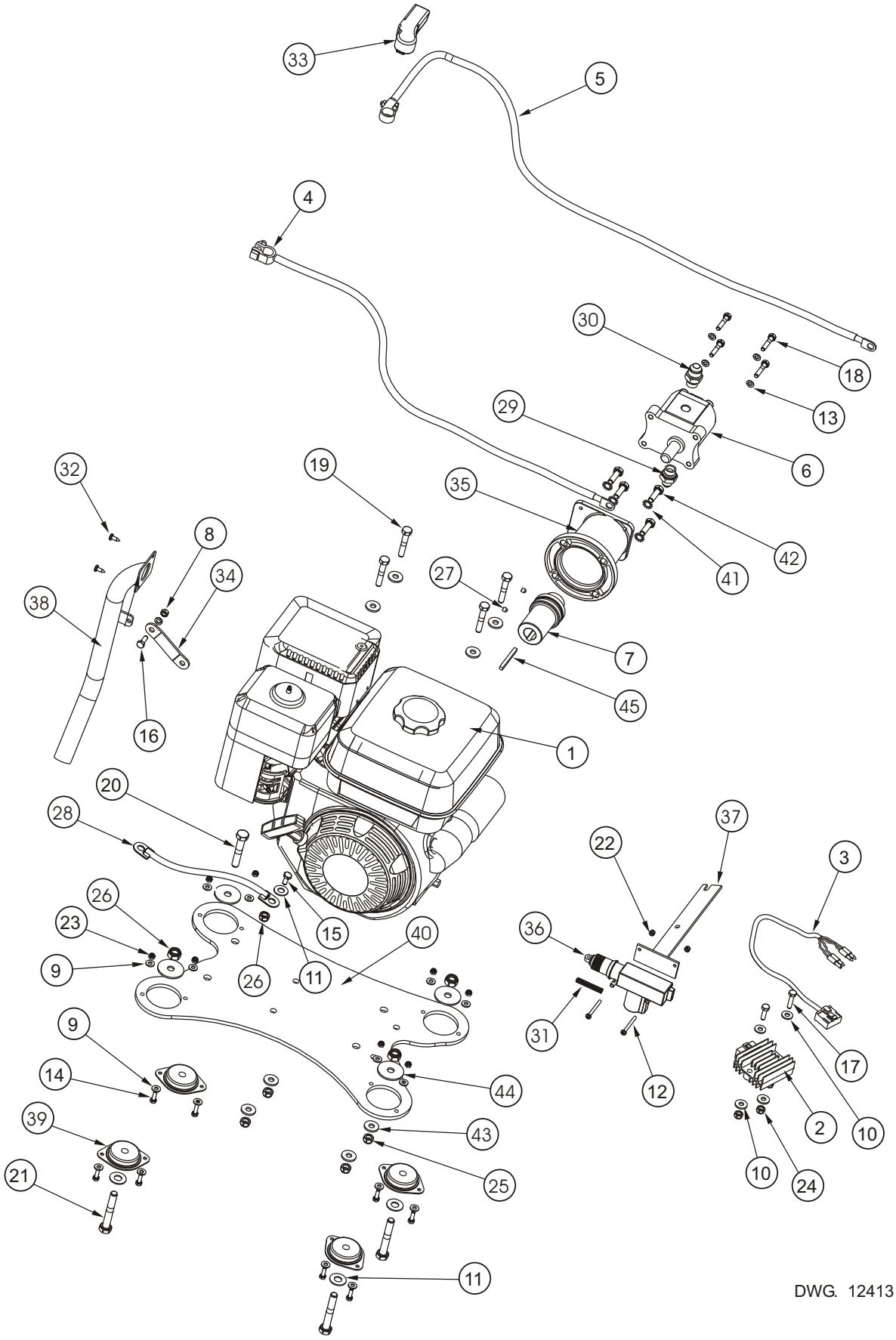
2

Engine assembly

Item	Part No	Qty	Description
	12413	1	Engine assembly
1.	1171-4	1	Honda GX160
2.	1171-4-022	1	Regulator / rectifier GX160
3.	1171-4-025	1	Loom, Honda rectifier
4.	1650-030	1	Battery cable
5.	1650-031	1	Battery cable
6.	1659	1	Gear pump
7.	1880	1	Drive coupling
8.	3602-06	1	Metric nut
9.	3603-05	16	Plain washer
10.	3603-06	4	Plain washer
11.	3603-10	4	Plain washer
12.	3604-04040	2	Metric screw pan head
13.	3605-06	5	Spring washer
14.	3610-05016	8	Metric bolt
15.	3610-10020	1	Metric bolt
16.	3610-06016	1	Metric bolt
17.	3610-06025	2	Metric bolt
18.	3610-06030	4	Metric bolt
19.	3610-08045	4	Metric bolt
20.	3610-10055	1	Metric bolt
21.	3610-10065	3	Metric bolt
22.	3611-04	2	Metric nylock nut
23.	3611-05	8	Metric nylock nut
24.	3611-06	2	Metric nylock nut
25.	3611-08	4	Metric nylock nut
26.	3611-10	4	Metric nylock nut
27.	3612-06006	2	Grub screw
28.	3649-10	1	Battery cable
29.	7013-003	1	BSPP (Dowty) x JICM nipple
30.	7013-004	1	BSPP (Dowty) x JICM nipple
31.	8398	1	Spring
32.	8978-1	2	Screw, self tapping
33.	10254	1	Cover, battery terminal
34.	10350-4	1	Exhaust bracket
35.	10417	1	Bell housing
36.	11444	1	Choke solenoid 12V
37.	11497	1	Choke solenoid bracket
38.	12407	1	Exhaust weldment
39.	12524	4	Engine mount
40.	12526	1	Engine mount plate
41.	60005-054	4	Lockwasher
42.	60016-090N	4	Bolt, plated
43.	60030-3N	8	Flat washer
44.	5560179	4	Flat washer, special
45.	1875KEY	1	Key steel


33
5
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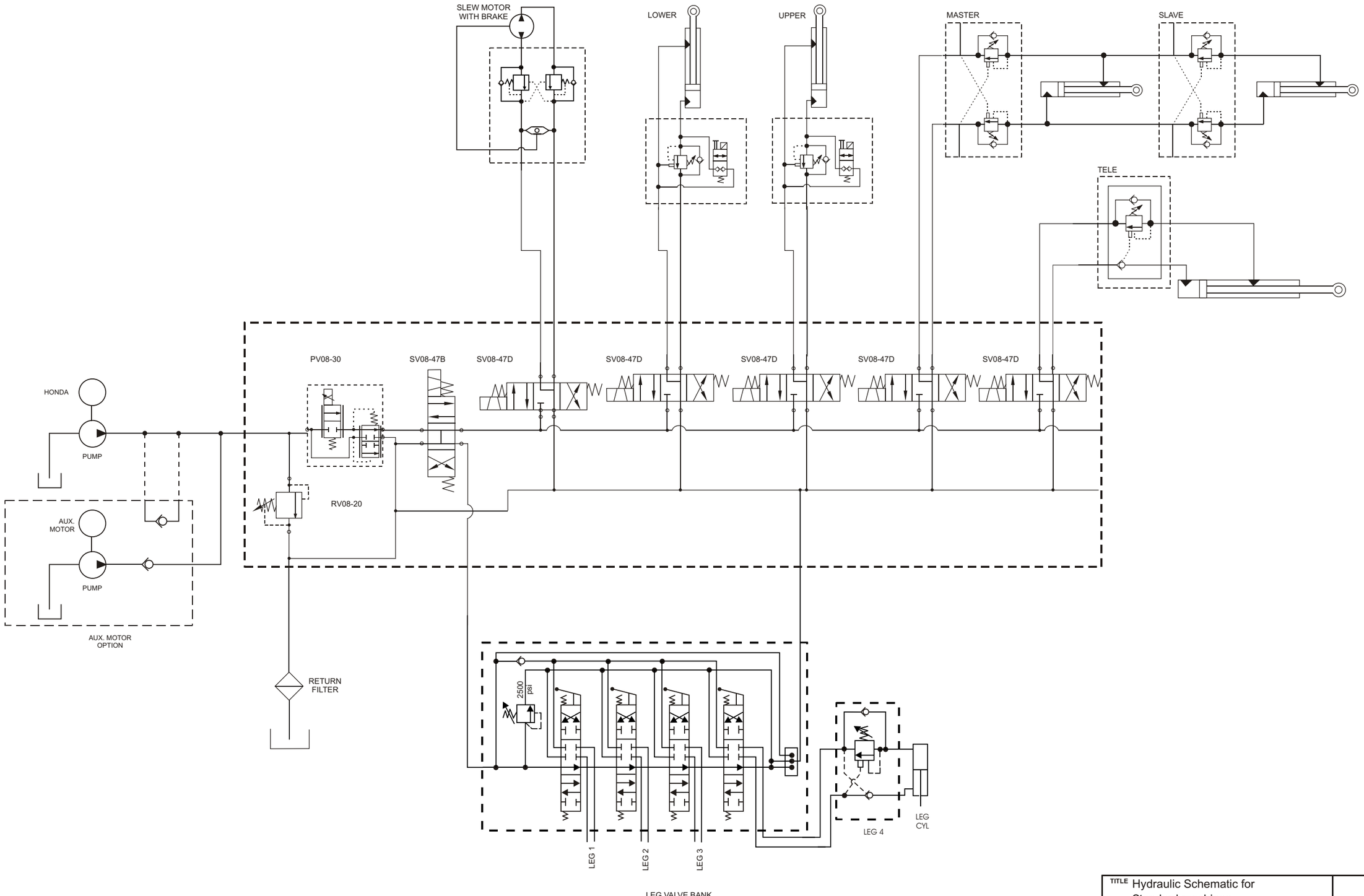
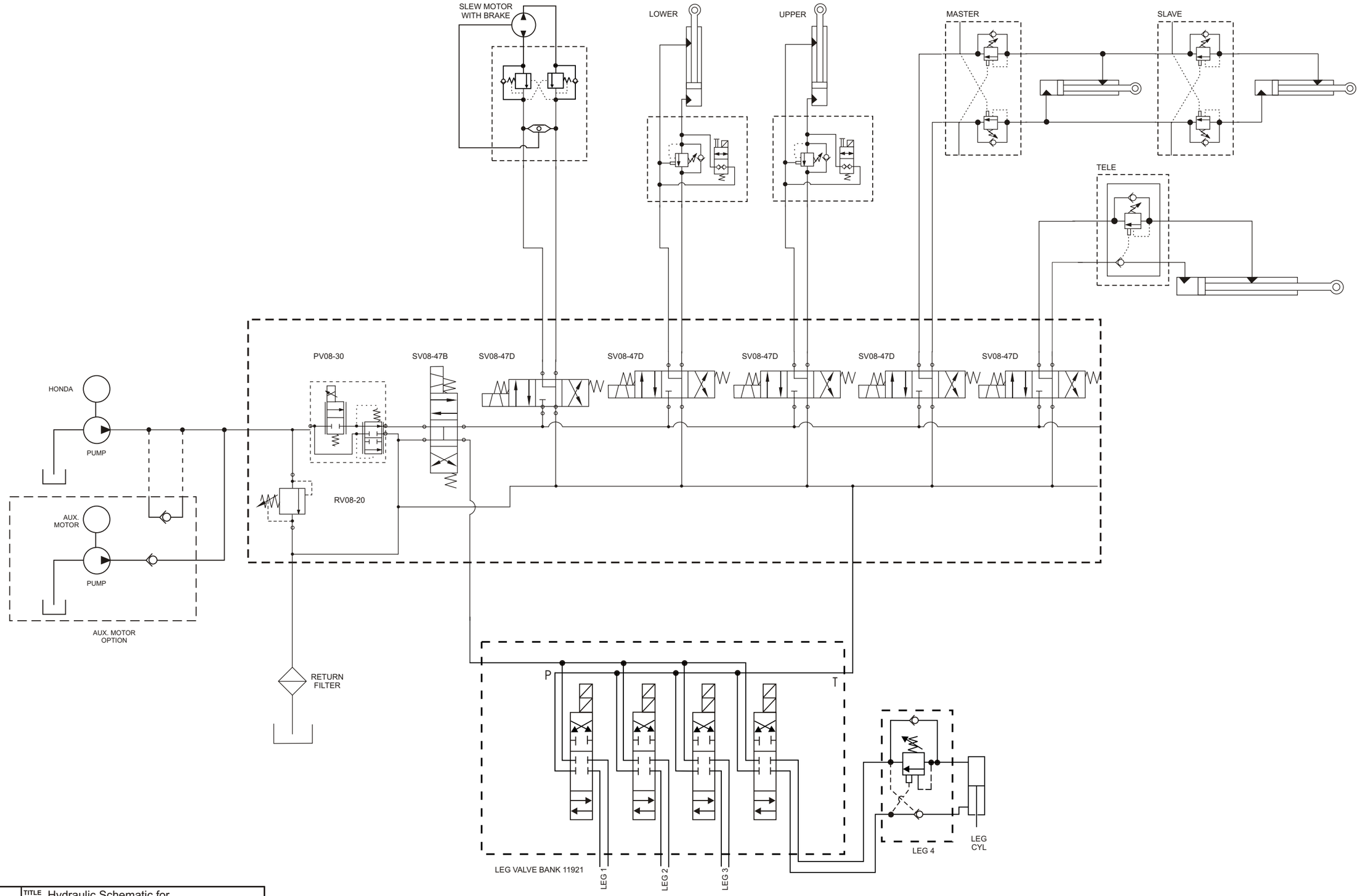
DWG. 12413

Section 2. - Hydraulics



TITLE Hydraulic Schematic for Standard machines Snorkel Model MHP14AT & MHP13AT

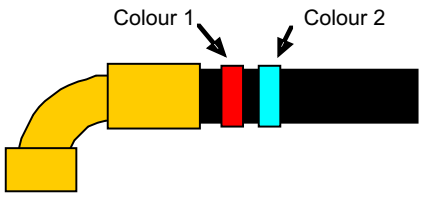


TITLE Hydraulic Schematic for
Auto Level machines
Snorkel Model MHP14AT & MHP13AT

READING HOSE TAGS

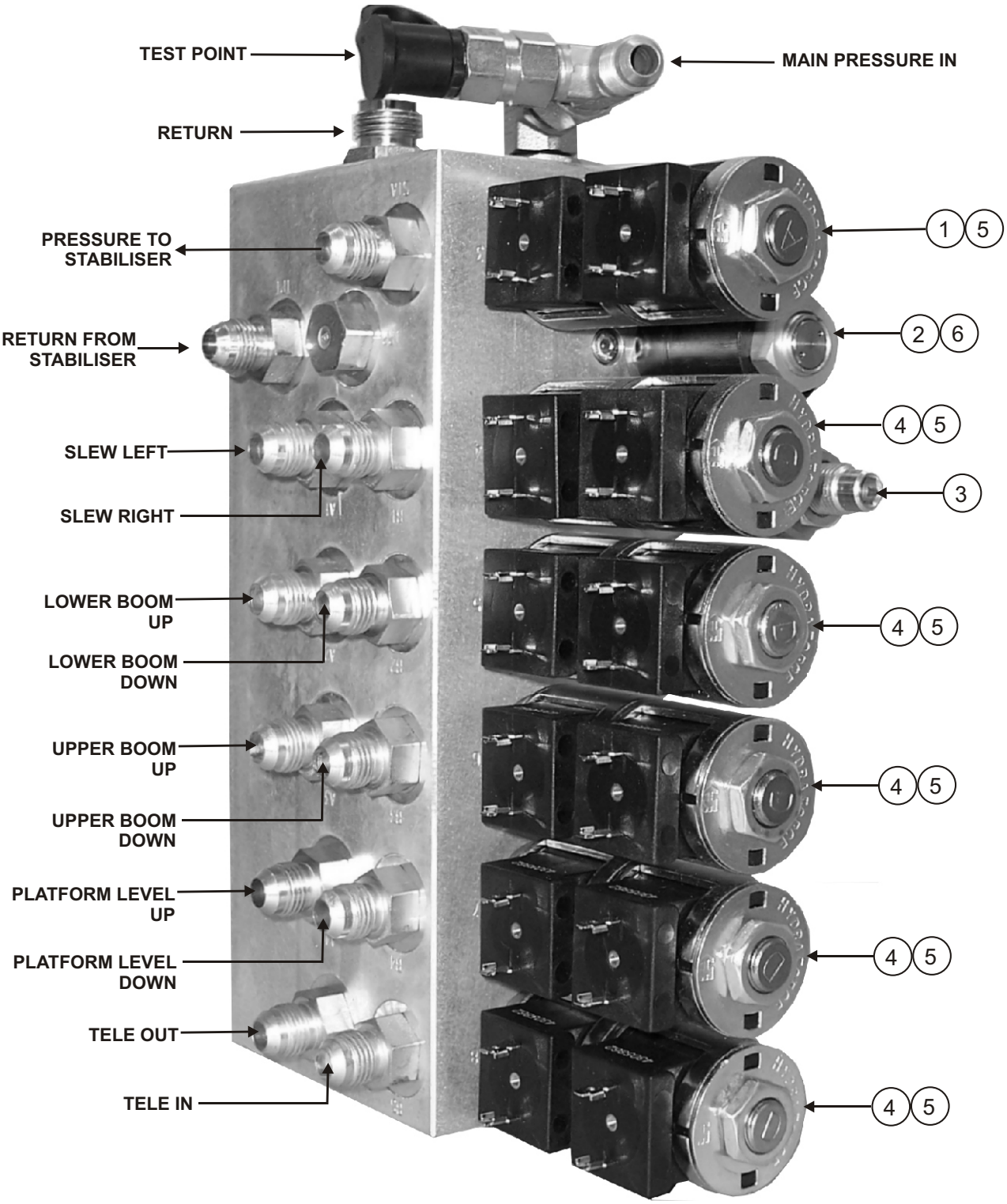
Hose tags are read from the fitting side of the hose in towards the hose.

As such colour 1 is the closest to the fitting, colour 2 the next colour then 3, 4 etc…



Snorkel Part Number	Colour ID		Hose Use
	Colour 1	Colour 2	
13254-01	Red	Yellow	Leg Valve (a) → LF Leg Cylinder (b), Extend
13254-02	Red	Green	Leg Valve (a) → LF Leg Cylinder (b), Retract
13254-03	Orange	Yellow	Leg Valve (a) → RF Leg Cylinder (b), Extend
13254-04	Orange	Green	Leg Valve (a) → RF Leg Cylinder (b), Retract
13254-05	Yellow	Yellow	Leg Valve (a) → LR Leg Cylinder (b), Extend
13254-06	Yellow	Green	Leg Valve (a) → LR Leg Cylinder (b), Retract
13254-07	Green	Yellow	Leg Valve (a) → RR Leg Cylinder (b), Extend
13254-08	Green	Green	Leg Valve (a) → RR Leg Cylinder (b), Retract
13254-09	Black	Yellow	Main Valve (a) → Leg Valve (b), Pressure
13254-10	Black	White	Main Valve (a) → Leg Valve (b), Return
13254-11	Red	Yellow	Main Manifold → Lower Lift Cylinder, Extend
13254-12	Red	Green	Main Manifold → Lower Lift Cylinder, Retract
13254-13	Orange	Yellow	Main Manifold → Master Level Cylinder, Extend
13254-14	Orange	Green	Main Manifold → Master Level Cylinder, Retract
13254-15	Yellow	Yellow	Main Manifold → Upper Lift Cylinder, Extend
13254-16	Yellow	Green	Main Manifold → Upper Lift Cylinder, Retract
13254-17	Green	Yellow	Main Manifold → Tele Cylinder, Extend
13254-18	Green	Green	Main Manifold → Tele Cylinder, Retract
13254-19	Blue	Yellow	Master Level Cylinder → Slave Level Cylinder, Extend
13254-20	Blue	Green	Master Level Cylinder → Slave Level Cylinder, Retract
13254-21	Blue	Yellow	Slew Left, Main Manifold → Slew Motor
13254-22	Blue	Green	Slew Right Main Manifold → Slew Motor
13254-23	Red	---	Oil Tank → Pump Suction
13254-24	Orange	---	Main Manifold → Return Filter
13254-25	Yellow	---	Return Filter → Tank
13254-26	Green	---	Pump Pressure → Main Manifold

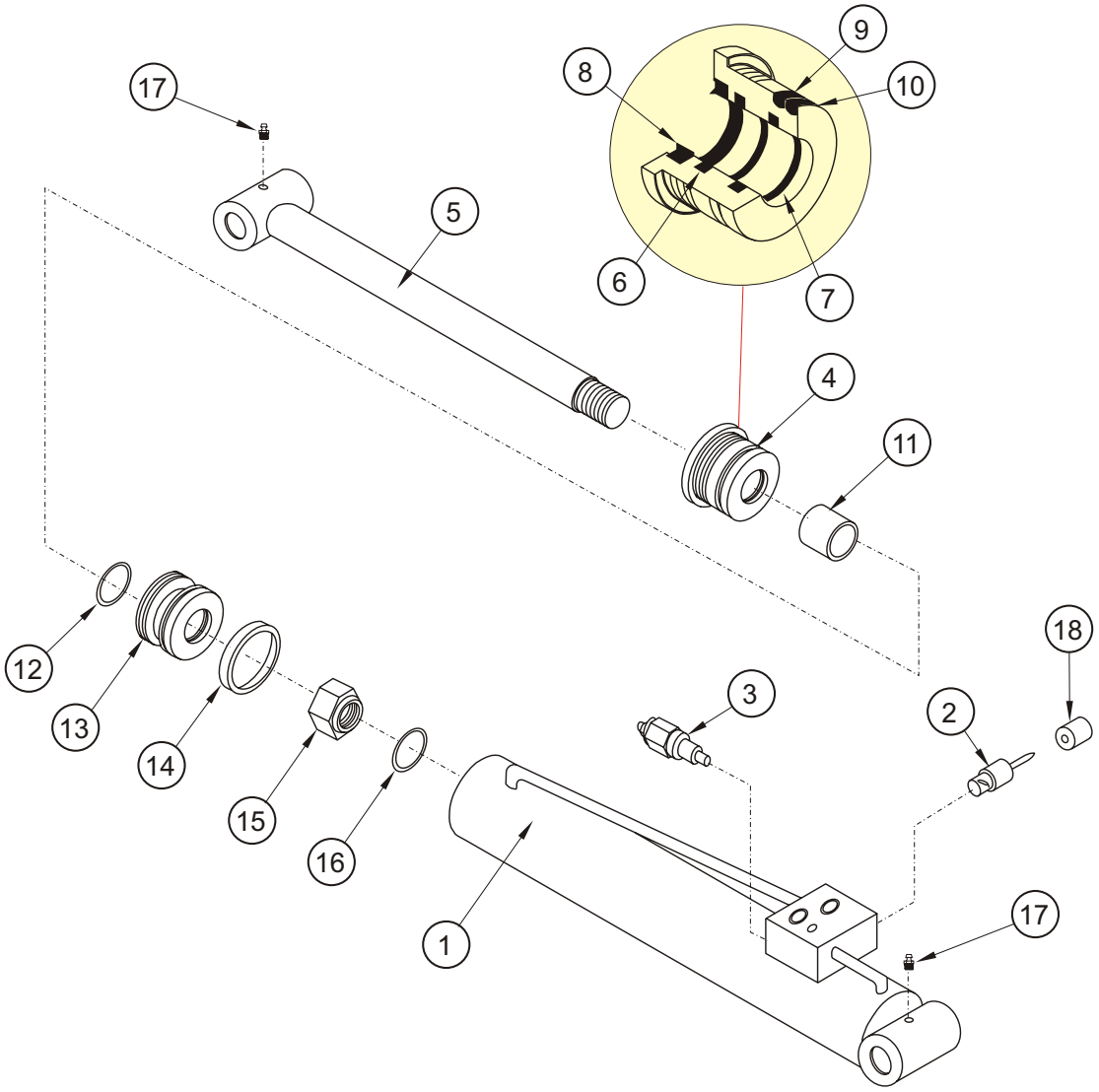
Main control valve



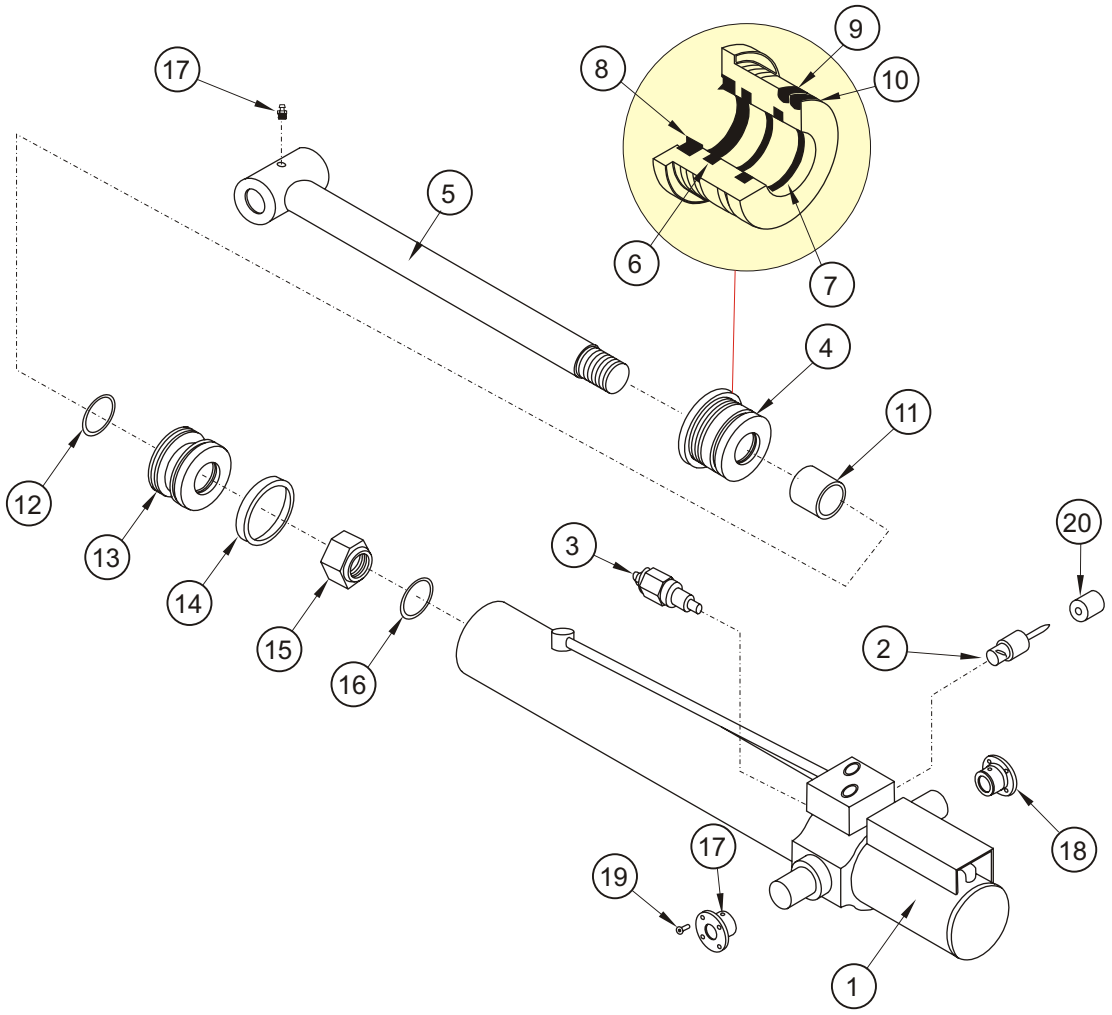
Item	Part No	Qty	description
1.	13269-1	1	Control select, boom / stabiliser
2.	13269-2	1	Speed control valve
3.	13269-3	1	Pressure relief valve
4.	13269-4	5	Directional valve
5.	13269-5	6	Coil, 12V
6.	13269-6	1	Coil

Upper boom lift cylinder assembly

Item	Part No	Qty	Description
0.	504505-000	1	Cylinder assembly
1.		1	Cylinder body
2.	13273	1	Emergency lowering valve
3.	058728-000	1	Single overcentre valve
4.		1	End cap
5.		1	Rod and end pivot
6.		1	U-Ring rod seal
7.		1	Rod seal
8.		1	Wiper
9.		1	Back up O-Ring
10.		1	O-Ring
11.		1	Spacer
12.		1	Piston O-Ring
13.		1	Piston head
14.		1	Piston seal
15.		1	Piston locknut
16.		1	Washer
17.	057048-000	2	Grease nipple
	500458-000	1	Items 6 to 10 inclusive + items 12 & 14 form the seal kit
18.	12835-2	1	Coil, 12V

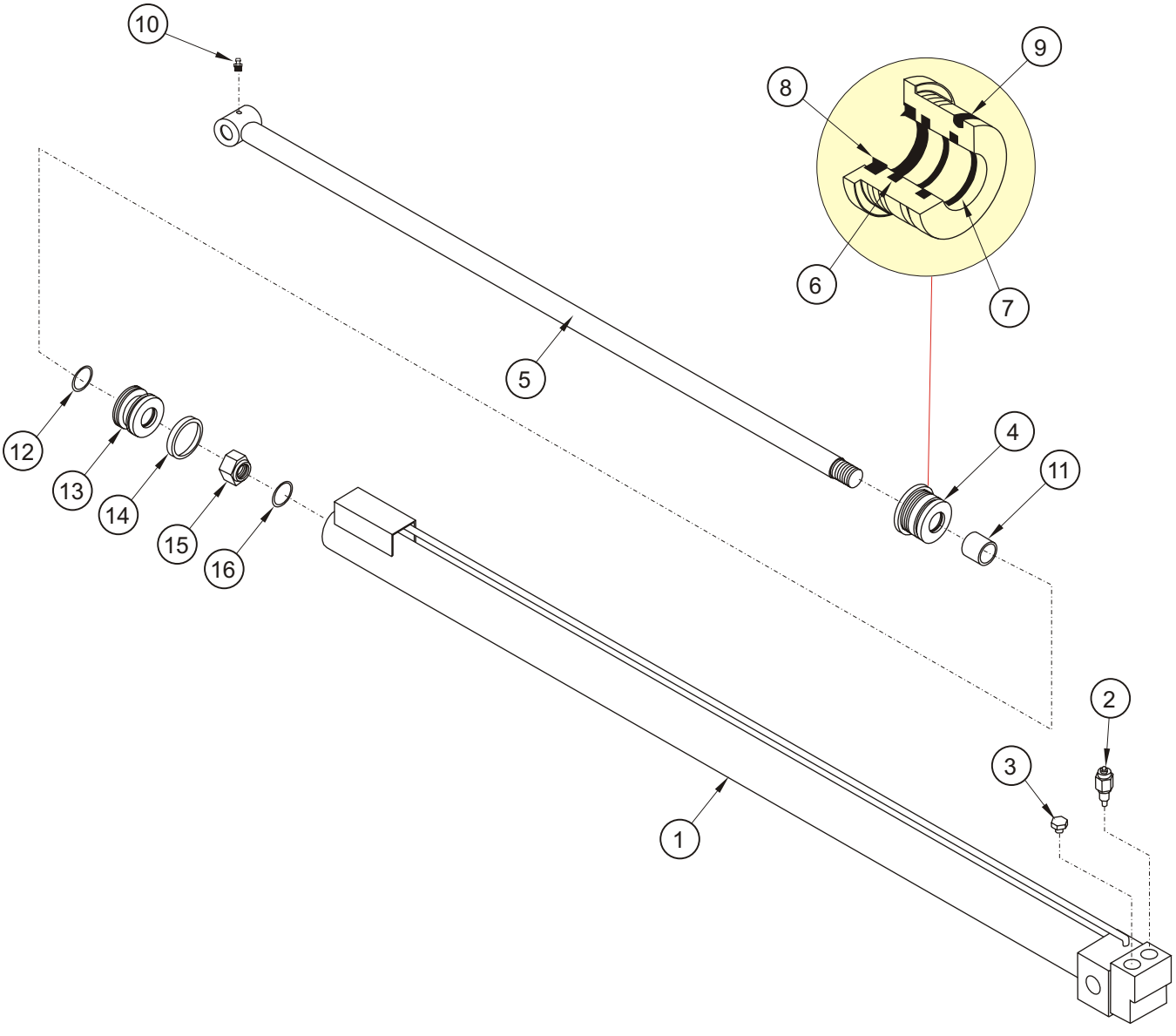


Item	Part No	Qty	Description
0.	504504-000	1	Lower cylinder assembly
1.		1	Cylinder body
2.	13273	1	Emergency lowering valve
3.	058728-000	1	Single overcentre valve
4.		1	End cap
5.		1	Rod and end pivot
6.		1	U-Ring rod seal
7.		1	Rod seal
8.		1	Wiper
9.		1	Back up O-Ring
10.		1	O-Ring
11.		1	Spacer
12.		1	Piston O-Ring
13.		1	Piston head
14.		1	Piston seal
15.		1	Piston locknut
16.		1	Washer
17.	057048-000	2	Grease nipple
18.	058447-000	2	Lower lift cylinder boss
19.	058516-000	8	Boss caphead screw, M8
	500457-000	1	Items 6 to 10 inclusive + items 12 & 14 form the seal kit
20.	12835-2	1	Coil, 12V

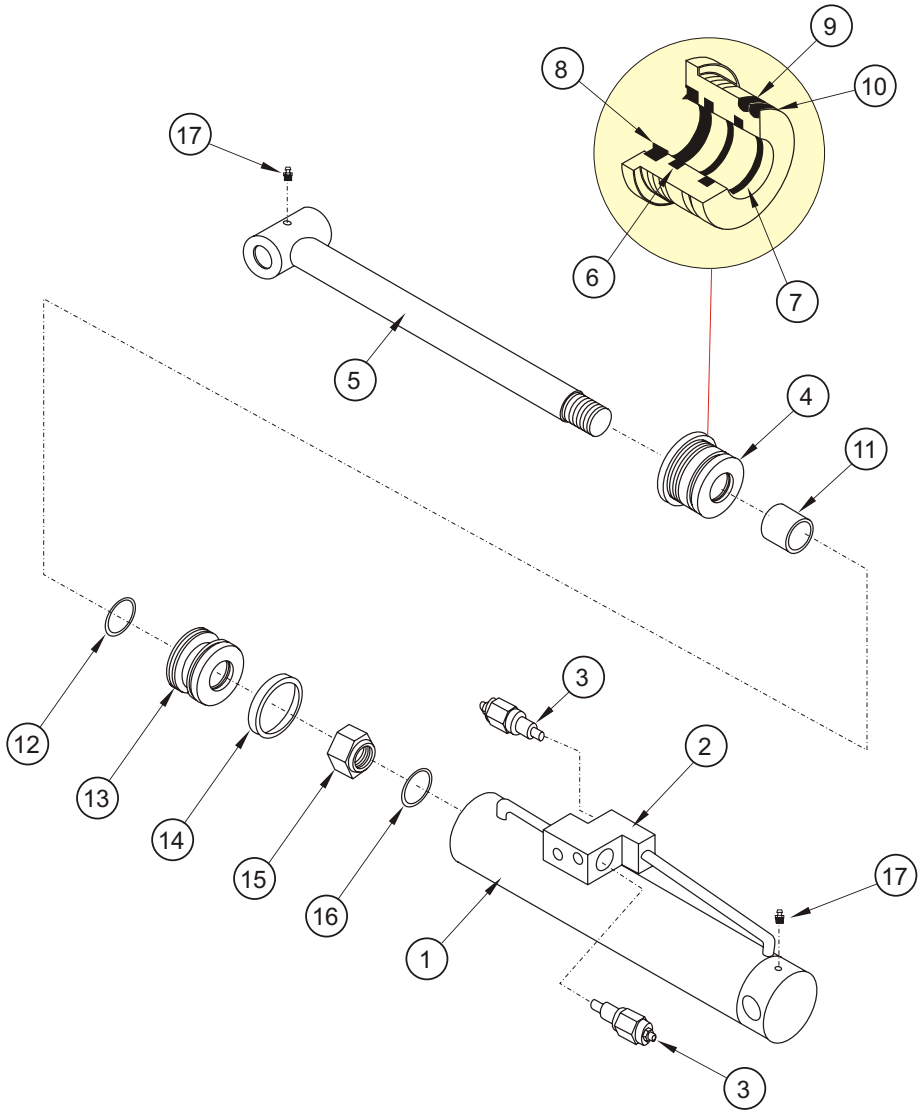


Teleboom cylinder assembly

Item	Part No	Qty	Description
0.	058461-000	1	Cylinder assembly
1.		1	Cylinder body
2.	058728-000	1	Single overcentre valve
3.	058714-000	1	Single PO check valve
4.		1	End cap
5.		1	Rod and end pivot
6.		1	U-Ring rod seal
7.		1	Rod seal
8.		1	Wiper
9.		1	O-Ring
10.	057048-000	1	Grease nipple
11.		1	Spacer
12.		1	Piston O-Ring
13.		1	Piston head
14.		1	Piston seal
15.		1	Piston locknut
16.		1	Washer
	500459-000	1	Items 6 to 9 inclusive + items 12 & 14 form the seal kit

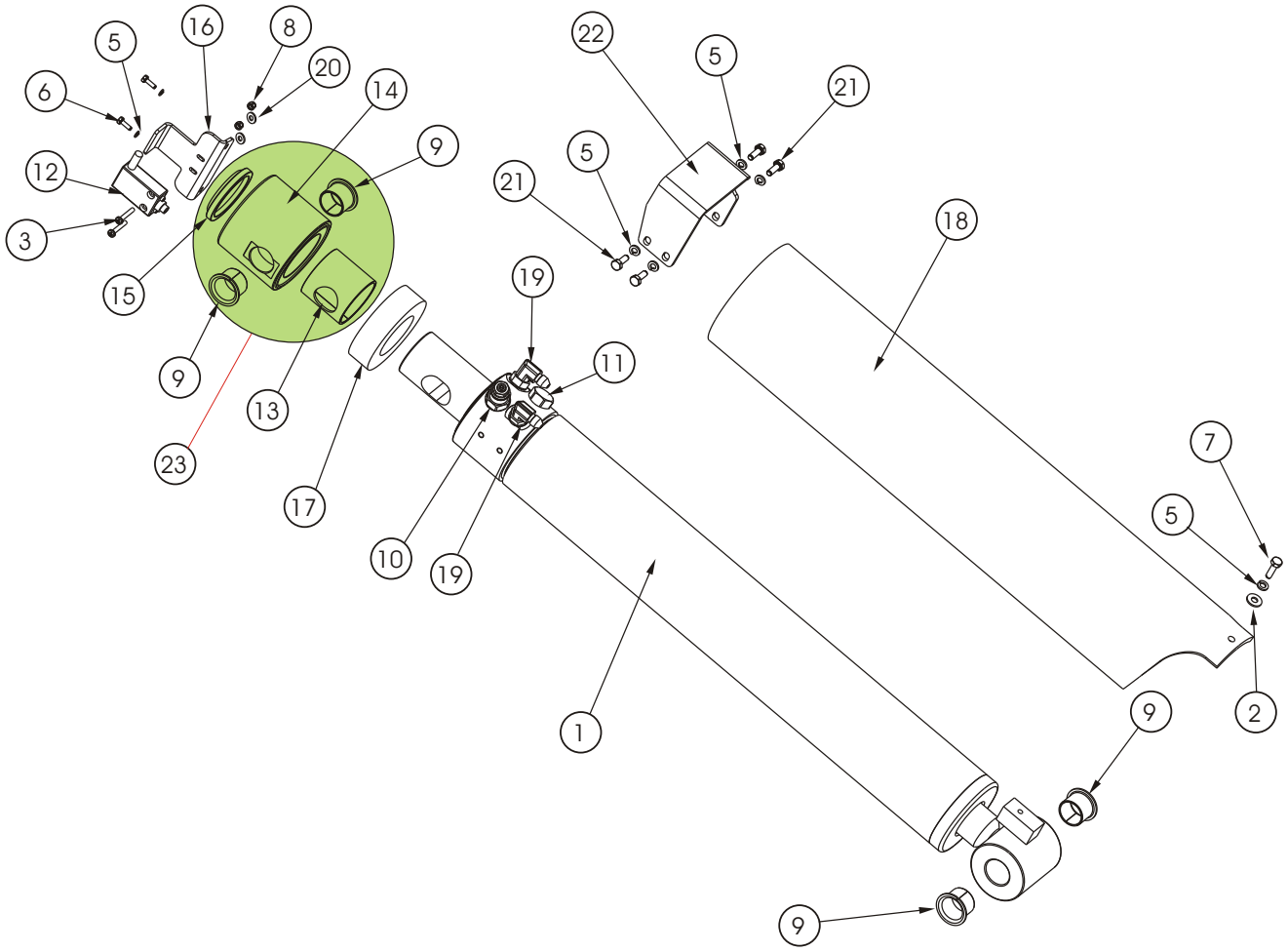


Item	Part No	Qty	Description
A.	058735-000	1	Slave level cylinder
B.	058734-000	1	Master level cylinder
1.		1	Cylinder body
2.		1	Valve block body
3.	058728-000	1	Single overcentre valve
4.		1	End cap
5.		1	Rod and end pivot
6.		1	U-Ring rod seal
7.		1	Rod seal
8.		1	Wiper
9.		1	Back up O-Ring
10.		1	O-Ring
11.		1	Spacer
12.		1	Piston O-Ring
13.		1	Piston head
14.		1	Piston seal
15.		1	Piston locknut
16.		1	Washer
17.	057048-000	2	Grease nipple
	058750-000	1	Items 6 to 10 inclusive + items 12 & 14 form the seal kit



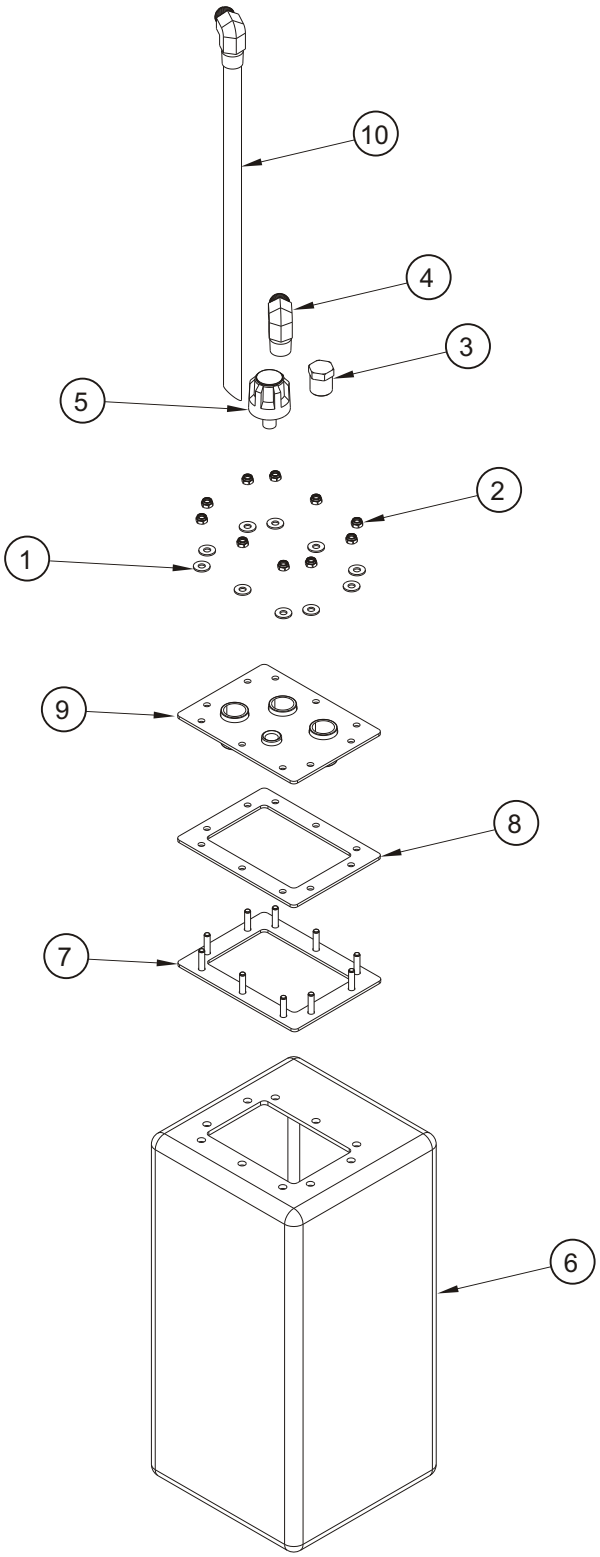
Stabiliser leg cylinder assembly

Item	Part No	Qty	Description
	12336A		Stabiliser leg cylinder assembly
1.	12336	1	Stabiliser leg cylinder
	12336K	1	Seal kit
2.	3603-06	1	Plain washer
3.	3663-04025	2	Hex head socket cap screw
5.	3605-06	7	Spring washer
6.	3610-06012	2	Metric bolt
7.	3610-06020	1	Metric bolt
8.	3611-04	2	Metric Nylock nut
9.	3626-1	4	Flanged permaglide bush
10.	10286-3	1	Counterbalance cartridge
11.	10286-4	1	Check cartridge
12.	12336-10	1	Limit switch
13.	12336-11	1	Sliding bush
14.	12336-2	1	Cylinder base
15.	12336-3	1	Wiper seal
16.	12336-4	1	Switch mount
17.	12336-7	1	Rubber spring
18.	12425	1	Leg cylinder guard
19.	7031-002	2	JICM x UN O-Ring M elbow
20.	3603-04	2	Plain washer
21.	3610-06016	4	Metric bolt
22.	12336-20	1	Valve guard
23.	12336-50	1	Cylinder base assembly, includes items 9, 14, 13, 15

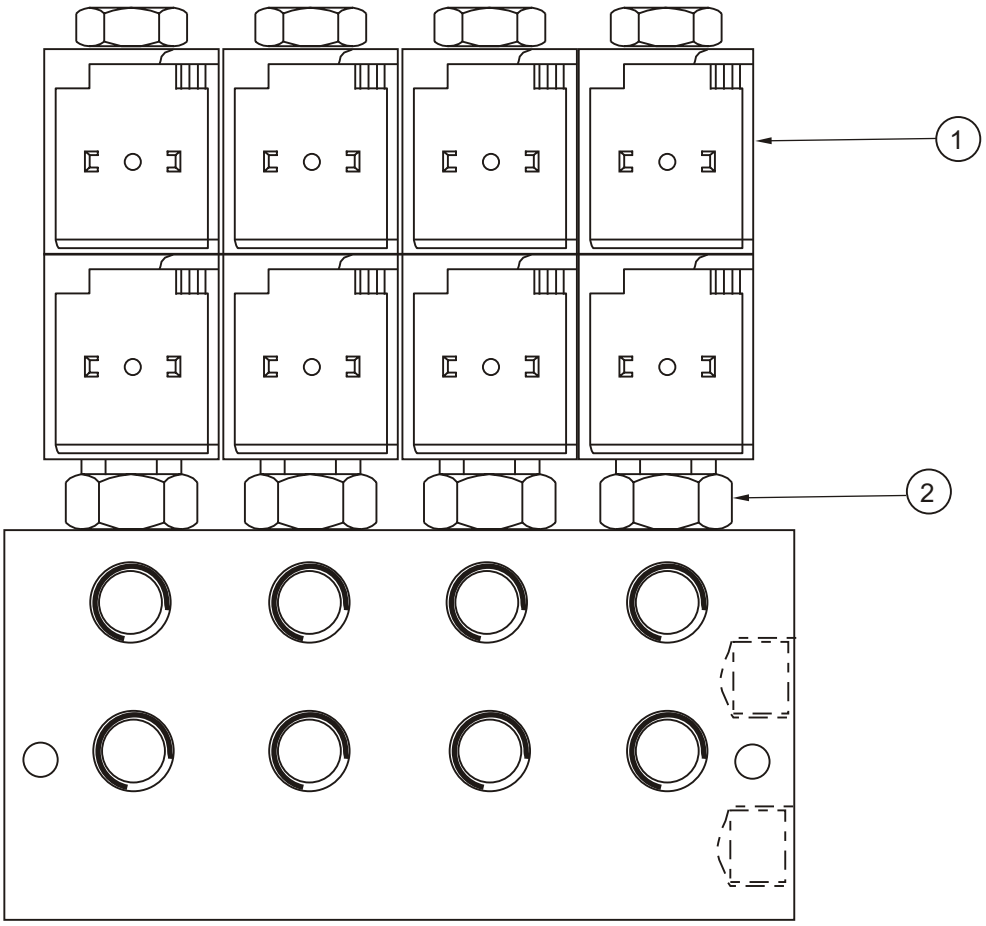


Item	Part No	Qty	Description
0.	13237A	1	Oil tank assembly
1.	3603-06	10	Washer, plain, M6 x 16, ZP
2.	3611-06	10	Nut, nyloc, M6, C8.8, ZP
3.	7034-004	1	Plug, BSPTM, 0.5"
4.	7046-007	1	Elbow, 90deg, 1/2" BSPTM -> 3/4" JCIM
5.	11487	1	Filter breather
6.	13237-8	1	Oil tank weldment
7.	13237-1	1	Base plate weldment
8.	13237-3	1	Gasket
9.	13237-4	1	Top tank plate weldment
10.	13237-6	1	Suction pipe weldment

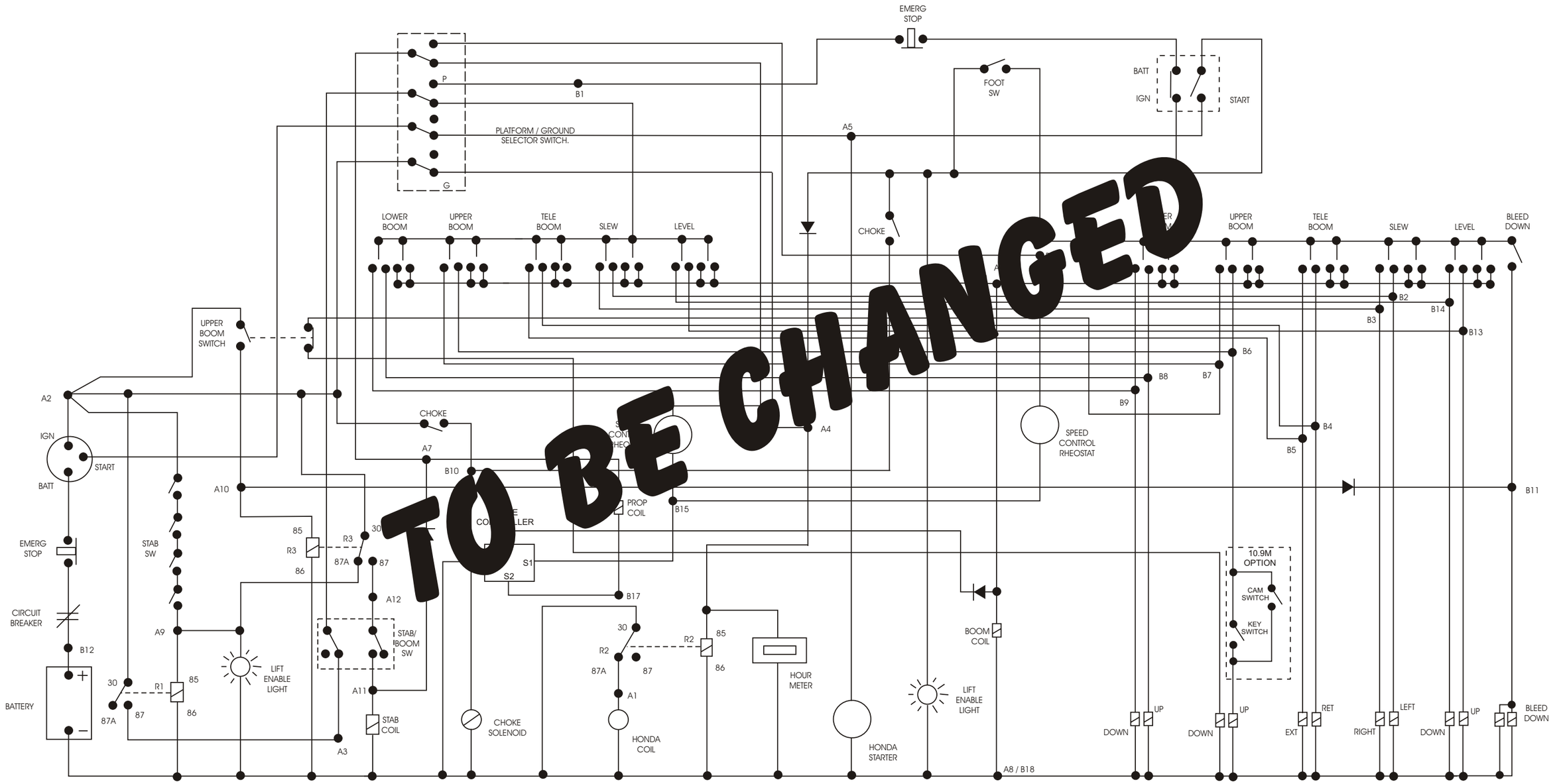
Hydraulic oil tank drawing



Item	Part No	Qty	Description
	11921	Ref	Manifold block assembly
1.	12835-2	8	12V coil
2.	11921-20	4	Valve spool

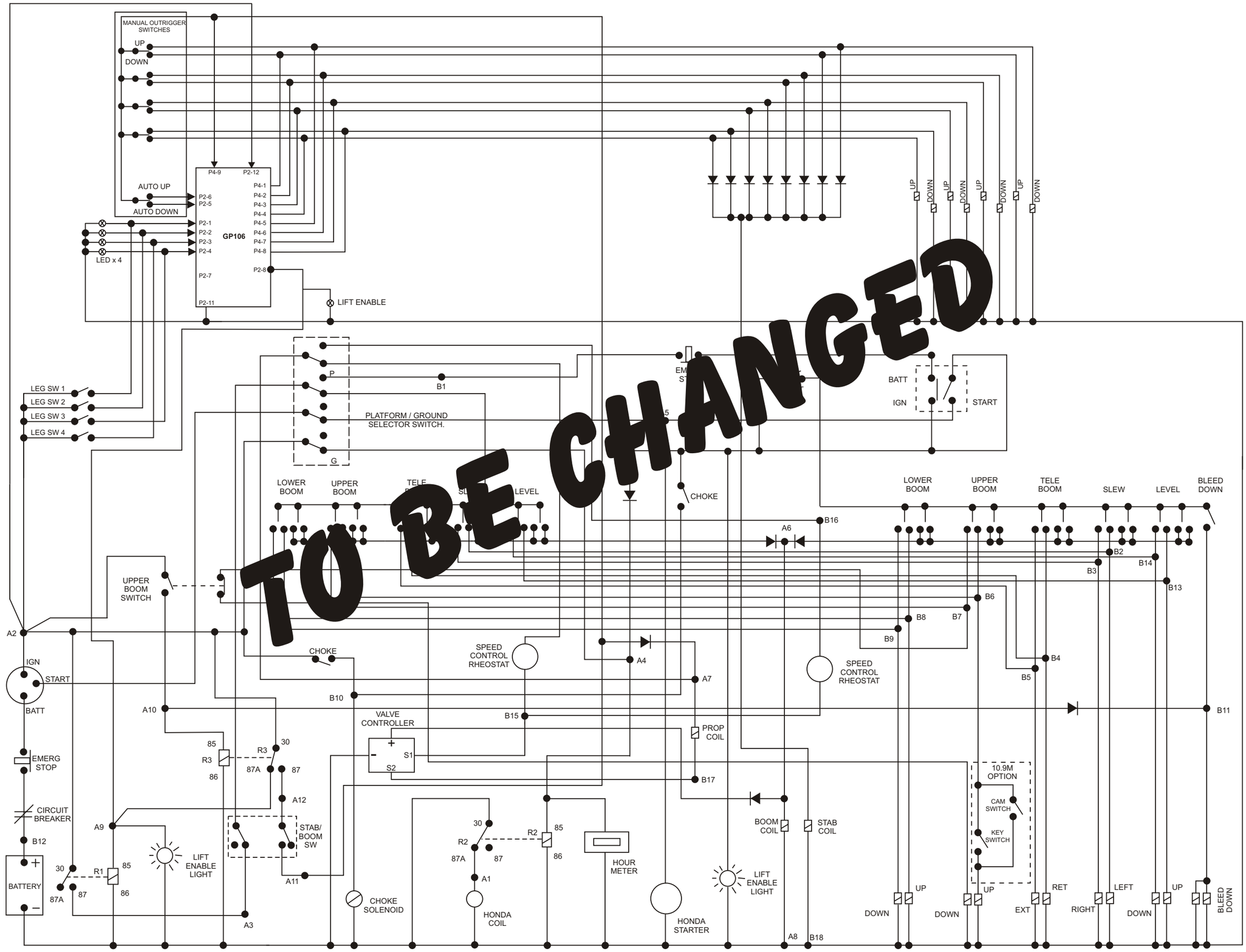


Section 3. - Electrical

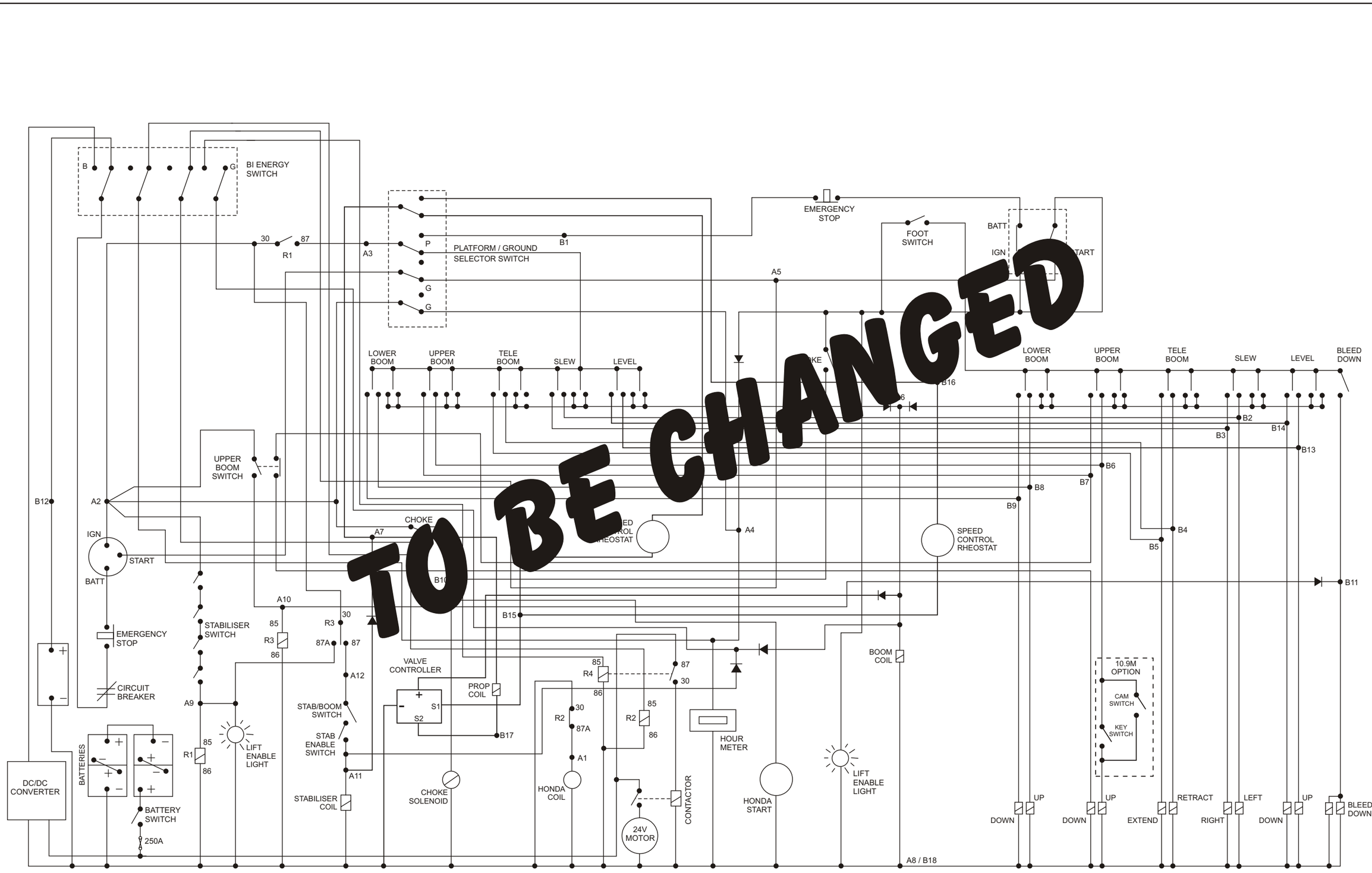


R1 = INTERLOCK RELAY P/N° 1650-010
R2 = IGNITION RELAY P/N° 1650-010
R3 = STABILISER RELAY P/N° 1650-010

Note:
(A1 - A12) and (B1 - B12) REPRESENT TERMINALS ON TERMINAL STRIP IN THE LOWER CONTROL BOX



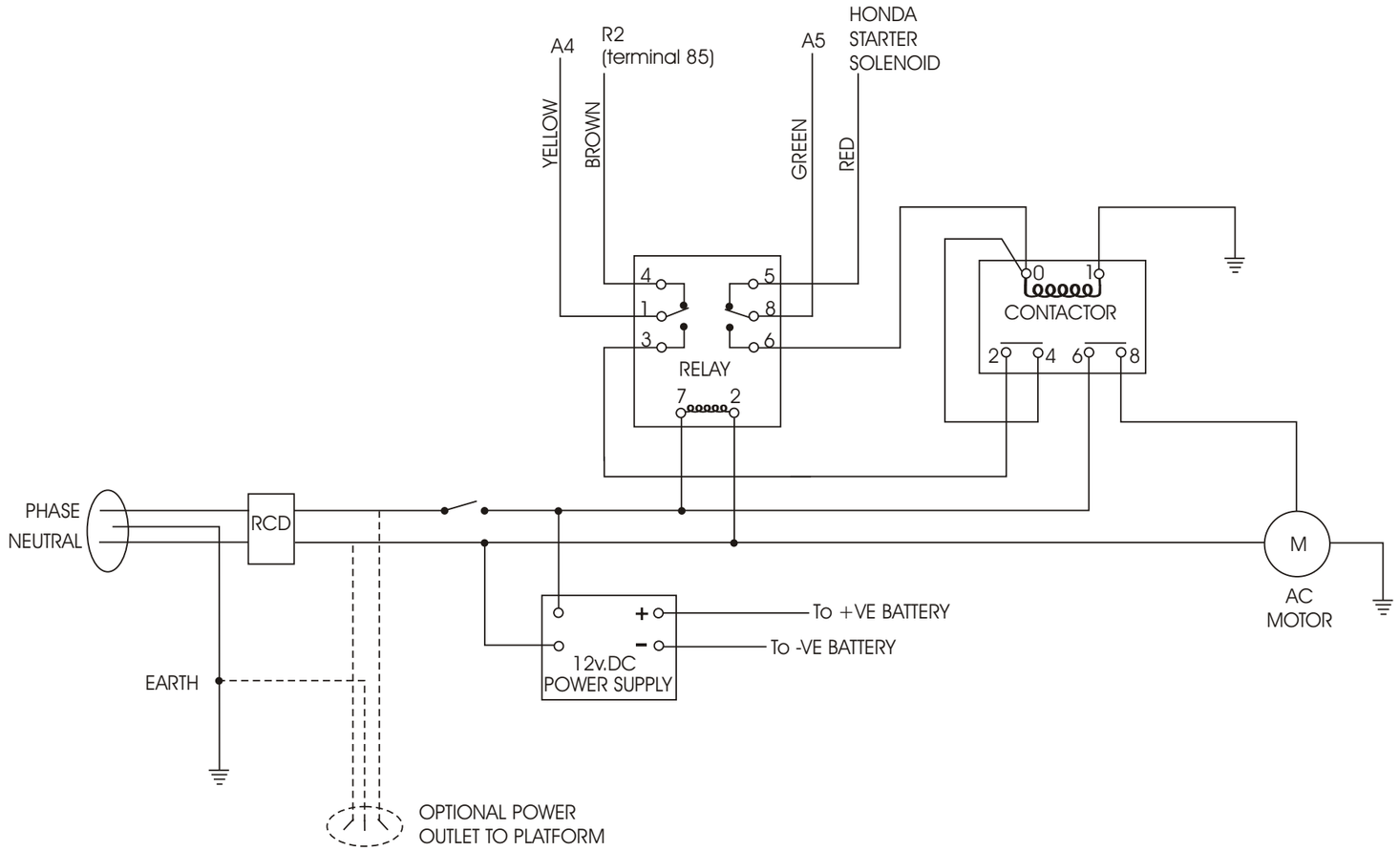
TITLE Electrical Schematic, Auto Level machines: Snorkel Model MHP14AT - Rev B July 15 2009



Rev B - July 15 2009	TITLE Electrical Schematic for Bi-Energy machines Snorkel Model MHP14AT
	Page 3-5

MANUAL OUTRIGGER SWITCHES
UP
DOWN
AUTO UP
AUTO DOWN
LED x 4
LEG SW 1
LEG SW 2
LEG SW 3
LEG SW 4
GP106
P4-9
P2-12
P2-6
P2-5
P2-1
P2-2
P2-3
P2-4
P2-7
P2-11
P4-1
P4-2
P4-3
P4-4
P4-5
P4-6
P4-7
P4-8
P2-8
LIFT ENABLE
UP
DOWN
BI ENERGY SWITCH
B
G
P
G
G
PLATFORM / GROUND SELECTOR SWITCH
B1
FOOT SWITCH
BATT
IGN
START
LOWER BOOM
UPPER BOOM
LEVEL
CHOKE
B16
A6
B2
B3
B4
B5
B6
B7
B8
B9
B13
B14
LOWER BOOM
UPPER BOOM
TELE BOOM
SLEW
LEVEL
BLEED DOWN
UPPER BOOM SWITCH
B12
A2
IGN
START
BATT
EMERGENCY STOP
CIRCUIT BREAKER
CHOKE
B10
SPEED CONTROL RHEOSTAT
A4
A7
SPEED CONTROL RHEOSTAT
B15
B11
A10
85
R3
86
30
R3
87A
87
A9
85
R1
86
30
87
A12
A3
STAB BOOM
A11
CHOKE SOLENOID
R2
30
87A
A1
HONDA COIL
R4
85
86
87
30
R2
85
86
24V MOTOR
CONTACTOR
HOUR METER
HONDA START
PROP COIL
BOOM COIL
STAB COIL
10.9M OPTION
CAM SWITCH
KEY SWITCH
S1
S2
VALVE CONTROLLER
B17
LIFT ENABLE LIGHT
A8
B18
DC/DC CONVERTER
BATTERIES
BATTERY SWITCH
250A
LIFT ENABLE LIGHT
UP
DOWN
UP
DOWN
RETRACT
EXTEND
LEFT
RIGHT
UP
DOWN
BLEED DOWN

TITLE Electrical Schematic for Bi-Energy machines with Auto Level, Snorkel Model MHP14AT - Rev B July 15 2009



F E D C B A

1 2 3 4 5 6 7 8 9

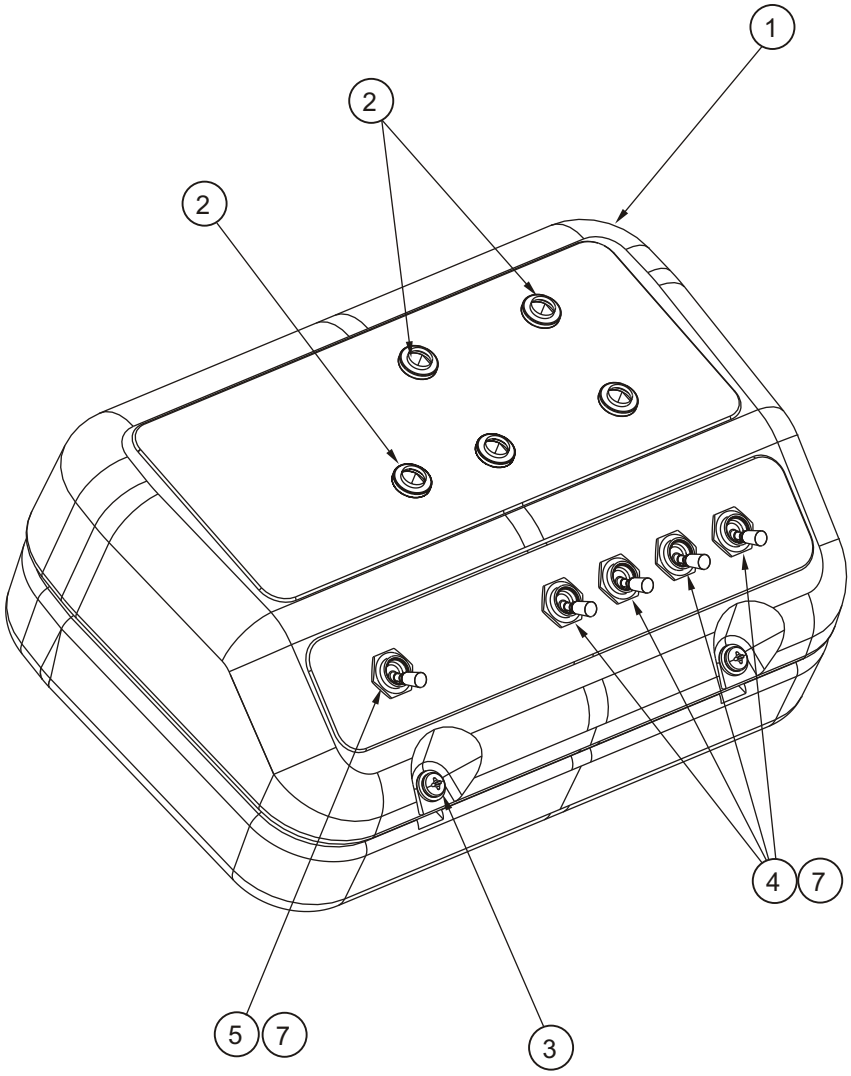
TITLE AC Motor Wiring Schematic

Rev B September 2009

Snorkel Model MHP14AT & MHP13AT

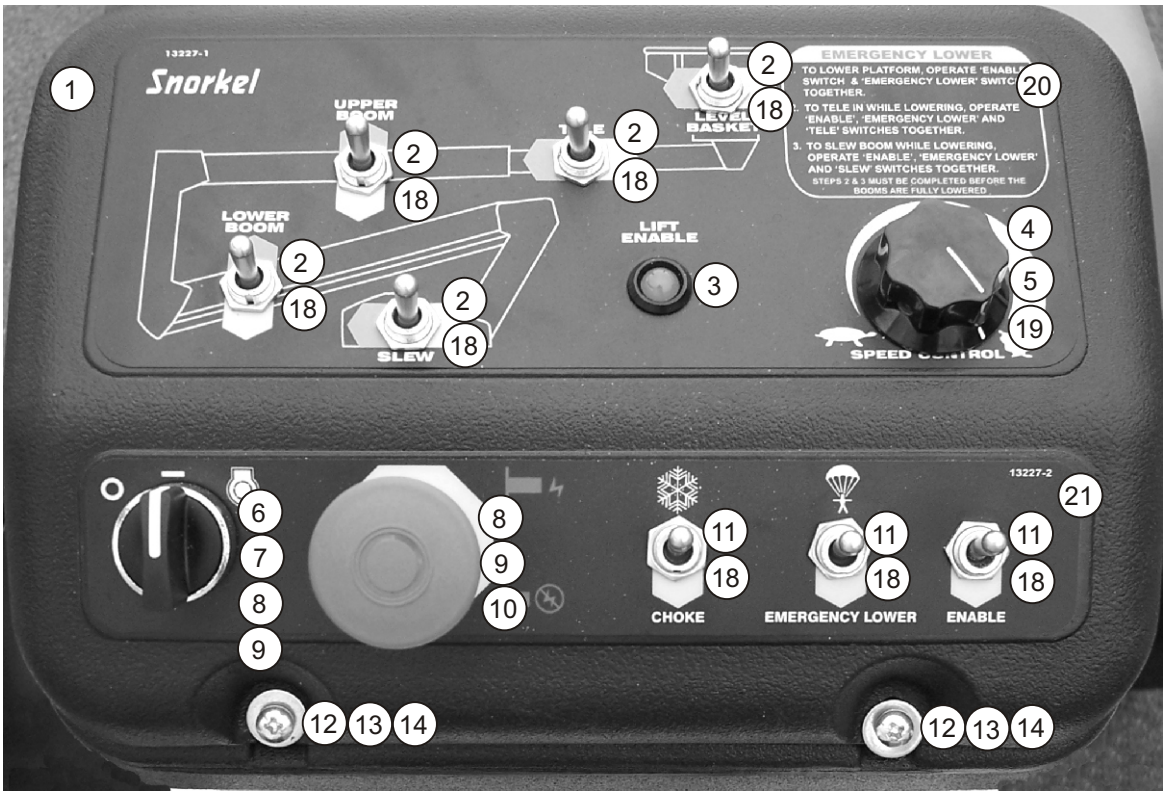
Snorkel

Item	Part No.	Qty	Description
	12433-1	1	Control box assembly, auto stabiliser
1.	12404	1	Control box
2.	12536-3	5	LED, 12V green
3.	3604-05020	2	Pan head screw
4.	302-0016	5	Switch, toggle, SPDT (M/OFF/M)
5.	12416	1	Hinge (not shown)
6.	12408	1	Seal (not shown)
7.	12515	5	Washer
8.	1815	2	Cable gland (not shown)

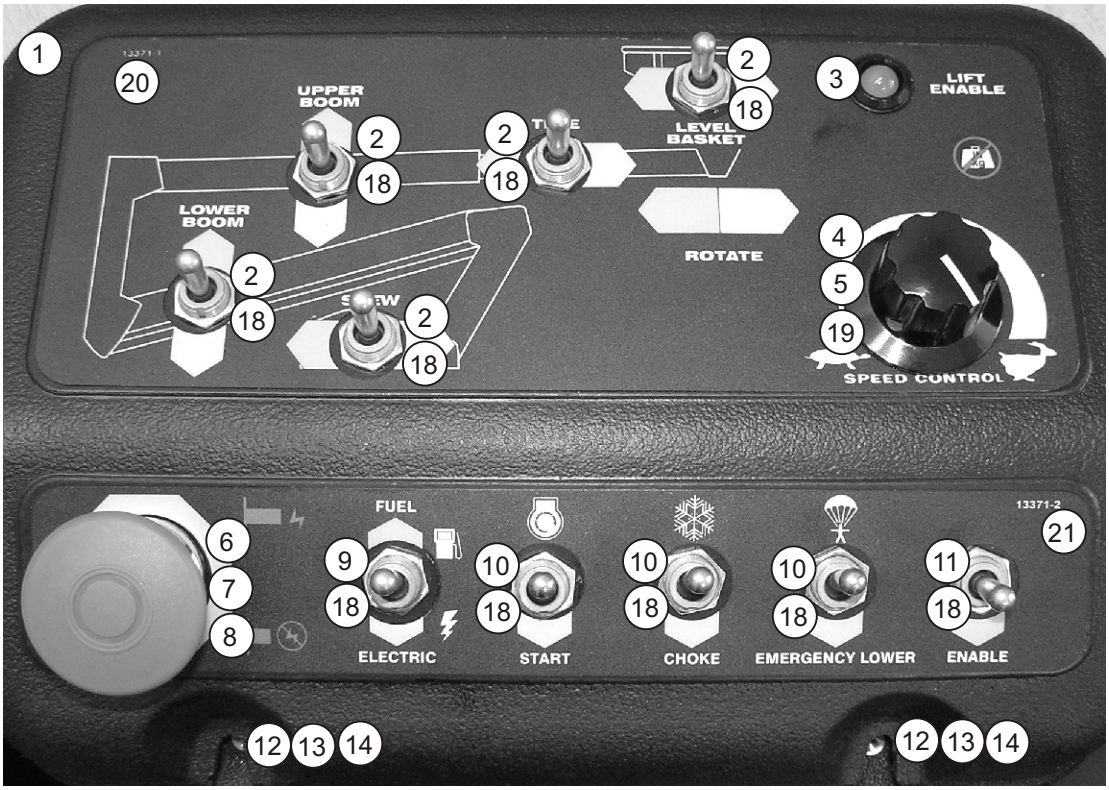


Upper control box, early units

Item	Part No	Qty	Description
1.	13251-1	1	Control Box - Upper, Blank
2.	302-0018	5	Switch - Toggle DPDT (M/OFF/M)
3.	12536-3	1	LED - Green 12V 10MM Lens
4.	304-0348	1	Knob - Speed Control Switch
5.	304-0412	1	Rheostat - 25 Ohm
6.	8801-1	1	Start Switch 3 Position
7.	10114	1	Contact - N/O
8.	13380	2	Collar
9.	10118	2	Contact N/C
10.	9775	1	Emergency Stop Switch - Pull Release
11.	302-0015	3	Switch - Toggle SPST (MON/OFF)
12.	3604-05020	2	Screw - Pan Head M5x20 ZP
13.	3605-05	2	Washer - Spring M5 ZP
14.	3603-06	2	Washer - Flat M6x16 ZP
15.	1815-1	1	Cable Gland - M32 Nylon (Not Shown)
16.	12416	1	Hinge (Not Shown)
17.	12408	1	Rubber Seal (Not Shown)
18.	12515	8	Washer - M12 Rubber
19.	12516	1	Washer - M10 Rubber
20.	13371-1	1	Decal - Upper Control Box, Large
21.	13371-2	1	Decal - Upper Control Box, Small

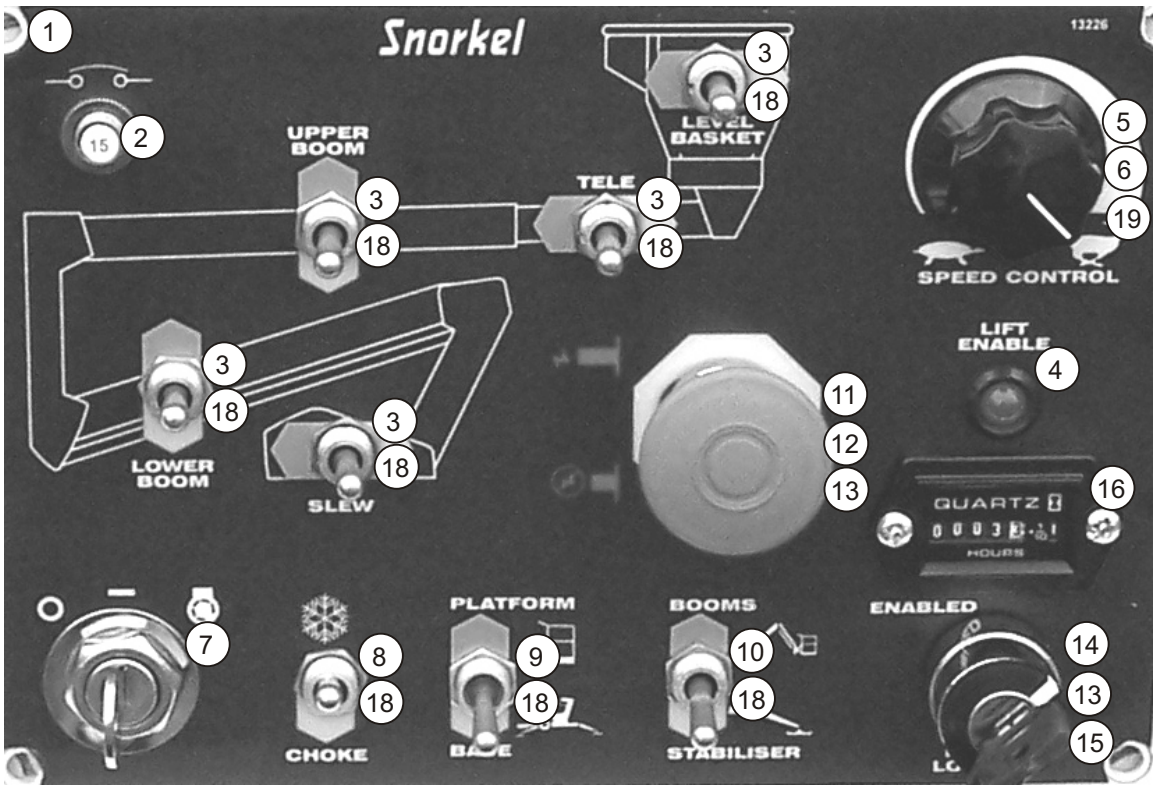


Item	Part No	Qty	Description
	13371A		Upper Control Box Assembly
1.	13251-1	1	Control Box - Upper, Blank
2.	302-0018	5	Switch - Toggle DPDT (M/OFF/M)
3.	12536-3	1	LED - Green 12V 10MM Lens
4.	304-0348	1	Knob - Speed Control Switch
5.	304-0412	1	Rheostat 25 Ohm
6.	9775	1	Emergency Stop Switch - Pull Release
7.	13380	1	Collar
8.	10118	1	Contact N/C
9.	302-0097	1	Switch - Toggle DPDT (ON/ON)
10.	302-0015	3	Switch - Toggle SPST (MON/OFF)
11.	3020081	1	Switch - Single Throw Mom.
12.	3604-05020	2	Screw - Pan Head M5x20 ZP
13.	3605-05	2	Washer - Spring M5 ZP
14.	3603-06	2	Washer - Flat M6x16 ZP
15.	1815-1	1	Cable Gland - M32 Nylon (Not Shown)
16.	12416	1	Hinge (Not Shown)
17.	12408	1	Rubber Seal (Not Shown)
18.	12515	10	Washer - M12 Rubber
19.	12516	1	Washer - M10 Rubber
20.	13371-1	1	Decal - Upper Control Box, Large
21.	13371-2	1	Decal - Upper Control Box, Small

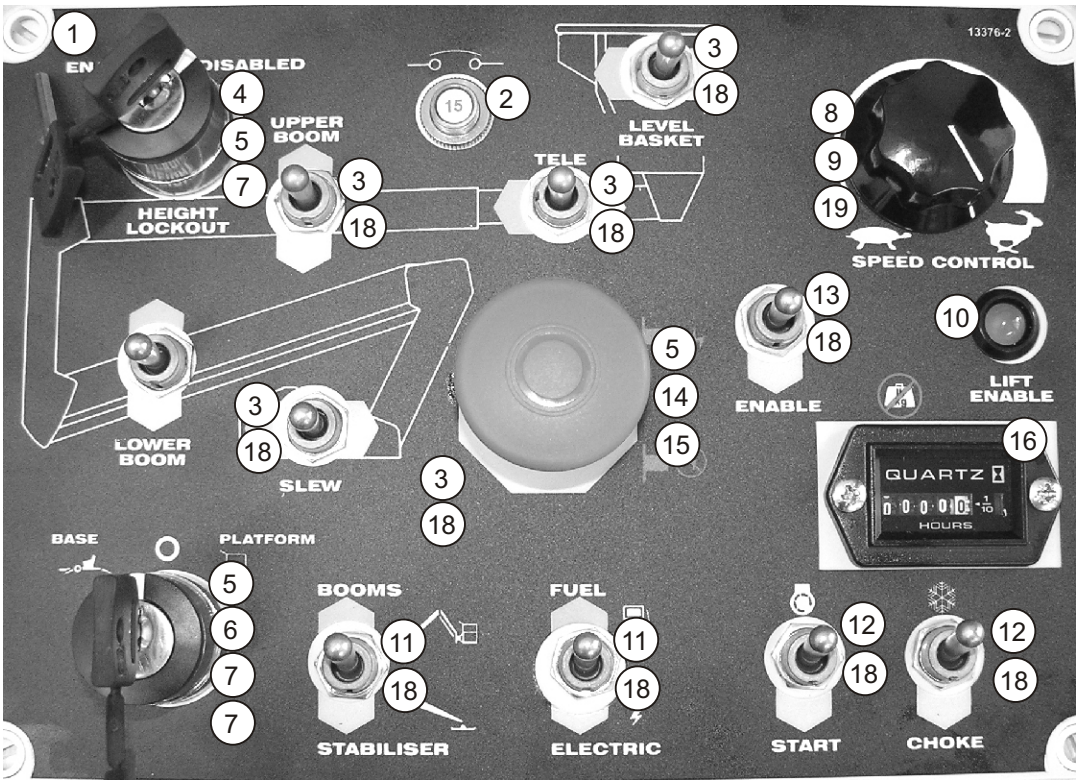


Lower control box, early units

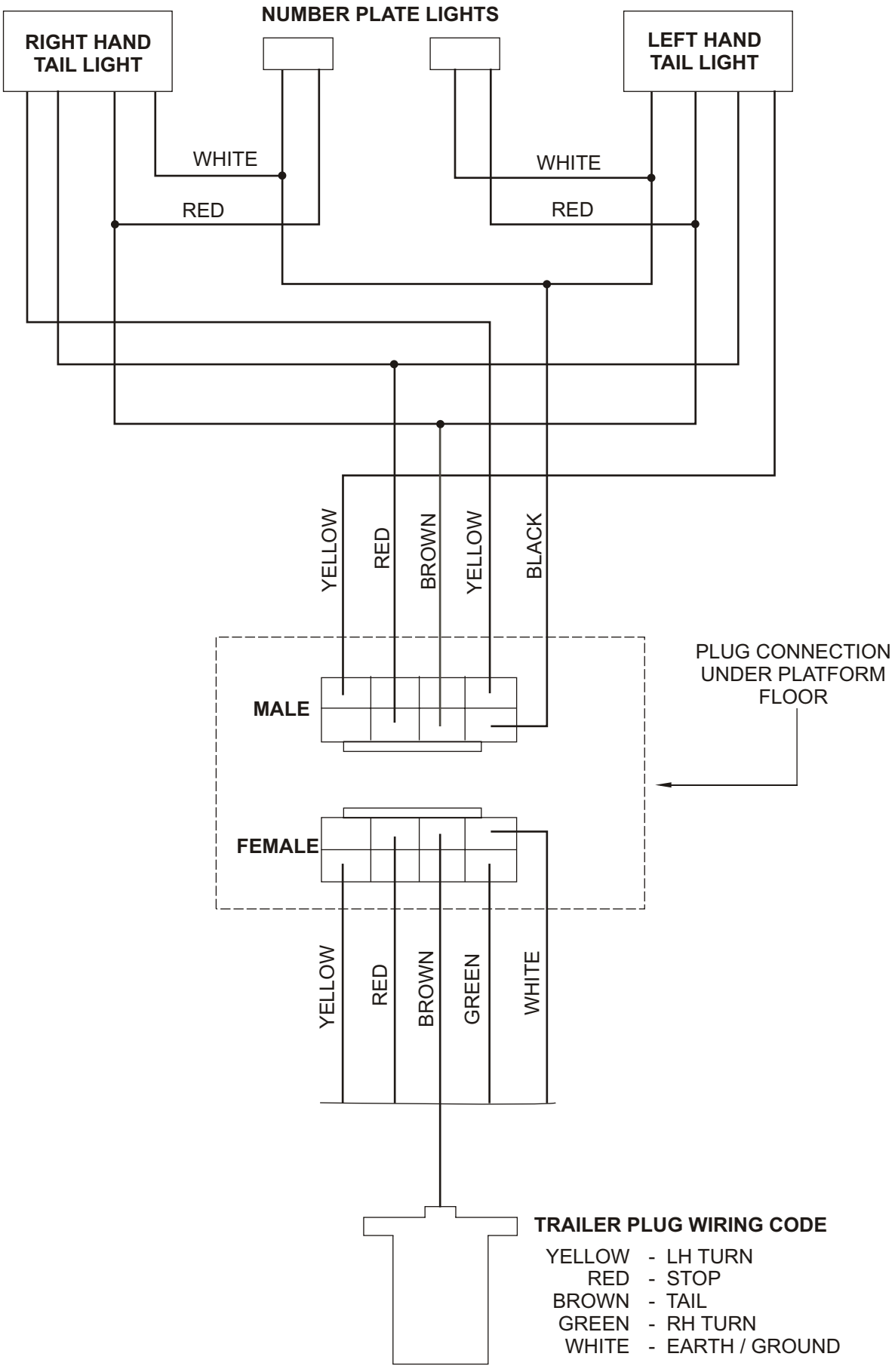
Item	Part No	Qty	Description
1.	12521	1	Enclosure
2.	56368-6	1	Circuit Breaker - 15 Amp
3.	302-0018	5	Switch - Toggle DPDT (M/OFF/M)
4.	12536-3	1	LED - Greem 12V 10MM Lens
5.	304-0348	1	Knob - Speed Control Switch
6.	304-0412	1	Rheostat - 25 Ohm
7.	3020087	1	Key Switch
8.	302-0015	1	Switch - Toggle SPST (MON/OFF)
9.	302-0048	1	Switch - Toggle 4PDT (ON/ON)
10.	302-0097	1	Switch - Toggle DPDT (ON/ON)
11.	9775	1	Emergency Stop Switch - Pull Release
12.	10118	1	Contact N/C
13.	13380	2	Collar
14.	10744	1	Switch, Key - 2 Pos - ON(R)-ON
15.	10114	1	Contact N/O
16.	455186	1	Hourmeter 12-60VDC Square
17.	1815	4	Cable Gland - M25 Nylon (Not Shown)
18.	12515	8	Washer - M12 Rubber
19.	12516	1	Washer - M10 Rubber



Item	Part No	Qty	Description
	13376A		Lower Control Box Assembly
1.	12521	1	Enclosure
2.	56368-6	1	Circuit Breaker - 15 Amp
3.	302-0016	5	Switch - Toggle SPDT (M/OFF/M)
4.	13381	1	Key Switch - 2 Position
5.	13380	3	Collar
6.	3020167	1	Key Switch - 3 Position
7.	10114	3	Contact N/O
8.	304-0348	1	Knob - Speed Control Switch
9.	304-0412	1	Rheostat - 25 Ohm
10.	12536-3	1	LED - Green 12V 10MM Lens
11.	302-0097	2	Switch - Toggle DPDT (ON/ON)
12.	302-0015	2	Switch - Toggle SPST (MON/OFF)
13.	3020081	1	Switch - Single Throw Mom.
14.	9775	1	Emergency Stop Switch - Pull Release
15.	10118	1	Contact N/C
16.	455186	1	Hourmeter 12-60VDC Square
17.	1815	4	Cable Gland - M25 Nylon (Not Shown)
18.	12515	10	Washer - M12 Rubber
19.	12516	1	Washer - M10 Rubber



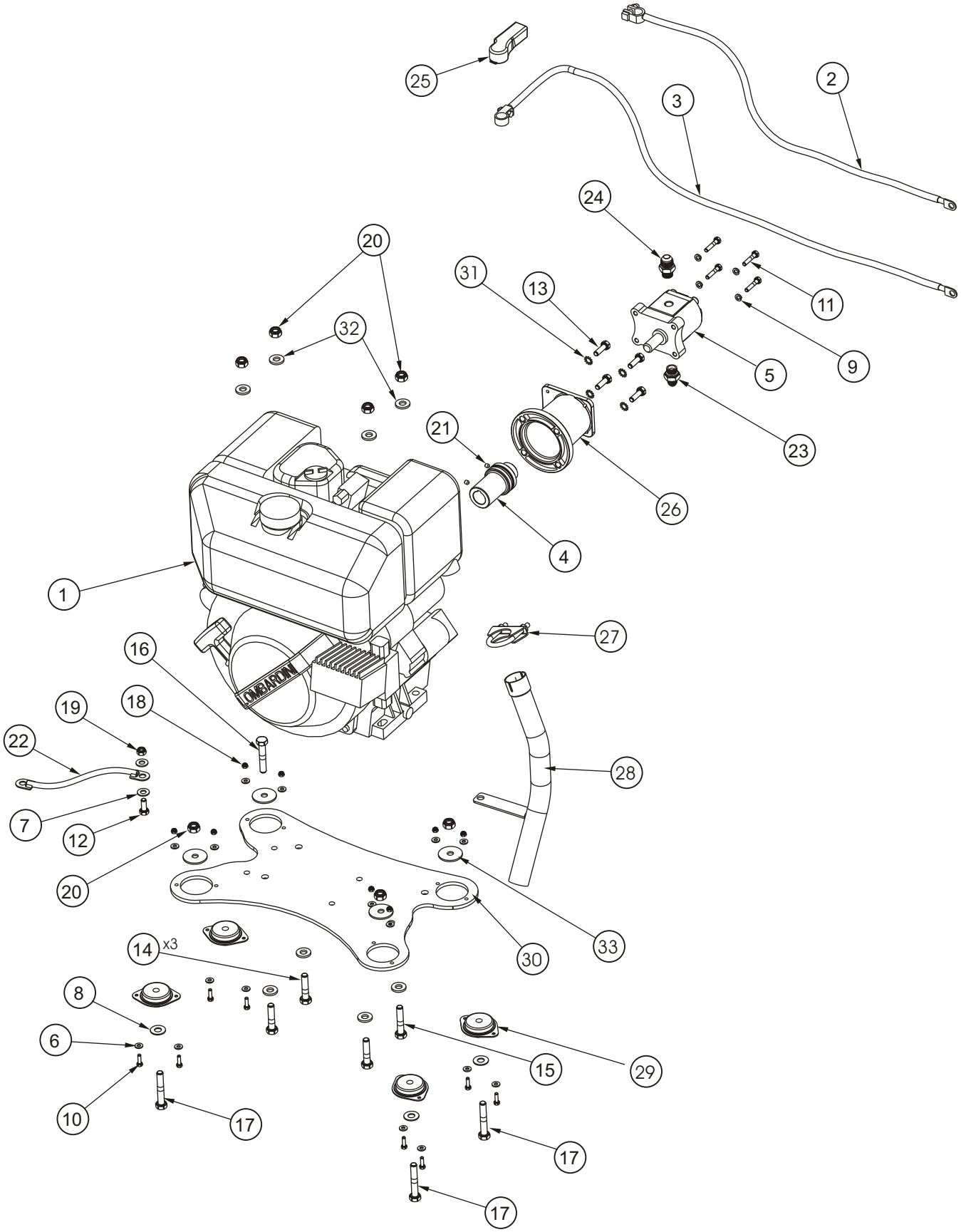
Wiring diagram for LED tail lights



Section 4. - Options

Engine assembly, Lombardini (Sheet 1)

Item	Part No	Qty	Description
0.	12449		Engine assembly
1.	1171-8	1	Lombardini 15LD315 diesel engine
2.	1650-030	1	Battery cable
3.	1650-031	1	Battery cable
4.	1657-11	1	Drive coupling
5.	1659	1	Gear pump
6.	3603-05	16	Plain washer
7.	3603-08	2	Plain washer
8.	3603-10	3	Plain washer
9.	3605-06	4	Spring washer
10.	3610-05016	8	Metric bolt
11.	3610-06030	4	Metric bolt
12.	3610-08020	1	Metric bolt
13.	3610-08025	4	Metric bolt
14.	3610-10045	3	Metric bolt
15.	3610-10050	1	Metric bolt
16.	3610-10055	1	Metric bolt
17.	3610-10060	3	Metric bolt
18.	3611-05	8	Nyloc nut
19.	3611-08	1	Nyloc nut
20.	3611-10	7	Nyloc nut
21.	3612-06006	2	Grub screw
22.	3649-10	1	Battery cable
23.	7013-003	1	BSPP (Dowty) x JICM nipple
24.	7013-004	1	BSPP (Dowty) x JICM nipple
25.	10254	1	Cover, battery terminal
26.	10417	1	Bell housing
27.	12409	1	Exaust clamp
28.	12450	1	Exhaust weld, Lombardini
29.	12524	4	Engine mount
30.	12526	1	Engine mount plate
31.	60005-054	4	Lockwasher
32.	60030-061	8	Washer, heavy duty
33.	5560179	4	Flat washer, special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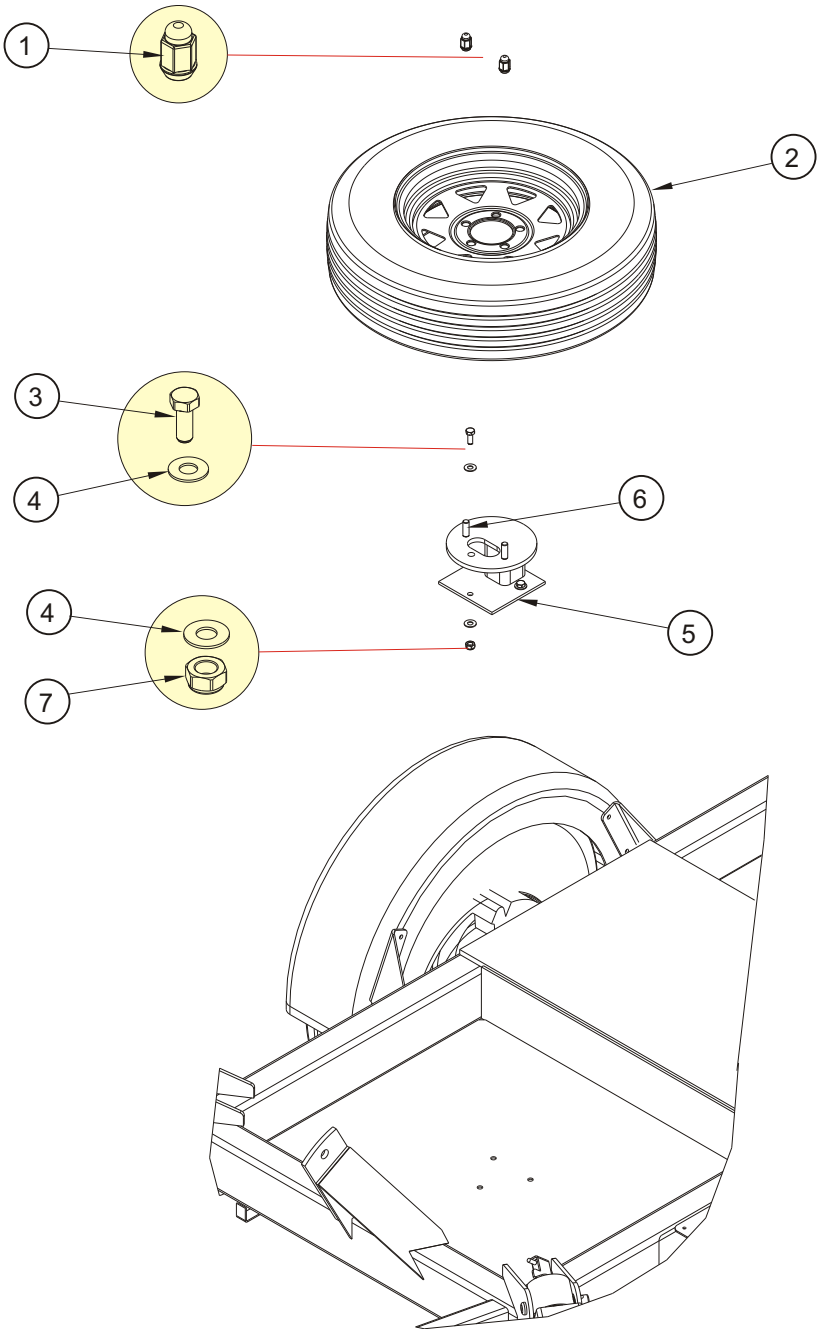
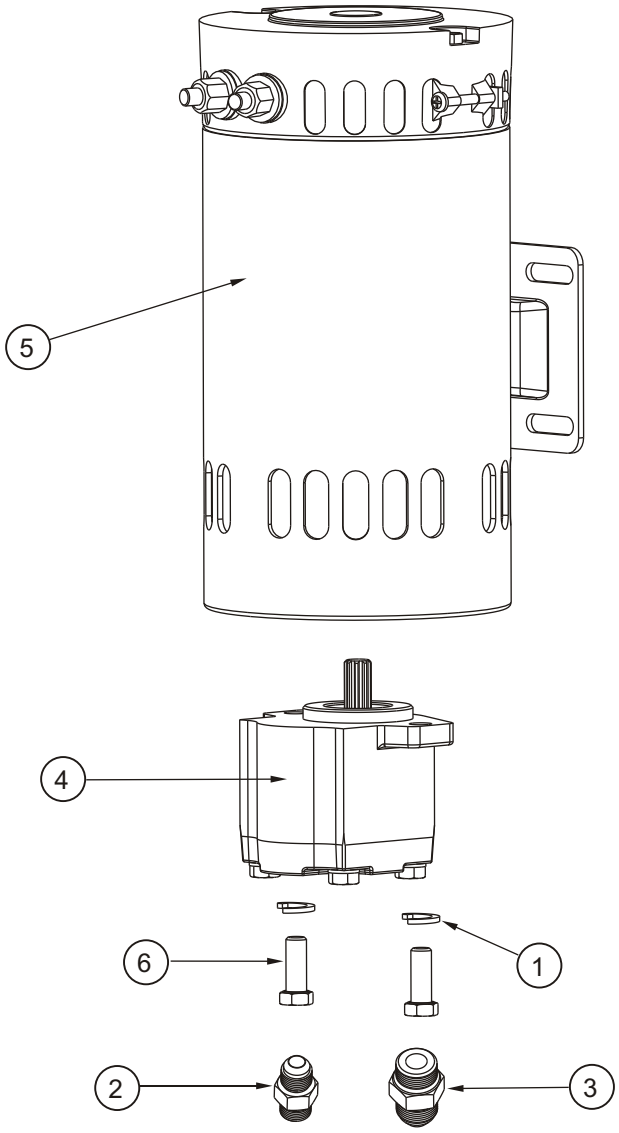
Spare wheel assembly

Item	Part No.	Qty	Description
1.	13196	2	Wheel nut, 1/2" UNF
2.	12772	1	Wheel & tyre assembly 14"
	12772-1		Rim
	12772-2		Tyre
3.	3610-10025	3	Bolt, M10 x 25
4.	3603-10	6	Washer, plain, M10
5.	13252	1	Spare wheel bracket
6.	1649-040	2	Wheel stud, 1/2" UNF, (supplied with 13252)
7.	3611-10	3	Nut, nylock, M10



Item	Part No.	Qty	Description
1.	3605-10	2	Spring washer
2.	11057-1	1	Check valve, 9/16 UNO -> 9/16 JICM
3.	7025-002	1	Adapter, 9/16 UNO -> 3/4 JICM
4.	13343	1	Pump
5.	3080046	1	24V DC motor
6.	60017-007	2	Bolt



240V petrol/AC option, pump & motor assembly

Item	Part No	Qty	Description
0.	12436-1		Pump and motor assembly
1.	1867-001	1	240V AC electric motor
2.	1657-007	1	Coupling taper shaft
3.	3612-06010	2	Grub screw
4.	1658-006	1	Bell housing
5.	11432	1	Pump
6.	7013-004	1	BSPP x JICM nipple
7.	3605-06	4	Spring washer
8.	3610-06025	4	Bolt
9.	6983-001	1	JIC F tapped hole plug
10.	7013-003	1	BSPP x JICM nipple
11.	9501-2	1	Hydraulic fitting
12.	11058-1	1	Check fitting
16.	3610-08035	4	Bolt
17.	3605-08	4	Spring washer
18.	3603-08	4	Plain washer