



Lighting Tower Workshop Manual

TCP-3247-01 Iss.B Nov 09



Taylor Construction Plant Ltd.
Quayside Industrial Park, Bates Road,
Maldon, Essex, CM9 5FA
Tel:+44 (0)1621 850777
Fax:+44 (0)1621 843330
mail@tcp.eu.com
www.tcp.eu.com

Contents

Preliminary	5		
Foreword	5		
Warranty	5		
<i>Liability</i>	5		
<i>Audits and Surveys</i>	5		
<i>Service and Warranty Training</i>	5		
<i>Warranty Terms</i>	5		
<i>General Exclusions:</i>	5		
<i>Warranty Claim Submission Procedures</i>	5		
Certificate of Conformity	6		
Hatz Engine Dealers	6		
Service Bulletins	6		
Machine Identification.....	6		
Theft Deterrence	6		
<i>Recovery of a Stolen Machine</i>	6		
Safety	7		
<i>General</i>	7		
<i>Fire Precautions</i>	7		
<i>Flammable Fluid Precautions</i>	7		
<i>Electrical Hazard</i>	8		
<i>Pre-Starting</i>	8		
<i>Starting</i>	8		
<i>Lubrication and Servicing</i>	8		
<i>Towing Safety</i>	9		
Specifications.....	9		
Section 1 Description	11		
1.1 Introduction	11		
1.2 Electrics	11		
1.2.1 <i>Ignition</i>	11		
1.2.2 <i>Charging Circuit</i>	12		
1.2.3 <i>Oil Pressure Light</i>	12		
1.2.4 <i>Hours Counter</i>	12		
1.3 Lighting Supply.....	12		
1.4 Road Running Lights	12		
1.5 Hydraulics	13		
Section 2 Operation	15		
2.1 Daily Pre-start Inspection.....	15		
2.2 Positioning	15		
2.3 Uncoupling.....	16		
2.4 Jacking up the Unit.....	17		
2.5 Using the Lights	18		
2.6 Auxiliary Supply (Optional)	19		
2.7 Moving the Trailer.....	19		
2.8 Redirecting the Lights.....	20		
2.9 Parking.....	20		
2.10 Emergency Stop.....	20		
2.11 Starting the Engine with Jumper Cables.....	21		
2.12 Battery Charging	21		
Section 3 Maintenance	23		
3.1 General	23		
3.2 Engine Maintenance.....	23		
3.3 Safety Precautions	23		
3.4 Maintenance Intervals	23		
3.5 Service Access.....	23		
3.6 Lubrication	24		
3.7 General Inspection	24		
3.8 Daily Check.....	24		
3.9 Engine Oil Check	24		
3.10 Engine Oil Filter.....	25		
3.11 Engine Oil Change	26		
3.12 Hydraulic Fluid	27		
3.13 Fuel Filters	27		
3.14 Tyres.....	28		
3.15 Engine Conditioning	28		
3.16 Inertia Brake.....	28		
3.17 Draining Fuel Tank.....	28		
3.18 Charging the Battery	29		
Section 4 Fault Finding	31		
4.1 Engine will not Crank.....	31		
4.2 Engine Cranks but will not Start.....	31		
4.3 Battery Charging Check	31		
4.4 Mast Will not Stay Up.....	32		
Section 5 Parts Replacement	33		
5.1 Recommended Tools	33		
5.2 Lamp replacement	33		
5.3 Housing Removal.....	34		
5.4 Air Filter	34		
5.5 Exhaust System	34		
5.6 Fan Replacement.....	35		
5.7 Alternator Replacement.....	35		
5.8 Engine Removal.....	36		
5.9 Hydraulic Pump.....	37		
5.10 AMOSS Valve Replacement.....	37		
5.11 Mast O-ring Replacement.....	38		
5.12 Mast Seal Replacement	39		
5.13 Mast Flat Bar Replacement	40		
Section 6 Drawings	41		
6.1 Rolling Chassis Assy TCP-2995 Sh A.....	41		
6.2 Rolling Chassis Assy TCP-2995 Sh B.....	42		
6.3 Upper Body Assy TCP-2870 Sh 1A	43		
6.4 Upper Body Assy TCP-2870 Sh 1B	44		
6.5 Upper Body Assy TCP-2870 Sh 2	45		
6.6 Four-head Lamp Gimbal Assy TCP-2970 SA Sh A	46		
6.7 Four-head Lamp Gimbal Assy TCP-2970 SA Sh B	47		
6.8 Jack Leg Assy TCP1655	48		
6.9 Jack Leg TCP-2064.....	49		
6.10 SA Fuel Tank Assy TCP-2867	50		
6.11 Hydraulic Schematic.....	51		
6.12 Hydraulic Assy Layout TCP-3010	52		
6.13 Hydraulic Tank TCP-2862	53		
6.14 Basic Unit Circuit Diagram 3110-01	54		
6.15 Circuit Diagram – with 230V Output.....	55		
6.16 Circuit Diagram – 230V In and Out.....	56		
6.17 Circuit Diagram – 110V CTE Out.....	57		
6.17 Cable Identification and Termination Sh 158			
6.17 Cable Identification and Termination Sh 259			
6.18 Control Box Assy Tank Mounted TCP- 3001-01 SA.....	60		
6.19 Battery Kit TCP-3034 SA.....	61		
6.20 Interior Light Assy TCP-3059 SA	62		
6.21 Mud Flap Kit TCP-3104	63		

Appendix A Nut & Bolt Torque

Specification	65
1. Specific Torque Settings.....	65
2. Generic Torque Settings.....	65

Appendix B Options

Preliminary

Foreword

Thank you very much for purchasing this product. We believe that it will serve you without fail. Ensure that you read the operating instructions carefully before use. With proper handling and maintenance, this product will provide reliable, long-term service.

This manual is intended to serve as a manual for workshop engineers. It assumes an engineering knowledge commensurate with tasks that will be undertaken in a workshop. For completeness, the manual incorporates operating instructions necessary to familiarise the operator and service engineer with the controls, recommended inspections, start-up, operating, and shutdown procedures for the equipment.

All information, illustrations and specifications contained in this publication are based on the latest product information available at the time of publication. The right is reserved to make changes at any time without notice.

Continuing improvement and advancement of the design may cause changes to your machine that may not be included in this publication.

Please read the operating instructions carefully and understand them before operating the equipment.

Warranty

Liability

The warranty period begins when the product is delivered to and installed at the first purchaser. Only genuine parts may be used to carry out repairs. Failure to use only genuine parts may invalidate the manufacturer's warranty.

TCP Ltd will not be held responsible if:

- the machine has been used to perform tasks that demand more than its design and strength limitations, or
- the machine has undergone modifications not approved by TCP Ltd, or
- conditions of use have been abnormal, or
- normal maintenance, with regard to requirements as set out and detailed by the manufacturer, have not been adhered to.

TCP Ltd will not pay for normal maintenance or servicing nor any materials used to carry out routine servicing.

The warranty liability of TCP Ltd is limited to diagnosis, repair or replacement of the defective part, and actuating the repair - depending on the product terms and conditions, this will be free of charge.

TCP Ltd shall be under no liability whatever to the customer for any indirect loss and/or expense (including loss of profit) suffered by the customer arising out of a breach by TCP Ltd of this contract.

Audits and Surveys

TCP Ltd reserves the right to carry out audits and inspections from time to time in relation to any reimbursed or outstanding warranty claims in order to determine that all relevant details and information is correct.

Service and Warranty Training

Service and warranty training for service fitters can be provided at competitive rates if required. Training can be carried out at a TCP depot or at a venue of your choice, please contact TCP with your requirements.

Warranty Terms

One year or 1000 hours whichever occurs first from date of installation

All engine warranty issues must be directed to the engine manufacturer, or the manufacturer's approved/appointed engine dealer.

General Exclusions:

THE FOLLOWING ARE WARRANTY EXCLUSIONS AS DETERMINED BY HATZ:

Service items including lubricants, filters, glow plugs, fuel injection equipment, stop solenoid/relay, charge regulator, leaks (oil and air).

IN ADDITION: paintwork and parts that wear.

Warranty Claim Submission Procedures

Claims must be reported accurately and all relevant details given, as follows:

OWNERS NAME AND ADDRESS: full name and address of customer and site location, if different

MACHINE TYPE: State machine type, i.e. Ecolite

Date of Failure:

SERIAL NUMBER: Serial number of unit

ENGINE NUMBER: Serial number of engine

HOURS USED: Sate hours used on hour clock.
Please do not guess the hours used

DETAILS OF FAILURE: Give a full report on the failure

ORDER NUMBER: An order number **will** be required

Note that the order number is to cover the diagnostic and call out time, as well as to determine the following:

- That the failure is to be covered under the terms and conditions of warranty. If this is the case, then the costs will be covered by TCP Ltd and the **order number will not be used**.
- If the failure is determined to be of a non-warrantable nature, further authorisation to continue will be sought before any rectification work takes place.

The information above must be provided even if your warranty claim is a “parts only” claim. An invoice will be raised for the exchange parts. The reported faulty/defective part must immediately be returned to TCP Ltd and full inspection of the parts carried out, if the failure is covered under the terms and conditions of warranty a credit note corresponding to the invoice will be despatched to the customer. If the failure is deemed to be of a non-warrantable nature, the invoice should be settled immediately.

Certificate of Conformity

Each machine is issued with a certificate of conformity that is sent to the head office of the purchaser. Further copies are available on request

Hatz Engine Dealers

To locate your nearest Hatz dealer, access the HATZ Worldwide page from the <http://www.hatz-diesel.de> web site.

Service Bulletins

TCP Ltd may from time to time issue service bulletins to keep you up to date as to any improvements or changes that may take place on the complete assembly or component parts.

Machine Identification

This manual may refer to controls and equipment that are not present on your particular machine. It is important that you know your machine and its equipment and how to operate it properly.

Information regarding the machine model, code and chassis serial number is on the unit serial number plate (*Fig 1*). This plate is on the front. Always

quote the machine model and serial number in correspondence with your dealer or the factory.

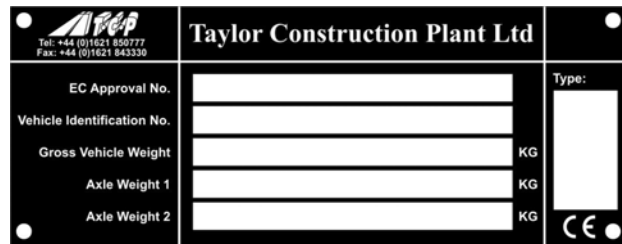


Fig 1 Data plate

Theft Deterrence

The owner/operator should take the following precautions to discourage theft, to aid in recovery in the event that the machine is stolen, or to reduce vandalism.

- Remove all keys any time the machine is left unattended.
- Immobilise the machine by removing a critical electrical or starting system device.
- Upon receipt of a machine, record the machine serial number and the serial numbers of all-major components and attachments. Keep this list up to date and filed in a safe location for fast retrieval.
- Place a decal or notice on the machine stating that all serial numbers are recorded.
- Discourage the thief! Inspect the gates and fences of the machinery storage yard or construction site. Keep machines in well-lit areas and ask the local law enforcement authorities to make frequent checks around the storage yard or work site.
- Liaise with neighbours. Ask them to watch equipment left at job sites and to report any suspicious activities to local allow enforcement authorities.
- Make frequent inventories of machines to promptly detect losses or vandalism.

Recovery of a Stolen Machine

In the event of theft, immediately notify the law enforcement authorities having jurisdiction. Provide the investigating officer with name, type of equipment, chassis and serial numbers of major attachments and components. It would be helpful to show the investigating officer an Operator’s Handbook, photographs, and advertising, to familiarise him with the appearance of the machine.

Report the theft to the insurance company. Provide the model and all serial numbers.

Report the model and serial numbers of the stolen machine to a dealer handling the respective line of equipment. Request that the dealer forward this same information to the equipment manufacturer.

Safety

Report all malfunctions to those responsible for maintenance. Do not operate the equipment until corrected. Normal service or maintenance performed as required can prevent unexpected and unnecessary down time. This handbook describes general inspections, servicing and operation with the normal safety precautions required for normal servicing and operating conditions. It is not a guide however, for other than normal conditions or situations.

Operators and service engineers must be safety conscious and alert to recognise potential operating or servicing safety hazards at all times, and take, necessary precautions to ensure safe operation and servicing of the machine.

General

WARNING

- Read this operator's Handbook and learn the operating characteristics and limitations of the machine. Know what operating clearances the machine requires.
- Know clearances of all side and overhead obstructions such as wires, etc., for operating safety.
- Be aware of operating hazards that weather changes can create on the job. Know proper procedures to follow when a severe rain or electrical storm strikes.
- Know what safety equipment is required and use it. Such equipment may be hardhat, safety glasses, reflector type vests, respirators and earplugs.
- Handle fuels and lubricants carefully and clean up spills to avoid fire and slipping hazards.
- Never rush. Walk do not run.
- Ensure that the area immediately surrounding the light tower is clean, neat and free of debris.
- Position and operate light tower on a firm , level surface.
- **NEVER** start a unit that is in need of repair.
- Lower tower when not in use, or if high winds or electrical storms are expected in the area.

- The tower extends up to 9 m (30 ft.). Make sure area above the tower is open and clear of overhead wires and obstructions.
- Bulbs become extremely hot is use! Allow bulb and fixture to cool 10-15 minutes before handling.
- Keep area around tower clear of people while raising and lowering mast!
- Tower must be levelled and outriggers extended before raising tower. Outriggers must remain extended while tower is up.
- **DO NOT** use a lamp without the glass lens of the lamp unit in place and undamaged. Ceramic discharge metal halide lamps are constructed of an outer glass bulb with an internal arc tube made of ceramic. The arc-tubes operate at high pressure (up to 50 p.s.i.) and at very high temperatures. They can rupture unexpectedly due to ballast failure or misapplication. If an arc-tube ruptures, it can shatter the outer glass bulb resulting in the discharge of glass fragments and extremely hot ceramic particles (as high as 18320F, 1000C). In the event of such rupture, there is risk of personal injury, property damage, burns and fire if the protective lens is not fitted.

Fire Precautions

WARNING

- Clean all dirt, oil, grease and other fluids from systems and components to minimise fire hazards and aid in spotting loose or leaking lines, fittings etc.
- Check the engine for rubbish, oily rags or other debris that could cause fires before starting the engine.
- Safely dispose of greasy, oily rags or similar hazards.

Flammable Fluid Precautions

WARNING

- Take due care when working with fuel. Diesel fuel is a health hazard for contact with eyes or sin, inhalation and ingestion. There is also danger of fire and pollution.
- Don't use diesel fuel or other flammable fluids for cleaning purposes. Use approved non-flammable solvents.
- Make sure all-fluid systems caps, drain, valves, fittings, lines etc., are secure and leak free.
- Shut off engine and use extra caution if engine is hot when refuelling.

Never smoke while checking or adding fuel or other fluid or handling fluid containers and lines.

- Use care and do not stand downwind when adding fuel or other flammable fluids to tanks and reservoirs to avoid fluids being blown or splashed onto clothing.
- When preparing machines or components for storage, seal and tape all openings and close containers tightly to seal in all volatile inhibitor fluids and compounds used.
- **DO NOT** fill fuel tank near an open flame, while smoking, or while engine is running.
- **DO NOT** fill tank in an enclosed area with poor ventilation.
- **DO NOT** run engine with the fuel tank cap loose or missing.

Electrical Hazard.

WARNING

- Never smoke or allow open flames or sparks near batteries.
- Always disconnect batteries before repairing electrical system to avoid danger of fire-causing sparks. Disconnect battery ground cable first and reconnect last.
- Always disconnect batteries and alternator leads before carrying out any welding on the machine.
- Never check battery charge by placing metal objects across battery posts to avoid sparks at battery posts.
- Use jumper cables only as recommended. Improper use can result in battery explosion.
- Make certain light tower is well grounded and securely fastened to a good earth ground.
- **NEVER** use tower if insulation on electrical cord is cut or worn through.
- **NEVER** operate lights without protective lens cover in place or with a lens cover that is cracked or damaged!

Pre-Starting

WARNING

- If engine is to be started and run indoors, ensure proper ventilation to remove deadly exhaust gases.
- Always perform 'Pre-Starting Inspection' instructions described in this manual to ensure the machine is ready for operation.

Starting

WARNING

- Do not start the engine or operate any control if there is a 'DO NOT OPERATE' or similar warning sign attached to any control.
- Use jumper cables only as recommended. Improper use can result in battery explosion or unexpected machine motion.

Lubrication and Servicing

WARNING

- Do not allow unauthorised personnel to service or maintain the machine. Study the Operator's handbook and Service Manual before starting, operating or servicing the machine.
- Always relieve pressure before servicing any pressurised system.
- Use only the special hydraulic fluid supplied by TCP. Unapproved or diluted fluid could freeze in cold conditions resulting in damage to the equipment and/or danger to personnel.
- **DO NOT** touch or lean against hot exhaust pipes or engine cylinder.
- **HIGH VOLTAGE!** This unit uses high voltage circuits capable of causing serious injury or death. Only a qualified electrician should troubleshoot or repair electrical problems occurring in this equipment.
- Replace all guards and safety devices immediately after servicing.
- Before servicing light tower, make sure engine start switch is turned to OFF, circuit breakers are open (off) and the battery isolation key is removed. **NEVER** perform even routine service (oi/filter changes, cleaning, etc.) unless all electrical components are shut down.
- Never allow water to accumulate around the base of the light tower set. If water is present, **DO NOT** service!
- Never service electrical components if clothing or skin is wet. If the unit is stored outside, check the engine and generator for any moisture and dry the unit before use.
- Never wash the unit with a power washer or high pressure hose.
- Open main circuit breaker before disconnecting battery cables.
- Keep hands, feet, and loose clothing away from moving parts on generator and engine.

- Replace all missing and hard-to-read labels. Labels provide important operating instructions and warn of dangers and hazards.
- Make sure slings, chains, hooks, ramps, jacks, and other types of lifting devices are attached securely and have enough weight-bearing capacity to lift or hold the equipment safely. Always remain aware of the position of other people around you when lifting the equipment

Towing Safety

WARNING

Towing a trailer requires care! Both the trailer and vehicle must be in good condition and securely fastened to each other to reduce the possibility of an accident.

- Check that the hitch and coupling on the towing vehicle are rated equal to, or greater than, the trailer's "gross vehicle weight rating" (GVWR).
- Inspect the hitch and coupling for wear or damage. DO NOT tow trailer using defective parts!
- Make sure the coupling is securely fastened to the vehicle.
- Check tyres on trailer for tread wear, inflation, and condition.
- Connect breakaway safety line securely to towing vehicle.
- Make sure directional, reverse and trailer lights are connected and working properly.
- Check that wheel nuts are tight and that none are missing.
- Maximum recommended speed for highway towing is 75 kph. Recommended maximum off-road towing speed is 15 kph (less on uneven terrain).
- Check that the road running lights are connected and operating, if applicable.

Specifications

Overall length	2503 mm
Overall height, floodlighting position	9500 mm
Overall mast height	8740 mm
Overall height, travel position	2200 mm
Overall width, travel position	1455 mm
Overall width with jack legs deployed	2106 mm
Tow hitch height	420 mm
Wheel size	155/ R13
Axle weight (GVM)	1000 kg
Total weight, with fuel	750 kg
Stabilizing/levelling positions	4
Lamps	4 or 6
Operating voltage	110 cte /220V
Fuel consumption	0.5 l/hour
Fuel tank capacity	95 lts
Fuel specification:	Diesel meeting EN 590, BS 2869 A1 / A2 or ASTM D 975 - 1D / 2D
Total run time	170 hours
Braking System	Fully fitted axle braking
Ground clearance	240 mm
Max wind speed for safe operation	Up to 100 kph

Additional Safety Systems:

Automatic Mast Operating Safety System (AMOSS) fitted as standard

Section 1 Description

1.1 Introduction

The Ecolite is a lighting tower designed for general use on building sites. It features:

- Four or six adjustable, ceramic discharge metal halide lamps mounted on a telescopic tower.
- 9m tower raised and lowered using hydraulics powered by a Hatz diesel engine.
- Lights powered from the diesel engine or (optionally) from a local mains supply.
- Mounted on a two-wheel trailer that can either be lifted onto a vehicle for transport or towed.
- AMOSS system prevents towing while the mast is raised. The mast cannot be raised unless the handbrake is on.

The diesel engine is coupled directly to an alternator to provide 240V a.c. power for the lights. The hydraulic power for raising the tower is provided by a 12V d.c. pump.

1.2 Electrics

The diagrams in this section are for explanatory purposes only. Refer to circuit diagrams TCP-3220-0x in *Section 6* for full information.

Versions are available with an auxiliary 230V input and/or output. Another version incorporates a transformer to provide a 110V (50 Hz) centre-tapped output. Only units with a 230V input option

have a Supply Selector switch.

1.2.1 Ignition

Engine starting is controlled by the ignition controller (Fig 1-2). The Hatz diesel engine has no glow plug but employs fuel-rich starting. When the controller key switch is set to 2 (Start), the controller applies 12V d.c. to the starter motor to turn the engine and to a solenoid to supply fuel to the engine. Initially the engine valves are open so that no fuel compression occurs and the engine turns easily. The valves remain open until the engine reaches a pre-determined speed. At this point, the valves close and the resultant compression ignites the fuel and the engine starts.

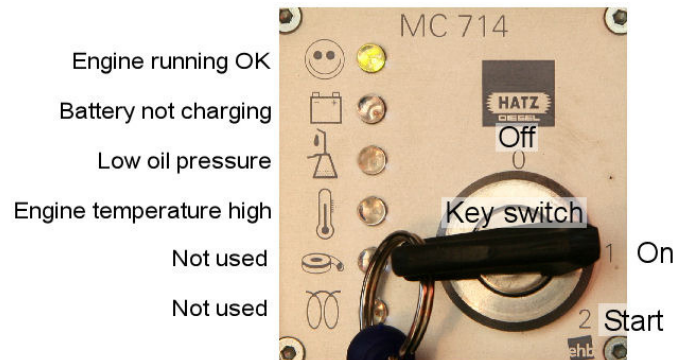


Fig 1-2 Ignition Controller

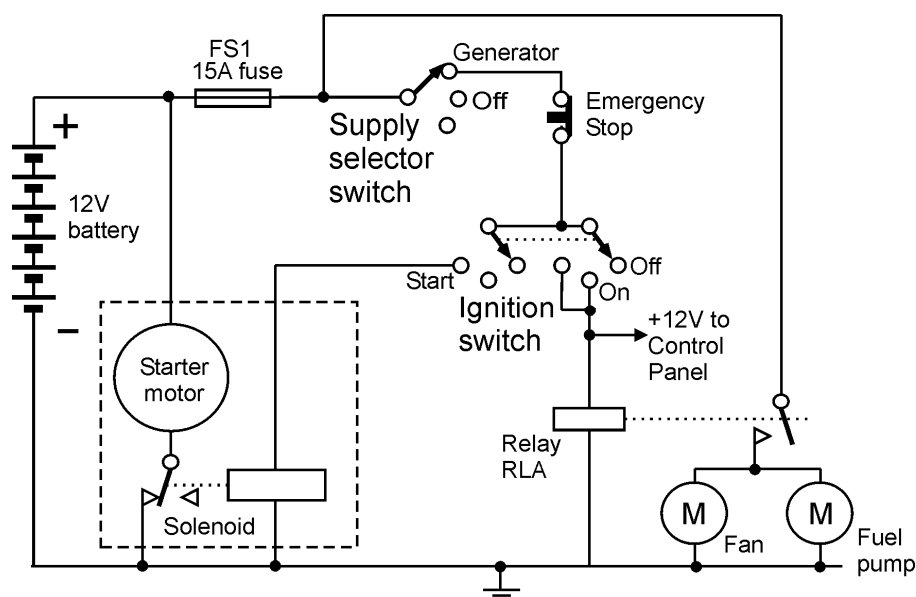


Fig 1-1 Ignition circuit

1.2.2 Charging Circuit

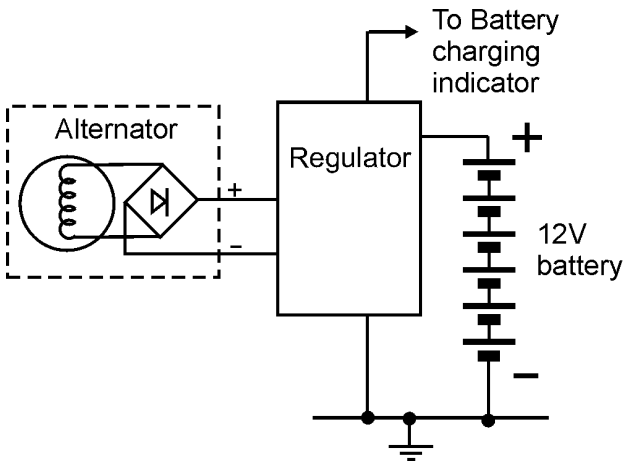


Fig 1-3 Charging circuit

The alternator unit incorporates a rectifier that converts the a.c. from the alternator into d.c. The regulator regulates the charging current it supplies to the battery to maintain a full charge.

1.2.3 Oil Pressure Light

An oil pressure switch turns on the oil pressure warning light if the oil pressure is low.

1.2.4 Hours Counter

The hours counter (Fig 1-4), powered from the 230V a.c. supply from the alternator, measures the

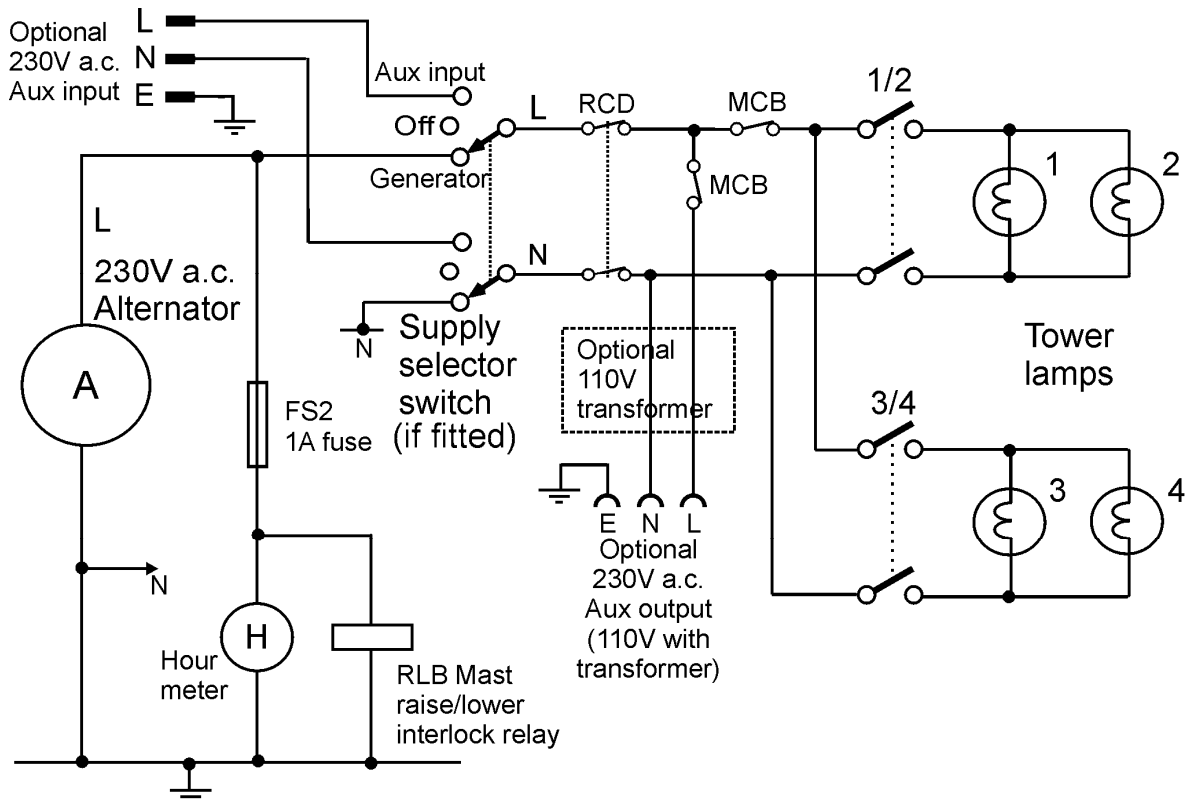


Fig 1-4 Lights circuit

elapsed time while the alternator is operating.

1.3 Lighting Supply

The engine drives an alternator to provide nominal 230V a.c. for the lights (Fig 1-4). Optionally, the lighting supply can be obtained from an external source connected via a socket on the case and selected by the Supply Selector switch. Also optionally, the generator supply can be fed to a socket on the case. This supply can be 110V if the optional transformer is fitted.

1.4 Road Running Lights

Some models have road running lights.

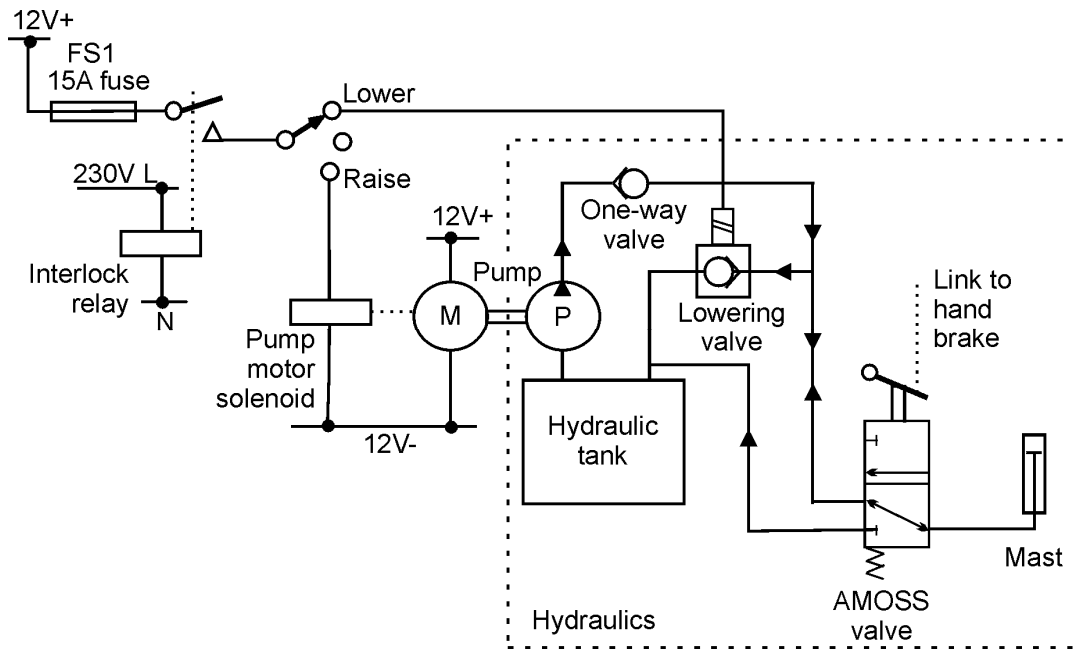


Fig 1-5 Hydraulics

1.5 Hydraulics

Refer to the Hydraulic Schematic drawing Fig 1-5.

The mast contains concentric, telescopic hydraulic cylinders and is raised by pumping hydraulic fluid into the cylinders. A one-way valve holds the pressure up when the pump is not operating so that the mast will stay up. A solenoid valve lowers the mast by routing the pressurised fluid back to the tank.

The Raise/Lower switch activates the pump motor solenoid to raise the mast or activates the Lowering valve to lower it. The Interlock relay ensures that the mast can only be raised or lowered if the 230V supply from the alternator is present – meaning that the engine is running to keep the battery charged for raising the mast.

The function of the AMOSS valve is to prevent the unit being moved while the tower is raised. A rod links the handbrake to the AMOSS valve so that if the brake is off, any pressure in the mast cylinders is relieved and the mast comes down. A spring operates on the valve to allow the mast to rise.

When the handbrake is off, the rod operates against the spring to prevent raising of the mast. As long as the hand brake is on, the mast can be raised and lowered normally.

Section 1 Description
1.5 Hydraulics

Section 2 Operation

2.1 Daily Pre-start Inspection

These instructions must be carried out to assure continuance of engine warranty.

Full routine maintenance procedures are given in *Section 3 Maintenance*.

1. Ensure that the machine is ready for operation before the starting it.
2. The machine should be in a level position to permit accurate checking of fluid quantities in the engine and other components.
3. Open the left hand side of the engine enclosure to access to the engine for routine maintenance.

Note: Refer to the engine manufacture's handbook for engine maintenance details.

4. Engine - With engine off, check oil level. The oil should be just over the top thread at filler. Add oil if low. (See *Table 3-2* for correct oil).
5. Inspect the engine air cleaner for any damage. (If damaged, replace it immediately. Using an engine with a damaged air cleaner will seriously reduce engine life).
6. Check that oil cooler outlet grill (between body and chassis) is clear of obstructions.
7. Inspect for any leaks whether fuel, engine oil or hydraulic oil.
8. Check fuel level.

To prevent condensation from contaminating the fuel, fill the fuel tank at end of each shift.

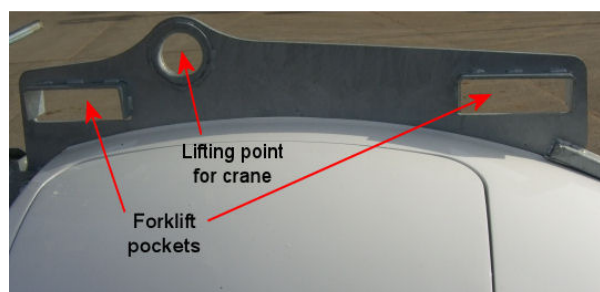


Fig 2-1 Lifting points

2.2 Positioning

When choosing a location of the Ecolite, bear in mind the following:

- The light tower should not be placed where those working under the light are:
 - Forced to look into the light regularly or
 - Forced to work with their backs to the light (shadows will block the light from the work area).
- Assess site conditions carefully before positioning and operating the tower.
- Do not position the tower in the vicinity of overhead cables or power lines!
- Locate the light tower on the same or a higher level than the area being lit (the higher the light, the less shadow length).
- The area where the tower is positioned should be relatively level. This will ensure smooth, trouble-free telescoping of the mast. (The mast may not telescope down properly if the unit is not level.)
- Put the handbrake on before attempting to raise the mast. **The mast cannot be raised unless the handbrake is on.**
- Do not move the tower with the mast raised! (The mast will telescope down automatically if the brake is released).
- Never raise the mast or operate the tower without the jacklegs touching the ground!

The Ecolite would normally be towed into the required position and then uncoupled from the towing vehicle. However, the Ecolite has a lifting point for use with a crane and two pockets for use with a forklift (*Fig 2-1*) that can be used.

2.3 Uncoupling

⚠ WARNING Do not release the Jockey Wheel Assy. Clamp Lever while the Jockey Wheel is taking the weight of the unit. The unit would tip forward and could cause damage or personal injury.

Uncouple the Ecolite trailer from the towing vehicle, if necessary, as follows:

9. Apply the parking brake by pulling up the lever (Fig 2-2). The mast cannot be raised unless the brake is on.
10. Disconnect the trailer lighting from the towing vehicle.
11. Detach the breakaway cable from the towing vehicle.
12. Release the jockey wheel assembly clamp and lower the wheel approximately half way to the ground.
13. Retighten the clamp.
14. Wind the jockey wheel down to release the weight from the towing eye.
15. Release and remove the pin from the towing eye on the towing vehicle.
16. Make any final adjustments to the position of the unit and apply the parking brake by pulling the lever upward to the limit of its travel.

Coupling the unit to a towing vehicle is the reverse of this procedure. Before moving off, check the tyres and check that the lights on the trailer work.

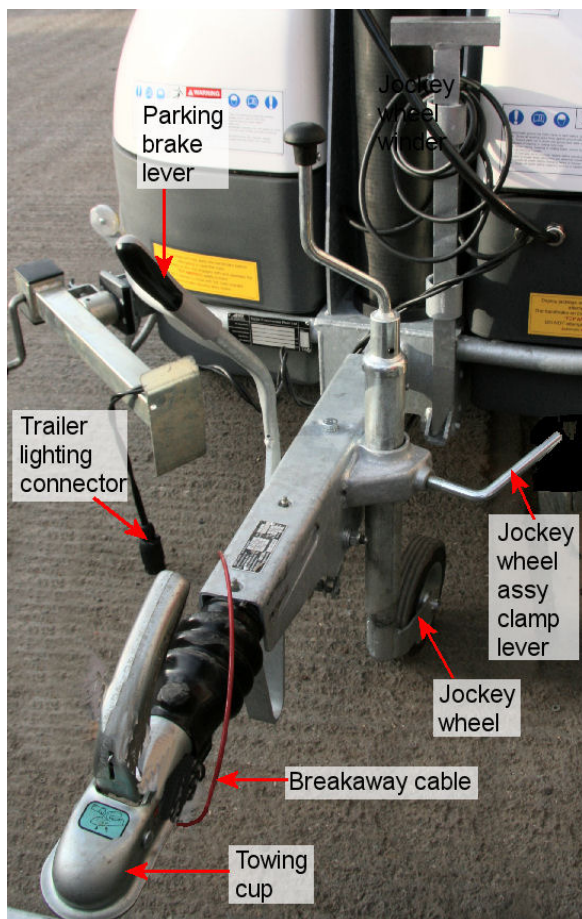


Fig 2-2 Parking brake

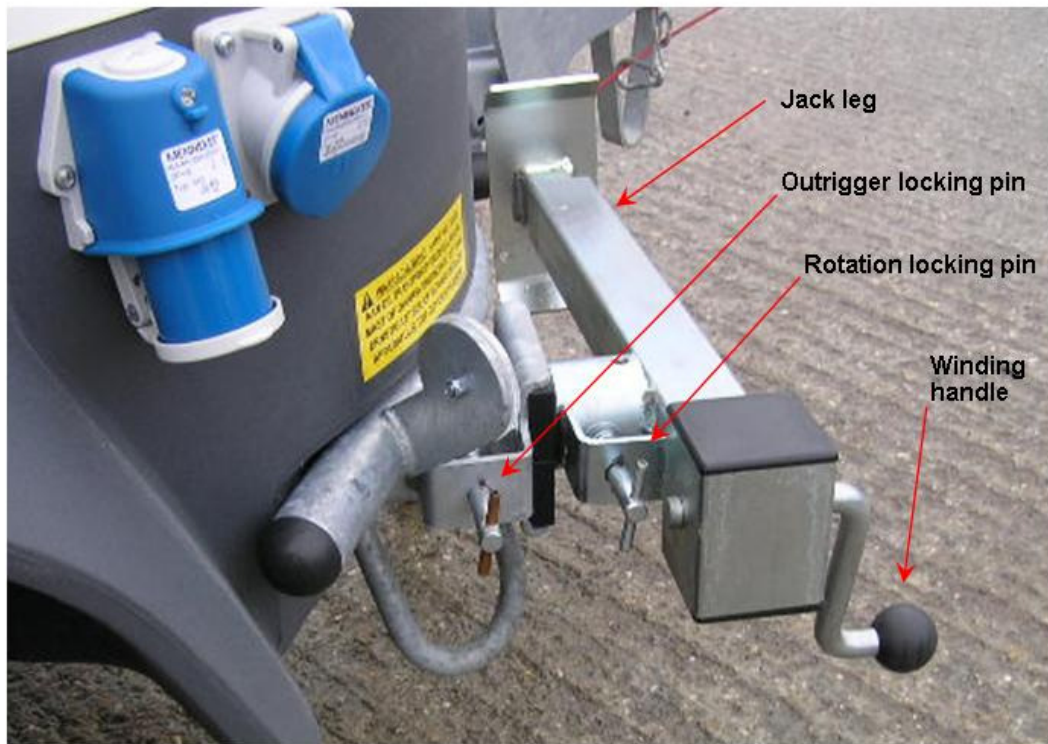


Fig 2-3 Jack components

2.4 Jacking up the Unit

Jack up the unit as follows. Start with the jack that is on the highest ground.

1. Hold the Jack Leg with one hand and pull the Rotation Locking pin to release the leg. Allow the leg to fall to the vertical position. Ensure that the pin locks the leg in the vertical position (Fig 2-4).



Fig 2-4 Jack vertical

2. Pull out the Outrigger Locking Pin (Fig 2-5) and pull the Jack Leg away from the body of the unit to its fullest extent (Fig 2-6).



Fig 2-5 Extending the jack

Section 2 Operation

3. Wind the foot of the jack down to the ground (Fig 2-7).



Fig 2-7 Jacking up

Repeat the procedure for all four jacks so that the unit is stable and level. Do not use the jacks to raise the tyres off the ground.

2.5 Using the Lights

1. Check that the brake is on. Note that the mast cannot be raised if the brake is off. Check that the brakes are operating correctly on both wheels by attempting to move the trailer.
2. Check that the light lenses are clean and undamaged.
3. Drive the earth spike (Fig 2-14) into the ground (earth) (follow any risk assessment). Check that the earth spike cable is securely attached to the unit.
4. Check that the Emergency Stop button is not pressed. If necessary, rotate the button clockwise to release it.
5. Open the cover to access the Control Panel.
6. Check the fuel level and top up if necessary. (The fuel level can be seen through the translucent fuel tank.)

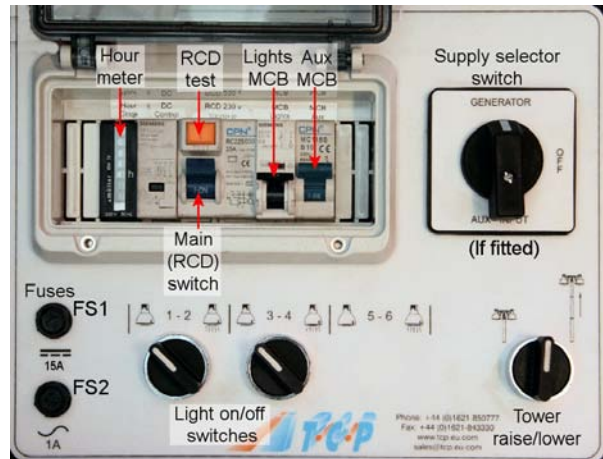


Fig 2-13 Control panel

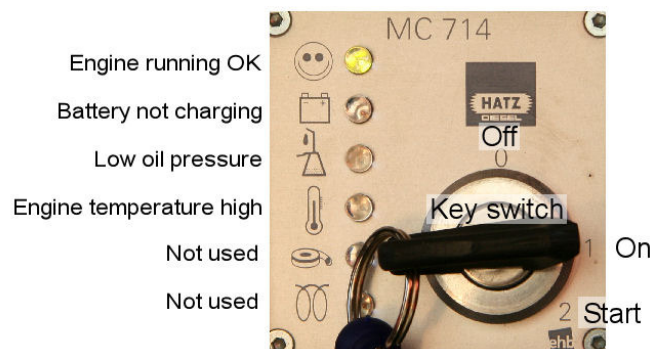


Fig 2-14 Ignition panel

Note: Fig 2-13 shows a 230V machine with an auxiliary output. The mcb configuration on other versions will be different.

7. Check that the main switch and miniature circuit breakers (MCBs) are on (up) and the Light switches are off. (The main switch is a residual current device (RCD) that can be tripped by an earth leakage.)
8. Set the Supply Selector Switch (if fitted) to Off.
9. Insert the key in the Key Switch and turn it to position 1. The Battery and Oil Pressure lights adjacent to the switch should light.
10. Turn the key to position 2.
11. As soon as the engine starts, release the Key to position 1. Check that the Battery and Oil Pressure lights go out and the green, Running light remains on.

Note: If the engine does not start, return the key switch to position 0 before retrying.

12. Check that the lights on the tower are oriented so as to provide optimum illumination of the site. The lights can be tipped up/down and rotated, as required. It is also possible to rotate the tower through 300 degrees. See Section

2.8 Redirecting the Lights.

13. Raise the tower by turning the Tower switch clockwise and holding it there.
14. Release the Tower switch when the lights reach either the required height or maximum. You will hear a change in the pitch of the hydraulic motor when the mast is fully extended.

Note: It is normal for the mast to appear wet as it is raised: the hydraulic fluid acts as a lubricant for the seals between the telescopic sections. Subsequent leakage from a raised mast could indicate a problem with a seal. Seals and O-rings can be replaced as detailed in Sections 5.11 Mast O-ring Replacement and 5.12 Mast Seal Replacement.

15. Set the Supply Selector switch (if fitted) to **Generator**.
16. Set the Light switches to **On** (clockwise). The lamps take a minute or two to warm up.
17. Close the cover to protect the Control Panel.

Closing down the unit is the reverse of this procedure.

Before lowering the tower, switch off the lights and allow time for them to cool.

To stop the engine, turn the Key Switch to **0**.

2.6 Auxiliary Supply (Optional)

Where an input plug is fitted (Fig 2-15), the lamps can be powered from a local mains supply instead of from the generator. Connect the mains supply to the Aux input plug (Fig 2-15).

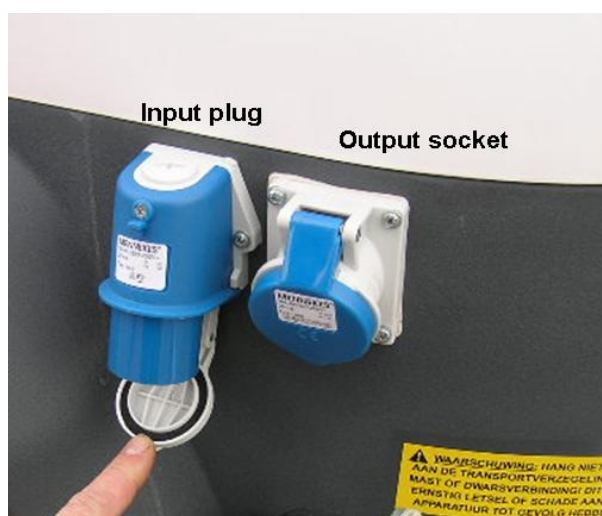


Fig 2-15 Auxiliary supply connectors

Note: To avoid depleting the battery, the unit is configured so that the mast can only be raised with the engine running.

To use the auxiliary supply, follow the instructions given in *Section 2.5 Using the Lights* but set the Supply Selector switch to **Aux Input** in Step 15. On completion, turn off the generator, leaving the lights powered from the Auxiliary mains input.

Where an output socket is fitted, it provides either 110V centre-tap earth (cte) or 220V output (depending on version/region) from the internal alternator.

2.7 Moving the Trailer

The trailer cannot be moved with the tower raised. (Releasing the brake causes the tower to telescope down.) To move the trailer:

1. Turn off the lights and allow time for them to cool.
2. Lower the tower.
3. Ensure that the jockey wheel is down and locked so that the unit will not tip over when the jacks are removed.
4. Raise, retract and stow the four jacks.
5. Ensure mast rotation clamp is secure, to prevent movement in transit.

The unit can be either manhandled or towed to the new location.

Before towing:

- Check that the hitch and coupling on the towing vehicle are rated equal to, or greater than, the trailer's "gross vehicle weight rating" (GVWR).
- Inspect the hitch and coupling for wear or damage. DO NOT tow trailer using defective parts!
- Make sure the coupling is securely fastened to the vehicle.
- Check tyres on trailer for tread wear, inflation, and condition.
- Connect breakaway safety line securely to towing vehicle.
- Make sure directional, reverse and trailer lights are connected and working properly.
- Check that wheel nuts are tight and that none are missing.
- Connect the road running lights, if applicable, and check that they work.

The maximum recommended speed for highway towing is 75 kph. Recommended maximum off-road towing speed is 15 kph (less on uneven terrain).

2.8 Redirecting the Lights

The tower can be rotated through up to 300 degrees so as to direct the light as required.

Slacken the Rotation Lock (Fig 2-14) and turn the Rotation Handle so as to direct the lights as required. Tighten the lock afterwards.

In addition to rotation of the mast, each of the lights can be rotated on two axes and tipped back and forth (Fig 2-17). Thus the lights can be directed either downwards or horizontally (e.g. to illuminate a facade (Fig 2-16)). For any adjustments, the mast must be lowered to allow access.

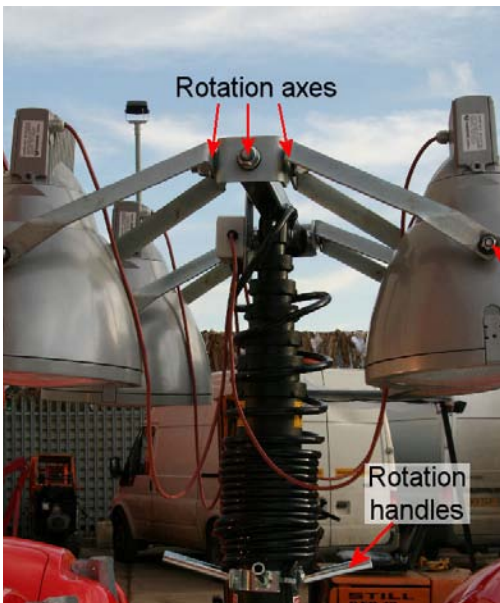


Fig 2-17 Light manipulation



Fig 2-14 Rotation lock



Fig 2-16 Façade illumination

2.9 Parking

WARNING When parking the machine overnight or for an extended period, the following procedure will help maintain it in good condition:

1. To prevent condensation from contaminating the fuel, fill the fuel tank completely before parking the machine overnight or for extended periods. If a security kit is supplied, keep it locked
2. Park on level ground where possible. If it must be parked on a slope, position machine at right angles to the slope and block tracks securely.
3. Remove key to a place of safety

2.10 Emergency Stop

The Emergency Stop button (Fig 2-18) shuts off the engine in under 20 seconds.



Fig 2-18 Emergency Stop button

The engine (and the power it generates) will remain off until the Emergency Stop button is released. To release the button, twist it in the direction of the arrows on the button.

There is also an emergency stop inside the cover (Fig 2-20). Pull the knob to cut off the fuel to the engine, which will stop after a short delay.

2.11 Starting the Engine with Jumper Cables.

For jump starting, jumper cables can be connect can be connected to stud terminals on the side of the engine compartment Fig (2-20). To access these terminals, open the left hand side of the enclosure.

Do not jump start a vehicle by using arc welding equipment. Currents and voltages are dangerously high and cannot be sufficiently reduced to make the method safe.

Be sure machines are not touching each other.

Use cables that are the same size as those on the machine.

If jumper cables are used to start an engine, be sure to follow this procedure:

1. Connect one end of the jumper cable, usually coloured red, to the **+** battery supply stud terminal (Fig 2-20).

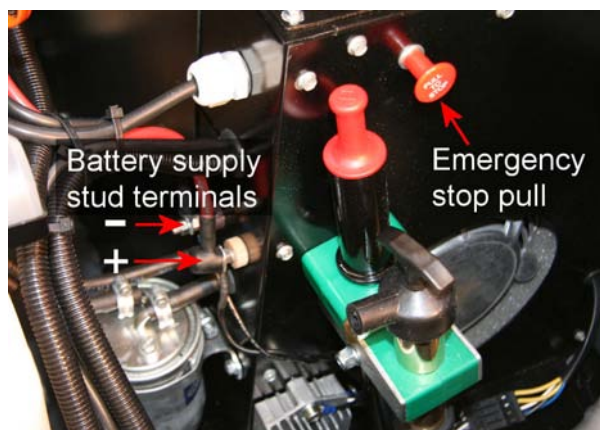


Fig 2-20 Internal Emergency Stop

2. Connect the other end of the same cable to the **'POSITIVE' (+)** post on the booster or charged battery.
3. Connect one end of the second cable, usually coloured black to the **'NEGATIVE' (-)** post of the booster battery.
4. Connect one end of the jumper cable to the **-** battery supply stud terminal or to a convenient point on the engine frame.

5. Keep grounding point clear of battery so that if a spark occurs, it is away from battery fumes (explosive hydrogen).
6. Locate cause of battery failure.

2.12 Battery Charging

If the battery is not being charged properly, refer to Section 4.3 Battery Charging Check. The battery can be charged from the mains as detailed in Section 3.18 Charging the Battery.

Charging of Odyssey Batteries

Check polarity of discharged battery connections.

Do not allow charging voltage to exceed 15 volts. Excessive booster voltage and/or incorrect jumper cable connections will destroy plates inside battery.

Keep all sources of ignition away from batteries. Do not lean over batteries.

Do not allow the battery to become fully discharged. The battery may no be able to recover from this state, rendering it unserviceable.

Voltmeter Reading	State of charge
12.84 Volts	100%
12.50 Volts	75%
12.18 Volts	50%
11.88 Volts	25%

Note: When Ecolite power is supplied from an outside source via the input socket (engine not used and supply Selector switch set to Auxiliary), the Emergency Stop button is inoperative and will not turn off the power. The RCD provides protection against electric shock.

Section 3 Maintenance

Operation	Service interval					Ref. Page
	Daily	Every 250 hr	Every 500 hr	Every 1000 hr	Every 1500 hr	
Engine Oil	Check	Change				24
Air filter		Check/replace				34
Fuel Filter – in-line		Replace				27
Fuel Filter – fixed			Replace			27
Hydraulic fluid	Check					27
Engine oil filter				Clean		24
Lubricate inertia brake				Grease		28
Drain fuel tank				Annually		28
Engine conditioning					Decoke	28

* Check/replace air filter daily if operating in dusty conditions

Table 3-1 |Maintenance Intervals

3.1 General

Lubrication is an essential part of preventive maintenance. It is important that the instructions regarding types of lubricants and the frequency of their application be followed to prolong the useful life of the machine. Periodic lubrications of moving parts reduce mechanical failures.

While servicing, thoroughly clean all fittings, caps, plugs etc., to prevent dirt from entering the system.

Lubricants must be at operating temperatures before draining.

Do not operate any system unless oil level is within the operating range as indicated on the dipstick or level plug.

All change and service periods are recommendations based on average operating conditions. Lubricants showing evidence of excessive heat, oxidation or dirt should be changed more frequently to prevent these conditions. Lubricants change and service periods must be established on the basis of individual job conditions.

3.2 Engine Maintenance

Since the workshop manual provided by the engine manufacturer contains comprehensive information on servicing the engine, this Routine Maintenance section only provides information on the engine for daily servicing and where it differs from the standard application covered by the engine workshop manual. Refer to the manufacturer's manual for all other information and instructions relating to the engine.

3.3 Safety Precautions

WARNING

- Do not allow unauthorised personnel to service or maintain this machine.
- Study the manual before starting, operating or servicing this machine. Always follow the procedures and safety precautions detailed in this manual.
- Do not work under or near any unblocked or unsupported linkage, or any part of machine.
- Always shut down machine before cleaning, lubricating or servicing the machine
- Always relieve pressure before servicing any pressurised system.
- Always attach a '**DO NOT OPERATE**' or similar warning sign to ignition switch or a control before cleaning or servicing the machine.
- The ceramic insulation wrapped around the exhaust pipe and the engine cover ceramic heat barrier are made of toxic material – possible, low risk carcinogenic. Minimise dust release and use appropriate 'Personal Protection Equipment' when handling them.

3.4 Maintenance Intervals

Table 3-1 lists the maintenance intervals.

3.5 Service Access

To access the engine for routine maintenance, open both sides of the engine enclosure.

Item	Component	Lubricant	Specifications	API Code	SAE Grade
1	Engine Crankcase and Filter	Engine Oil	1.85% max. sulphated ash limit	CC/CD	10W-30
2	Hydraulic System	Hydraulic fluid	Ecolite Mast Fluid TCP Part No. 80-0372		
3	Fuel tank	Diesel Fuel Oil with max. Sulphur 0.5%	A.S.T.M. No.2 Diesel Fuel at sub zero temp. blend No. 2 with No.1		
4	Towbar greasing	Morris Lubricants K2 EP	Multipurpose Lithium grease NLGI No.2		

Table 3-2 Recommended lubricants

3.6 Lubrication

Grease the tow bar coupling at least once per year – more frequently if the unit is towed frequently.

3.7 General Inspection

- Engine air intake. Check air intake system for wear or damage to piping, loose clamps and leaks.
- Check for loose bolts or fixings. Tighten as per bolt chart in Appendix A.
- Check for oil leaks. Securely tighten any loose joints and replenish any losses:
- Examine the body, particularly the chassis, for cracks or broken welds. Repair where necessary.

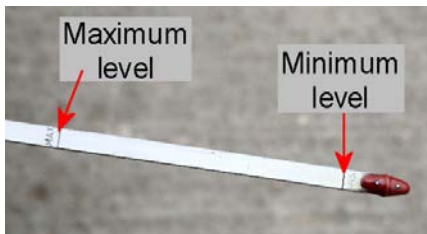


Fig 3-1 Dipstick levels

3.8 Daily Check

After every 10 hours of operation, do a walk-around inspection:

- Visually check engine for damage, listen for any unusual noises:
- Engine Air Cleaner, Inspect and remove any obstructions from the air cleaner inlet with the engine stopped:
- Check Engine oil level. See Section 3.9 Engine Oil Check.

Note:

- Service air cleaners more often when operating under extremely dusty conditions.
- Do not wash the air cleaner element out with detergent. Replace with new.

3.9 Engine Oil Check

Check the engine oil after each day's use.

1. Ensure that the unit is level.
2. Switch off the engine.
3. Clean the area around the oil filler cap/dipstick.
4. Remove the dipstick (Fig 3-8) and allow a few moments for the oil level to settle.
5. Check the oil level using the dipstick (Fig 3-1).
6. If necessary, top up the oil (see Fig 3-9). Do not overfill.

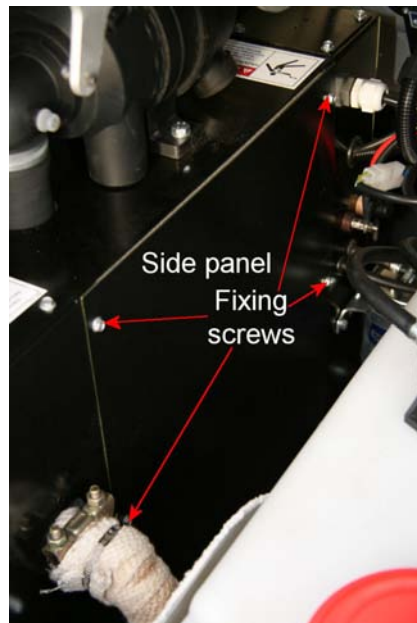


Fig 3-1 Engine side panel

3.10 Engine Oil Filter

Clean the oil filter after every 1000 operating hours.

1. To gain access to the oil filter it is necessary to remove the side panel from the engine. Fig 3-1 shows the side panel and some of the fixing screws. The oil filter is located near the bottom of the engine (Fig 3-3).

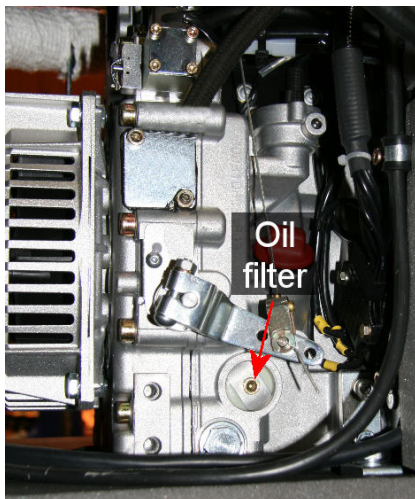


Fig 3-3 Engine oil filter

2. Use an Allen key to remove the filter (Fig 3-4) and extract it (Fig 3-5).
3. Wash out oil filter with degreaser. Replace filter if damaged.
4. Check joint washers (Fig 3-6). Replace if necessary.
5. Lubricate joint washers before fitting.
6. Insert filter to limit of travel. Ensure that tension springs (Fig 3-7) sit close to filter before tightening screw.

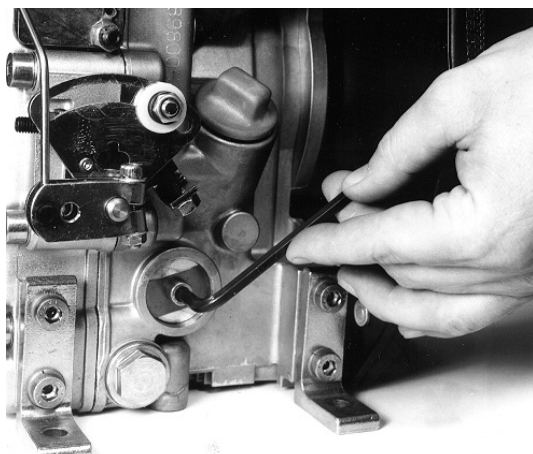


Fig 3-4 Unscrewing oil filter

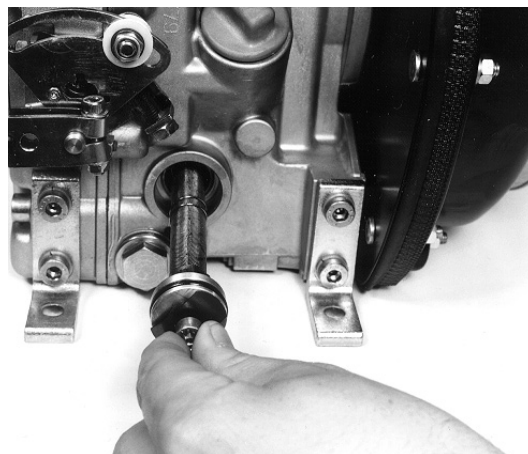


Fig 3-5 Oil filter extraction

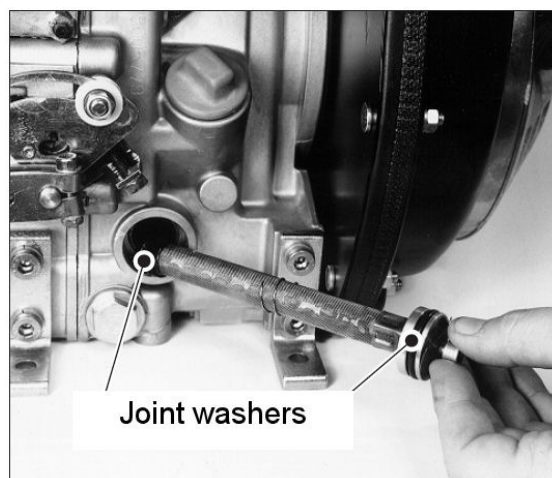


Fig 3-6 Oil filter washers

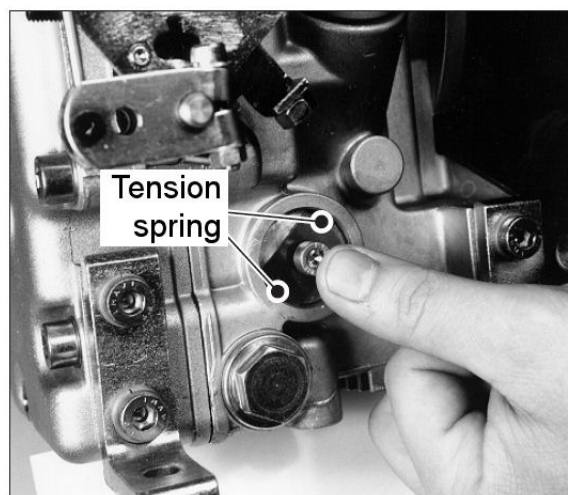


Fig 3-7 Oil filter spring

7. Unless doing an oil change, check oil level and top up as necessary.

3.11 Engine Oil Change

Parts: Oil filter TCP

Change the oil every 250 operating hours.

Take care that no contamination enters the sump

1. Ensure that the unit is level.
2. Run the engine until it is warm.
3. Clean the area around the oil filler cap/dipstick.
4. Remove the filler cap/dipstick (*Fig 3-8*).
5. Attach a suitable tube to the oil evacuation pump and route it to a suitable container.
6. Use the hand pump to evacuate all the oil from the sump.
7. Disconnect the tube.
8. Refill the sump with oil of the correct grade for the conditions (*Fig 3-9*) to the correct level, as indicated on the dipstick.
9. Refit the filler cap/dipstick.

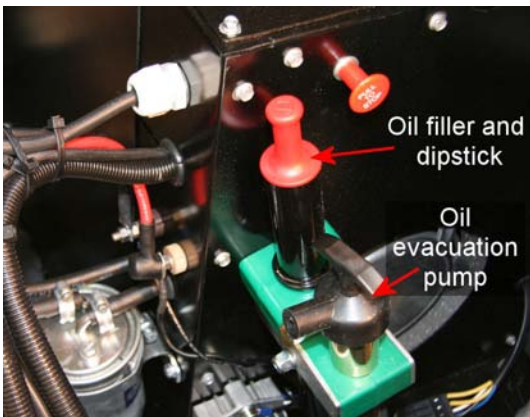


Fig 3-8 Oil filler/dipstick and pump

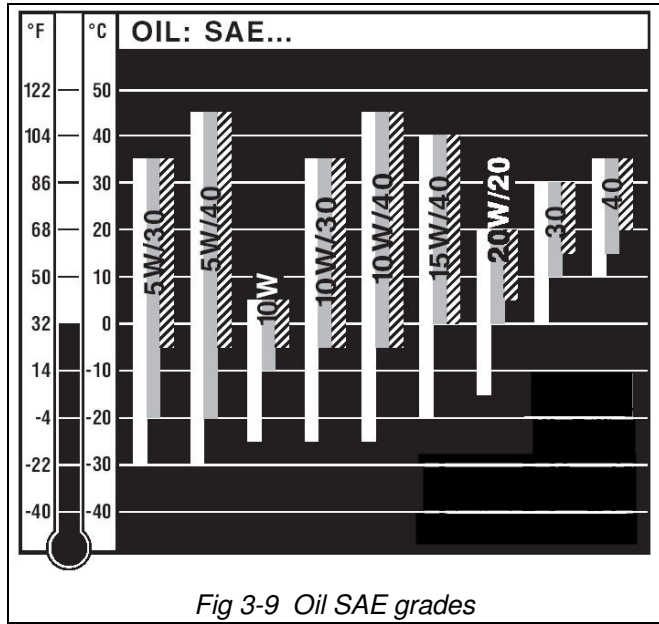


Fig 3-9 Oil SAE grades

Oil should meet at least one of the following specifications:

ACEA – B2 / E2 or better

API – CD / CE / CF / CF-4 / CG-4 or better.

If engine oil of a poorer quality is used, reduce oil change interval to 150 hours of operation.

3.12 Hydraulic Fluid

Check the fluid in the hydraulic tank daily.

Remove the cap from the hydraulic tank and check the level. The fluid should just reach the bottom of the filter that is under the cap (Fig 3-10). If necessary, top up with Ecolite Mast Fluid (TCP Part No. 80-0372).

WARNING: Only use the specified TCP hydraulic fluid (undiluted). This fluid is specially formulated for the purpose. If the wrong fluid is used or the fluid becomes diluted, it could freeze under cold conditions with resultant structural damage to the equipment. This could result in injuries to personnel and/or damage to property.



Fig 3-10 Hydraulic fluid level check

If it is suspected that the fluid has become diluted, drain the tank (as described for the fuel, in *Section 3.17 Draining Fuel Tank*) and refill with the prescribed TCP fluid.

Take care not to mix fuel and hydraulic fluid.

3.13 Fuel Filters

Parts:

In-line fuel filter TCP 14-0131

Fixed fuel filter TCP 14-0128

WARNING Take due care when working with fuel. Diesel fuel is a health hazard for contact with eyes or skin, inhalation and ingestion. There is also danger of fire and pollution.

Dirty or contaminated fuel will damage the engine. For this reason, three fuel filters are fitted, as follows:

Two fuel filters are fitted: one on top of the fuel tank, in the line to the fuel pump (Fig 3-12) and the other mounted on the side of the engine compartment (Fig 3-13). Replace the in-line filter after 250 hours of operation and the fixed filter after 500 hours.

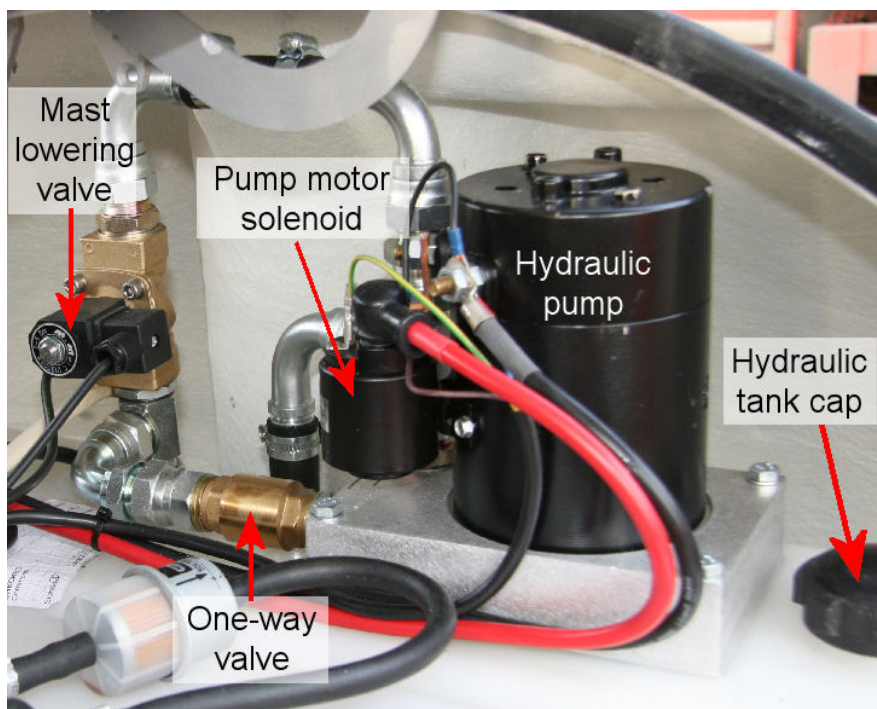


Fig 3-11 Hydraulics

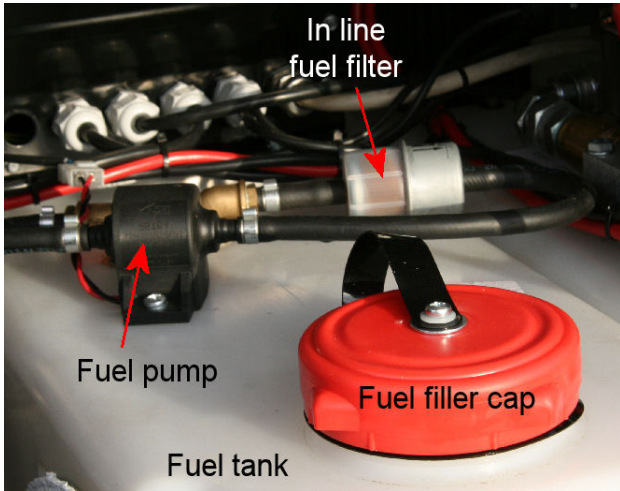


Fig 3-12 In-line fuel filter



Fig 3-13 Fixed fuel filter

3.14 Tyres

Check the condition of the tyres. They should meet local wear regulations if used on public roads.

Check the tyre pressures. They should be 2.5 bar (35 psi).

3.15 Engine Conditioning

After every 1500 hours of operation, the engine should be run under a 2.6 kW load for two hours in order to clear it of accumulated carbon deposits. The 2.6 kW can comprise a 2 kW load connected to the Auxiliary Supply output plus 600W for the lights.

3.16 Inertia Brake

The inertia brake applies the trailer brakes when the towing vehicle brakes.

Apply medium multipurpose grease to the nipples (Fig 3-14).

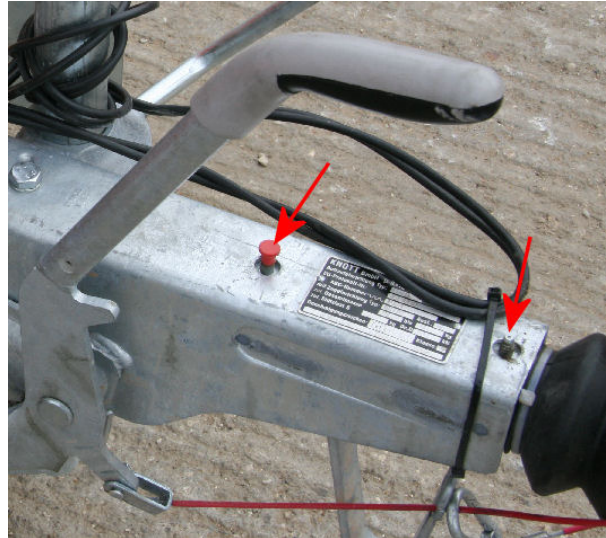


Fig 3-14 Inertia brake grease nipples

The frequency of greasing depends on the extent of towing. If the trailer is towed frequently, with frequent braking, the brake will need more frequent greasing than if the brake is seldom used.

Inspect the brake every three months. If adequate lubricant is showing, grease annually.

3.17 Draining Fuel Tank

WARNING

When working on the fuel system, do not expose it to a naked flame; do not smoke.

Over time, condensation results in a layer of water forming at the bottom of the fuel tank, water being heavier than diesel fuel. Once per year, remove the water as follows:

1. Fit a polyethylene tube (diameter 4 mm, length 700mm approx.) to a commercial syringe (20 ml or larger).
2. Remove the diesel filler cap and run the tube down to the bottom of the tank.
3. Drain off the fuel/water mixture with the syringe.
4. Repeat the procedure until the transparent syringe is found to contain only diesel fuel.

3.18 Charging the Battery

The battery can be charged by means of a standard 12V car battery charger. Connect the charger between positive and negative battery stud terminals or between the positive stud and engine chassis (negative) (Fig 3-15).

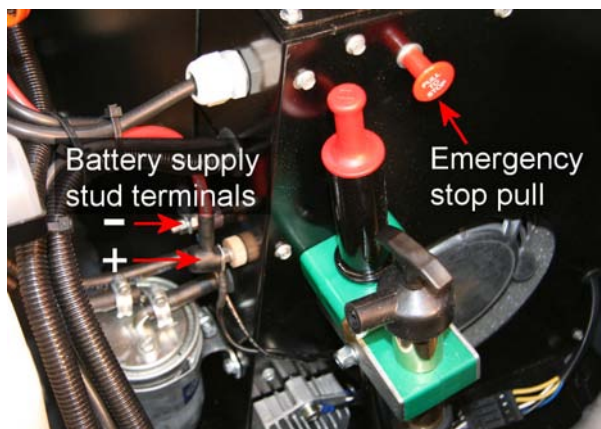


Fig 3-15 Battery test stud

Section 4 Fault Finding

4.1 Engine will not Crank

The ignition controller (Fig 1-2) controls engine starting. The Hatz diesel engine has no glow plug but employs fuel-rich starting. At startup, the engine valves initially open so that no fuel compression occurs and the starter motor turns the engine easily. The resultant compression ignites the fuel and the engine starts.

If the battery voltage is low, the controller releases a solenoid, which cuts off the fuel supply to the engine so that the engine will not start. Similarly, if the engine is running and the battery voltage falls below the acceptable threshold, the engine will stop. This could occur if the mast were raised repeatedly within too short a time for the battery to recharge.

1. Check that Emergency Stop button is released.
2. Check that Supply Selector switch is set to Generator.
3. Check that Supply Isolator switch (if fitted) is on.
4. Check the battery connections.
5. Check the battery voltage with the ignition switch off. This can be measured between the battery test studs shown in Fig 4-1.

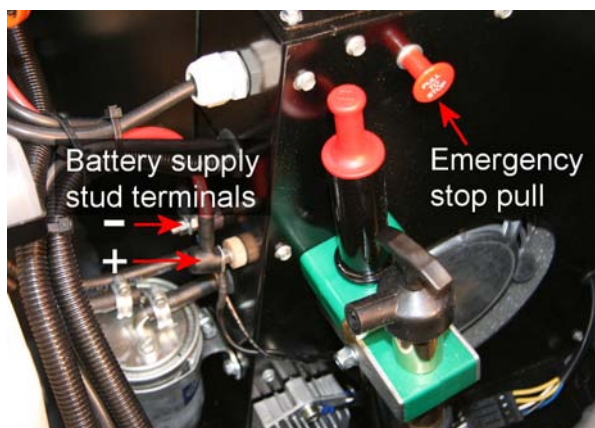


Fig 4-1 Battery test stud

The battery voltage varies with charge as follows:

Voltmeter reading	State of charge
12.84V	100%
12.50V	75%
12.2V	50%
11.9V	25%

If a charging problem is suspected, check the charging circuit as detailed in Section 4.3 Battery Charging Check.

6. Check starter motor.

4.2 Engine Cranks but will not Start

1. Check fuel amount and quality.
2. Check that the emergency Pull to Stop button on the engine compartment is fully in.
3. Check that the electric fuel pump is running. It should produce audible clicking.
4. Check battery voltage as detailed in Section 4.1 Engine will not Crank.
5. To check for water in the base of the fuel filter, unscrew the tap on the underside of the filter. Use a container to catch any water or fuel that comes out.
6. Check the fuel valve, accessed by removing the side panel of the engine compartment. The valve should produce an audible click when the ignition is turned on. Check the continuity of the valve solenoid.

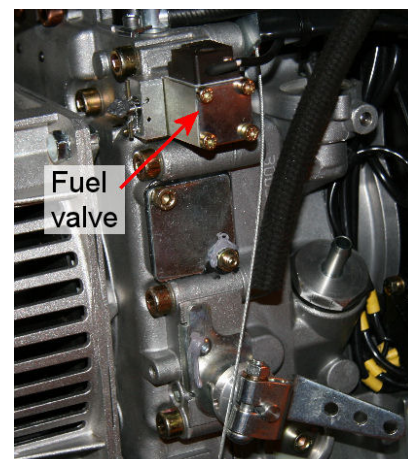


Fig 4-2 Fuel valve

4.3 Battery Charging Check

The battery is charged from an a.c. alternator driven by the engine. A regulator converts the a.c. to a d.c. charging current, which it regulates to ensure a full battery charge.

To check charging, start the engine and measure the battery voltage. The charging voltage should be of the order of 14V. If the battery voltage has not

Section 4 Fault Finding

increased significantly from its off-load value, suspect an alternator, regulator or wiring problem.

To check the alternator, switch off the engine, disconnect the connections to the alternator and connect an d.c. voltmeter to the alternator. Start the engine and measure the (off-load) output from the alternator, this should be more than 14V d.c.

If the alternator output is correct, check the regulator and wiring as detailed in the engine workshop manual.

4.4 Mast Will not Stay Up

Check that the handbrake is fully on.

Check that the linkage to the handbrake is correctly operating the AMOSS valve under the tow bar.

Check for leakage around the mast segments. If necessary, replace the relevant seals on the mast (See Section 5.12 Mast Seal Replacement).

Section 5 Parts Replacement

5.1 Recommended Tools

- Crows foot 32 mm spanner

5.2 Lamp replacement

Note: Do not touch the lamp bulb with bare fingers. The grease deposited from skin will cause the lamp to fail when it is turned on. Ensure that the new lamp is clean.

1. Release the clips securing the lens (Fig 5-1) and remove the lens (Fig 5-2).



Fig 5-1 Lens clips



Fig 5-2 Lamp lens

2. Unclip the lamp from the holder (Fig 3-3).
3. Install the new lamp and refit the lens.

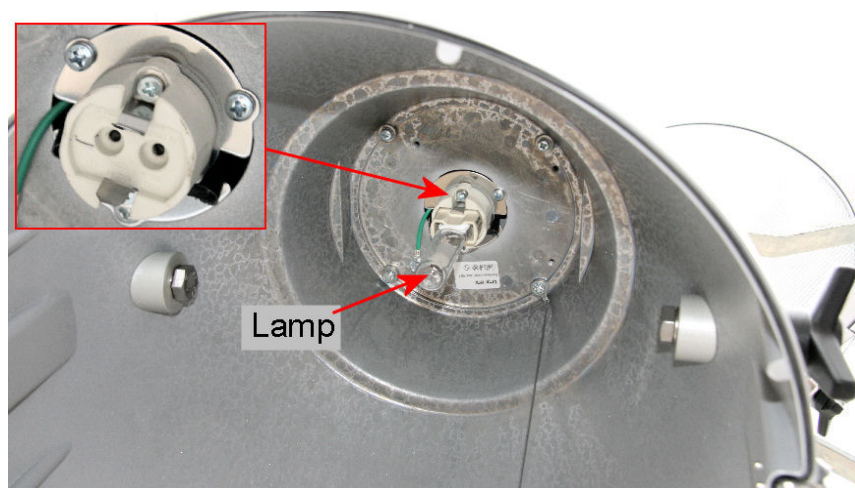


Fig 3-3 Lamp and holder

5.3 Housing Removal

The housing is held in place by the lifting frame.

1. Release the lifting frame by removing the two bolts at the rear (Fig 5-4) and the single bolt at the front (Fig 5-3)
2. If necessary, disconnect the licence plate wiring.
3. Remove the lifting frame and lift off the housing.

Refitting is the reverse of this procedure.

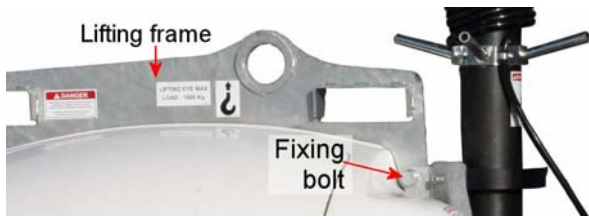


Fig 5-3 Lifting frame front fixing

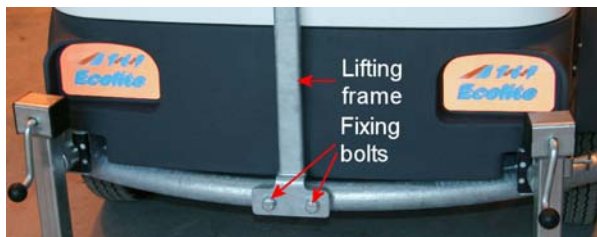


Fig 5-4 Lifting frame rear fixing

5.4 Air Filter

Parts:

Air filter element	TCP 10-0273
Safety element	TCP 10-0274



Fig 5-5 Air filter cover removal

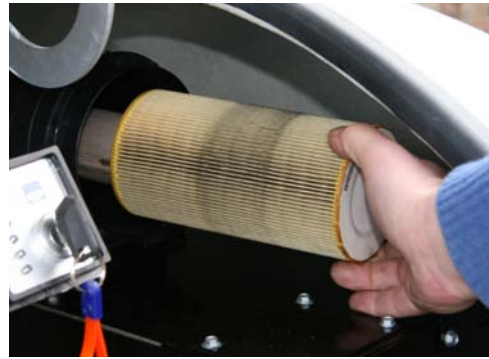


Fig 5-6 Air filter element

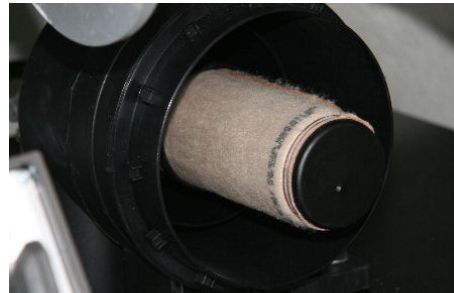


Fig 5-7 Safety element

Check the air filter every 250 operating hours - daily under dusty conditions. The filter comprises an outer filter element and an inner safety element, intended to stop the filter element being sucked in.

1. Open the cover to access the air filter assembly.
2. Unscrew the air filter cover (Fig 5-5).
3. Extract the filter element (Fig 5-6).
4. Extract the inner, safety element (Fig 5-7).
5. Replace filter if damaged or dirty.
6. Reassemble the filter assembly.

5.5 Exhaust System

⚠ WARNING

The ceramic wrapping on the exhaust pipe is toxic – possible, low risk carcinogenic. Minimise dust release and use appropriate personal protection equipment when handling it.

Parts:

10-2924	Silencer
10-3003	Exhaust Flexible Pipe
10-2962	Exhaust Elbow
10-2878	Exhaust Outlet Pipe
10-3032	Silencer + Spark Arrestor MS

1. Release the clamp securing the exhaust chamber to the down pipe on the underside of the unit.
2. Remove the four screws securing the exhaust chamber (Fig 5-8) and remove the chamber.

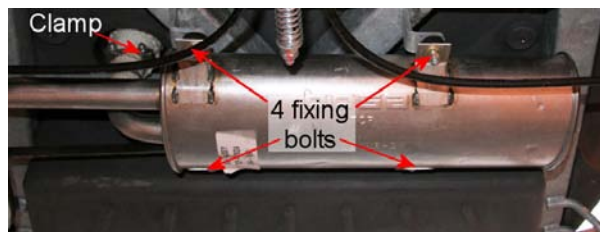


Fig 5-8 Exhaust chamber fixing points

Fitting the exhaust is the reverse of this procedure.

5.6 Fan Replacement

To replace the fan on the engine compartment:

1. Ensure that the engine is switched off. Remove and pocket the key.
2. Isolate the battery by disconnecting the negative terminal of the battery.
3. Remove the enclosure as detailed in Section 5.3 Housing Removal.
4. Remove the side panels from the engine compartment.
5. Remove the concertina hose from the fan.
6. Remove the panel on which the fan is mounted.



Fig 5-9 Fan

7. Disconnect the fan supply leads. The red lead unplugs from a free socket. The black lead is attached to the alternator frame.
8. Remove the fan from the panel (four screws).

Fitting the new fan is the reverse of this procedure.

5.7 Alternator Replacement

1. Ensure that the engine is switched off. Remove and pocket the key.
2. Isolate the battery by disconnecting the negative terminal of the battery.
3. Remove the enclosure as detailed in Section 5.3 Housing Removal.
4. Remove the side, top and fan panels from the engine compartment.
5. Unbolt Hatz engine controller from control panel and lift away with engine pod.
6. Disconnect cables from alternator (white multi-connector).
7. Remove the two or four screws securing the alternator vibration mount(s) to the base.
8. Remove the four screws securing the alternator to the engine.

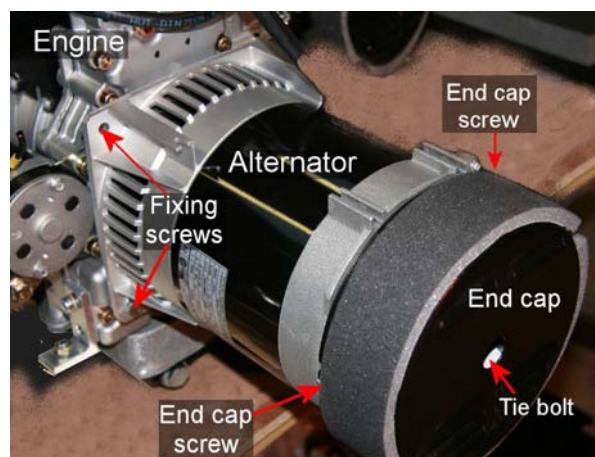


Fig 5-10 Fan

9. Remove the alternator end cap (two screws).
10. Unscrew the tie bolt that passes through the centre of the alternator.

The next step is to disconnect the alternator from the motor, which drives the alternator via a tapered shaft (Fig 5-11).



Fig 5-11 Drive shaft on alternator

Section 5 Parts Replacement

11. Screw the tie bolt two turns back into the shaft. While pulling the alternator away from the engine, tap sharply on the end of tie bolt with a copper mallet to release the shaft from the taper. If necessary, use a pry bar in the gap between the alternator and the engine to prise them apart while tapping the bolt.

Fitting the new alternator is the reverse of this procedure.

5.8 Engine Removal

⚠ WARNING

Take due care when working with fuel. Diesel fuel is a health hazard for contact with eyes or skin, inhalation and ingestion. There is also danger of fire and pollution.

⚠ WARNING

The engine is heavy. Use appropriate lifting equipment and/or get the necessary help.

1. Ensure that the engine is switched off. Remove and pocket the key.
2. Isolate the battery by disconnecting the negative terminal of the battery.
3. Remove the enclosure as detailed in *Section 5.3 Housing Removal*.
4. Remove the four bolts securing the engine pod to the Ecolite chassis.
5. Disconnect the lead to the alternator from the terminal block attached to the underside of the plate on the top corner of the engine pod (Fig 5-12) and extract the lead from the engine pod.

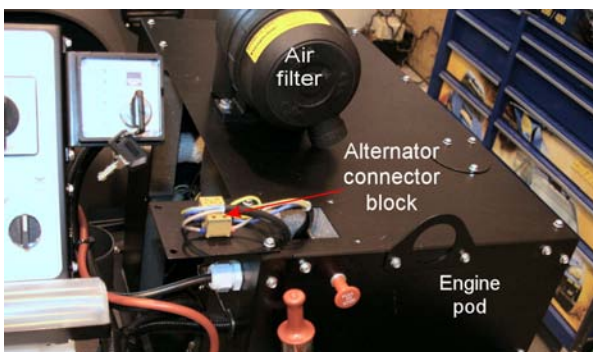


Fig 5-12 Alternator connector block

6. Disconnect the exhaust at the elbow where the pipe leaves the engine pod.



Fig 5-13 Engine exhaust outlet

7. Disconnect the fuel lines.

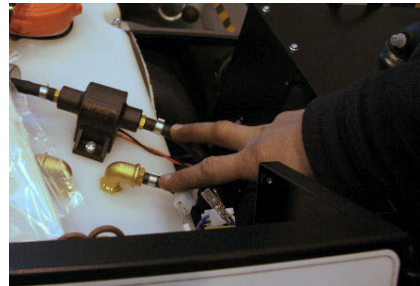


Fig 5-14 Fuel lines

8. Disconnect the concertina duct from the engine extractor fan.



Fig 5-15 Engine extractor duct

9. Attach the hoist straps to the lifting eyes of the engine pod.
10. Lift the pod out and deposit it on a bench working area.
11. Remove the two screws securing the dipstick and pump assembly to the panel.

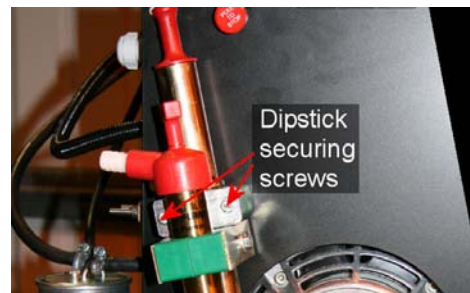


Fig 5-16 Dipstick securing screws

12. Tip the engine pod on its side to reveal the sump cover.
13. Disconnect the sump adaptor from the dipstick assembly (Fig 5-18).

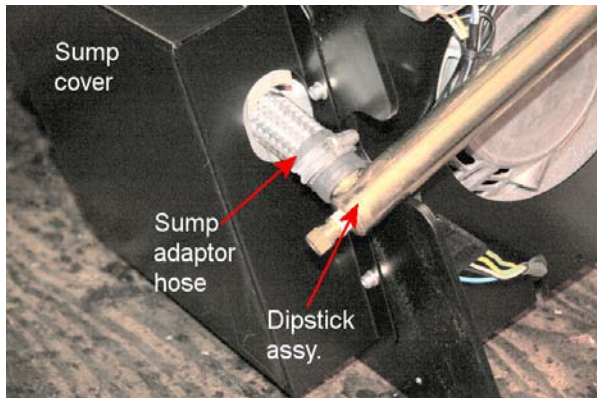


Fig 5-19 Sump cover and adaptor hose

14. Remove the sump cover from the frame.
15. Remove the hose from the sump adaptor and unscrew the sump adaptor from the sump.

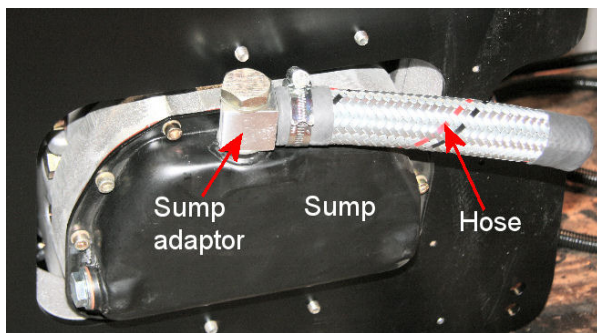


Fig 5-18 Sump adaptor

16. Remove the four bolts securing the engine to the pod and lift out the engine.
17. Remove the alternator from the engine as described in *Section 5.7 Alternator Replacement*.

Fitting the new engine is the reverse of this procedure. Fit the sump adaptor and hose from the old engine to the sump of the new engine.

5.9 Hydraulic Pump

1. Ensure that the engine is switched off. Remove and pocket the key.
2. Isolate the battery by disconnecting the negative terminal of the battery.
3. Remove the enclosure as detailed in *Section 5.3 Housing Removal*.
4. Disconnect the supplies to the pump motor and the pump motor solenoid.5.
Disconnect the hoses from the pump assembly (Fig 5-21).



A

B

Fig 5-21 Disconnecting pump assembly

6. Remove the four screws securing the pump assembly to the tank



Fig 5-22 Pump screws

7. Carefully lift out the pump, taking care not to observe the safety precautions appropriate to the hydraulic fluid.

Refitting is the reverse of this procedure.

5.10 AMOSS Valve Replacement

Recommended tools: Crows foot 32 mm spanner.

The AMOSS valve is responsible for ensuring that the mast cannot be raised unless the handbrake is off. It is located under the tow bar.

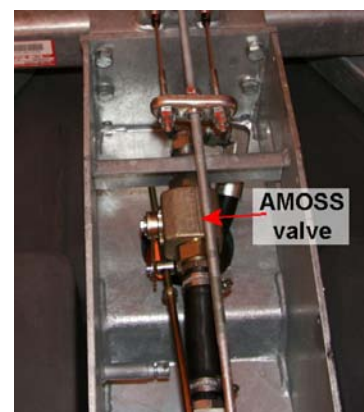


Fig 5-23 AMOSS valve

Section 5 Parts Replacement

When removing the nuts securing the valve to the cross strut and the hose connector, take care to avoid turning the 41 mm nuts on the valve as they have a very low torque setting.

5.11 Mast O-ring Replacement

1. Remove the bolt securing the Light Assembly to the mast and lift the assembly off the mast using a hoist or similar.
2. At the cap containing the faulty O-ring, remove the screws securing the cap. (Fig 5-24)



Fig 5-24 Hoisting mast section

3. Attach a strop to the assembly just above the cap and use a hoist or fork-lift to raise the upper section by about 20 cm. (Fig 5-26)



Fig 5-25 Removing cap

4. Using a hammer and copper drift, tap off the cap (Fig 5-25) and raise it a few cm. The O-ring is located just under the rim of the cap (Figs 5-26 and 5-30).



Fig 5-26 O-ring

5. Extract the O-ring from the cap rim.
6. Carefully clean the area.
7. Remove the strop from the assembly
8. Remove the O-ring by stretching it and lifting it over the assembly (Fig 5-27).



Fig 5-27 Removing O-ring

Fitting a new O-ring is the reverse of this procedure. However:

- Be sure to use the correct O-ring. There is a different size for each mast section – numbered 1 for the bottom one (largest) to 6 for the top one.
- Ensure that the O-ring and the surrounding area are clean.
- Apply water-resistant grease to the area.
- After stretching the new O-ring over the caps, allow time for the ring to regain its proper size before attempting to fit it into the groove in the cap.
- On refitting the cap, tap it down with a soft mallet.

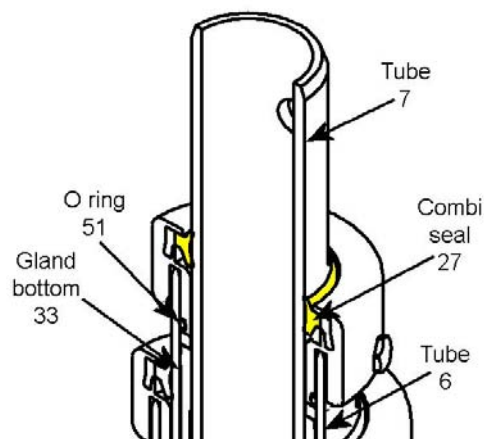


Fig 5-30 Mast detail



Fig 5-28 Refitting cap

- After refitting the cap, check for rubber debris in the cap fixing holes (Fig 5-29). The presence of debris could indicate that the O-ring has been damaged by a burr around the hole. If debris is present, remove and check/replace the O-ring.



Fig 5-29 Checking for debris

5.12 Mast Seal Replacement

Tools: A machine seal guide kit 51-0381.

A seal is fitted in each of the caps on the mast. Each seal is a combination pressure and wiper seal.



Fig 5-31 Mast seal

1. Remove the bolt securing the Light Assembly to the mast and lift the assembly off the mast using a hoist or similar.
2. **Mark the caps with Tipex or similar to ensure that they can be refitted with the correct orientation.**
3. Remove the caps down to and including the cap with the faulty seal, as described in Section 5.11 Mast O-ring Replacement.
4. Check/replace the suspect seal. Also check/replace the O-ring.
5. Carefully clean the area and apply water-resistant grease.
6. Check/replace the seals and O-rings on the remaining caps that have been removed.

Section 5 Parts Replacement

7. Refit the caps as described in Section 5.11 Mast O-ring Replacement. However:
 - Ensure that the orientation of each cap is correct, as marked (Fig **Error! Reference source not found.**).
 - Use the guide jigs as shown in Fig 5-32. These compress the inner pressure seal so that the cap will fit over the tube.



Fig 5-32 Fitting a cap

5.13 Mast Flat Bar Replacement

Within each cylinder of the mast, two flat bars connect upper and lower sections to maintain their alignment. The bars are not fixed in place but sit in slots at top and bottom.

To replace a bar, proceed as follows:

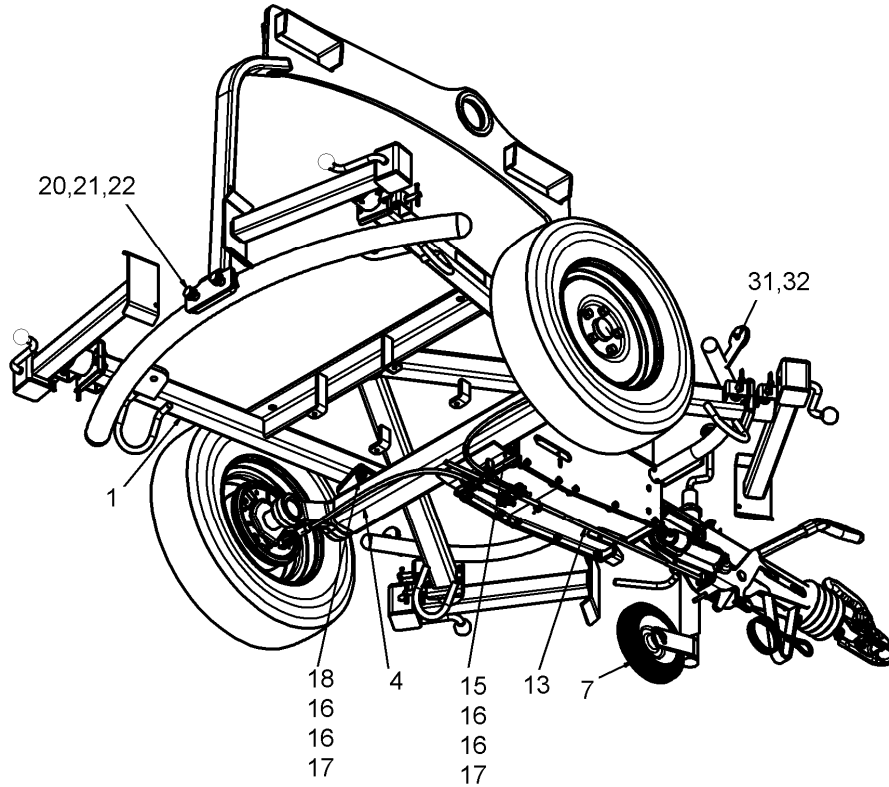
1. Remove the bolt securing the Light Assembly to the mast and lift the assembly off the mast using a hoist or similar.
2. Mark the caps with Tipex or similar to ensure that they can be refitted with the correct orientation. (Fig **Error! Reference source not found.**)
3. Attach two straps to the cap where the problem lies and hitch them to a hoist. Fit the straps in such a way as to ensure horizontal stability.
4. Hoist the mast section clear of the remainder to reveal the two flat bars.
5. Remove the faulty bar and replace it with a new one. The bar sits in a slot at the bottom of the assembly.

The new bar will be seen to be slightly bowed. Orient the bar so that it bows out at the centre. When in place, it will thus be supported by the outer cylinder.

6. Smear some thick grease on the outer surface of the top of the bars and press them against the cylinder. The grease is intended to keep the bars in position until they can be engaged with the top slots.
7. Quickly and carefully, lower the assembly, with the correct orientation, into the cylinder and position it so that the bars fit into the designated slots. If the bars come adrift, repeat the procedure.
8. Reassemble the unit.

Section 6 Drawings

6.1 Rolling Chassis Assy TCP-2995 Sh A

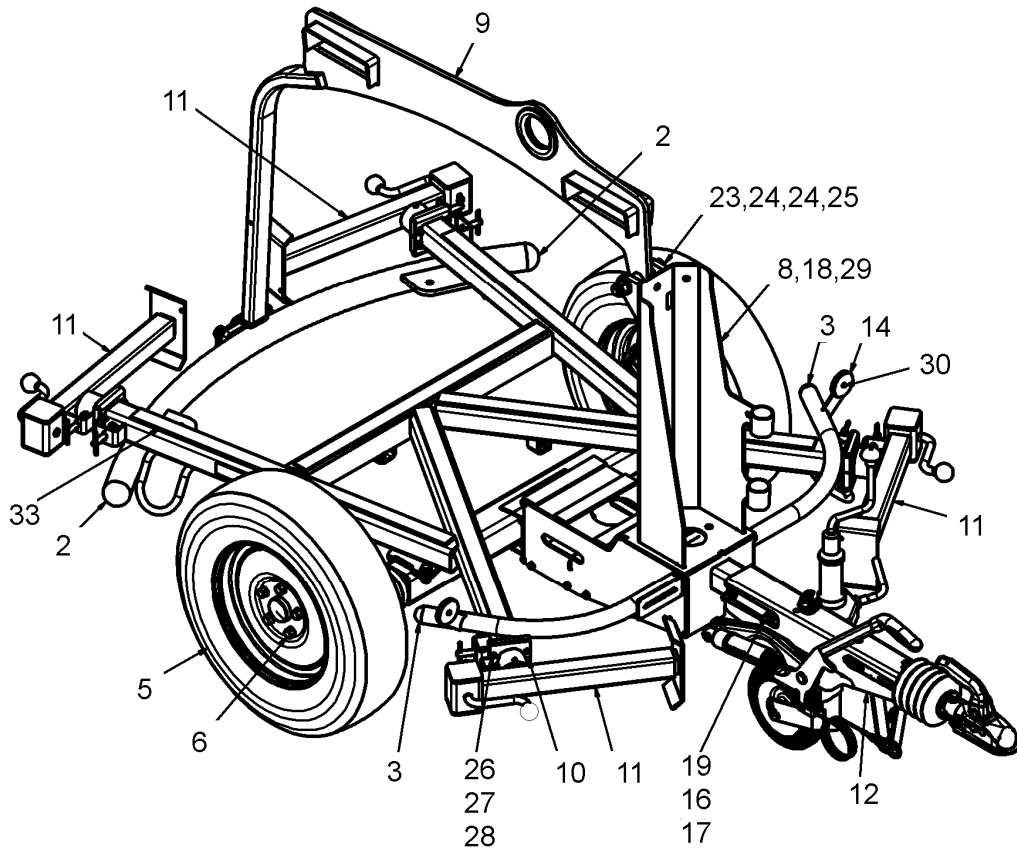


33	TCP-2384	30-0050		FOAM STRIP 30 X 6	8
32	ISO 7040 - M5	01-0085	50-2982	HEX NUT WITH TORQUE PART	2
31	BS 4320 - M5 (Form A)	02-0013	50-2982	BRIGHT METAL WASHER - METRIC SERIES	2
30	ISO 7045 - M5 x 20 - 4.8 - Z	01-0190	50-2982	PAN HEAD SCREW - GRADE A	2
29	DIN 9021 - 13 (NS)	AS SUPPLIED	50-2982	WASHER	2
28	ISO 4032 - M6	01-0081	50-2982	HEXAGON FULL NUT	16
27	BS 4320 - M6 (Form A)	02-0004	50-2982	BRIGHT METAL WASHER - METRIC SERIES	16
26	ISO 10642 - M6 x 30	01-0178	50-2982	HEXAGON SOCKET COUNTERSUNK HEAD SCREW	16
25	ISO 7040 - M20	01-0046	50-2982	HEX NUT WITH TORQUE PART	1
24	BS 4320 - M20 (Form A)	02-0047	50-2982	BRIGHT METAL WASHER - METRIC SERIES	2
23	ISO 4014 - M20 x 130	01-0186	50-2982	HEXAGON HEAD BOLT - PRODUCT GRADES A and B	1
22	ISO 4017 - M16 x 45	01-0185	50-2982	HEXAGON HEAD SCREW	2
21	BS 4464 - M16 Form B	02-0046	50-2982	SPRING WASHER - METRIC SERIES	2
20	BS 4320 - M16 (Form A)	02-0025	50-2982	BRIGHT METAL WASHER - METRIC SERIES	2
19	ISO 4014 - M12 x 100	01-0184	50-2982	HEXAGON HEAD BOLT - PRODUCT GRADES A and B	2
18	ISO 4017 - M12 x 35	01-0183	50-2982	HEXAGON HEAD SCREW	6
17	ISO 7040 - M12	01-0038	50-2982	HEX NUT WITH TORQUE PART	10
16	BS 4320 - M12 (Form A)	02-0021	50-2982	BRIGHT METAL WASHER - METRIC SERIES	20
15	ISO 4762 - M12 x 35	01-0024	50-2982	HEXAGON SOCKET HEAD CAP SCREW	4
14	TCP-1983	22-0029	50-2982	REFLECTOR - WHITE	2
13			50-2982	BRAKE ROD (KNOTT) ECOLITE	1
12	TCP-2987 SA	22-2987	50-2982	60mm COUPLING 1000 kg - PRESSED STEEL HEAD	1
11	TCP-1655	50-0056	50-2982	JACK LEG ASSY	4
10	TCP-2046	50-0050	50-2982	JACK LEG STOP	8
9	TCP-2899	50-2899	50-2982	LIFTING FRAME	1
8	TCP-2900	50-2900	50-2982	CHASSIS FRONT 60mm	1
7	TCP-1998	22-0245	50-2982	JOCKEY WHEEL	1
6	TCP-2810	22-0152	50-2982	WHEEL BOLT	10
5	TCP-1997	22-0247	50-2982	165R13 WHEEL & TYRE ASSY	2
4	TCP-1934	22-0246	50-2982	ECOLITE AXLE ASSY 5 X 112	1
3	TCP-2907	03-2907	50-2982	38mm SPHERICAL BLANKING PLUG	2
2	TCP-1979	03-0044	50-2982	60mm SPHERICAL BLANKING PLUG	2
1	TCP-2905	50-2905	50-2892	CHASSIS WELDMENT	1
ITEM	DRG. No.	STOCK No.	KIT	DESCRIPTION	QTY

Iss A 10/09/2008
Stock No.SA-2995

TCP-2995 SA Rolling Chassis Assy A
50 mm Pressed Steel Head

6.2 Rolling Chassis Assy TCP-2995 Sh B

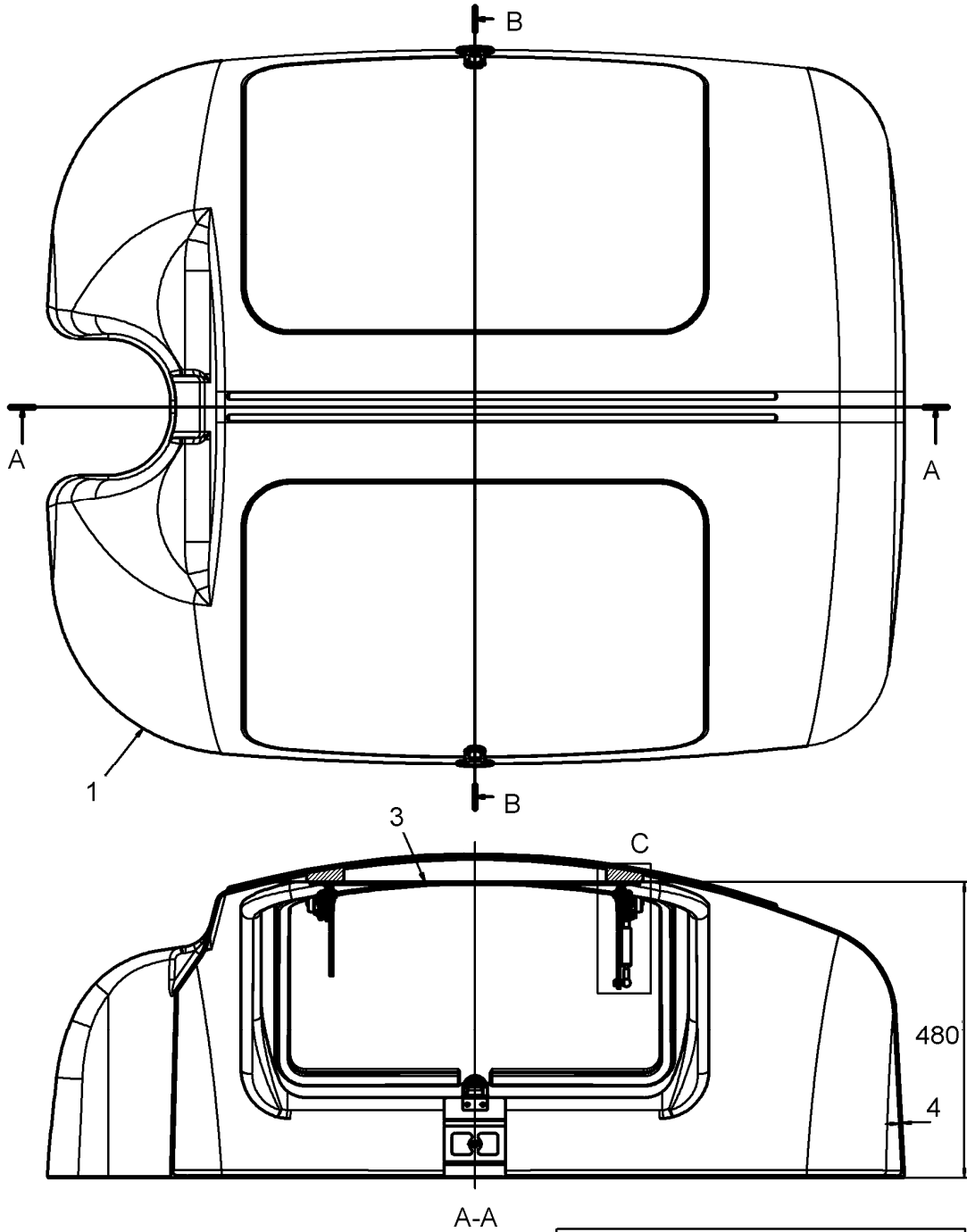


33	TCP-2384	30-0050		FOAM STRIP 30 X 6	8
32	ISO 7040 - M5	01-0085	50-2982	HEX NUT WITH TORQUE PART	2
31	BS 4320 - M5 (Form A)	02-0013	50-2982	BRIGHT METAL WASHER - METRIC SERIES	2
30	ISO 7045 - M5 x 20 - 4.8 - Z	01-0190	50-2982	PAN HEAD SCREW - GRADE A	2
29	DIN 9021 - 13 (NS)	AS SUPPLIED	50-2982	WASHER	2
28	ISO 4032 - M6	01-0081	50-2982	HEXAGON FULL NUT	16
27	BS 4320 - M6 (Form A)	02-0004	50-2982	BRIGHT METAL WASHER - METRIC SERIES	16
26	ISO 10642 - M6 x 30	01-0178	50-2982	HEXAGON SOCKET COUNTERSUNK HEAD SCREW	16
25	ISO 7040 - M20	01-0046	50-2982	HEX NUT WITH TORQUE PART	1
24	BS 4320 - M20 (Form A)	02-0047	50-2982	BRIGHT METAL WASHER - METRIC SERIES	2
23	ISO 4014 - M20 x 130	01-0186	50-2982	HEXAGON HEAD BOLT - PRODUCT GRADES A and B	1
22	ISO 4017 - M16 x 45	01-0185	50-2982	HEXAGON HEAD SCREW	2
21	BS 4464 - M16 Form B	02-0046	50-2982	SPRING WASHER - METRIC SERIES	2
20	BS 4320 - M16 (Form A)	02-0025	50-2982	BRIGHT METAL WASHER - METRIC SERIES	2
19	ISO 4014 - M12 x 100	01-0184	50-2982	HEXAGON HEAD BOLT - PRODUCT GRADES A and B	2
18	ISO 4017 - M12 x 35	01-0183	50-2982	HEXAGON HEAD SCREW	6
17	ISO 7040 - M12	01-0038	50-2982	HEX NUT WITH TORQUE PART	10
16	BS 4320 - M12 (Form A)	02-0021	50-2982	BRIGHT METAL WASHER - METRIC SERIES	20
15	ISO 4762 - M12 x 35	01-0024	50-2982	HEXAGON SOCKET HEAD CAP SCREW	4
14	TCP-1983	22-0029	50-2982	REFLECTOR - WHITE	2
13			50-2982	BRAKE ROD (KNOTT) ECOLITE	1
12	TCP-2987 SA	22-2987	50-2982	60mm COUPLING 1000 kg - PRESSED STEEL HEAD	1
11	TCP-1655	50-0056	50-2982	JACK LEG ASSY	4
10	TCP-2046	50-0050	50-2982	JACK LEG STOP	8
9	TCP-2899	50-2899	50-2982	LIFTING FRAME	1
8	TCP-2900	50-2900	50-2982	CHASSIS FRONT 60mm	1
7	TCP-1998	22-0245	50-2982	JOCKEY WHEEL	1
6	TCP-2810	22-0152	50-2982	WHEEL BOLT	10
5	TCP-1997	22-0247	50-2982	165R13 WHEEL & TYRE ASSY	2
4	TCP-1934	22-0246	50-2982	ECOLITE AXLE ASSY 5 X 112	1
3	TCP-2907	03-2907	50-2982	38mm SPHERICAL BLANKING PLUG	2
2	TCP-1979	03-0044	50-2982	60mm SPHERICAL BLANKING PLUG	2
1	TCP-2905	50-2905	50-2982	CHASSIS WELDMENT	1
ITEM	DRG. No.	STOCK No.	KIT	DESCRIPTION	QTY

Iss A 10/09/2008
Stock No.SA-2995

TCP-2995 SA Rolling Chassis Assy B 50 mm Pressed Steel Head

6.3 Upper Body Assy TCP-2870 Sh 1A

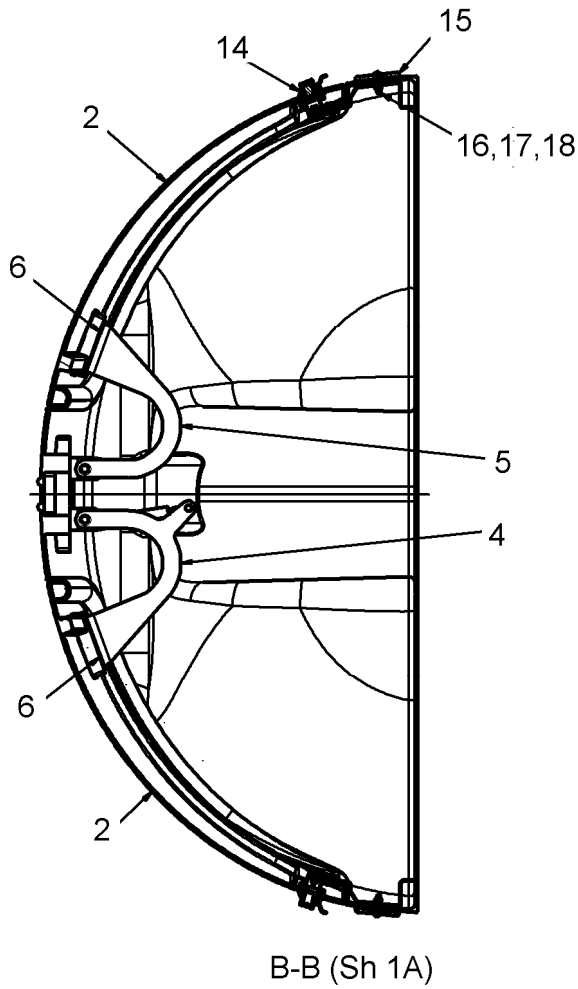


Iss C 10/10/2008
 Stock No.30-2870-XX

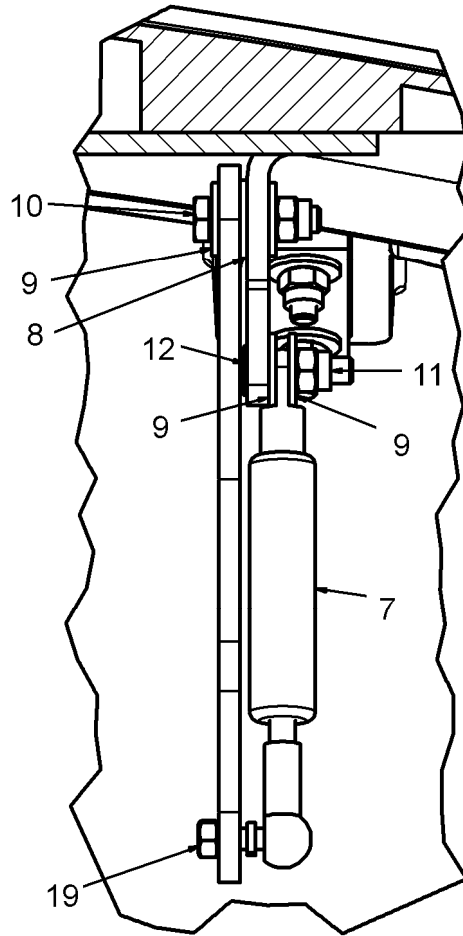
UPPER BODY COLOUR			
EDN	COLOUR	COLOUR SPEC	STOCK No
1	ORANGE	RAL 2009	30-2870-01
2	WHITE		30-2870-02
3	RED	RAL 3020	30-2870-03
4	YELLOW	RAL 1007	30-2870-04
5	PINK		30-2870-05
6	LIGHT GREEN	RAL	30-2870-06

Upper Body Assy TCP-2870 Sh 1A

6.4 Upper Body Assy TCP-2870 Sh 1B



B-B (Sh 1A)



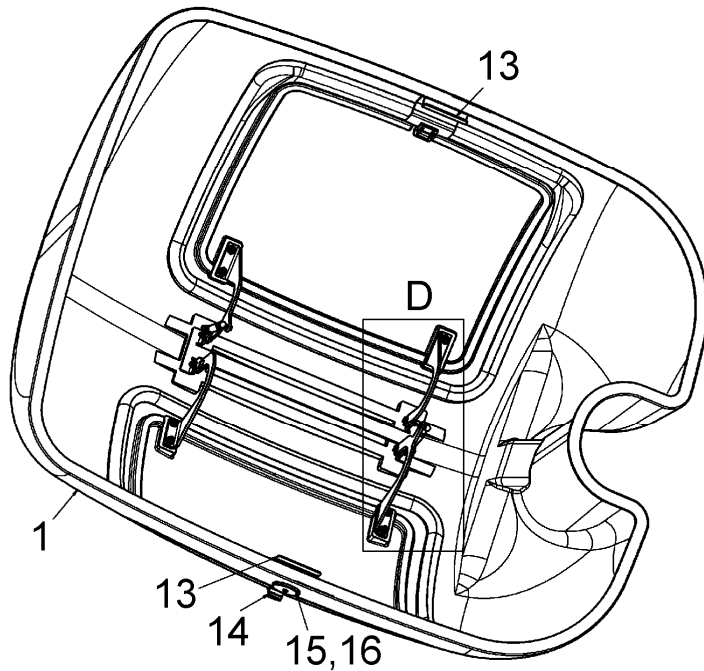
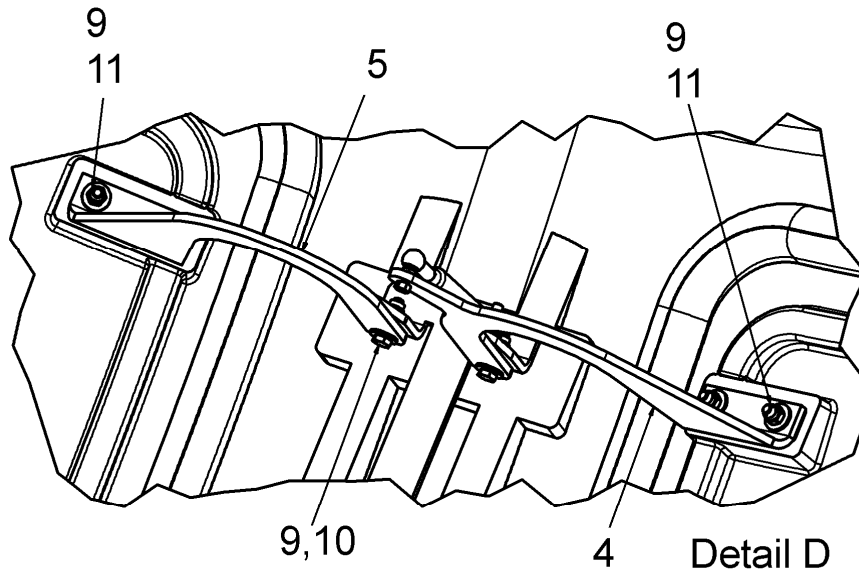
Detail C (from Sh 1A)

19	ISO 4032 - M5	01-0187	HEXAGON FULL NUT	2
18	ISO 7040 - M5	01-0085	HEX NUT WITH TORQUE PART	2
17	BS 4320 - M5 (Form A)	02-0013	BRIGHT METAL WASHER - METRIC SERIES	2
16	ISO 7045 - M5 x 25 - 4.8 - Z	01-0188	PAN HEAD SCREW - GRADE A	2
15	TCP-1982	22-0028	REFLECTOR - YELLOW	2
14	TCP-2126	41-0163	SERVICE COVER LOCK	2
13	TCP-2923 SA	30-2923	DOOR CATCH ASSY	2
12	ISO 10642 - M6 x 25	01-0166	HEXAGON SOCKET COUNTERSUNK HEAD SCREW	2
11	ISO 7040 - M6	01-0017	HEX NUT WITH TORQUE PART	14
10	ISO 4017 - M6 x 25	01-0040	HEXAGON HEAD SCREW	4
9	BS 4320 - M6 (Form A)	02-0004	BRIGHT METAL WASHER - METRIC SERIES	20
8	DIN 9021 - 6.4	02-0033	WASHER	4
7	TCP-2196	40-0024	GAS STRUT	2
6	TCP-3053		HINGE SHIM	4
5	TCP-3050	30-3050	HINGE RIGHT PLAIN	2
4	TCP-2910	30-2910	HINGE RIGHT PIVOT	2
3	TCP-3052	30-3052	HINGE PIVOT PLATE	1
2	TCP-2872	30-2872-XX	SERVICE DOOR	2
1	TCP-2871	30-2870-XX	UPPER BODY	1
ITEM	DRG. No.	STOCK No.	DESCRIPTION	QTY

Iss C 10/10/2008
Stock No.30-2870-XX

Upper Body Assy TCP-2870 Sh 1B

6.5 Upper Body Assy TCP-2870 Sh 2

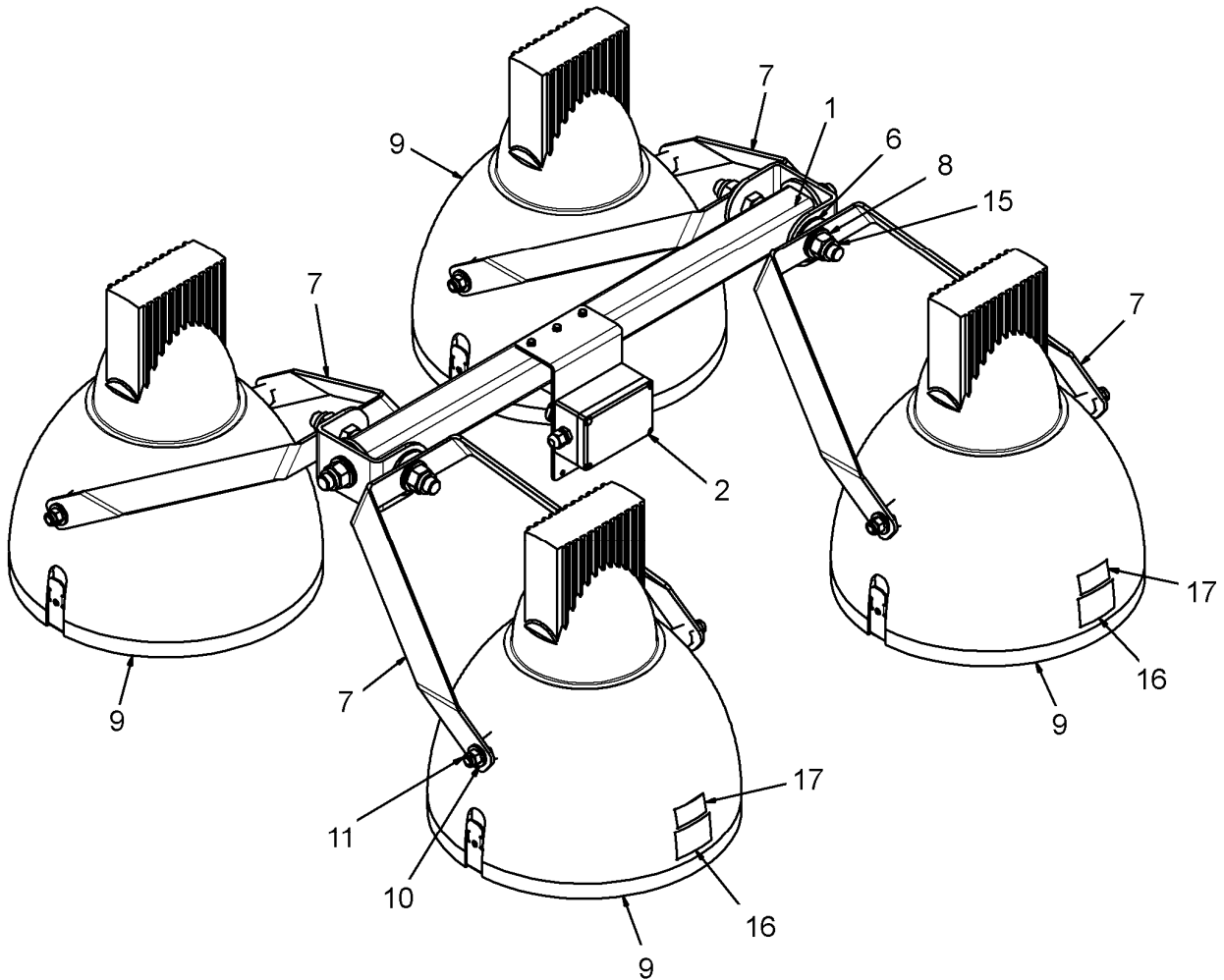


19	ISO 4032 - M5	01-0187	HEXAGON FULL NUT	2
18	ISO 7040 - M5	01-0085	HEX NUT WITH TORQUE PART	2
17	BS 4320 - M5 (Form A)	02-0013	BRIGHT METAL WASHER - METRIC SERIES	2
16	ISO 7045 - M5 x 25 - 4.8 - Z	01-0188	PAN HEAD SCREW - GRADE A	2
15	TCP-1982	22-0028	REFLECTOR - YELLOW	2
14	TCP-2126	41-0163	SERVICE COVER LOCK	2
13	TCP-2923 SA	30-2923	DOOR CATCH ASSY	2
12	ISO 10642 - M6 x 25	01-0166	HEXAGON SOCKET COUNTERSUNK HEAD SCREW	2
11	ISO 7040 - M6	01-0017	HEX NUT WITH TORQUE PART	14
10	ISO 4017 - M6 x 25	01-0040	HEXAGON HEAD SCREW	4
9	BS 4320 - M6 (Form A)	02-0004	BRIGHT METAL WASHER - METRIC SERIES	20
8	DIN 9021 - 6.4	02-0033	WASHER	4
7	TCP-2196	40-0024	GAS STRUT	2
6	TCP-3053		HINGE SHIM	4
5	TCP-3050	30-3050	HINGE RIGHT PLAIN	2
4	TCP-2910	30-2910	HINGE RIGHT PIVOT	2
3	TCP-3052	30-3052	HINGE PIVOT PLATE	1
2	TCP-2872	30-2872-XX	SERVICE DOOR	2
1	TCP-2871	30-2870-XX	UPPER BODY	1
ITEM	DRG. No.	STOCK No.	DESCRIPTION	QTY

Issue C 22/07/2008
Stock No. 30-2870-XX

Upper Body Assy TCP-2870 Sh.2

6.6 Four-head Lamp Gimbal Assy TCP-2970 SA Sh A

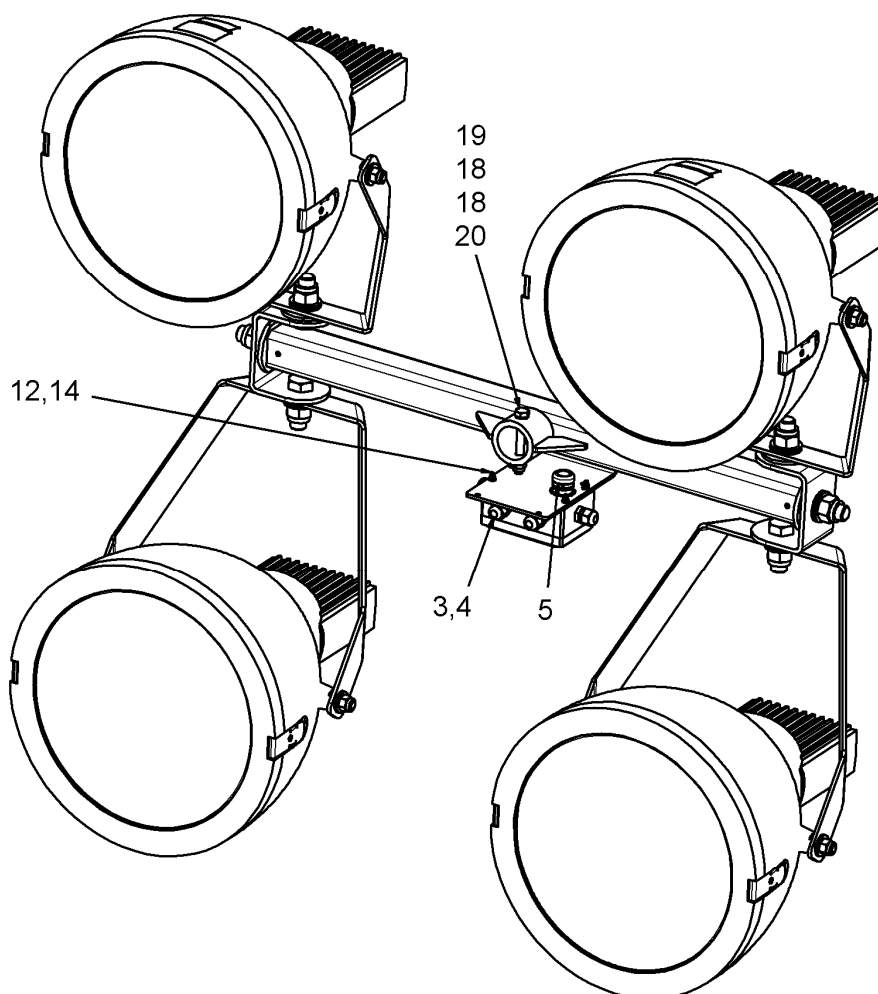


20	ISO 4014 - M10 x 80	01-0182		HEXAGON HEAD BOLT - PRODUCT GRADES A and B	1
19	ISO 7040 - M10	01-0006		HEX NUT WITH TORQUE PART	1
18	BS 4320 - M8 (Form A)	02-0011		BRIGHT METAL WASHER - METRIC SERIES	2
17	TCP-1090	80-0040		DECAL, WARNING HOT SURFACE	4
16	TCP-1091	80-0041		DECAL, WARNING LAMP GLASS BROKEN	4
15	ISO 7040 - M20	01-0046		HEX NUT WITH TORQUE PART	6
14	ISO 7040 - M4	01-0019		HEX NUT WITH TORQUE PART	4
13	BS 4320 - M4 (Form A)	02-0028		BRIGHT METAL WASHER - METRIC SERIES	4
12	ISO 7045 - M4 x 16 - 4.8 - Z	01-0152		PAN HEAD SCREW - GRADE A	4
11	ISO 7040 - M12	01-0038		HEX NUT WITH TORQUE PART	8
10	D2812215	40-0022		M12 DISK SPRING	16
9	TCP-2181	72-0038		BOOSTER LAMP 150W x Ø330mm	4
8	D4020425	40-0010		M20 DISK SPRING	12
7	TCP-1802	51-0307		LAMP SUPPORT BRACKET FIXED	4
6	TCP-4053		51-4105	FRICTION WASHER GIMBAL TEE BAR	4
5	TCP-2137	28-019		M25 CABLE GLAND	1
4	TCP-2113	IR3380		M15 CABLE GLAND NUT	4
3	TCP-2112	IR3375		M15 INDEX CABLE GLAND	4
2	TCP-2192	71-0230		JUNCTION BOX	1
1	TCP-4046		51-4105	GIMBAL TEE BAR ASSY	1
ITEM	DRG. No.	STOCK No.	KIT	DESCRIPTION	QTY

Iss A 29/09/2008
Stock No. SA-2970

TCP-2970 SA Ecolite 330 Four-lamp Gimbal Assy Sh A

6.7 Four-head Lamp Gimbal Assy TCP-2970 SA Sh B



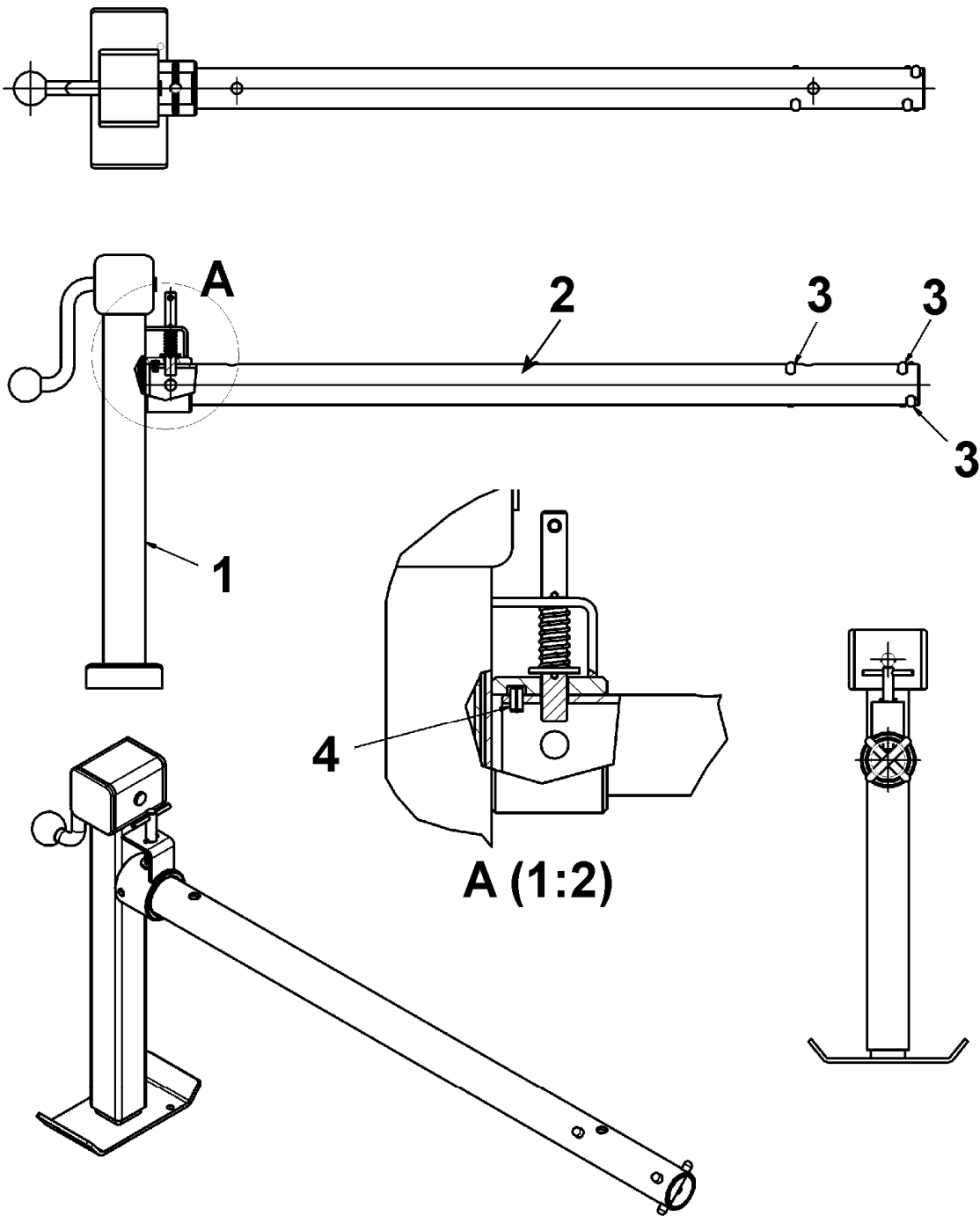
20	ISO 4014 - M10 x 80	01-0182		HEXAGON HEAD BOLT - PRODUCT GRADES A and B	1
19	ISO 7040 - M10	01-0006		HEX NUT WITH TORQUE PART	1
18	BS 4320 - M8 (Form A)	02-0011		BRIGHT METAL WASHER - METRIC SERIES	2
17	TCP-1090	80-0040		DECAL, WARNING HOT SURFACE	4
16	TCP-1091	80-0041		DECAL, WARNING LAMP GLASS BROKEN	4
15	ISO 7040 - M20	01-0046		HEX NUT WITH TORQUE PART	6
14	ISO 7040 - M4	01-0019		HEX NUT WITH TORQUE PART	4
13	BS 4320 - M4 (Form A)	02-0028		BRIGHT METAL WASHER - METRIC SERIES	4
12	ISO 7045 - M4 x 16 - 4.8 - Z	01-0152		PAN HEAD SCREW - GRADE A	4
11	ISO 7040 - M12	01-0038		HEX NUT WITH TORQUE PART	8
10	D2812215	40-0022		M12 DISK SPRING	16
9	TCP-2181	72-0038		BOOSTER LAMP 150W x Ø330mm	4
8	D4020425	40-0010		M20 DISK SPRING	12
7	TCP-1802	51-0307		LAMP SUPPORT BRACKET FIXED	4
6	TCP-4053		51-4105	FRICTION WASHER GIMBAL TEE BAR	4
5	TCP-2137	28-019		M25 CABLE GLAND	1
4	TCP-2113	IR3380		M15 CABLE GLAND NUT	4
3	TCP-2112	IR3375		M15 INDEX CABLE GLAND	4
2	TCP-2192	71-0230		JUNCTION BOX	1
1	TCP-4046		51-4105	GIMBAL TEE BAR ASSY	1
ITEM	DRG. No.	STOCK No.	KIT	DESCRIPTION	QTY

Iss A 29/09/2008

Stock No. SA-2970

TCP-2970 SA Ecolite 330 Four-lamp Gimbal Assy Sh B

6.8 Jack Leg Assy TCP1655



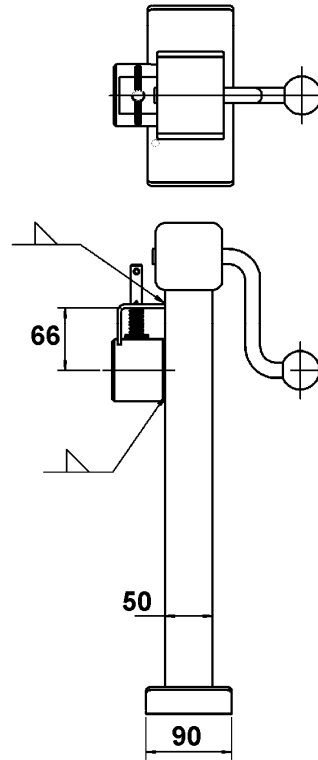
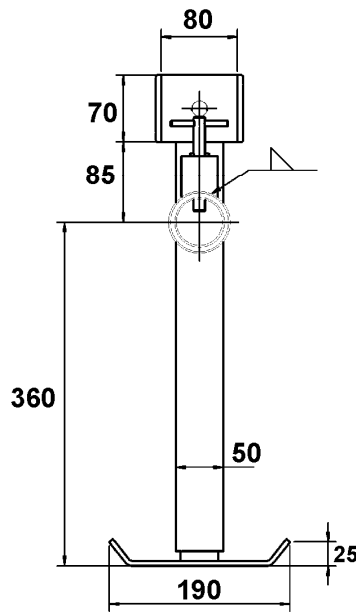
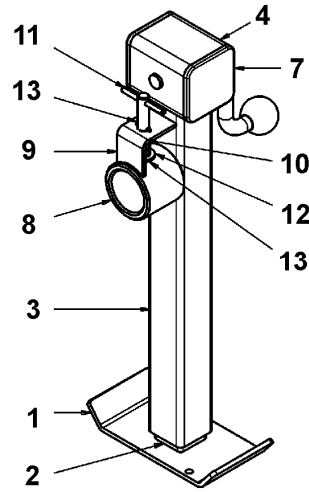
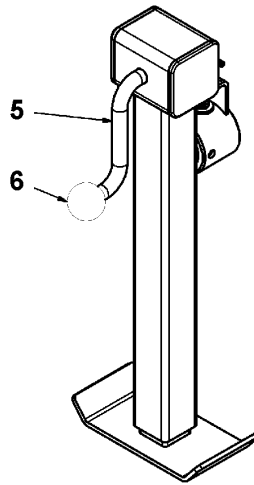
4	ISO 13337 - 6 x 12	02-0045	Spring-type straight pins - slotted, light duty	1
3	TCP-2245	50-0061	GUIDE PIN	3
2	TCP-1877	50-0047	JACK LEG TUBE	1
1	TCP-2064	50-0046	JACK LEG	1
ITEM	DRG. No.	STOCK No.	DESCRIPTION	QTY

Iss E 12/03/2008

Jack Leg Assy TCP-1655

6.9 Jack Leg TCP-2064

ISS	DESCRIPTION	DATE
A	INITIAL ISSUE	23/01/2007
B	UPDATED FROM MODEL	20/03/2007
C	REVISED LOCK PIN	31/03/2007
D	LENGTH INCREASED	12/04/2007
E	SEE DCA 00263	12/03/2008

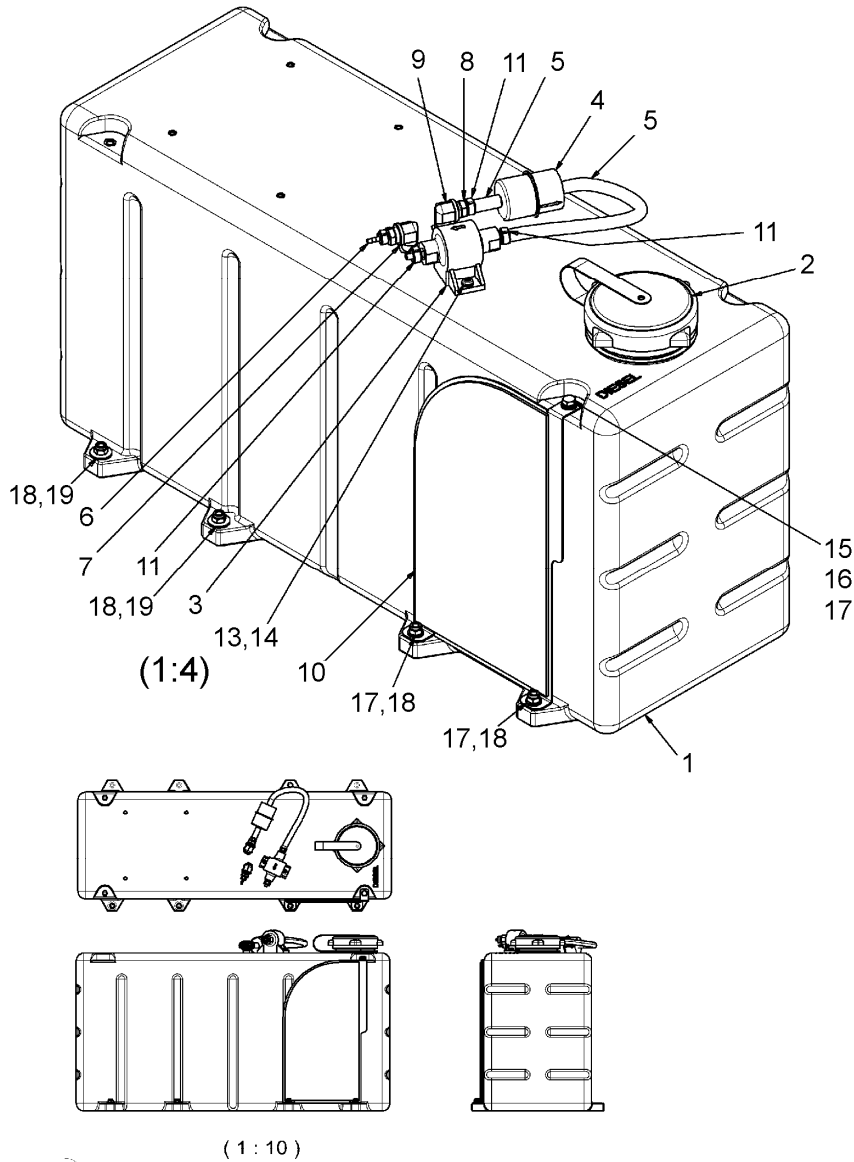


13	ISO 13337 - 3 x 20	-	Spring-type straight pins - slotted, light duty	2
12	BS 4320 - M12 (Form A)	02-0021	BRIGHT METAL WASHER - METRIC SERIES	1
11	TCP-2120		LOCATING PIN	1
10	TCP-2124		SPRING	1
9	TCP-2122		LOCATING BRACKET	1
8	TCP-2121		LOCATING RING	1
7	TCP-2147		BLANKING PLUG	2
6			KNOB	1
5	TCP-2848		HANDLE	1
4			GEARBOX	1
3			LEG BOX 50	1
2			LEG BOX 40	1
1			FOOT	1
ITEM	DRG. No.	STOCK No	DESCRIPTION	QTY

Iss E 12/03/2008

Jack Leg TCP-2064

6.10 SA Fuel Tank Assy TCP-2867

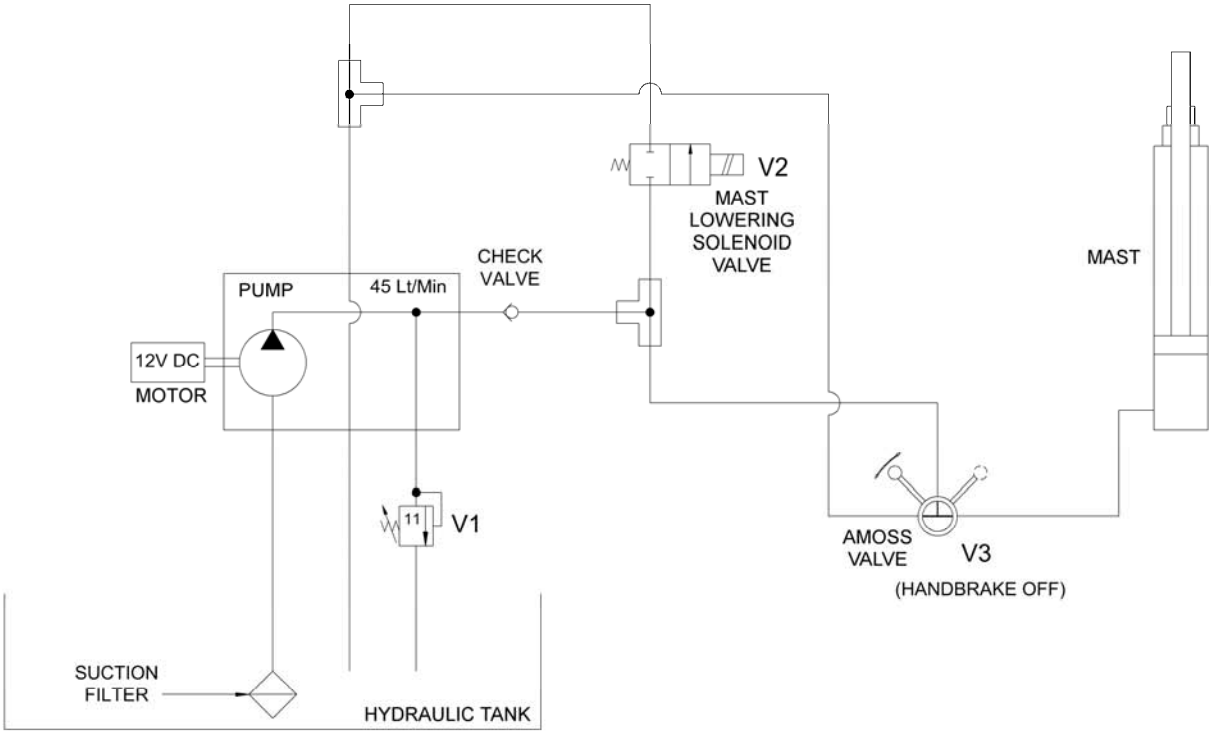


19	DIN 9021 - 8.4	02-0050		WASHER	2
18	ISO 7040 - M8	01-0007		HEX NUT WITH TORQUE PART	4
17	BS 4320 - M8 (Form A)	02-0011		BRIGHT METAL WASHER - METRIC SERIES	3
16	BS 4464 - M8 Form B	02-0012		SPRING WASHER - METRIC SERIES	1
15	ISO 4017 - M8 x 16 St/St	01-0079		HEXAGON HEAD SCREW	1
14	BS 4320 - M6 (Form A)	02-0004		BRIGHT METAL WASHER - METRIC SERIES	2
13	ISO 7045 - M6 x 16 - 4.8 - Z	01-0201		PAN HEAD SCREW - GRADE A	2
12	TCP-3067	14-0037		HOSE CLIP DIA 11.5mm	1
11	TCP-3068	14-0038		HOSE CLIP DIA 13.3mm	3
10	TCP-3024	10-3024		EXHAUST HEAT SHIELD ASSY	1
9	TCP-3066	14-3066		FUEL PICKUP	1
8	TCP-3063	61-3063		3/8 BSP TO 7mm HOSE BARB TO MALE	1
7	TCP-3064	61-3064		3/8-3/8 BSP 90 ELBOW MALE FEMALE	1
6	TCP-3065	61-3065		3/8 BSP TO 5mm HOSE BARB TO MALE	1
5	TCP-2186	14-0035		7mm ID FUEL HOSE	2
4	TCP-2385		12-2891	HATZ INLINE FUEL FILTER	1
3	TCP-2852	71-0138		12V FACET FUEL PUMP	1
2	TCP-2931		14-2868	FUEL FILLER CAP	1
1	TCP-2868	14-2868		FUEL TANK	1
ITEM	DRG. No.	STOCK No.	KIT	DESCRIPTION	QTY

Iss B 12/08/2008 Stock No.2867

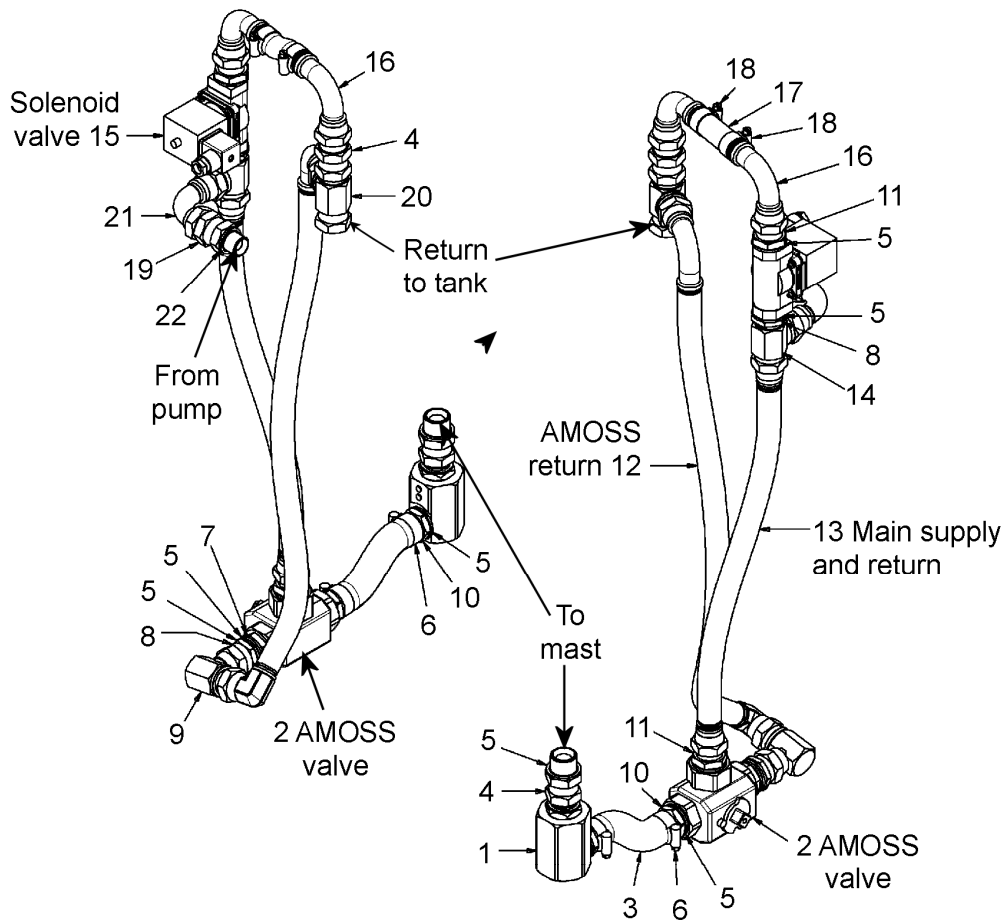
SA Fuel Tank Assy TCP-2867

6.11 Hydraulic Schematic



HYDRAULICS SCHEMATIC
TCP 3127 Sh 1 Iss A

6.12 Hydraulic Assy Layout TCP-3010

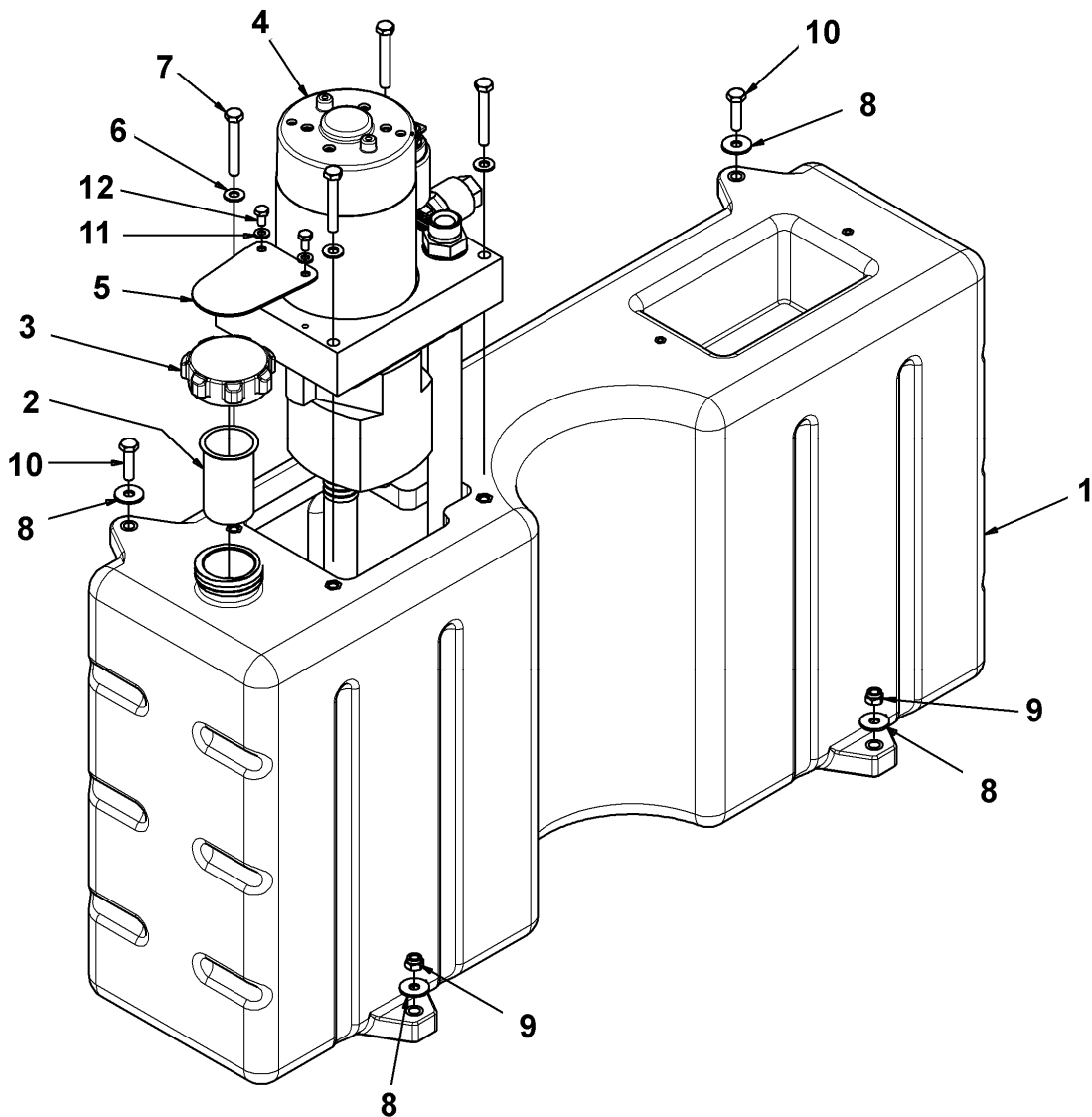


22		62-0011		1/2 INCH BONDED WASHER	1
21		62-0135		3/4 SWEPT ELBOW MALE FEMALE	1
20		62-0208		3/4 INCH TEE FM M M ON BRANCH	1
19	TCP-2989	62-2989		1/2" TO 3/4" M-F SWIVEL ADAPTOR	1
18	TCP-3016	03-0204		JUBILEE HOSE CLIP 18 - 25mm	2
17	TCP-3015	62-3015		3/4 INCH ID RUBBER HOSE SAE100R6	64mm
16	TCP-3011	62-3011		3/4 INCH SWEPT 90 ELBOW	2
15	TCP-2981	60-2981		3/4 INCH 12 VOLT SOLANOID VALVE	1
14	TCP-2979	62-2979		3/4 INCH MALE TEE	1
13	TCP-3013	62-3013		MAIN SUPPLY AND RETURN HOSE	1
12	TCP-3014	62-3014		AMOSS HOSE	1
11	TCP-2251	62-0013		3/4 INCH BSP MALE MALE ADAPTOR	2
10	TCP-2180	62-0153		3/4 INCH BSP HOSE TAIL	2
9	TCP-3057	62-3057		3/4 INCH M F COMPACT ELBOW	1
8	TCP-2252	62-0144		3/4 INCH BULKHEAD ADAPTOR NUT	2
7		62-0134		3/4 INCH BULKHEAD ADAPTOR CW NUTS	1
6	TCP-2796	10-0082		JUBILEE HOSE CLIP 30 - 40mm	2
5	TCP-2389	62-0014		3/4 INCH BONDED WASHER	8
4	TCP-2467	62-0132		3/4 INCH MALE FEMALE SWIVEL	2
3		62-0183		1" I/D RUBBER HOSE SAE100R6 (136 Iq)	136mm
2	TCP-2151	60-0064		3/4 BSP 3 WAY BALL VALVE (CAST)	1
1	TCP-1961	62-0133		3/4 BSPP 90° ROTARY COUPLING	1
ITEM	DRG. No.	STOCK No.	KIT	DESCRIPTION	QTY

Iss.B 24/10/2008

Hydraulic Assy Layout TCP-3010

6.13 Hydraulic Tank TCP-2862

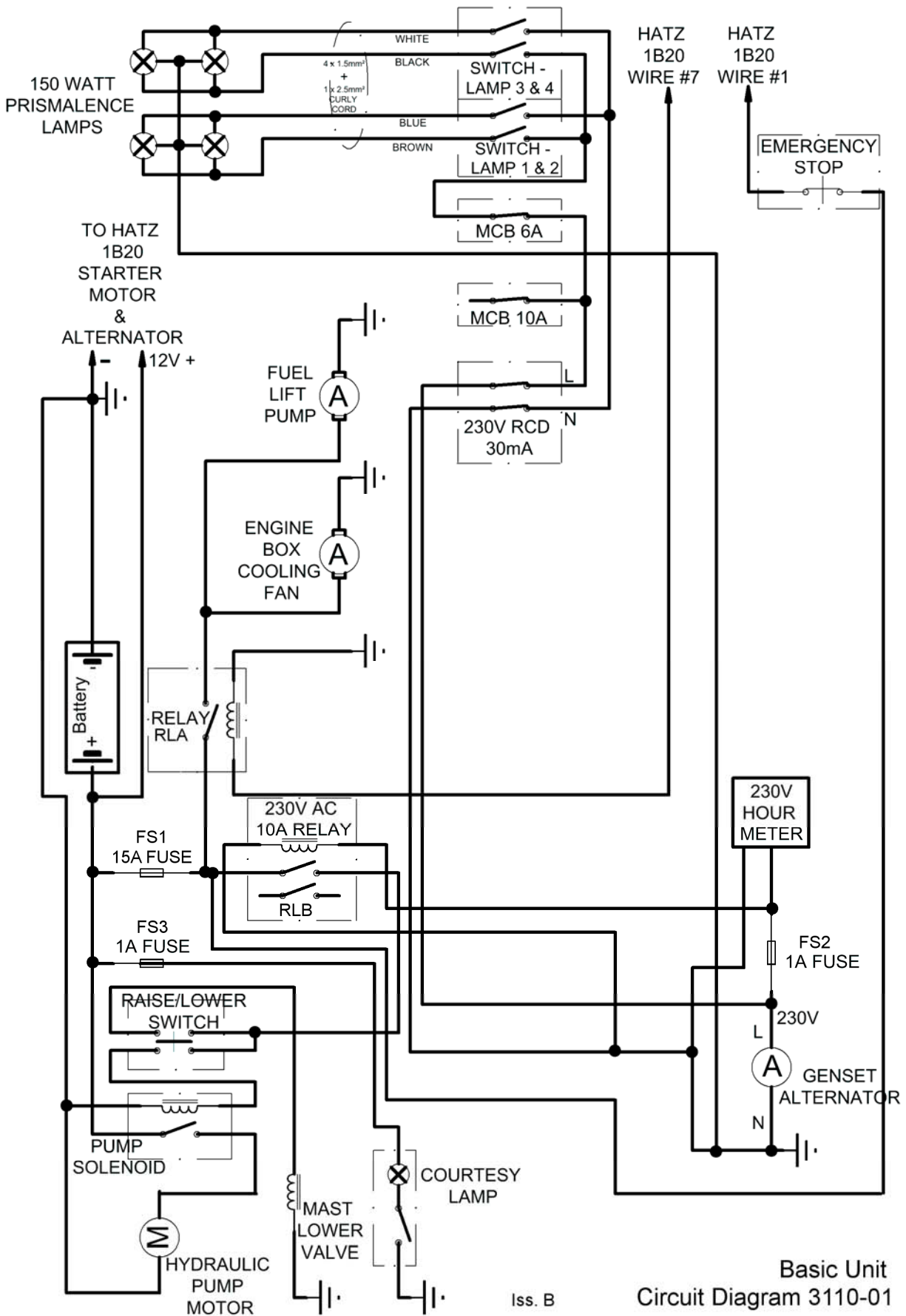


12	ISO 4017 - M6 x 12	01-0004	HEXAGON HEAD SCREW	2
11	BS 4320 - M6 (Form A)	02-0004	BRIGHT METAL WASHER - METRIC SERIES	2
10	ISO 4017 - M8 x 30	01-0012	HEXAGON HEAD SCREW	2
9	ISO 7040 - M8	01-0007	HEX NUT WITH TORQUE PART	2
8	DIN 9021 - 8.4	02-0050	WASHER	4
7	ISO 4014 - M8 x 55	01-0222	HEXAGON HEAD BOLT - PRODUCT GRADES A and B	4
6	BS 4320 - M8 (Form A)	02-0011	BRIGHT METAL WASHER - METRIC SERIES	4
5	TCP-3056	51-3056	CAP COVER PLATE	1
4	TCP 2866	60-2866	HYDRAULIC PUMP	1
3	TCP-2960	61-2960	HYDRAULIC TANK CAP	1
2	TCP-2864	61-2864	HYDRAULIC TANK FILLER FILTER	1
1	TCP-2863	61-2863	HYDRAULIC TANK	1
ITEM	DRG. No.	STOCK No.	DESCRIPTION	QTY

Iss B 11/07/2008 Stock No.2862

TCP-2862 Hydraulic Tank

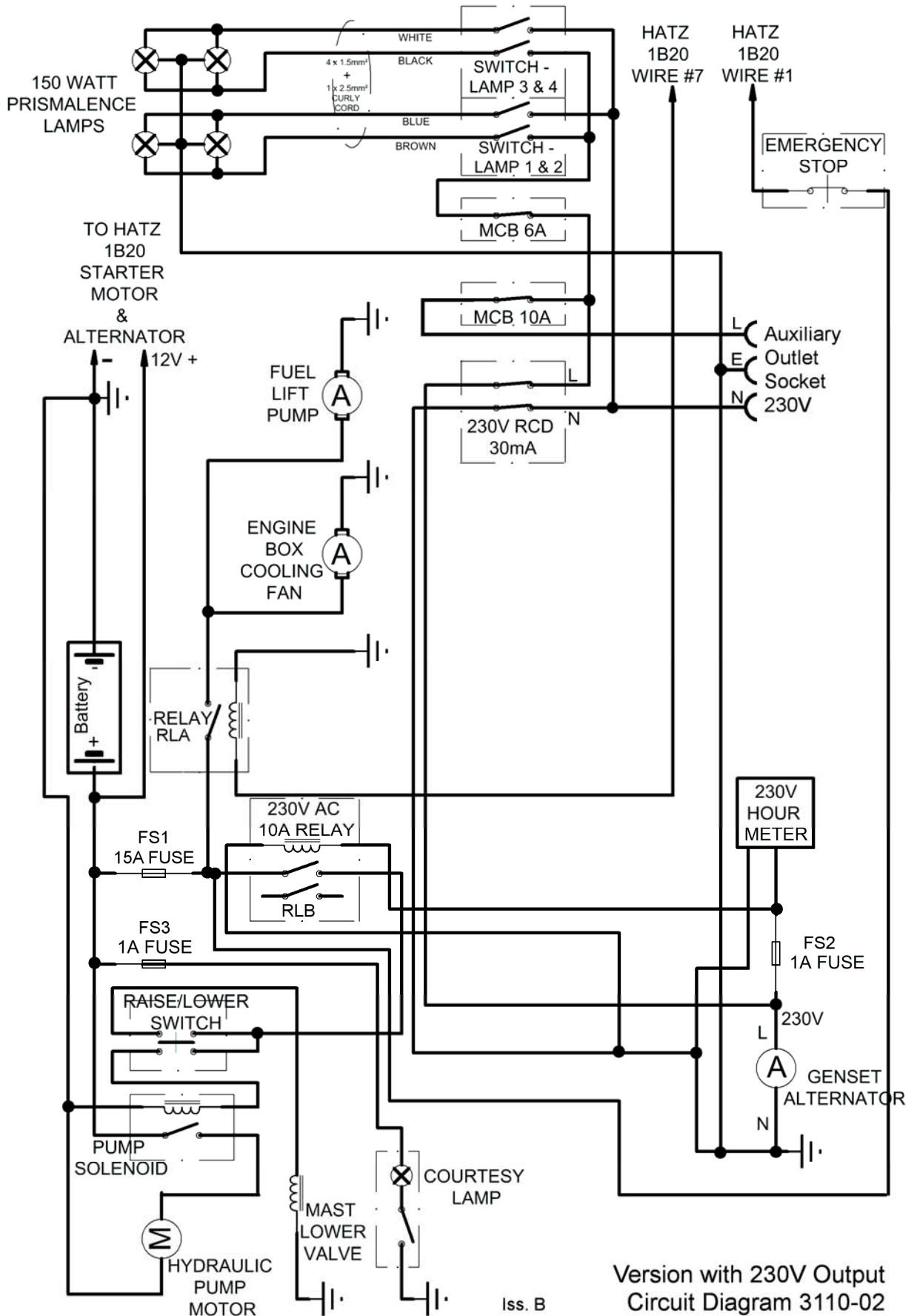
6.14 Basic Unit Circuit Diagram 3110-01



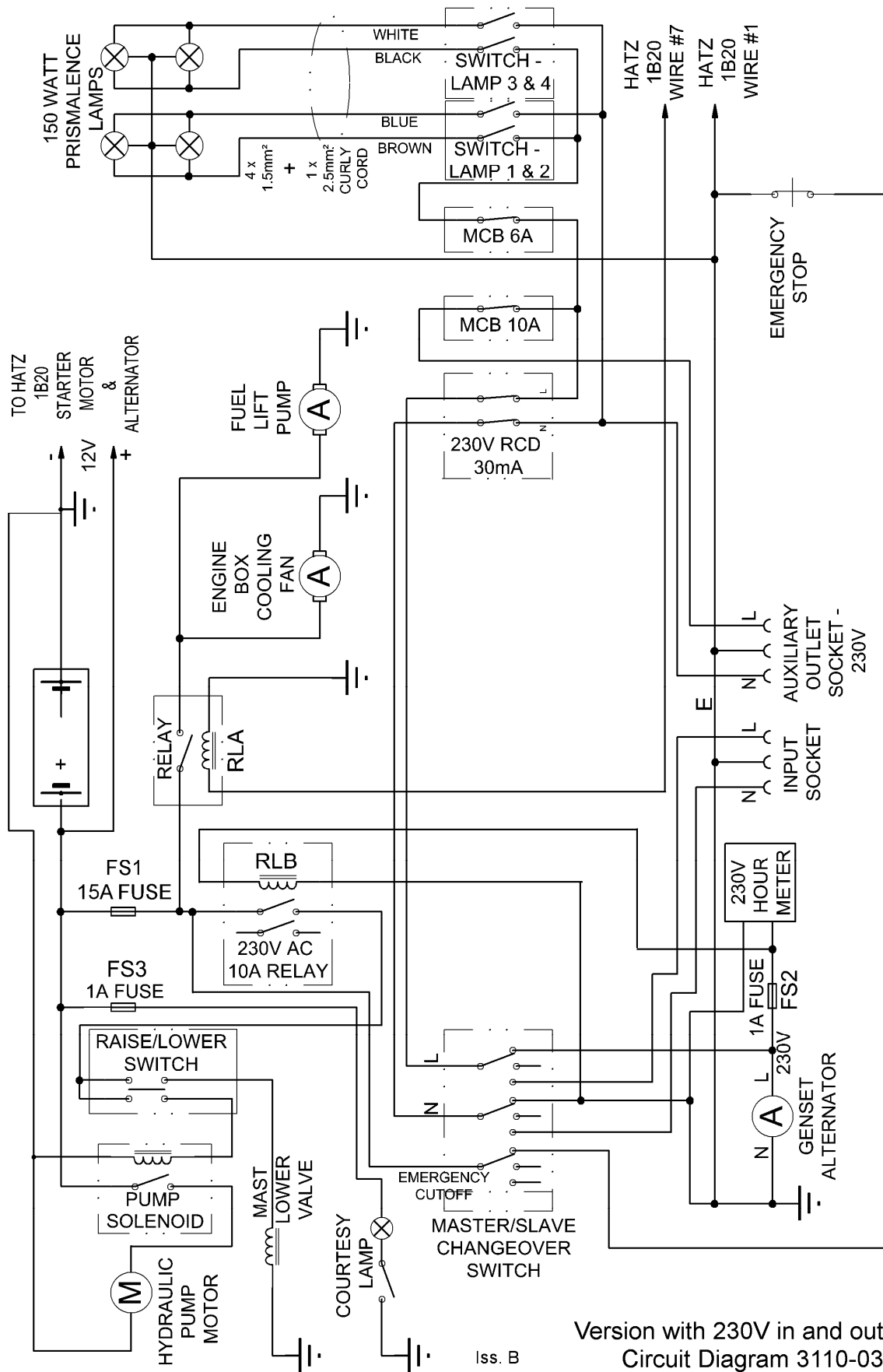
Basic Unit
Circuit Diagram 3110-01

Iss. B

6.15 Circuit Diagram – with 230V Output



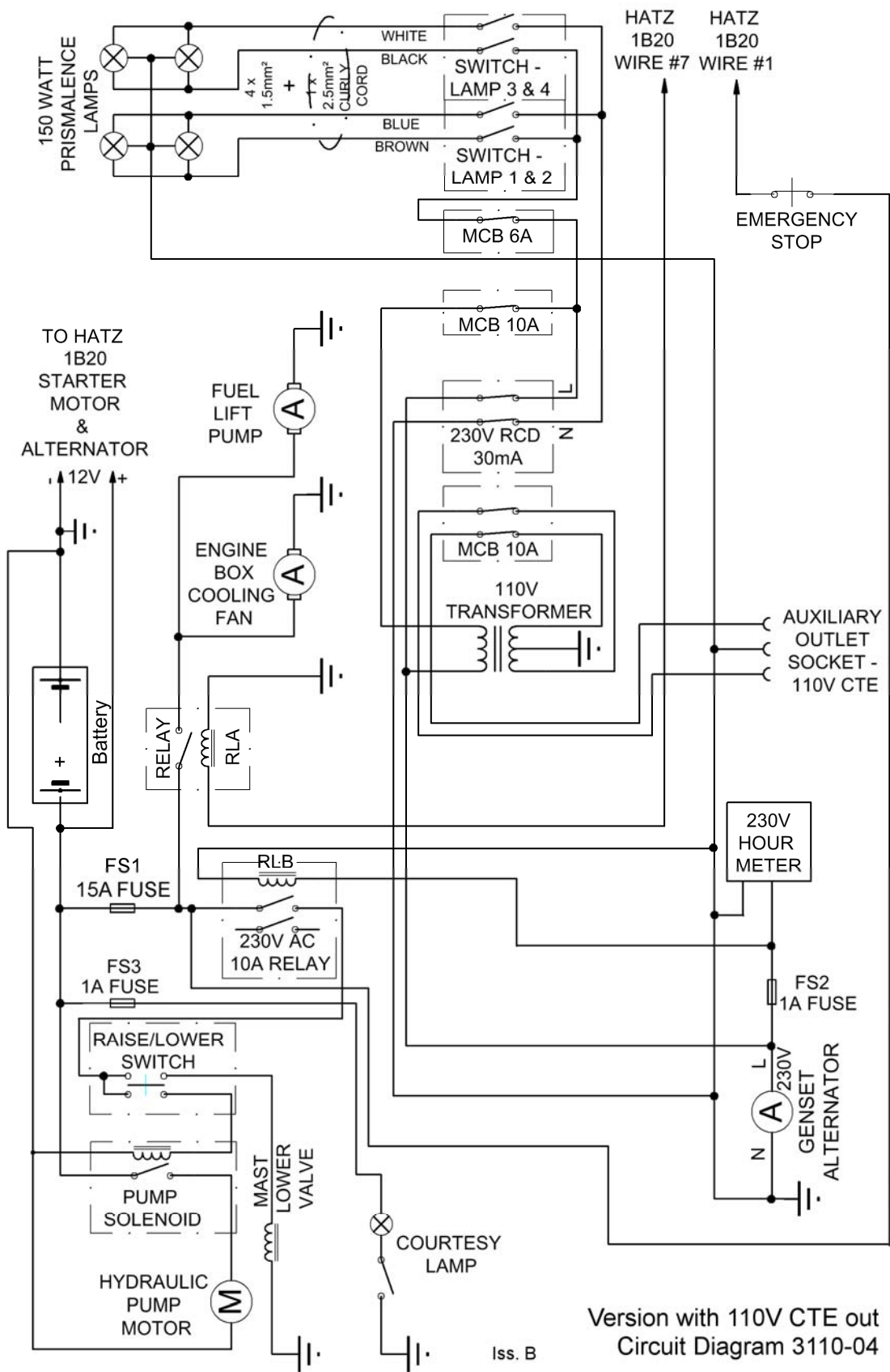
6.16 Circuit Diagram – 230V In and Out



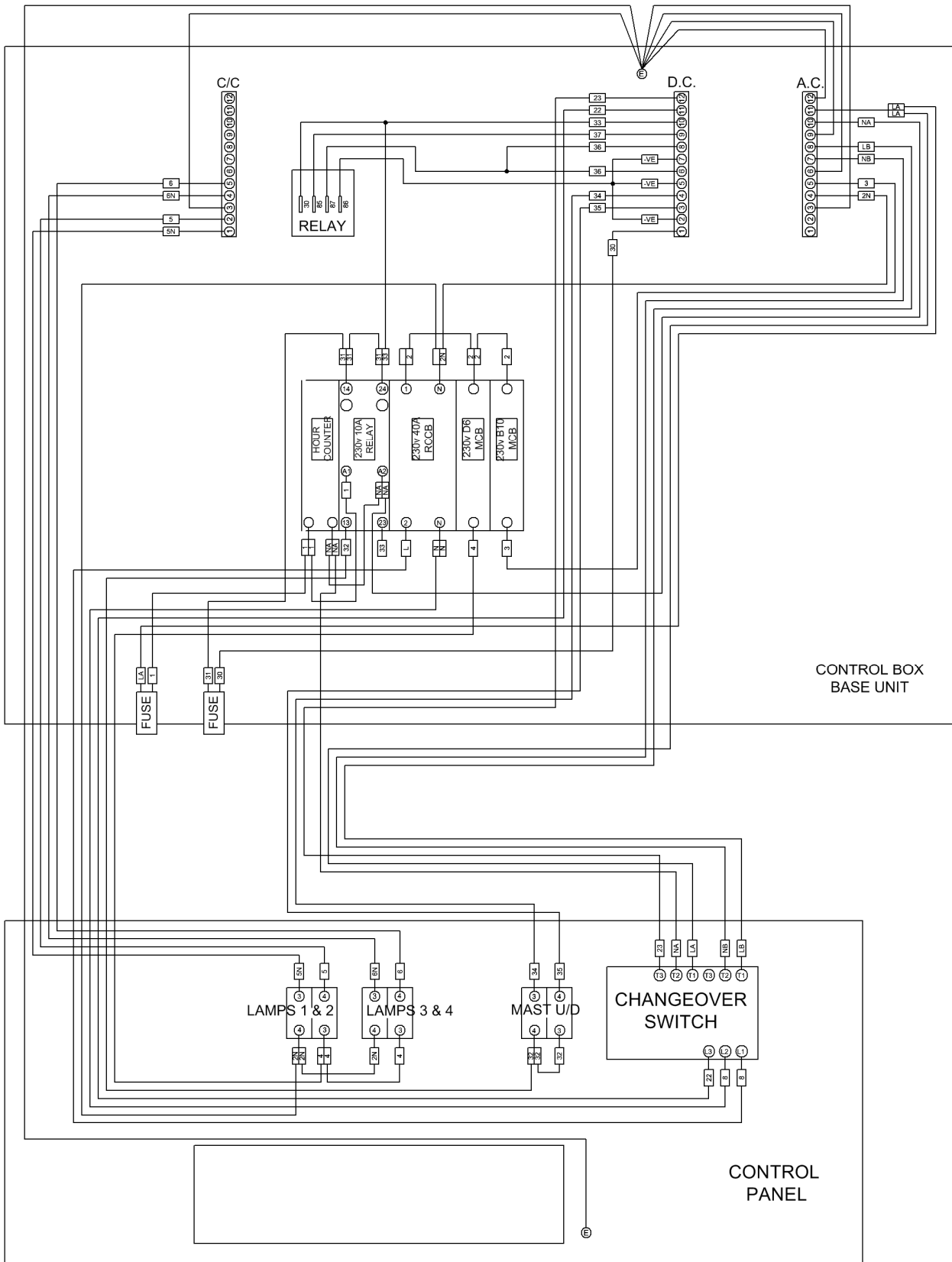
Version with 230V in and out
Circuit Diagram 3110-03

Iss. B

6.17 Circuit Diagram – 110V CTE Out



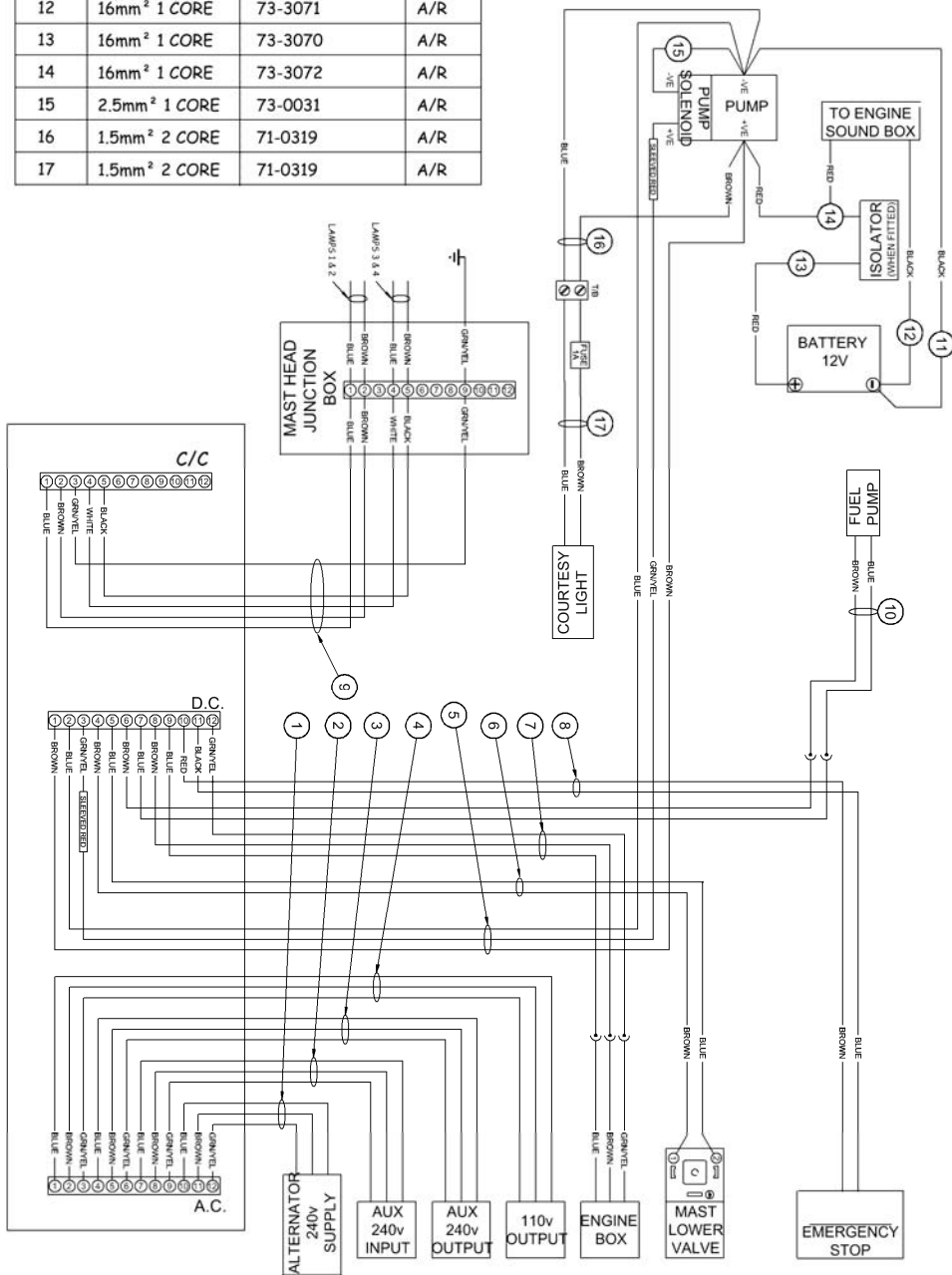
6.18 Cable Identification and Termination Sh 1



Cable Identification & Termination
3111 Sh 1 Iss B

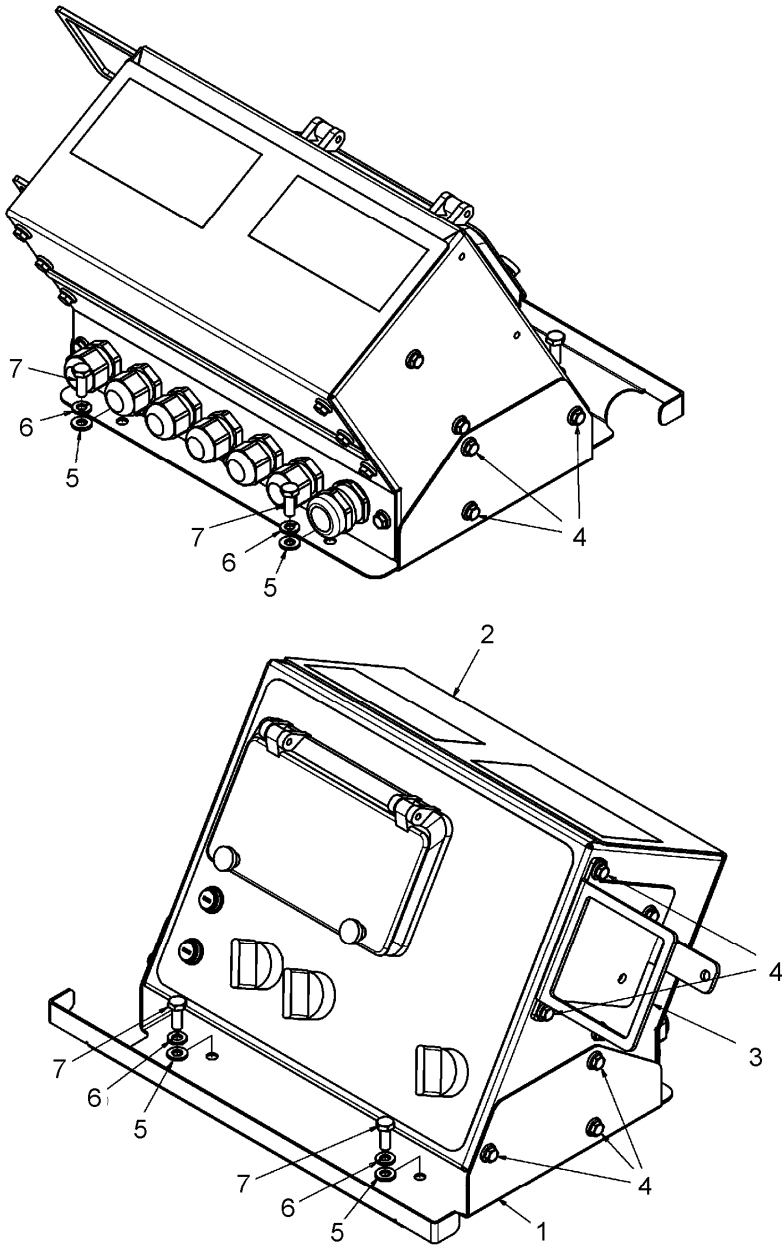
6.19 Cable Identification and Termination Sh 2

ITEM	DRG No.	PART No.	QTY
1	2.5mm ² 3 CORE	71-0062	A/R
2	2.5mm ² 3 CORE	71-0062	A/R
3	2.5mm ² 3 CORE	71-0266	A/R
4	2.5mm ² 3 CORE	48-000	A/R
5	1.5mm ² 3 CORE	71-0052	A/R
6	1.5mm ² 2 CORE	71-0319	A/R
7	1.5mm ² 3 CORE	71-0052	A/R
8	1.5mm ² 2 CORE	71-0319	A/R
9	CURLY CORD	71-0273	A/R
10	1.5mm ² 2 CORE	71-0319	A/R
11	16mm ² 1 CORE	73-3073	A/R
12	16mm ² 1 CORE	73-3071	A/R
13	16mm ² 1 CORE	73-3070	A/R
14	16mm ² 1 CORE	73-3072	A/R
15	2.5mm ² 1 CORE	73-0031	A/R
16	1.5mm ² 2 CORE	71-0319	A/R
17	1.5mm ² 2 CORE	71-0319	A/R



Cable Identification & Termination
3111 Sh 2 Iss B

6.20 Control Box Assy Tank Mounted TCP-3001-01 SA

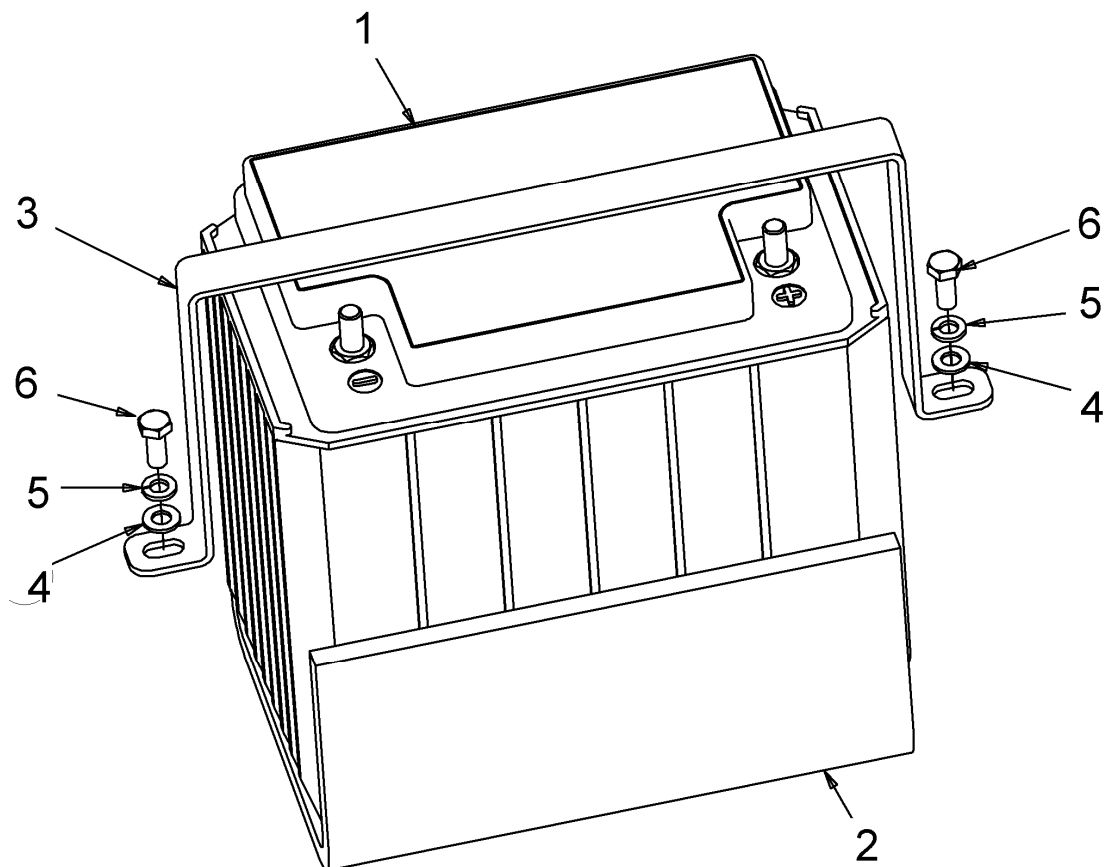


7	ISO 4017 - M6 x 16	01-0075	HEXAGON HEAD SCREW	4
6	BS 4464 - M6 Form B	02-0003	SPRING WASHER - METRIC SERIES	4
5	BS 4320 - M6 (Form A)	02-0004	BRIGHT METAL WASHER - METRIC SERIES	4
4	DIN 6921 - M5 x 12	01-0205	HEXAGON FLANGED BOLT	8
3	TCP-2946	51-2946	MOUNTING BRACKET - HATZ CONTROLLER	1
2	TCP-4070-01 SA	SA-4070-01	CONTROL BOX ASSY - BASIC OPTION	1
1	TCP-2963	51-2963	CONTROL BOX MOUNTING BRACKET	1
ITEM	DRG. No.	STOCK No.	DESCRIPTION	QTY

Iss A 25/09/2008 Stock No. SA-3001-01

Control Box Assy Tank Mounted TCP-3001-01 SA

6.21 Battery Kit TCP-3034 SA

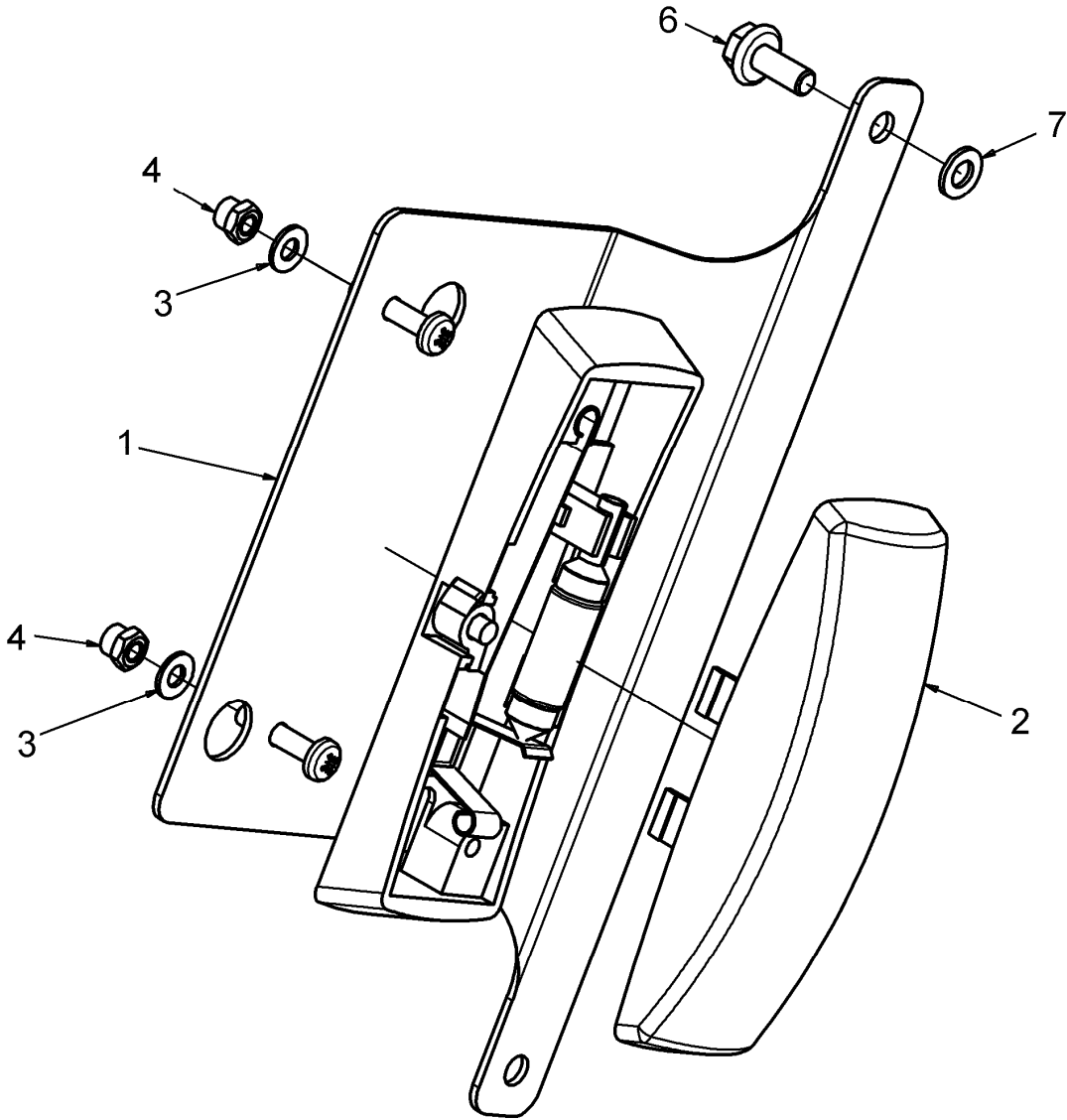


6	ISO 4017 - M5 x 12	01-0041	HEXAGON HEAD SCREW	2
5	BS 4464 - M5 Form B	-	SPRING WASHER - METRIC SERIES	2
4	BS 4320 - M5 (Form A)	02-0013	BRIGHT METAL WASHER - METRIC SERIES	2
3	TCP-2869	51-2869	BATTERY CLAMP	1
2	TCP - 2958	30 - 2958	FOAM INLAY - 12 VOLT BATTERY	1
1	TCP-2214	70-0037	PC625 BATTERY	1
ITEM	DRG. No.	STOCK No.	DESCRIPTION	QTY

Iss.A 26/9/2008

Battery Kit TCP-3034 SA

6.22 Interior Light Assy TCP-3059 SA

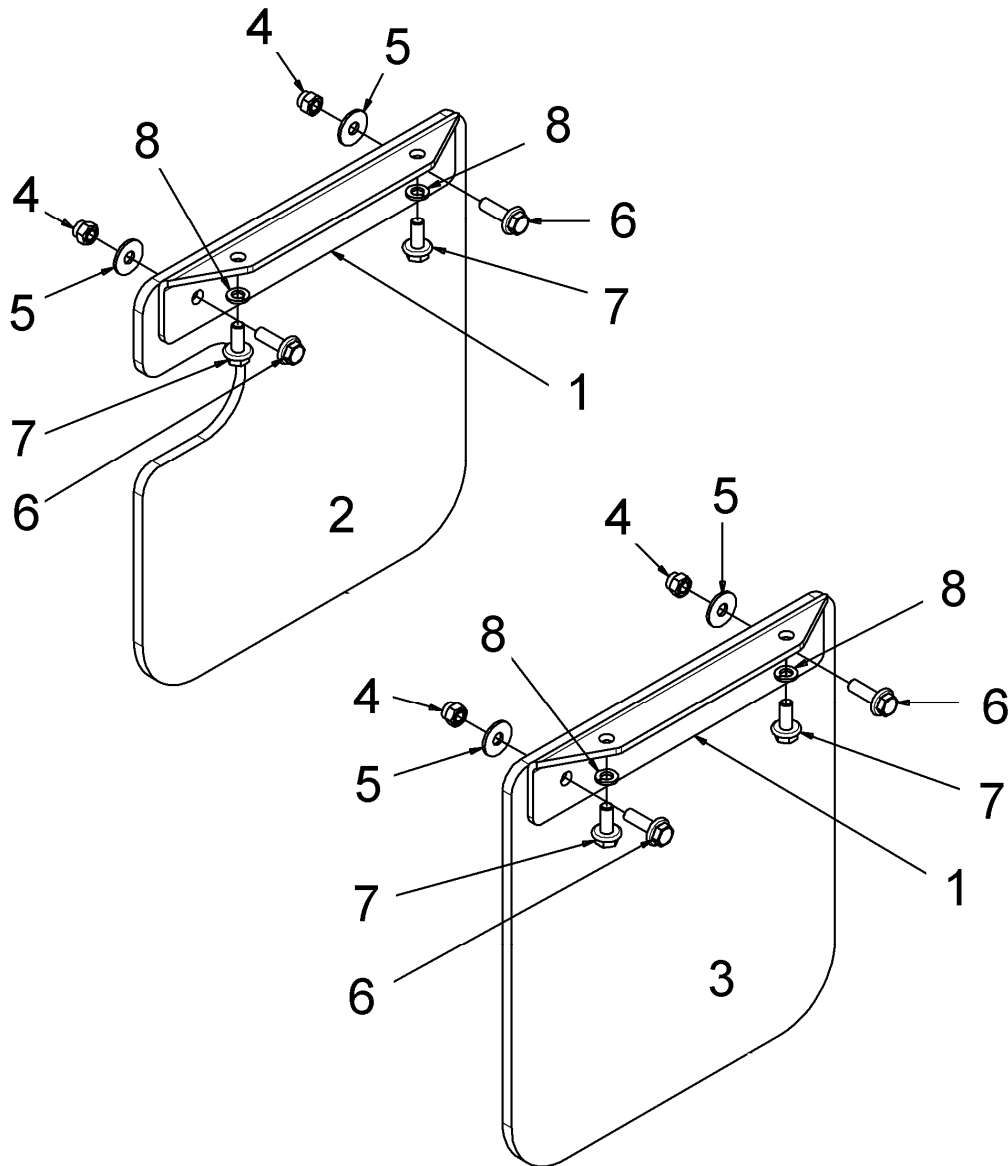


10	ISO 7045 - M4 x 20 - 4.8 - Z	01-0181	PAN HEAD SCREW - GRADE A	2
7	BS 4320 - M5 (Form A)	02-0013	BRIGHT METAL WASHER - METRIC SERIES	1
6	DIN 6921 - M5 x 12	01-0205	HEXAGON FLANGED BOLT	1
4	ISO 7040 - M4	01-0019	HEX NUT WITH TORQUE PART	2
3	BS 4320 - M4 (Form A)	02-0028	BRIGHT METAL WASHER - METRIC SERIES	2
2	TCP-3060	72-0075	COURTESY LIGHT	1
1	TCP-3061	51-3061	INTERIOR LIGHT BRACKET	1
ITEM	DRG. No.	STOCK No.	DESCRIPTION	QTY

Iss.A 30/08/2008

Interior Light Assy TCP-3059 SA

6.23 Mud Flap Kit TCP-3104



8	BS 4464 - M5 Form B	-	SPRING WASHER - METRIC SERIES	4
7	DIN 6921 - M5 x 12	01-0205	HEXAGON FLANGED BOLT	4
6	DIN 6921 - M5 x 16	01-0175	HEXAGON FLANGED BOLT	4
5	DIN 9021 - 5.3	-	WASHER	4
4	ISO 7040 - M5	01-0085	HEX NUT WITH TORQUE PART	4
3	TCP-2967		MUD FLAP	1
2	TCP-2966		MUD FLAP WITH EXHAUST CUT-OUT	1
1	TCP-2965		MUD FLAP BRACKET	2
ITEM	DRG. No.	STOCK No.	DESCRIPTION	QTY

Iss.A 23/09/2008

Mud Flap Kit TCP-3104

Section 6 Drawings

Appendix A Nut & Bolt Torque Specification

1. Specific Torque Settings

Wheels 80-90 nm

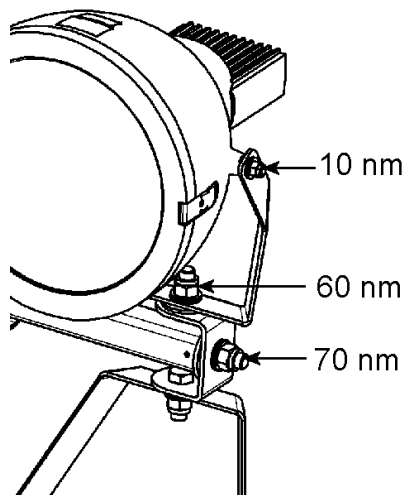


Fig A-1 Light fitting torque settings

2. Generic Torque Settings

Bolts not defined above should be tightened to the torque settings listed in Table A-1.

Friction coefficient total 0.14 for screws and nuts without after treatment as well as for phosphate nuts.

Tighten by hand.

If nothing special is indicated, select correct torque limits from the following tabulations:

Size	6.9 Some Engine Bolts		8.8 Standard Hex Bolt		10.9 Some Engine Bolt		12.9 Standard Cap head	
	Nm	(lbfft)	Nm	(lbfft)	Nm	(lbfft)	Nm	(lbfft)
M6	8.5	(6.3)	10	(7.4)	14	(10.3)	17	(12.5)
M8	21	(15.5)	25	(18.4)	35	(25.8)	41	(30.2)
M10	41	(30.2)	49	(36.1)	69	(50.9)	83	(61.2)
M12	72	(53.1)	86	(63.4)	120	(88.5)	145	(106.9)
M14	115	(85)	135	(100)	190	(140)	230	(170)
M16	180	(133)	210	(155)	295	(218)	355	(262)
M18	245	(181)	290	(214)	400	(295)	485	(358)
M20	345	(255)	410	(302)	580	(428)	690	(509)
M22	465	(343)	550	(406)	780	(575)	930	(686)
M24	600	(443)	710	(524)	1000	(738)	1200	(885)
M27	890	(656)	1050	(774)	1500	(1106)	1800	(1328)
M30	1200	(885)	1450	(1070)	2000	(1475)	2400	(1770)

Table A-1 Torque settings for Metric ISO Thread DIN 13

Appendix A Nut & Bolt Torque Specification

Appendix B Options
