

SYKES PUMPS ™

**OPERATION & MAINTENANCE
INSTRUCTIONS GP80**

OPERATION & MAINTENANCE INSTRUCTIONS

Model No. SY3871032

GP80 DIESEL DRIVEN (2-wheel & electric skid)

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STATUS SHEET

AMENDMENTS

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2 FOREWORD

This manual covers the Andrews Sykes GP80 (2 WHEEL SITE TRAILER, 2 WHEEL HIGH SPEED TRAILER and ELECTRIC MOTOR OPTION) pump. It is written for operators and maintenance personnel and provides the information needed for safe and efficient siting, use, testing, routine maintenance and repairs.

Manuals provided are an essential part of the relevant equipment. They should be kept for the life of the equipment and passed on to any subsequent purchaser. Any amendment issued by Andrews Sykes Hire Limited should be promptly incorporated into this manual.

Information contained in this manual is correct at the date of publication. As improvements are continually being made, Andrews Sykes Hire Limited reserve the right to make alterations without giving prior notice.

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Product names referenced in this manual are registered trade marks of the original equipment manufacturers.



HEALTH & SAFETY STATEMENT

DO TAKE TIME TO ENSURE THAT YOUR SAFETY AND THAT OF OTHERS IS NOT PUT AT RISK. FAILURE TO OBSERVE PRECAUTIONS, BOTH ELEMENTARY AND THOSE EXPLICIT IN THIS MANUAL, MAY RESULT IN PERSONAL INJURY AND/OR DAMAGE TO EQUIPMENT. THE SAFETY INFORMATION ON PAGE 7 IS INTENDED TO MAKE YOU AWARE OF HAZARDS AND PRECAUTIONS AND TO ENCOURAGE A SAFETY-CONSCIOUS APPROACH TO OPERATING AND CARRYING OUT MAINTENANCE WORK ON THIS EQUIPMENT.

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3 SERVICING AND REPAIR INFORMATION

3.1 Contacting your local Sykes depot

For any enquiry regarding the use, servicing or repair of your Andrews Sykes pump, please contact your local Andrews Sykes Hire Ltd depot on (freefone) 0800-211-611.

Please provide the following information:

- (1) Machine model and chassis type
- (2) Model-Serial number of the machine
- (2) Approximate date of purchase
- (3) Details of enquiry, apparent fault(s), etc.

Section 5.3, *Product identification*, page 14, describes how to identify models and where to locate the Model-Serial number.

3.2 Ordering spares

Section 8, *Spare parts*, page 32, explains how to order spare parts.

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4 SAFETY PRECAUTIONS

4.1 Warnings and Cautions

For the purpose of definition in this manual, a **WARNING** gives information which, if ignored, could cause serious injury to personnel. A **CAUTION** gives information which if ignored could cause serious damage to the machine or associated equipment. Also see Operating Instructions, General Precautions in Section 6.5.1 on page 17.



WARNING

Warning notices are boxed and highlighted in the style of this paragraph.



CAUTION

Cautionary notices are boxed and highlighted in the style of this paragraph.

4.2 Training

It is strongly recommended that all operators, other personnel working on or near the pump, and any site visitors, are made fully aware of the potential dangers of this rotating equipment. If in **ANY** doubt please contact Andrews Sykes Limited for advice.



WARNINGS

FOR YOUR OWN PERSONAL SAFETY READ AND TAKE NOTE OF THE FOLLOWING:

- Hazardous areas**
- All moving parts, including drive belts, are dangerous and are guarded to prevent intrusion during operation.
- Pump intake and discharge ports are also dangerous when open. Do not insert hands or other objects into the ports when the pump is operating.
- Lifting and transport**
- Read and follow the instructions on page 16. In particular, always lift using the lifting points provided and ensure that any lifting equipment is of adequate load-carrying capacity and possesses a valid test certificate.

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- Operating the pump** - Replace all guarding removed for maintenance before starting the pump. Never operate without covers and guards in place.
 Never operate the pump without the correct protective clothing and equipment (PPE).
 Before attempting maintenance work on the pumpset, ensure that the engine is properly isolated. Refer to the manufacturer's handbook for details.
 Note the general precautions on page 16 and ensure that you are familiar with the controls before operating the pump. Read and follow the instructions on safe siting and operation on pages 16 to 19.
- Fault finding and pump maintenance** - Follow a regular maintenance schedule as defined on page 23.

4.3 Representative Noise Levels



WARNING

Please be aware noise levels during operation may exceed recommended exposure levels

Table 1 Representative Noise Levels

Pump Model	Driver	Speed RPM	Sound Power Level	Sound Pressure Level at 1m	Sound Pressure Level at 7m
GP80	Lister TR1	2000	106	98	81
		1800	104	96	79
		1500	103	95	78

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4.4 Modifications

Any unauthorised modification to the product may impinge upon the validity of the CE Compliance for the machine, the warranty of the product and the safe working of the product.

For any enquiry regarding the use , servicing or repair of your Andrews Sykes Pump, please contact your local Andrews Sykes Hire Ltd service centre on (free phone) 0800-211611

4.5 Personal Protective Equipment

The following PPE is recommended when installing and operating the pumpset.

Hand Protection as a result of general handling of the pumpset and hoses, along with protection from the liquid being pumped.

Protective footwear due to the general handling of the pumpset and hoses.

Protective clothing due to the handling of the pumpset and hoses, along with protection from the liquid being pumped.

Eye protection during installation and operation due to splashes from the liquid being pumped.

Ear protection during operation of pumpset.



WARNING

It is recommended a full RISK ASSESMENT is carried out prior to commencement of any Maintenance, Installation or Operation of Pumpset



Note: Please be aware of any environmental issues associated with the Maintenance, Installation and operation of the Pumpset, please read general precautions on page 17.

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5 DESCRIPTION OF EQUIPMENT

5.1 General description

The GP80 is a general purpose, self priming, free standing site pump. The pumps can be used in a range of environmental conditions, including tropical temperatures.

Each pump is capable of passing solids up to the specified maximum diameter for the size of machine (see **Table 2**, page13), provided the solids are in suspension; a typical example being ditch water containing soil and rock particles. Slurries may also be pumped, if concentration of solid matter is not too high. The pumps can also handle abrasive materials at the expense of higher wear rate. (For advice on the suitability of your pump for specific applications contact your local Sykes depot; see Section 3.1, page 6.)

The GP80 pump is normally powered by a diesel engine with electric start. It has a two wheeled chassis which is suitable for towing on site.

5.2 Technical description

5.2.1 Overview

This section identifies the main components of the standard pump and provides general technical and performance data. It does not cover any special options or modifications made to suit customer requirements.



 **NOTE:** Tolerances are given in Maintenance, Section 7 page 23.

Figure 1, page 11, shows the general arrangement and the overall dimensions of the pump set.

 **NOTE:** By adjusting the 'surge control valve', when the pump is fully primed, the operator can prevent continual air valve cycling -an effect referred to as 'snoring' (see **Figure 7** on page 26.)

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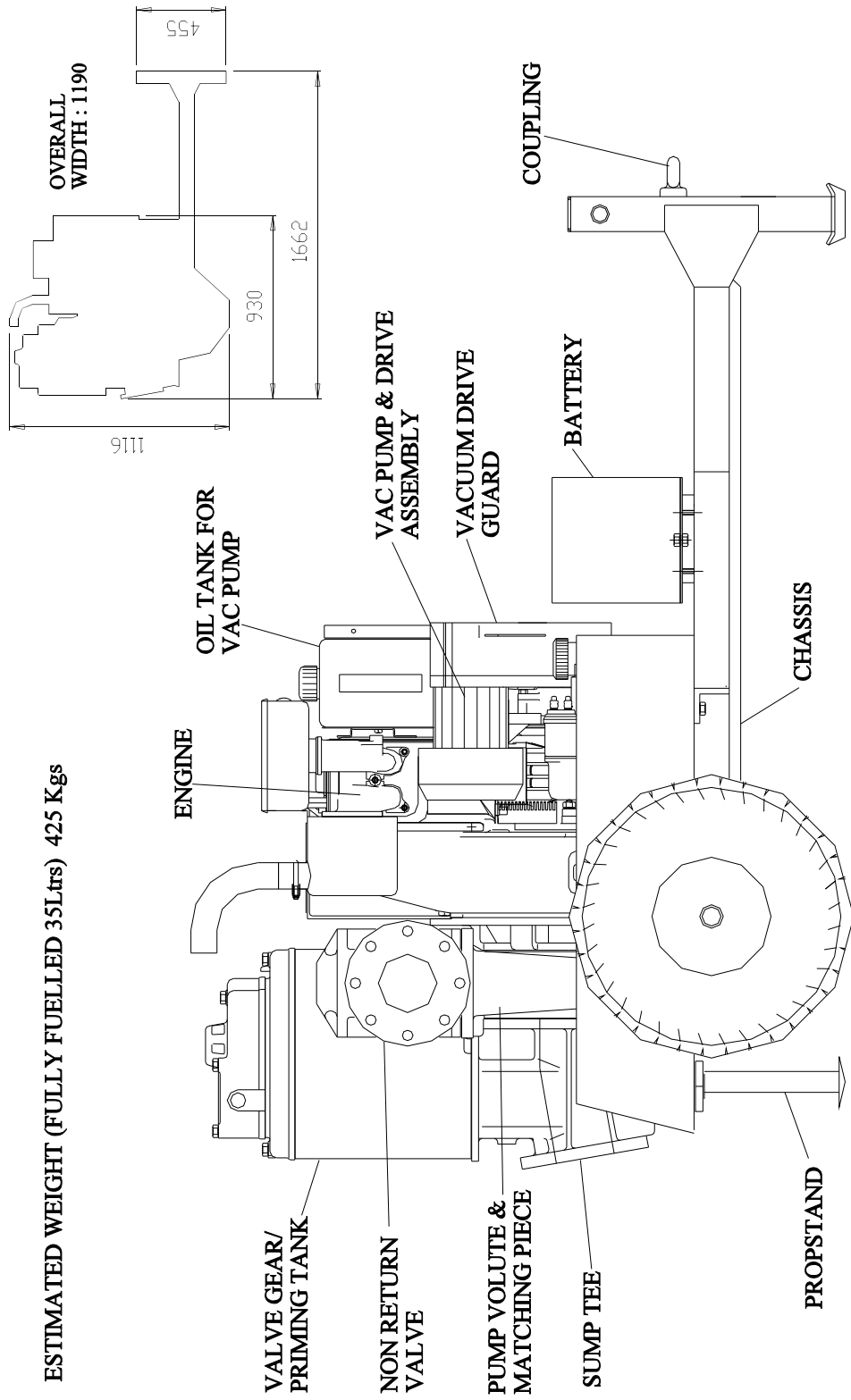


Fig 1 Main components

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Figure 2 illustrates, schematically, the pumpset's principle of operation.

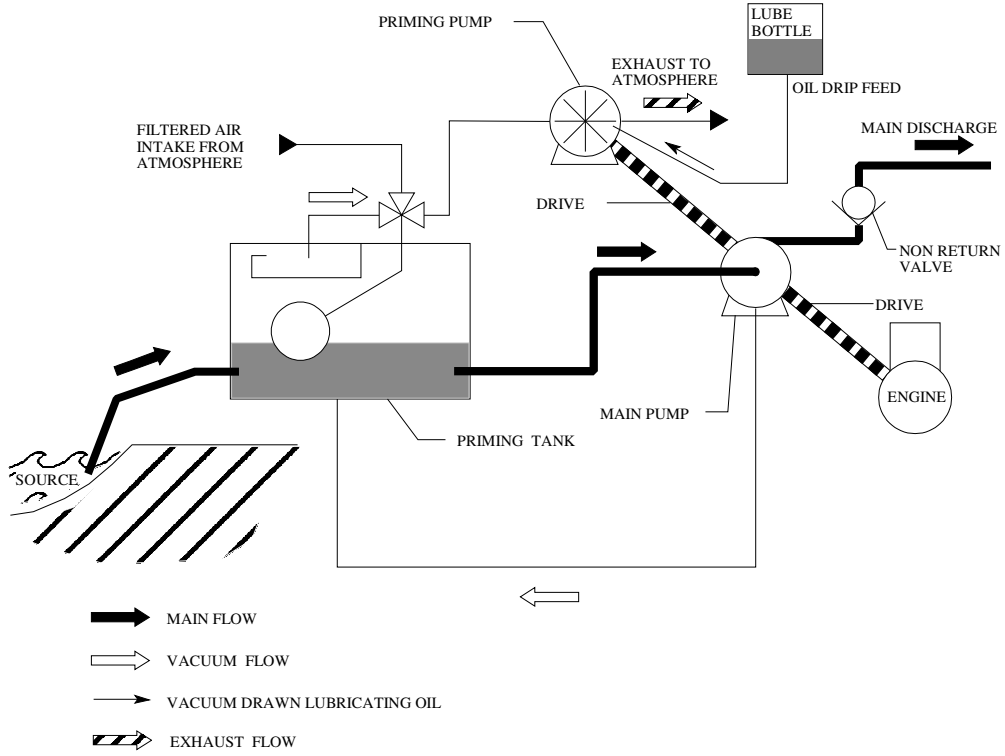


Figure 2 Schematic drawing of the pumpset system

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5.2.2 Main pump

Figure 13 shows the main pump in detail page 42.

Table 2 Main pump technical data

PARAMETER	GP80
Standard pump body (volute) material	Cast iron
Volute size	80mm
Intake and discharge ports	4"BST'D'
Solids handling capability (maximum diameter)	40mm
Maximum lift (theoretical)	9.75m
Maximum discharge head	20m
Maximum flow	90m ³ /hr
Pump bearing grease	Shell Alvania EP2 or equivalent
Nominal speed	2000 rpm

5.2.3 Vacuum Pump

Figure 10 shows an exploded view of the vacuum pump. **Figure 11** on page 36 shows it assembled in the vacuum pump drive assembly.

Table 3 Vacuum system technical data

COMPONENT/PARAMETER	GP80
Vacuum pump	Utile vacuum pump
Vacuum pump displacement	0.012m ³ /s
Vacuum level	10m
Lubricating oil	30 SAE viscosity below 30°C 10W30 SAE above 30°C
Nominal speed	1800 rpm

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5.2.4 Engine, drives and fuel system

Table 4 Engine and fuel system technical data

COMPONENT/PARAMETER	SPECIFICATION	COMMENTS
Engine	Lister TR1 air cooled single cylinder diesel engine	Drives main and vacuum pumps
Main pump coupling	d/c stub shaft	
Vacuum pump transmission	Fenner v-belt and pulleys	
Battery	037 × 35 Ah	
Fuel tank	35 litres	
Approximate running time on full tank, at max load	16.5 hours	
Nominal speed	2000 rpm	

5.2.5 Weights

Table 4 provides approximate component weights for the Pumpset and its major components. The weights given are typical and may vary by $\pm 20\%$ for individual machines. Therefore, ensure that all lifting and towing equipment used have a safe working load of at least 120% of the relevant indicated weight.

Table 5 Approximate component and combined weights

COMPONENT	WEIGHT (kg)
Engine (dry)	142
Main pump	160
Main pump, priming tank, engine and stub shaft	325
Priming tank	23
Gross weight with full tank of fuel	435

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5.2.6 Chassis

Table 6 Chassis technical data

COMPONENT/PARAMETER	DETAILS/VALUE
General specification	2 wheel site trailer
Maximum towing speed	10 kph
Tyres	Pneumatic rubber
Wheel bearing grease	High melting point water repellent grease recommended
Tow-hitch coupling	Tow-bar with standard \varnothing 20mm eye
Recommended lifting methods	Crane, using the single lifting point.

5.3 Product identification

For your own security and to enable Andrews Sykes Hire Ltd to answer any enquiries and requests for service and spares, where not stated, record details of your pumpset in the table below.

DETAIL	CORRESPONDING INFORMATION
Model:	GP80
Type of chassis:	2-Wheel Site Trailer
'Model-Serial number'. Figure 1 , page 11 shows where on the pumpset these numbers are marked.	Model number: SY3871032 Serial number:
Engine serial number. (See Associated Publications, page59.):	
Date of purchase:	

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6 HANDLING AND OPERATION

6.1 Lifting and transportation

The pumpset is equipped with the single point lifting eye by which it can be lifted using a suitable chain. The site trailer **MUST NOT** be towed on the public highway.



WARNINGS

DO NOT attempt to lift pump with suction and discharge hoses in place.

ALWAYS ensure that lifting gear are adequate for the weight being lifted (See **Table 4.**).

6.2 Trailer routine checks

Routine checks are essential for the safety of personnel and the maintenance of equipment condition.

1. Check tyre and wheel retaining pin conditions. Renew if heavily damaged.
2. Verify that the tow-hitch is sound and that all that the trailer chassis is in good condition.
3. Grease wheel bearings and all trailer moving joints.

6.3 Siting and preparation for pumping

If you wish to test pump operation before use, refer to *Testing*, page 19.

1. Place the pumpset on a firm, level area of ground, as close as practical to the source of liquid.



CAUTION

DO NOT place the unit on soft ground into which it could sink.

2. Connect the hoses to the intake and discharge flanges (see **Figure 1**, page 11).



USE all the bolt holes provided on the flanges. **DO NOT** use a collapsible hose on the suction side, and make sure that the strainer is in place on the suction side.

3. Submerge the end of the suction hose.
4. Place the end of the discharge hose in a suitable outlet.



CAUTION

DO NOT put any stress on hoses. Lay them so as to avoid forming sharp kinks and protect them where they come in contact with abrasive surfaces.

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6.4 Controls and connection points

6.4.1 Main control panel

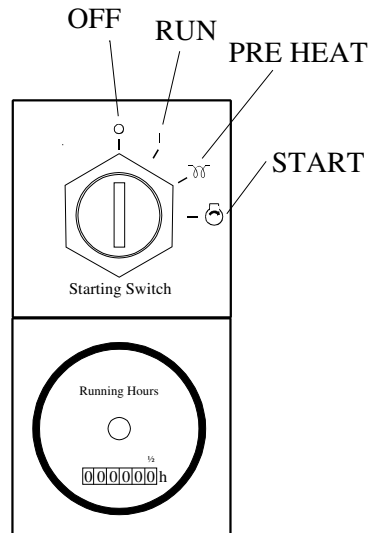


Figure 3 Main Control Panel

6.5 Operating instructions

6.5.1 General precautions



WARNINGS

DO NOT attempt to insert anything into the pump intake and discharge ports while the engine is running.

Ensure the pumpset is stable and immobilised **BEFORE** starting the pump.

BEWARE of fire risks. **DO NOT** place any flammable material near or around the engine or exhaust. Allow adequate ventilation.

The engine, exhaust and coalescer become **HOT** during operation.

ENSURE that any discharge into rivers or watercourses, or to soak away onto land, is environmentally acceptable.

The pump body retains liquid which could be hazardous to health. Flush the pump with clean water **BEFORE** disconnecting the hoses or working on the pump.

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NOTE: In the event of an emergency, **STOP** the engine **IMMEDIATELY** using the engine stop lever (see manufacturer's handbook).



CAUTIONS

NEVER use the pump without a strainer.

DO NOT pump, either liquids that may damage the pump, or dry material. If in doubt contact your local Andrews Sykes Hire Ltd depot for advice (see Section 3.1, page6).

6.5.2 Starting up

Follow this procedure before each engine start-up. Refer to **Figure 3**, page17, for details of the keyswitch.



WARNINGS

Make sure you are familiar with the engine manufacturer's safety instructions **BEFORE** running the engine.



CAUTION

ALWAYS top up using oil of correct specification. See the manufacturer's handbook for details of engine oil, and **Table 2**, page 12, for details of vacuum pump oil.


1. Check and top up, if necessary;
 - i the engine fuel, oil and radiator water levels;
 - ii the oil level in the lubrication bottle feeding the vacuum pump;
 - iii fuel tank.
2. Ensure that all drain taps are closed.
3. Screw in fully the priming tank surge control valve, to allow the system to prime.
4. Submerge the intake hose in the source.
5. Turn the key clockwise to the **START** position and release as soon as the engine starts. If the engine fails to start within 30 seconds, release the key and attempt to restart after allowing time for all moving parts to come to rest.

(The pump should prime automatically. In case of start-up failure, consult, Section 6.7 , *Fault diagnosis* on page20.)

6. When the pump is fully primed, re-adjust the surge control valve, as necessary, to avoid excessive 'snoring' -see note on page 10.

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6.5.3 Shutting down / Storage

 **TO STOP:** Turn the engine lever to the **OFF** position and push in fully the surge control valve knob to release the vacuum and empty the the priming tank and the intake hose. Turn key to **OFF** position.



CAUTION

ALWAYS drain the pump; before removing it, or if it is being left unused for a while -especially in cold weather.

The procedure is as stated below.

1. Flush the pump with clean water.
2. Drain water from the following, through the drain taps or plugs provided;
 - i the main pump;
 - ii the priming tank;
 - iii the non-return valve; and,
 - iv the coalescer
3. Follow the engine manufacturer's instructions relating to engine being left unused for a period of time.

If the pump is to be moved to a new site, disconnect the hoses and follow the instructions in Section 6.1, *Lifting and transportation*, page16.

To maintain the body parts in good condition, it is strongly recommended that the trailer is steam or spray cleaned regularly to remove dirt, mud and grit.

When not in use store the trailer under cover in a dry environment, where practicable.



CAUTION

NEVER leave water in the pumps or hoses if there is any risk of it freezing.

6.6 Testing

To test correct operation of the pumpset before its first service, or whenever required, follow the procedure described below.

1. Immobilise and secure the pumpset, at the test site.

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2. Start the engine as described in Section 6.5.2, page 18, but leave the surge control valve fully screwed in throughout the test.
3. Place a 'cone tester' (or an alternative test gauge) in the inlet flange and check that the vacuum reading is sufficient for the intended lift plus the pipework losses. If the vacuum reading is unsatisfactory or the pump fails to prime consult *Fault diagnosis*, Section 6.7, page 20.
4. Stop the engine. (See manufacturer's handbook)

6.7 Fault diagnosis

6.7.1 Engine

The engine has no engine shutdown safety systems.

See manufacturer's handbook for further details on operation.

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6.7.2 Pump performance fault diagnosis

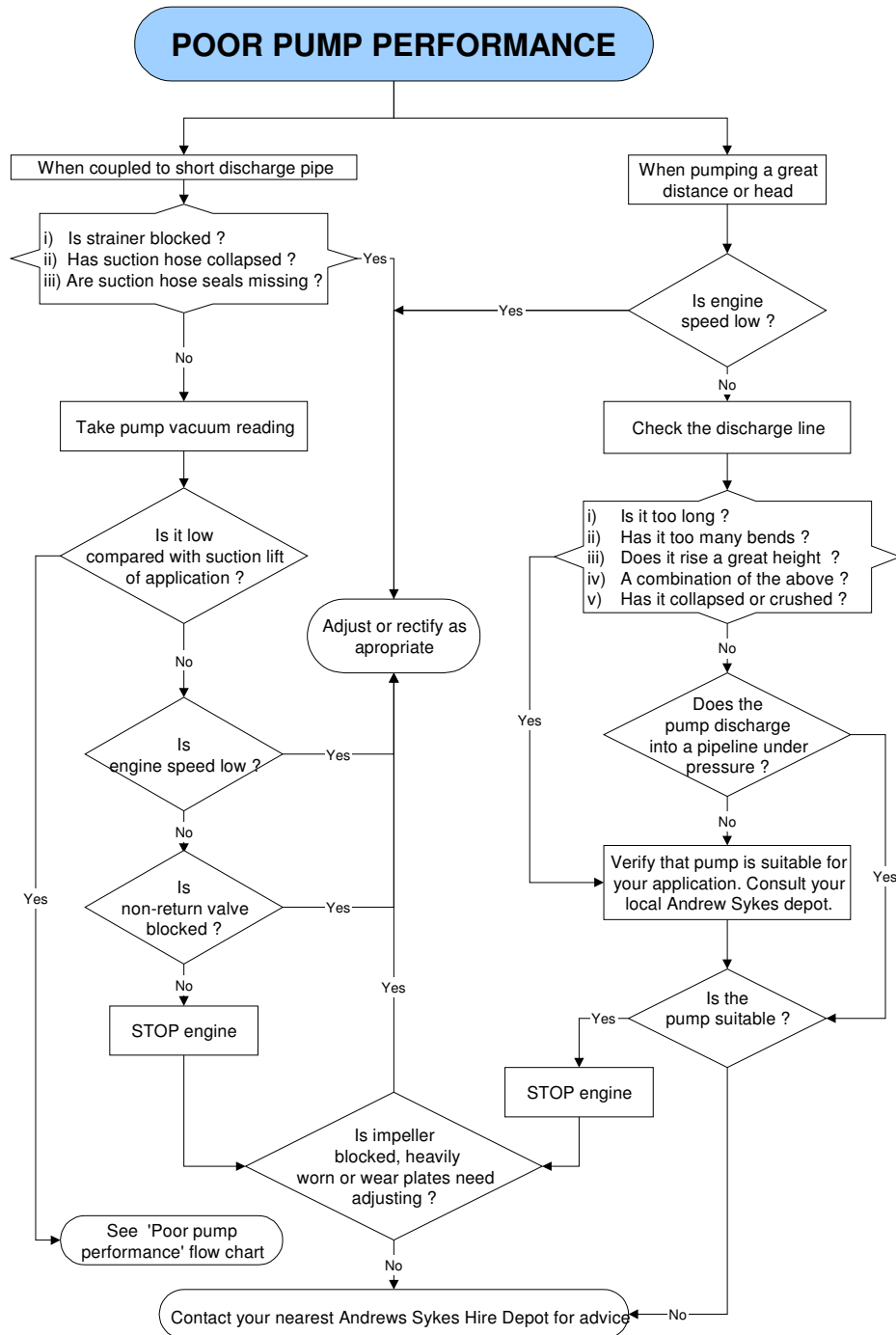


Figure 4 Pump fault diagnosis flowchart

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6.7.3 Priming system fault diagnosis

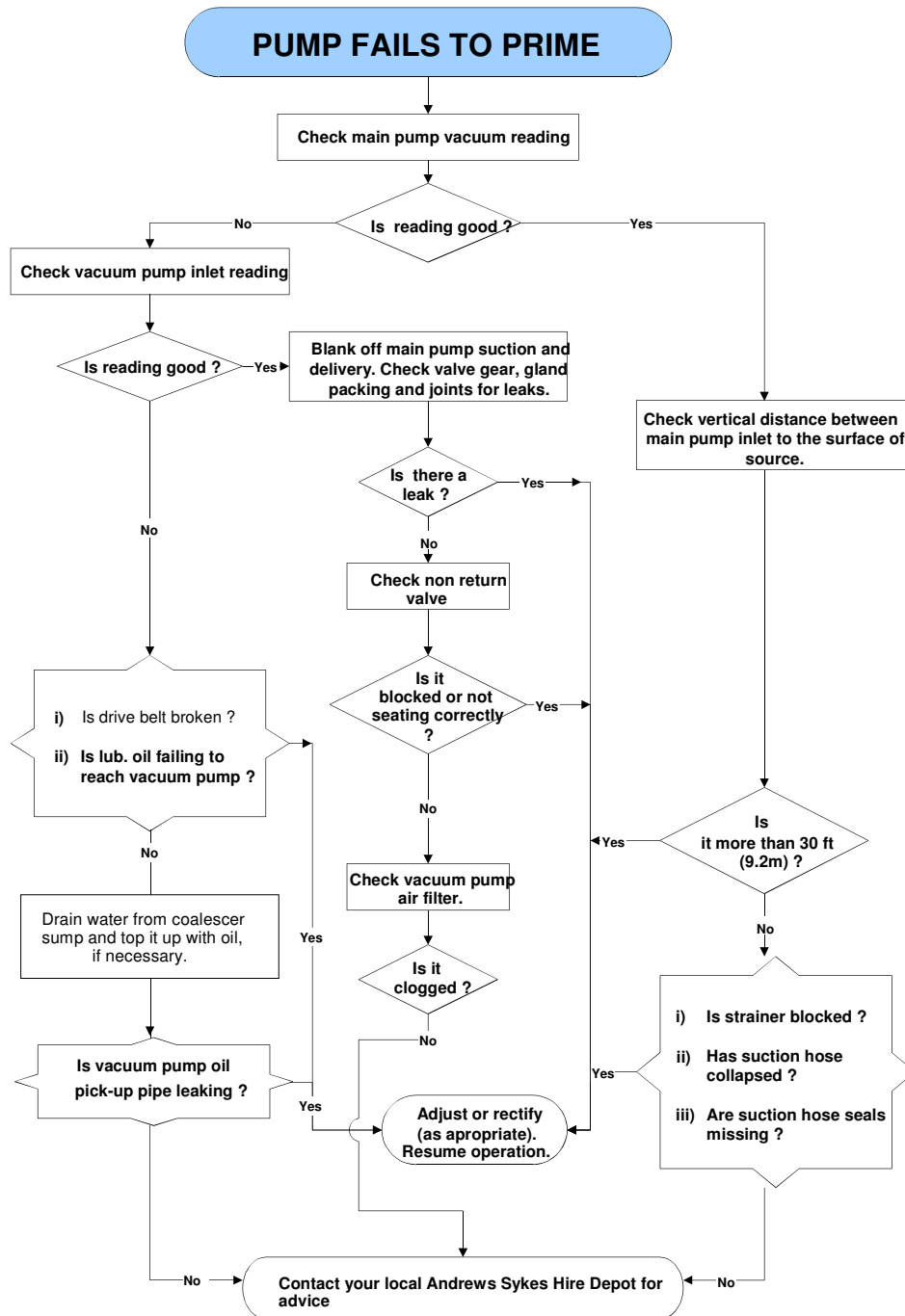


Figure 5 Priming fault diagnosis flowchart

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7 MAINTENANCE

7.1 Tools required

1. A fitter's standard toolkit.

7.2 Maintenance schedule

The following schedule provides a guide for maintaining the pump.

The actual hours of operation between maintenance will depend on the operating conditions. For full details of engine maintenance, refer to the manufacturer's handbook.

Maintenance description	Refer to Section	Running hours					
		Daily	125	250	500	2000	6000
Vacuum pump and priming system:							
Check tension and condition of vacuum pump drive belt	7.5			×			
Check priming tank valves and clean or renew air filter	7.6				×		
Renew vacuum pump drive belt	7.5					×	
Check non-return valve ball is sealing on seat	7.8				×		
Dismantle and clean priming tank, valves and pipes	7.6				×		
Check performance of vacuum pump and overhaul as necessary	7.7					×	
Main pump:							
Check impeller and wear plates for wear and renew or adjust as required.	7.9				×		
Renew pump pressure seal gland packing	7.11				×		

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7.3 General instructions and precautions

7.3.1 Removal of engine and pump for major service

See **Figure 9**, page 34, for details of lifting points, securing bolts etc.



WARNINGS

Chock and stabilise the chassis **BEFORE** commencing work.



CAUTIONS

Drain main pump volute and priming tank.

ALWAYS remove major component to clean for workshop conditions, for overhaul.

1. Disconnect the wiring loom from the key switch.
2. Disconnect and remove the battery.
3. Disconnect the fuel hoses from the engine.
4. Remove all guarding.
5. Disconnect the engine from its mounts and the pump matching piece.
6. Remove priming tank, sump tee assembly and front wear plate from volute.
7. Remove impeller and pump mounting bolts, withdraw pump from stub shaft.
8. Lift engine by its lifting points (Lifting gear will be required).

7.4 Engine and fuel system

7.4.1 General

Consult original manufacturer's handbook for engine maintenance instructions.

7.4.2 Cleaning the fuel tank

1. Remove its drain plug and drain the fuel tank.
2. Remove all traces of dirt, debris and fuel by steam cleaning.
3. Drain the tank of all water and ensure that its inside is dry.
4. Replace the drain plug.

7.5 Vacuum pump drive belt

The vacuum pump drive arrangement is illustrated in **Figure 6** page 25.

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7.5.1 Adjusting belt tension - See Figure 11 on page38.

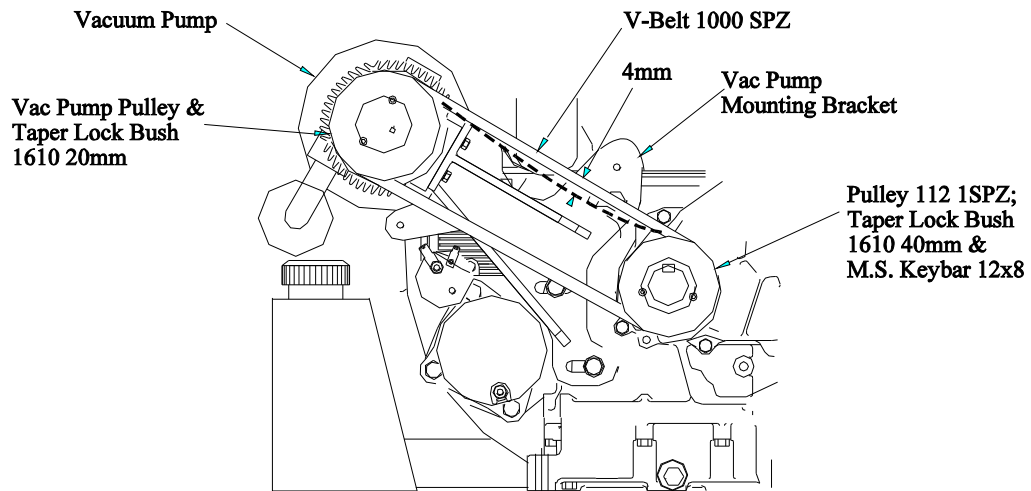


Figure 6 Drive Belt Arrangement

1. Loosen the vacuum pump mounting bracket screws.
2. Re-position the vacuum pump mounting bracket to adjust the tension of the belt. (At the correct tension a force of 3.5lbs (1.6kg) is needed to deflect the belt 4mm at the midpoint between the pulleys.)
3. When the vacuum pump is in the correct position, tighten the vacuum pump mounting bracket locking screws (B03, B04, B05).

7.5.2 Renewing the belt

1. Remove guarding.
2. Loosen the vacuum pump mounting bracket screws and move the assembly mounting plate towards the engine shaft to slacken the belt.
3. Slide the belt off the pulleys.
4. Fit a new belt and adjust the tension as described in the Section 7.5.1.page 24.
5. Replace guarding.

7.5.3 Cleaning and Replacement of Vacuum Pump Lubrication Oil

1. Remove all retaining clips on oil feed line and disconnect.
2. Remove lubrication bottle from its securing bracket.
3. Drain oil from both and clean in petrol or similar spirit.
4. Reconnect and replace with all clips and refill with new oil (specification as **Table 2** on page 13). See **Figure 12**, page 40.

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7.6 Priming tank surge control valve and air valve

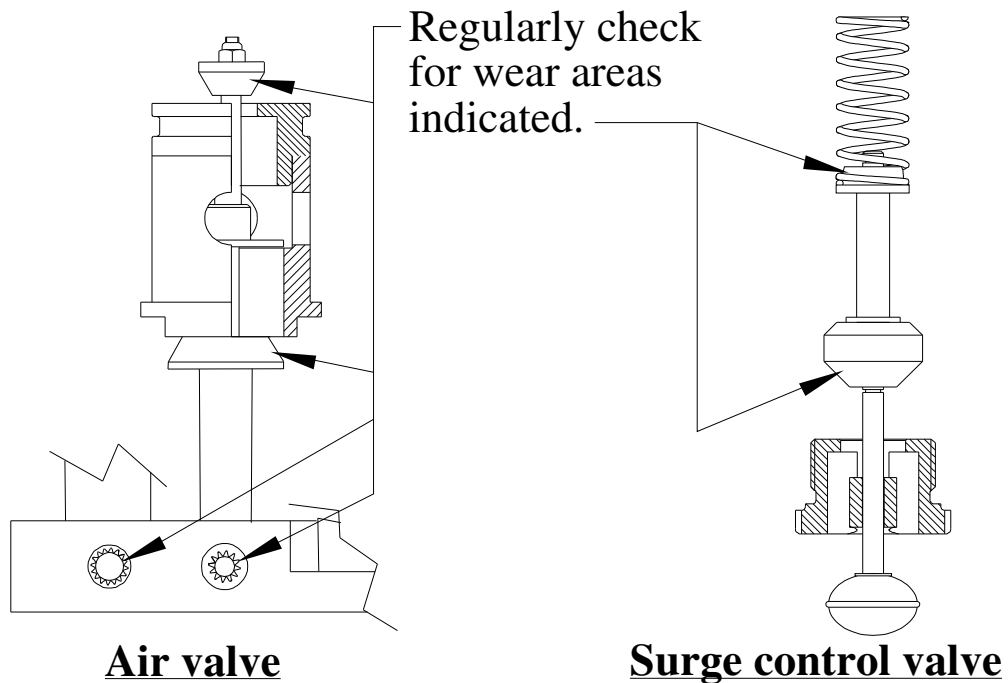


Figure 7 Priming tank air and surge control valves

Figure 7 shows the air and surge control valve assemblies, indicating areas that should be checked for wear and damage. To access the valves or for cleaning out, remove the priming tank top complete with valve gear. See **Figure 14**, page 44. Renew parts, as necessary and grease valve seats to prevent seizure.

7.7 Vacuum pump

7.7.1 Removing the vacuum pump

See **Figure 11**, page 38.



WARNING

Lifting equipment may be required to remove the 18 ft³/min vacuum pump, where fitted. Check Technical Specification, section 5.2. page 10.

1. Remove guarding.
2. Disconnect hoses from the vacuum pump.
3. Using a suitable spanner, disconnect the oil feed pipe at the vacuum pump and withdraw the oil feed pipe.

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4. Loosen the vacuum pump mounting locking screws.
5. Move vacuum pump mounting plate to allow the belt to slip over the vacuum pump pulley.
6. Remove the two vacuum pump holding nuts.
7. Remove the vacuum pump and pulley.

7.7.2 Service Instructions for Rotary Vacuum Pump

Reference **Figure 10**, page 36.

1. Installation

When the machine is not required for immediate use the inlet and outlet must be kept covered, otherwise entry of foreign matter through the ports could cause serious damage. Connecting pipework on the intake side of the machine must be thoroughly cleaned to remove internal rust and scale. Use PTFE tape for making joints since surplus from jointing compounds will damage the blades if drawn into the machine. It is essential to fit a filter on the intake of vacuum pumps to prevent pipe scale, oil, water, dust and other harmful matter from being drawn in.

2. Checks before use

Before running the machine for the first time after installation or maintenance, make the following checks:

1. Check that the machine is free by turning the shaft by hand through a few revolutions.
2. Check that the direction of rotation is anti-clockwise when viewed from the drive shaft.
3. The pump speed must not exceed 1800 rpm.
4. Ensure that there is an adequate supply of oil available in the oil tank or bottle. Use the following oil or equivalent - Shell Rimula X Oil 20/20W.

3. Operation Instructions

Regularly inspect any filters fitted in the intake pipeline. Clean the elements and renew when necessary. Failure to carry out this procedure will result in loss of performance and overheating. Check the blades for wear every 2500 running hours or if loss of performance occurs. Regrease both bearings every 1000 working hours, giving 1 stroke only with the grease gun, using one of the following greases:-

Shell Darina Grease R2
Shell Darina Grease R
or equivalent.

4. To inspect and change blades

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Remove fancowl (V25), fan (V24) and circular guard (V31). Undo 4 screws (V18) and draw off rear coverplate (V03) complete with outer race of roller bearing (V12), seal bush (V13) and seal (V14). The blades (V08) may now be inspected and should be renewed if the blade tips have worn so as to reduce the depth to 21mm (13/16") or less. When fitting new sliding blades check that they fall freely from the rotor slots. Measure the thickness of gaskets (V19) positioned between the coverplate and cylinder (V01).

5. To change bearings and seals

Proceed as above for changing blades and then remove endcap (V05) from coverplate. The outer race of roller bearing, seal and seal bush can be tapped out from the coverplate. Now undo 4 screws (V18) at drive end and remove drive end coverplate (V02) complete with rotor and shaft assembly (V06 and V07). Once again measure the thickness of gaskets (V19) between coverplate and cylinder. Take off endcap (V04) circlip (V23) and bearing abutment washer (V09). Some machines have shims (V20) fitted between the endcap and face of bearing, and care must be taken not to lose or damage these. the purpose of these shims is to provide the correct clearance between coverplate and front face of rotor (V06). Continue to dismantle by pressing out shaft leaving the bearings (V11) seal bush (V13), seal (V14) and thrust washer (V21) in coverplate. These items can now be tapped out from the coverplate.

6. To reassemble

Reassemble in reverse order. When fitting the angular contact bearings (V11) these are assembled in the back-to-back position. When grease seals (V14) are replaced ensure that the tension spring faces the bearings. It is essential that all parts are perfectly clean before assembly. Re-build with gaskets having exactly the same thickness as the originals and ensure that any shims (V20) are assembled in the correct position. The gaskets and shims are essential to give the correct running clearances which are:-

1. Between coverplate and rotor - drive end .05/.75mm (.002/.003")
2. Between coverplate and rotor - rear end .15/.175mm (.006/.007")
3. Between rotor and cylinder bore .75/.10mm (.003/.004").

Ensure that the coverplate location dowels (V15) are replaced.

Failure to follow the above instructions can cause seizure or loss of performance.

When ordering spare parts always quote the machine serial number.

7.7.3 Refitting vacuum pump

See **Figure 11**, page 38.

1. Put the vacuum pump in place on the mounting bracket (B06).
2. Refit the belt over the vacuum pump pulley (B08).
3. Fit and tighten the vacuum pump holding down fixings (B12, B13, B14).

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4. Adjust the belt tension by moving vacuum pump mounting bracket on its slotted holes and tighten the vacuum pump mounting bracket screws as explained in Section 7.5.1, page 24.
5. Refit the vacuum and exhaust hoses to the vacuum pump, ensuring each is refitted in the same position from which it was removed. Check that the fittings are tight.
6. Check that the oil feed pipe is clean. Refit the pipe and check that the fitting is tight.
7. The Taper Lock® bush screws should be checked for tightness after the machine has been run under load for a short time.
8. Refit the guarding.

7.8 Non-return valve

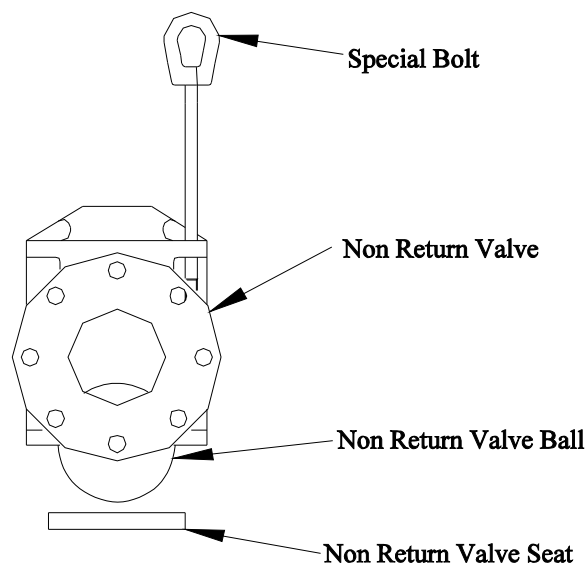


Figure 8 Non-return Valve

1. Regularly check the non-return valve, **Figure 8**, for blockage and wear.
2. For a thorough inspection;
 - i disconnect the non-return valve from the volute and remove it;
 - ii detach the valve seat, remove the ball and inspect both for wear and damage;
 - iii re-fit or renew as appropriate.

7.9 Main pump impeller

To check the condition of the impeller and wear plates without removing the main pump:

1. Drain the volute.
2. Disconnect the intake hose and fittings.
3. Disconnect the volute from the priming tank.

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4. Remove priming tank and sump tee by removing nuts and washers.
5. Consult **Figure 13** on page 42.
6. Remove the impeller assembly by unscrewing in an anti-clockwise direction, looking at the impeller end and extract it from the volute casing. Check for wear.
7. If the impeller blades are damaged, replace the entire impeller assembly. If only the wear ring is worn, remove it and bond on a replacement using a suitable retainer.
8. Check the packing for wear and renew if necessary, as detailed in section 7.11.1 page 30.
9. Refit the impeller and subsequently sump tee and priming tank assembly in reverse of previous instructions.

7.10 Removing and refitting pump pressure seal

Reference **Figure 13**, page 42.

1. After removal of the impeller as described in Section 7.11 (optional NRV), withdrawing item through front of volute.
2. Remove the set screw and washers from underside of volute. (Items W21, W22 & W23)
3. Remove 3/8" nut and washers from their studs and extract pump end assembly off engine and accompanying stub shaft (Items W32 & W33) & (Items W34 & W35).
4. Remove end cap by removing set screws and washers. (Items 5,6&7)
5. Remove packing holder, spring and gaitor respectively. Replace any worn components as required.

7.11 Main pump pressure seal

The main pump pressure seal is shown in **Figure 13** on page 42.

Renewal of the pump pressure seal packing can be undertaken during regular inspection of the impeller as explained in Section 7.9, and replaced as explained in Section 7.11.1.

7.11.1 Renewing the pump pressure seal packing

1. Cut a 270mm length of 1/2" square packing material.
2. Place the packing in the holder, butting the two ends first and then pressing the rest of the packing into the holder. The total length of packing is greater than the circumference of the holder and must be forced into place. The packing will protrude slightly from the face of the holder on completion.

7.11.2 Refitting pump pressure seal

1. Replace spring and gaitor onto packing holder.
2. Replace end cap (with newly fitted o-ring if required) and tighten all set screws evenly to position the pressure seal assembly in the matching piece.

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3. Replace pump volute and matching piece assembly back onto the engine bell housing using the studs, nuts and washers previously removed and tighten evenly, as reverse of the steps in section 7.9 parts 1, 2, 3 & 4. For impeller refitting refer to Section 7.12.

7.12 Fitting the impeller - Reference Figure 13, page 42.

1. Clean the threaded portion of the shaft and impeller using solvent. Grease threads. Fit impeller shims (W13&14) and screw the impeller into place, making sure it is fully locked.
2. Prior to final assembly, coat the outer edges of the wear plates heavily with water pump grease to facilitate removal at a later date.

7.13 Replacing the Priming tank, Sump Tee and Wear Plate

Reference **Figure 13**, page 42.

1. Fit priming tank (c/w wear plates etc.) with no shims, pinch bolts only.
2. Measure gap between volute and priming tank faces.
3. Remove tank and refit with appropriate number of shims (ie. gap measured + 0.5mm).
4. Check the shaft turns freely.
5. Ensure all nuts and screws are tight before restarting.

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8 SPARE PARTS

8.1 Introduction

If you require spare parts for your Andrews Sykes pump please contact your local Andrew Sykes Hire Ltd depot, telephone (free phone) 0800-211-611.



CAUTION

The use of any spares other than those supplied by Andrews Sykes Hire Ltd for the machine in question may cause **DAMAGE** to the machine and may **INVALIDATE** any EC Declaration given in respect of the equipment.

8.2 Ordering Spares

When ordering spare parts, please provide the following details:

Please provide the following information:

- (1) Machine model and chassis type
- (2) Model-Serial number of the machine
- (3) Part number
- (4) Description of part
- (5) Quantity required

See *Product identification*, page 15 for details of model naming and serial numbers.

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8.3 Spare Parts Listing

Miscellaneous parts					
Ref.	Description	Part No.	Ref.	Description	Part No.
01	Battery Box	SY387200	17	Washer	SY9519512
02	Cable	SY3864065	18	Set Screw	SY9519140
03	Cable	SY3872001	19	Joint	SY5004121
04	Lug Ring	SY3864066	20	C.E. Badge Mark	SY2994010
05	Lug Ring	SY3864067	21	Lifting Bracket	SY3872006
06	Battery	SY7004404	22	Silencer Exhaust	S9124
07	Socket Screw	SY9519509	23	Spacer Engine Exhaust	SY3804372
08	Set Screw	SY9519095	24	Fuel Inlet Hose	SY3804065
09	Set Screw	SY6664006	25	Fuel Leak Off / Return Hose	SY9519518
10	Washer	SY9509678	26	Set Screw	SY9519181
11	Lister Engine	SY7841007	27	Flat Washer	SY9509684
12	Eye Nut Lifting	SY3874040	28	Spring Washer	SY9509812
13	Set Screw	SY9519075	29	Screw Csk HD	SY9519526
14	Washer	SY9019353	30	Bolt	SY9509555
15	Bolt	SY9519504	31	Copper Washer	SY9519529
16	Washer	SY9509860			

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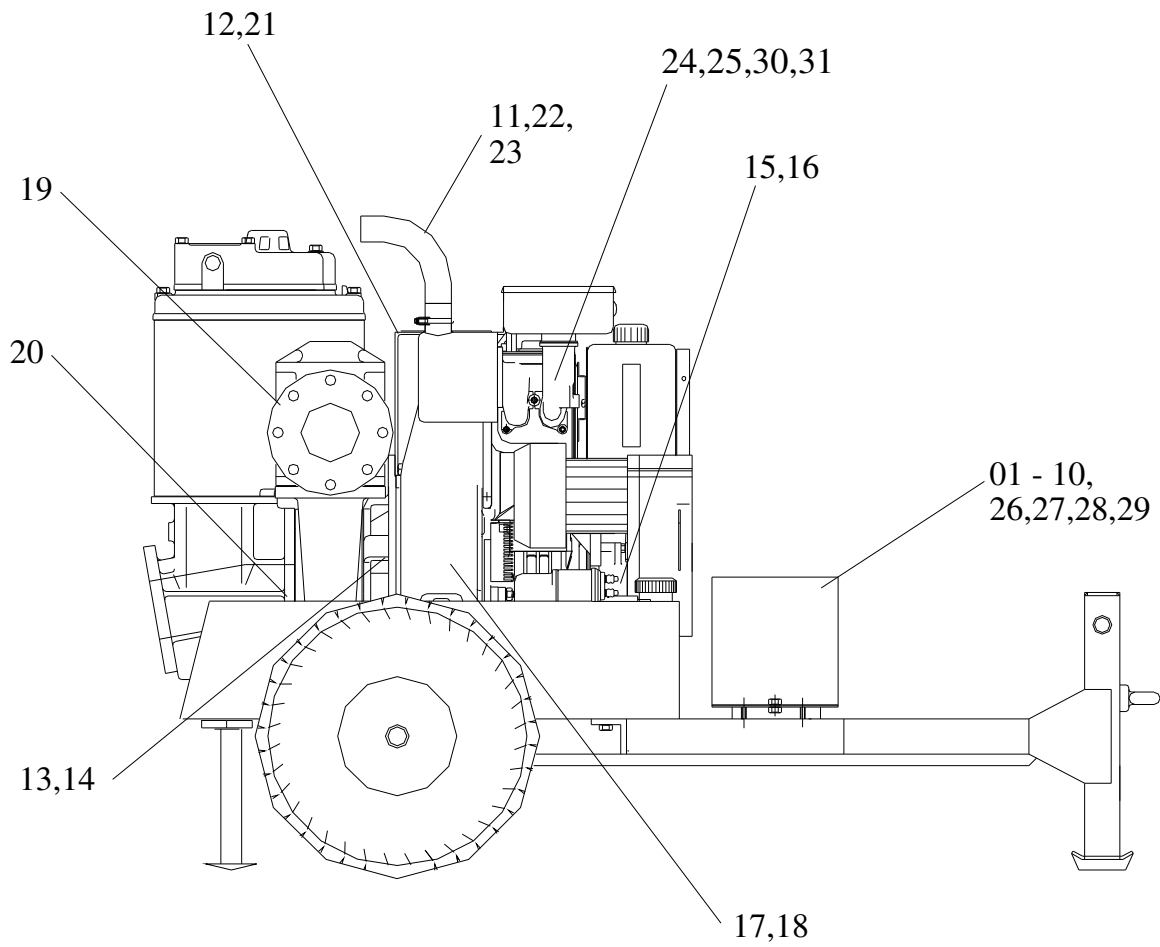


Figure 9 Miscellaneous Parts

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Vacuum pump assembly -18cfm			Part No. SY3874077		
Ref.	Description	Part No.	Ref.	Description	Part No.
V01	Cylinder	S8416	V19	Gasket - Coverplate	K1001
V02	Coverplate -D.E.	S8018/S P	V20	Bearing Shim	K1005
V03	Coverplate -Rear	S8426	V21	Thrust Washer	B1100
V04	End Cap - D. E.	S8027/1 SP	V22	Drive Pin	E1000
V05	End Cap - Rear	S8027/3	V23	Circlip	B1033
V06	Rotor	S8413	V24	Fan	W1021
V07	Shaft	S8427	V25	Fancowl	W1005
V08	Blade	S8047/1	V26	Fancowl Support Legs	S8443
V09	Bearing Retaining Washer	S8021	V27	Round Head Screw	G1153
V10	Seal Sleeve	S8073	V28	Round Head Screw	G1152
V11	Angular Contact Bearing	H1018/H	V29	Key	N1036
V12	Roller Bearing	H1020/H	V30	Grease Nipple Extension	S3031/2
V13	Seal Bush	F1051/G	V31	Circular Guard	S8443/1
V14	Seal	F1047/P	V32	Exhaust Silencer	S9124
V15	Dowel Pin	E1000	V33	Elbow	M1015
V16	Grease Nipple	J1000	V34	Hexagon	M1023
V17	Skt Head Screw	G1048	V35	Elbow	R1096
V18	Skt Head Screw	G1014			

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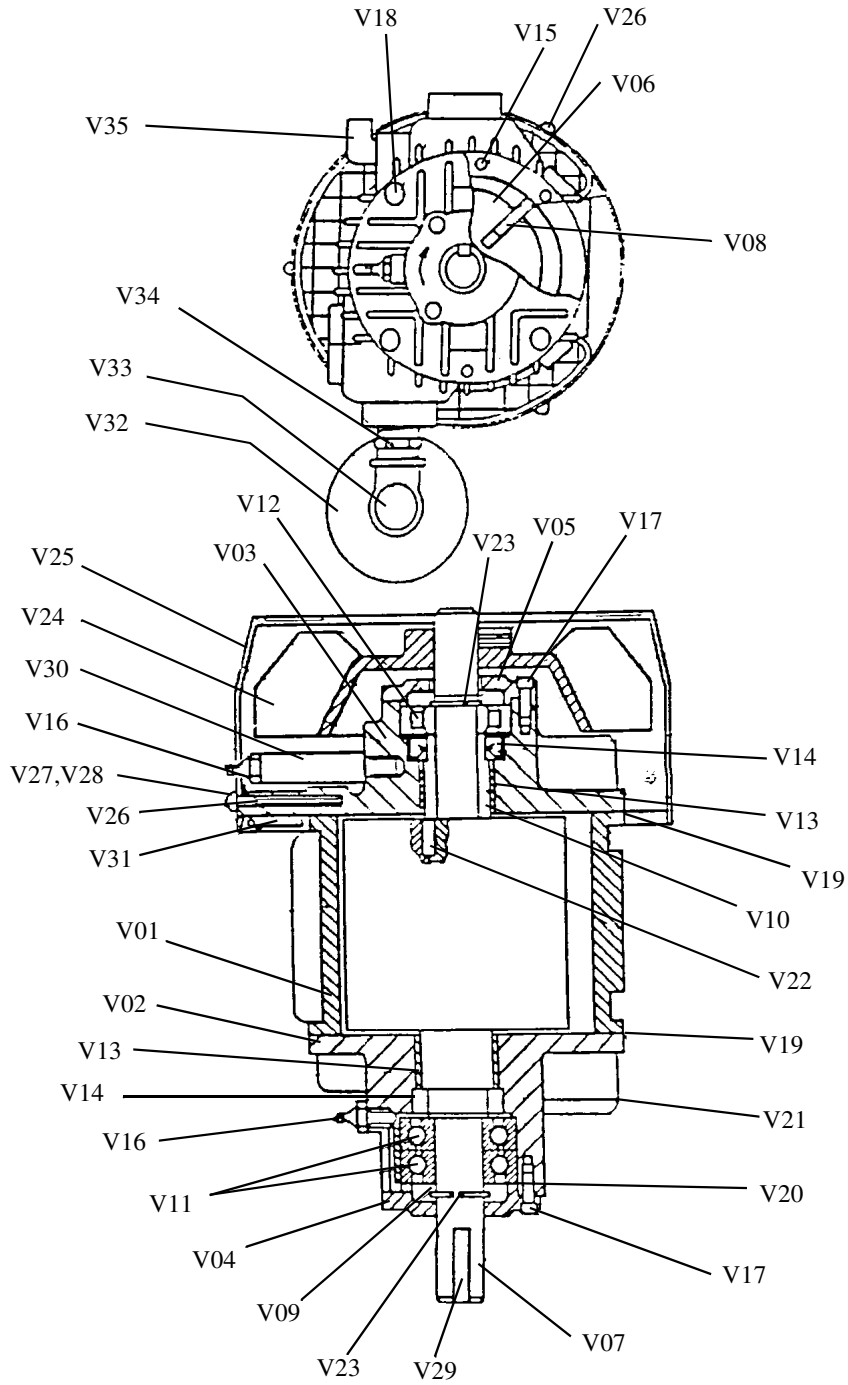


Figure 10 Vacuum Pump

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Vacuum pump drive assembly					
Ref.	Description	Part Number	Ref.	Description	Part Number
B01	Shaft pulley	SY3874030	B18	Nut Tubing	SY9209402
B02	Taper Bush	SY3872011	B19	Sleeve Tubing	SY9209392
B03	Set Screw	SY9519513	B20	Set Screw	SY9519095
B04	Steel Washer	SY9509860	B21	Steel Washer	SY9509678
B05	Spring Washer	SY9519514	B22	Spring Washer	SY9509806
B06	Mounting Bracket	SY3874101	B24	Straight Connector Bracket	SY9519522
B07	Taper Bush	SY9059146	B25	Elbow Stem	SY9519520
B08	Pulley	SY3874029	B26	Elbow	SY9519516
B09	Vacuum Pump Guard	SY3874112	B27	Exhaust Silencer	S9124
B10	Nut Tubing	SY9209402	B28	PVC Hose (To Priming Tank)	SY3872015
B11	Sleeve Tubing	SY9209392	B29	Hose Clamp (Both Ends)	SY3872017
B12	Set Screw	SY9519075	B30	Elbow	SY9519516
B13	Steel Washer	SY9509676	B31	Bush	SY3872019
B14	Spring Washer	SY9509805	B32	Nipple	SY9519517
B15	Hose Adaptor	SY3874043	B33	Adaptor Elbow	R1096
B16	Wedge Belt	SY3874031			
B17	Tube Nylon	SY9209716			

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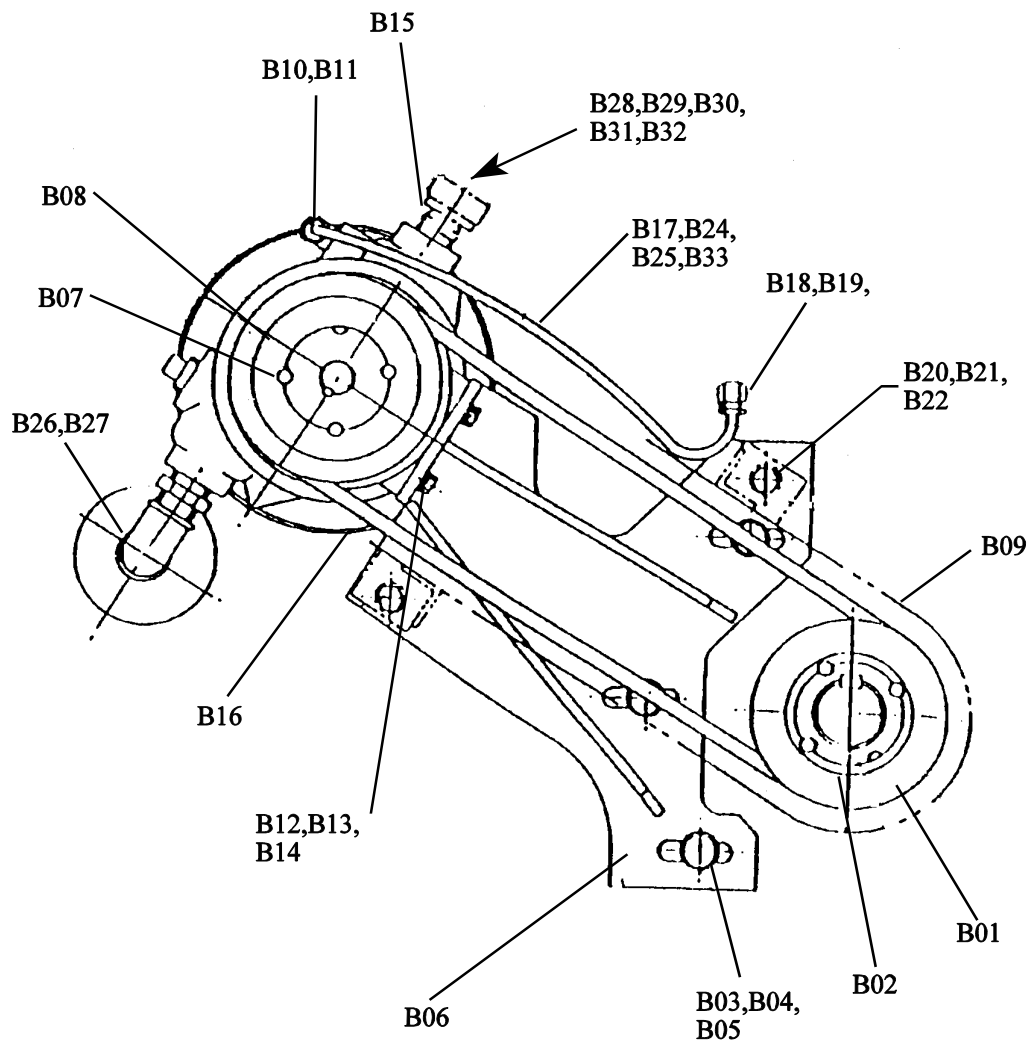


Figure 11 Vacuum Pump Drive Assembly

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Lube Bottle Arrangement		
Ref.	Description	Part Number
L01	Oil Tank	U-C9243
L02	Nut	SY9509652
L03	Special Stud	SY3874080
L04	Support Plate	SY3874090
L05	Washer	SY9509676
L06	Set Screw	SY9519075
L07	Washer	SY9509676
L08	Set Screw	SY9519177
L09	Spring Washer	SY9509807
L10	Washer	SY9509679
L11	Spring Washer	SY9509806

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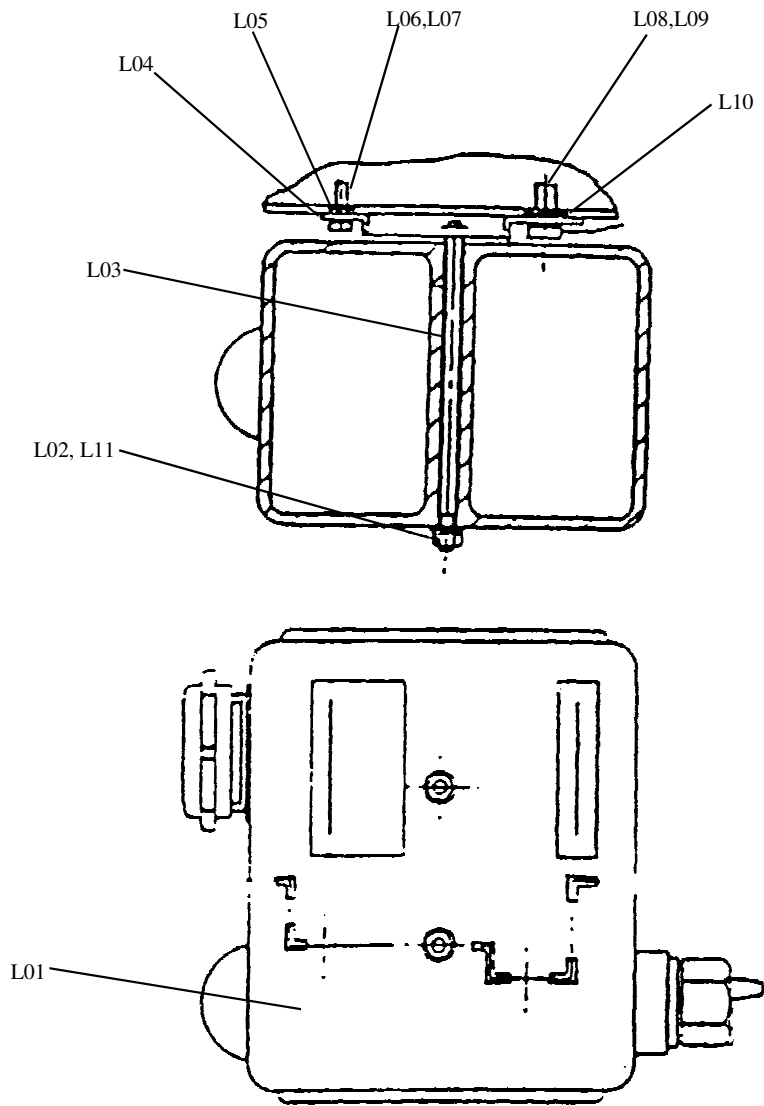


Figure 12 Lube Bottle Arrangement

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Main pump assembly					
Ref.	Description	Part Number	Ref.	Description	Part Number
W01	Matching Piece	SY3874003	W25	Wear Ring	SY3804017
W02	Set Screw	SY9519142	W26	Impeller (2 Vane)	SY3874002-M
W03	Nut	SY9509654	W27	Front Wear Plate	SY3874016
W04	End Cap	SY3874017	W28	Packing 270 lg	SY6384003A
W05	Set Screw	SY9519103	W29	Packing carrier	SY3874007-2
W06	Spring Washer	SY9509806	W30	Back Cover Gasket	SY5004410
W07	Spring Washer	SY9509805	W31	Spring Gaitor	SY3804412
W08	Steel Washer	SY9509678	W32	Spring Washer	SY9519562
W09	Special Set Screw	SY3874045	W33	Nut	SY9019425
W10	Steel Washer	SY9509676	W34	Spring Washer	SY9509808
W11	Shaft Sleeve	SY3874022	W35	Set Screw	SY9519140
W12	Stub Shaft	SY3874015	W36	M.S. Keybar	SY9519559
W13	Steel Shim	SY3874024	W37	Bolt	SY9519549
W14	Copper shim	SY3874046	W38	Spring Washer	SY9509808
W15	'O' Ring	SY3804166	W39	Stud	SY9019093
W16	Compresion Spring	SY3804160	W40	Flat Washer Cop.	SY5004308
W17	Stud	SY9509089			
W18	Nut	SY9509653			
W19	Spring Washer	SY9509807			
W20	Matching Piece Gasket	SY5004438			
W21	Steel Washer	SY9509680			
W22	Spring Washer	SY9509808			
W23	Set Screw	SY9519140			

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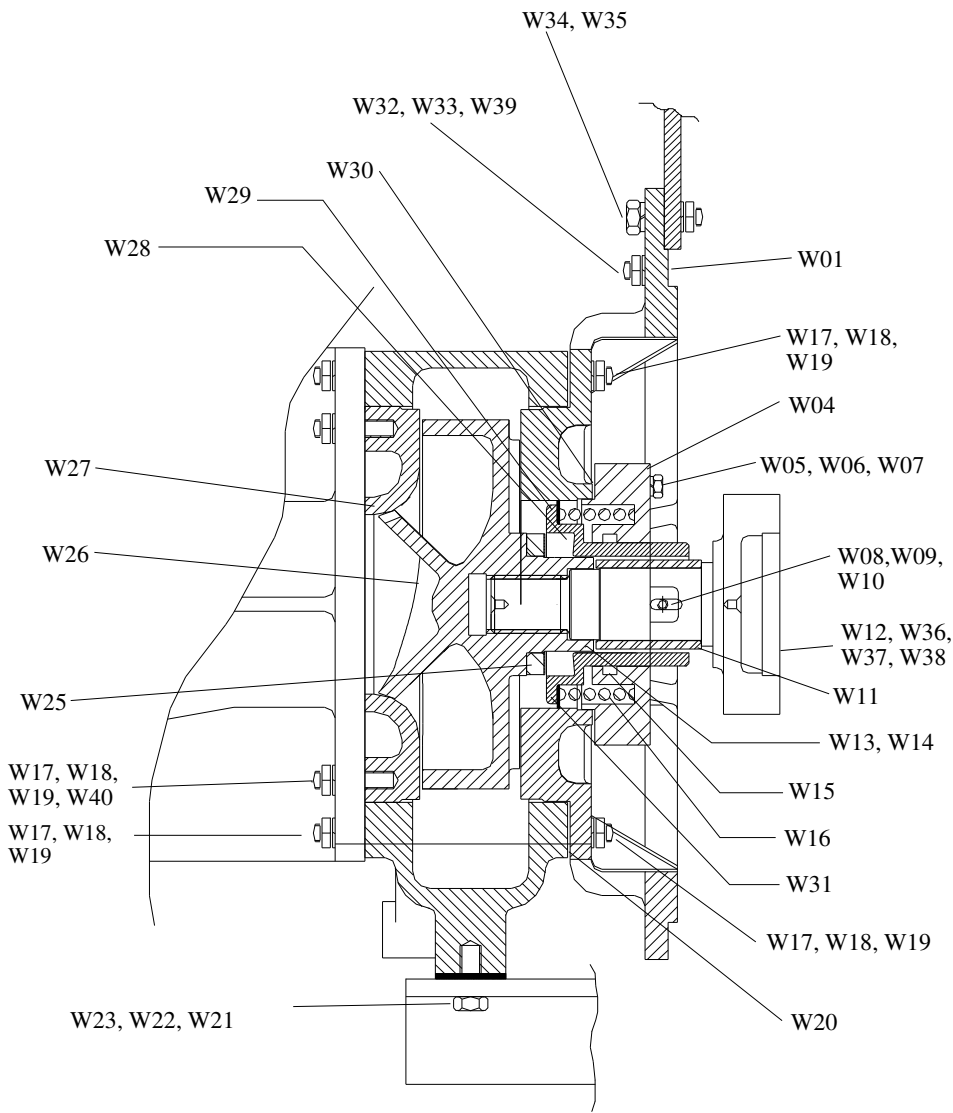


Figure 13 Main Pump Impeller and Wear Plates

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Priming tank assembly			Part No. SY3802500		
Ref.	Description	Part No.	Ref.	Description	Part No.
P01	Ball Valve	SY1544001	P36	Joint Fulcrum brk	SY5004235
P02	PVC Hose	SY3404502	P37	Tank/Top Cvr. gasket	SY5004262
P03	Float Disc	SY3404509	P38	Cvr./Vlv. cvr. gasket	SY5004263
P04	Top Cover	SY3474510	P39	Filter cvr/Cvr. gasket	SY5004268
P05	Valve Cover	SY3474511	P40	Tank/Sump gasket	SY5004373
P06	Air Filter Cover	SY3474519	P41	Elbow	SY9209044
P07	Valve Rod	SY3474521	P42	Solid Plug	SY9209148
P08	Valve Seat In/Outlet	SY3474522	P43	Brass Plug	SY9209164
P09	Main Valve Inlet	SY3474523	P44	Stud	SY9509061
P10	Valve Air Inlet	SY3474524	P45	Stud	SY9509097
P11	Diaphragm	SY3474525	P46	Stud	SY9509104
P12	Float Rod	SY3474526	P47	Stud	SY9509113
P13	Compression Spring	SY3474527	P48	Stud	SY9509119
P14	Float	SY3474547	P49	Stud	SY9509133
P15	Fulcrum Pin	SY3564037	P50	Nut	SY9509652
P16	Valve support Pin	SY3564038	P51	Nut	SY9509653
P17	Air Filter Element	SY3804418	P52	Nut	SY9509654
P18	Valve Seat	SY3564293	P53	Washer	SY9509678
P19	Valve Ball	SY3564294	P54	Steel Washer	SY9509679
P20	Control Vlv adj. seat	SY3564296	P55	Steel Washer	SY9509680
P21	Control Valve	SY3564297	P56	Nylon Washer	SY9509693
P22	Control Vlv ret. sprng	SY3564298	P57	Brass Washer	SY9509694
P23	Distance Piece	SY3564300	P58	Brass Washer	SY9509697
P24	Control Valve Knob	SY3564302	P59	Nylon Washer	SY9509700
P25	Pipe Adaptor	SY3474599	P60	Spring Washer	SY9509808
P26	Instruction plt.	SY3564350	P61	Self Locking Nut	SY9509861
P27	Spring	SY3564354	P62	Self Locking Nut	SY9509864
P28	Cont. Vlv Spindle	SY3564425	P63	Starlock Washer	SY9519256
P29	Air Outlet Valve	SY3614033	P64	Starlock Washer	SY9519260
P30	Fulcrum Bracket	SY3614035	P65	Salterfix Ring	SY9519482
P31	Fulcrum Arm	SY3614036	P66	Cap Screw	SY9529201
P32	'O' Ring	SY3614043	P67	Brass Washer	SY9509701
P33	Tank Primary	SY3804002			

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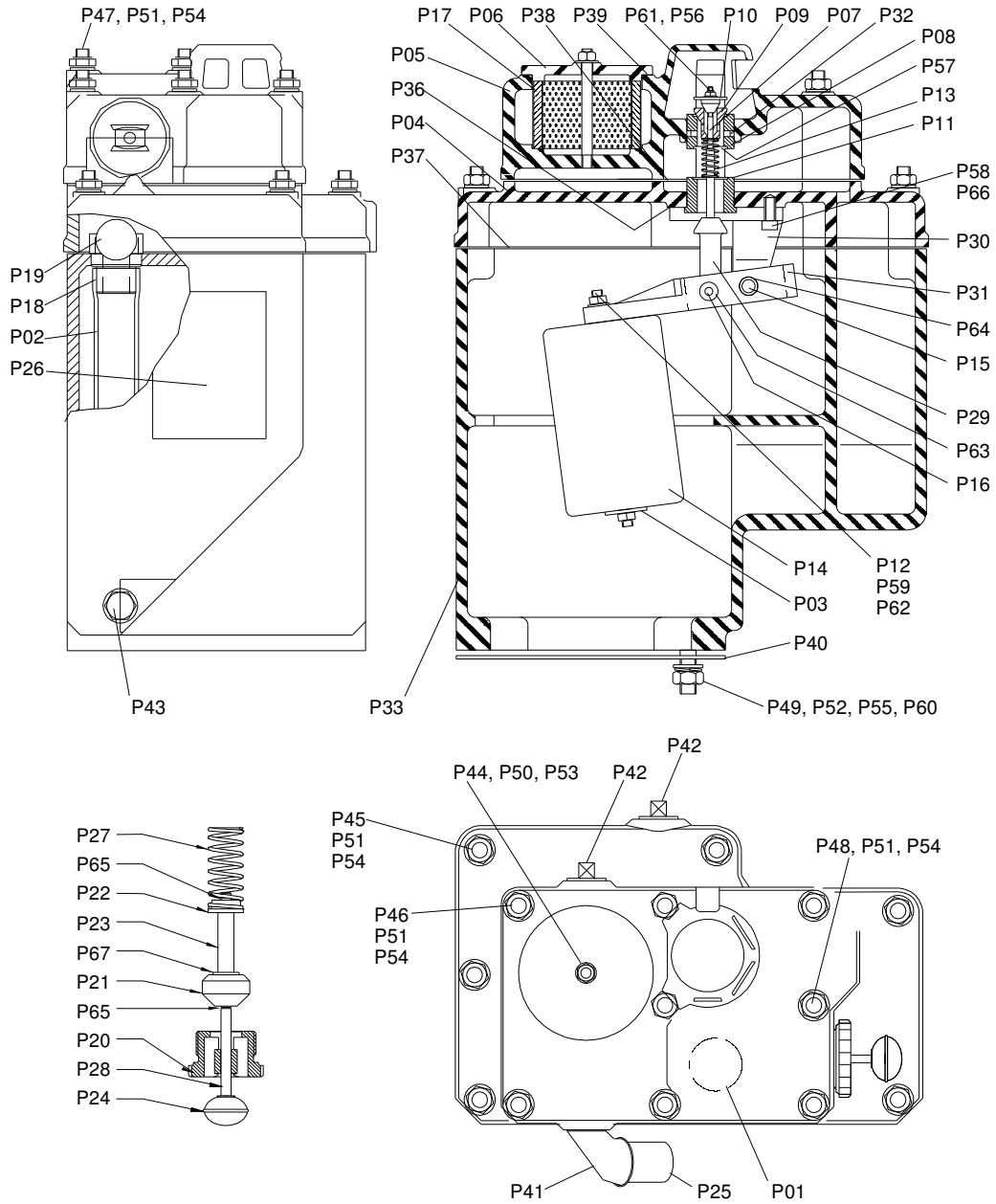


Figure 14 Priming Tank Assembly

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Non-Return Valve Assembly		
Ref.	Description	Part Number
A01	Non-Return Valve (07613)	SY3874013
A02	Non-Return Valve Ball	SY3874018
A03	Non-Return Valve Seat	SY3874014
A04	Male Cock	SY9209730
A05	Volute	SY3874001
A06	Matching Piece Guard	SY3874037
A07	Nut	SY9509651
A08	Spring Washer	SY9509805
A09	Bolt	SY9509515
A10	Solid Plug	SY9209160
A11	Drain Cock 1/4"	SY9209240
A12	Special Bolt	07769
A13	Bonded Seal	SY5004022

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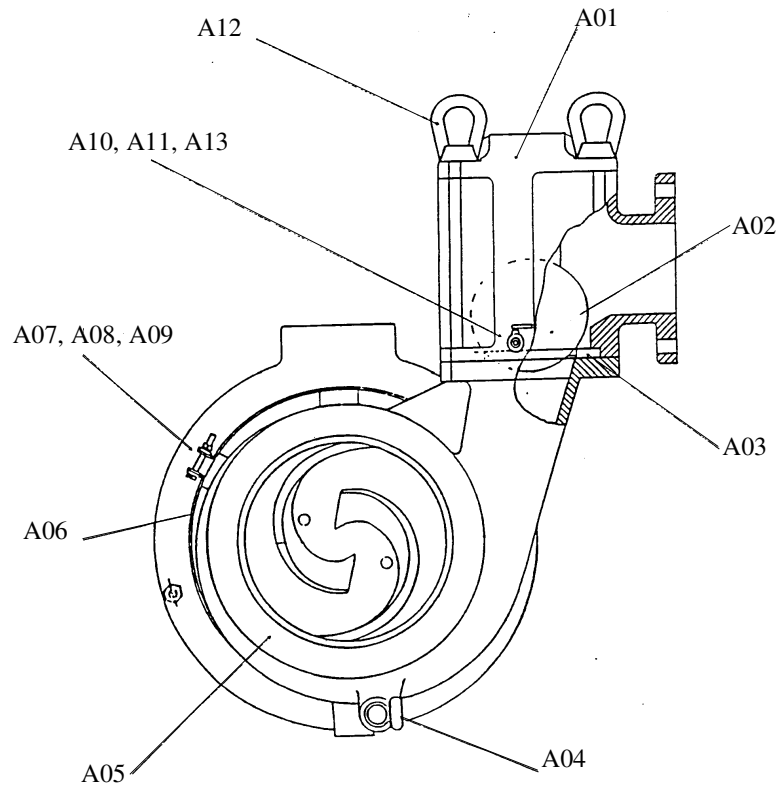


Figure 15 Non-Return Valve Assy

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Sump & Tee, with Back Prime		
Ref.	Description	Part Number
S01	Pipe Adaptor	SY3872014
S02	Vacuum Hose	SY3864101
S03	Bush	SY3872018
S04	Check Valve	SY3714105
S05	Straight Adaptor	SY9512521
S06	Tubing Nut	SY9519523
S07	Tubing Sleeve	SY9519524
S08	Copper Tube	SY9519519
S09	Right Angle Adaptor	03996
S10	Gasket	SY9509653
S11	Nut	SY9509653
S12	Spring Washer	SY9509807
S13	Gasket	SY5004132
S14	Tee Piece	03000
S15	Stud	SY9509089

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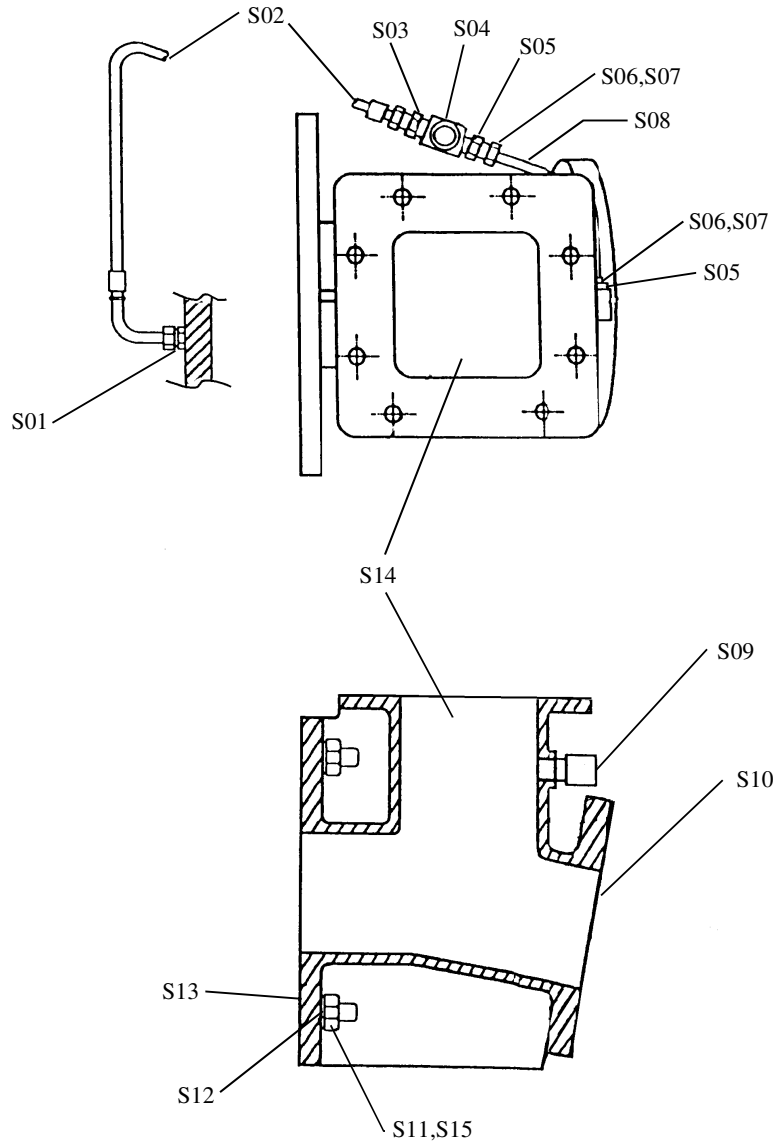


Figure 16 Sump & Tee

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Two Wheel Site Trailer Assembly		
Ref.	Description	Part Number
T01	Prop Stand Foot	SY3874096
T02	Chassis	SY3874008
T03	Pneumatic Wheel	SY3874009
T04	Eye Nut	SY3874040
T05	Bolt	SY9509604
T06	Steel Washer	SY9509684
T07	Spring Washer	SY9509812
T08	Nut	SY9509652
T09	Steel Washer	SY9509678
T10	Spring Washer	SY9509806
T11	Nut	SY9509654
T12	Spring Washer	SY9509808
T13	Screw Set Hex	SY9519142
T14	Prop Stand	SY3874054
T15	Clamp	SY3874055
T16	Cotter Pin	SY9519027
T17	Flat Washer	SY9019361
T18	Filler Cap	SY3354079
T19	Rubber Grommet	SY3864049
T20	Hollow Plug	SY9209166

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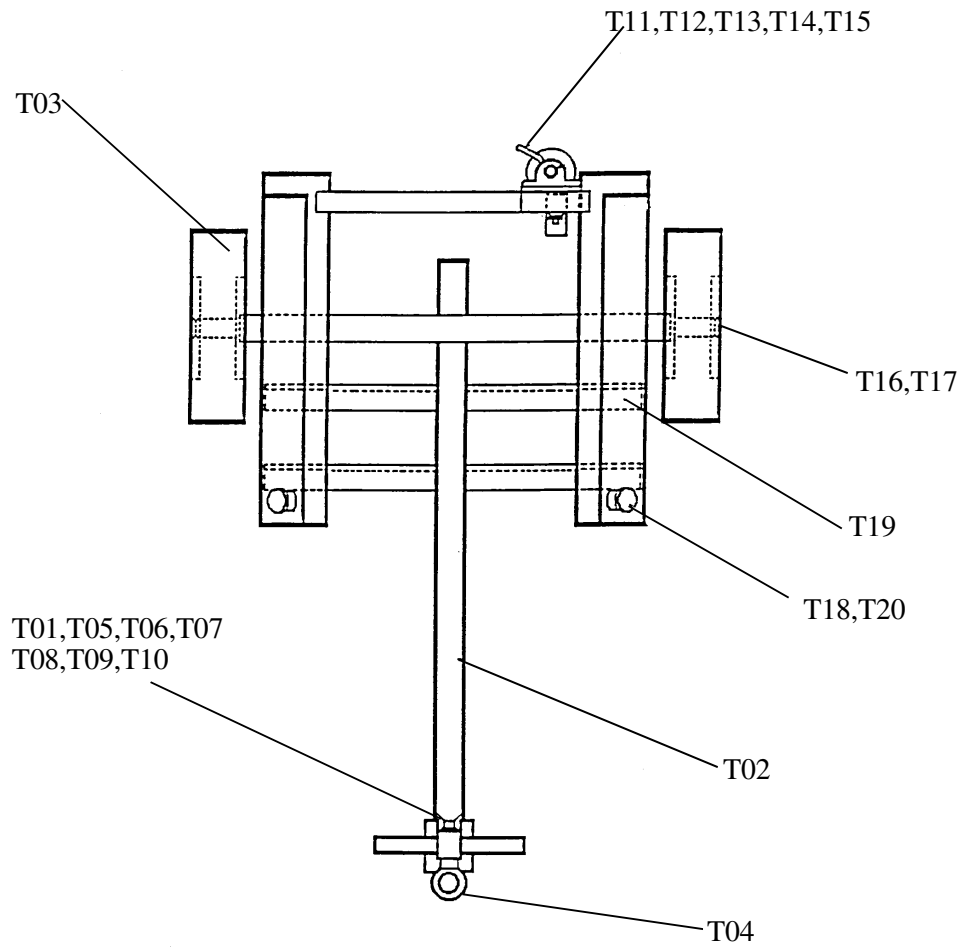


Figure 17 Two Wheel Site Trailer Assembly (Diesel Engine)

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Two Wheel High Speed Trailer Assembly					
Ref.	Description	Part Number	Ref.	Description	Part Number
H01	Chassis Fabrication	SY3874048	H23	Spring Washer	SY9509808
H02	Wheel Assy	SY3874052	H24	Triangle	SY3874073
H03	Steel Washer	SY9519531	H25	Number Plate	SY3874074
H04	Nut Nyloc	SY9519522	H26	Wheel Hub	SY3874051
H05	Spring Washer	SY9519533	H27	Suspension Unit	SY3874050
H06	Set Screw	SY9519053	H28	Lock Nut	SY9509861
H07	Spring Washer	SY9509808	H29	Brass Washer	SY9509694
H08	Bolt	SY1009509	H30	Set Screw	SY9029156
H09	Coupling	SY3864088	H31	Lock Nut	SY9509683
H10	Steel Washer	SY9509678	H32	Steel Washer	SY9509676
H11	Spring Washer	SY9509806	H33	Set Screw	SY9519077
H12	Set Screw	SY9519095	H34	Hollow Plug	SY9209166
H13	Mudguard	SY3874053	H35	Set Screw	SY9519097
H14	Rubber Grommet	SY3864049	H36	Spring Washer	SY9509806
H15	Plug	SY9519536	H37	Nut	SY9509652
H16	Filler Cap	SY3354079	H38	Lock Nut	SY9509861
H17	Union	SY9209253	H39	Brass Washer	SY9509694
H18	Prop Stand	SY3874054	H40	Set Screw	SY9519538
H19	Clamp (Prop Stand)	SY3874055	H41	Plug Holder	SY9519539
H20	Lighting Unit	SY3874056	H42	Set Screw	SY9509957
H21	Bolt	SY9519599	H43	Spring Washer	SY9509805
H22	Nut	SY9509654			

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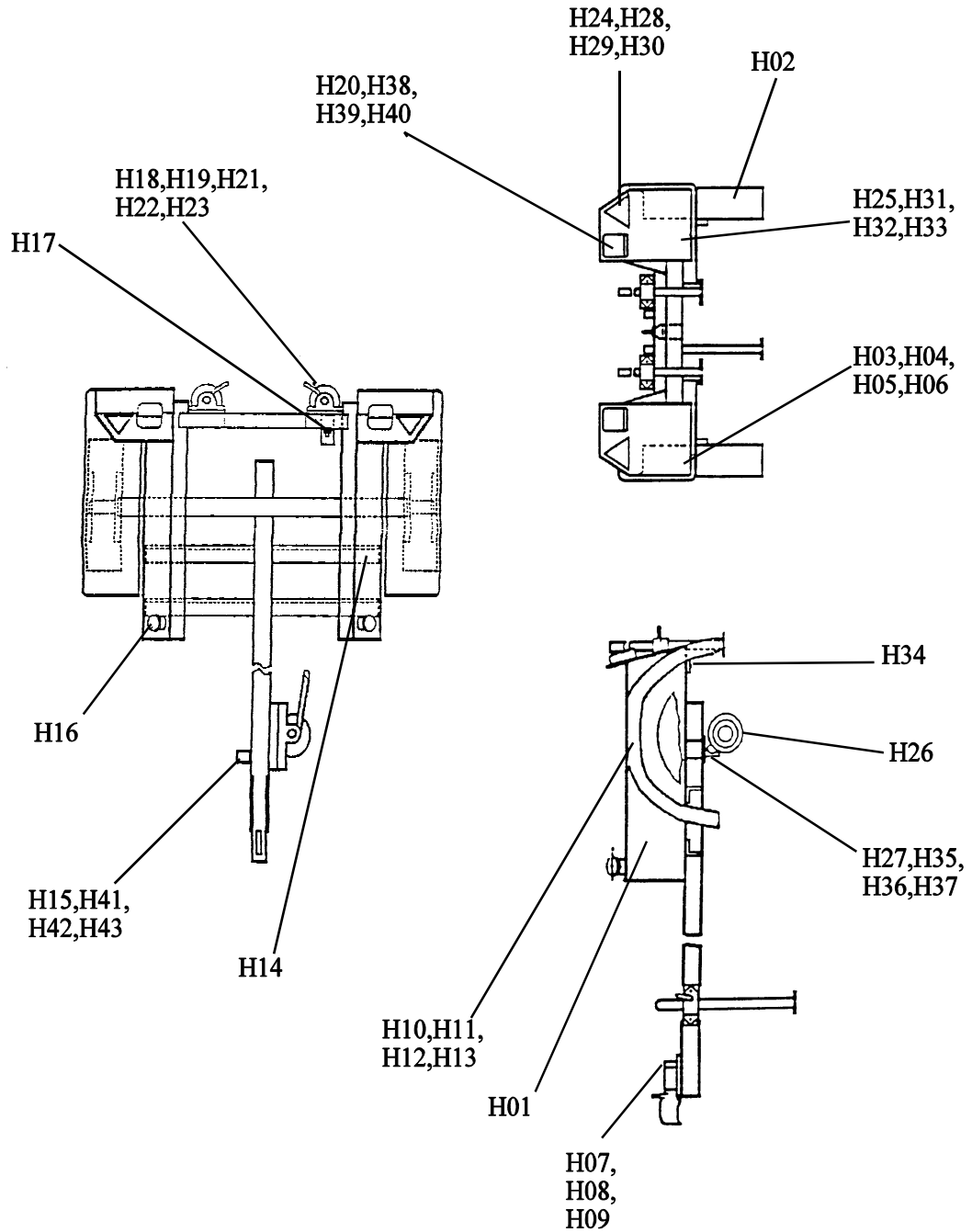


Figure 18 Two Wheel High Speed Trailer Assembly

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General Arrangement - Electric Motor Option		
Ref.	Description	Part Number
E01	Impeller	SY3874060
E02	Adaptor Plate	SY3874084
E03	Electric Motor	SY3874082
E04	Set Screw	SY9519121
E05	Flat Washer	SY9509676N
E06	Spring Washer	SY9509807
E07	Bedframe	SY3874083
E08	Bolt	SY9509552
E09	Spring Washer	SY9509808
E10	Nut	SY9509654
E11	Shaft Spacer	SY9519540
E12	Copper Shim	SY9519542
E13	Steel Shim	SY9519543
E14	Oil Tank Bracket	SY9519544
E15	Guard Bracket	SY9519545
E16	Lifting Bracket	SY9519541

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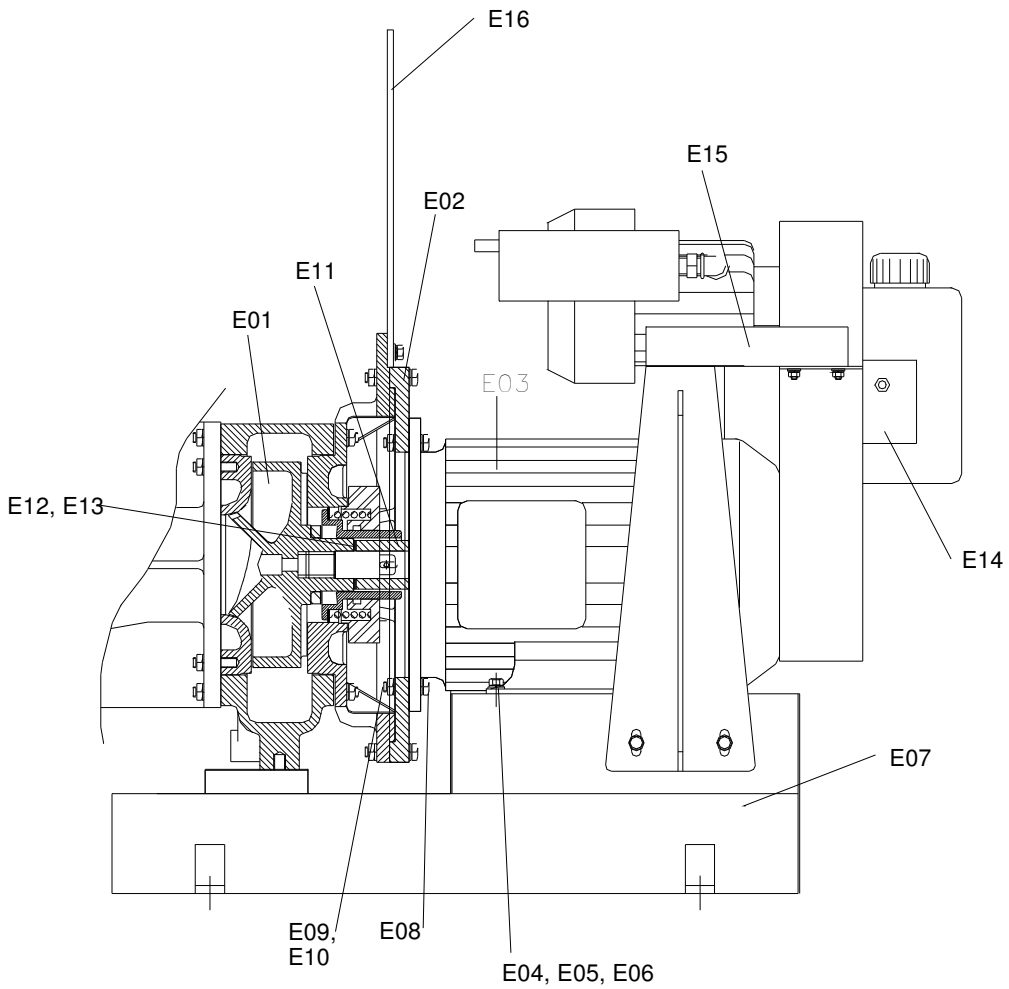


Figure 19 General Arrangement - Electric Motor Option

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Vacuum pump drive assembly		
Ref.	Description	Part Number
D01	Taper Lock Bush	SY3872020
D02	Pulley	SY3864051
D03	Wedge Belt	SY3872022
D04	Bracket Lube Bottle	SY3872023
D05	Special Stud	SY3874080
D06	Flat Washer	SY9509678
D07	Nut	SY9509652
D08	Flat Washer	SY9509676
D09	Nut	SY9509651
D10	Spring Washer	SY9509805
D11	Set Screw	SY9519077
D12	Taper Lock Bush	SY9059149
D13	Pulley	SY3872021
D14	Mounting Bracket	SY3874081
D15	Spring Washer	SY9509806
D16	Set Screw	SY9519095
D17	Set Screw	SY9519077
D18	Guard	SY3874087

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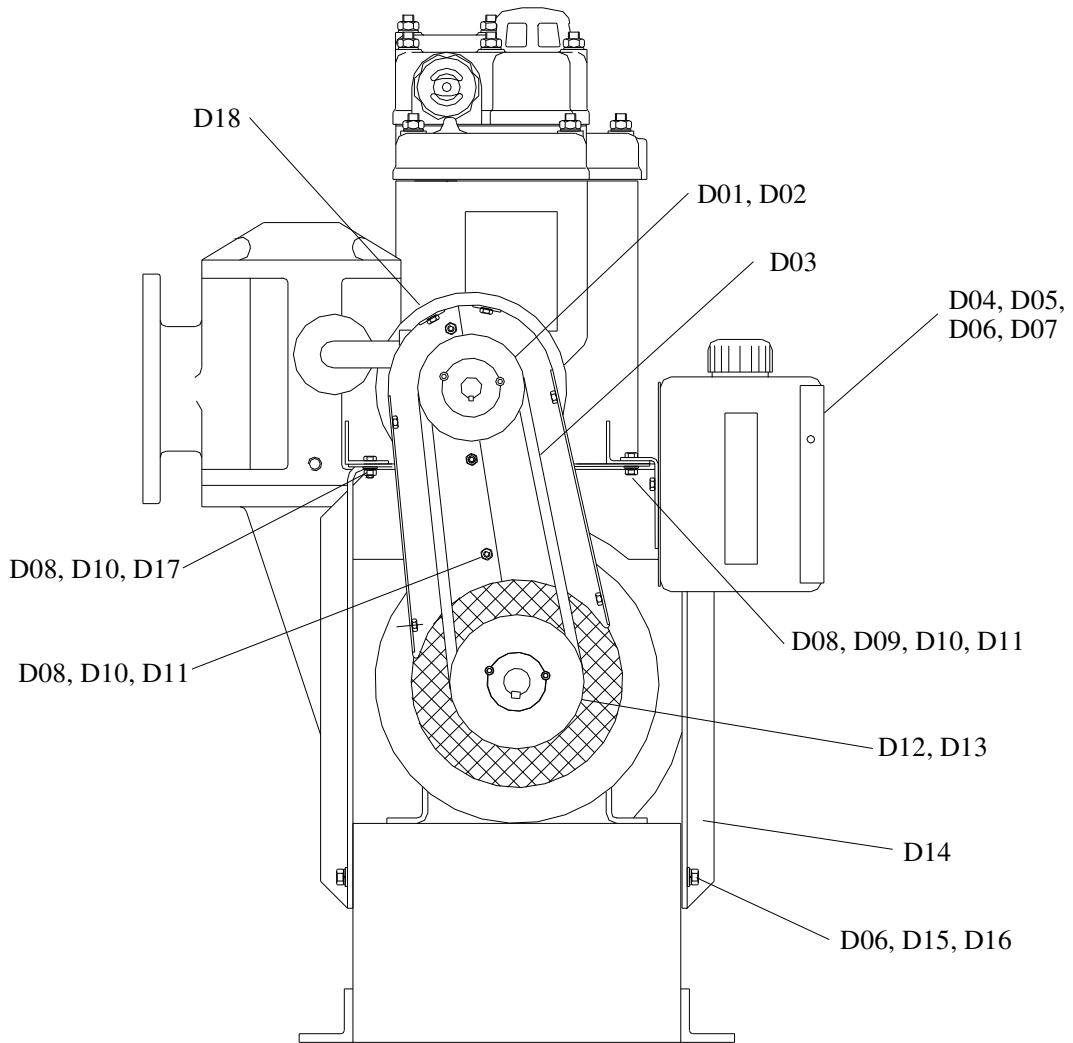


Figure 20 Vacuum Pump Drive Assembly
- Electric Motor Option

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Electric Motor Pump End					
Ref	Description	Part Number	Ref	Description	Part Number
1	Matching Piece	SY3874003	23	Set Screw M12x30	SY9519140
2	Set Screw	SY9519142	24	Volute	SY3874001
3	Nut	SY9509654	25	Wear Ring	SY3804017
4	End Cap	SY3874017	26	Impeller (2 Vane)	SY3874060
5	Set Screw	SY9519103	27	Front Wear Plate	SY387 4016
6	Spring Washer	SY9509806	28	Packing	SY638 4003A
7	Spring Washer	SY9509805	29	Packing Carrier	SY387 4007-2
8	Steel Washer	SY9509678	30	Back Cover Gasket	SY500 4410
9	Special Set Screw	SY3874045	31	Adapter Plate	SY3874084
10	Steel Washer	SY9509676	32	Bolt M12x45	Z1052146
11	Shaft Sleeve	PBCA245	33	Bolt M10x50	Z1140354
12	Set Screw	SY9529206	34	Washer Flat M10	Z1182517
13	Steel Shim	PBCA248			
14	Copper Shim Set	PBCA247			
15	O Ring	SY3874166			
16	Compression Spring	SY3804160			
17	Stud	SY9509100			
18	Nut Hex M10	SY9509653			
19	Spring Washer	SY9509807			
20	Matching Piece Gasket	SY5004483			
21	Steel Washer	SY9509680			
22	Spring Washer	SY9509808			

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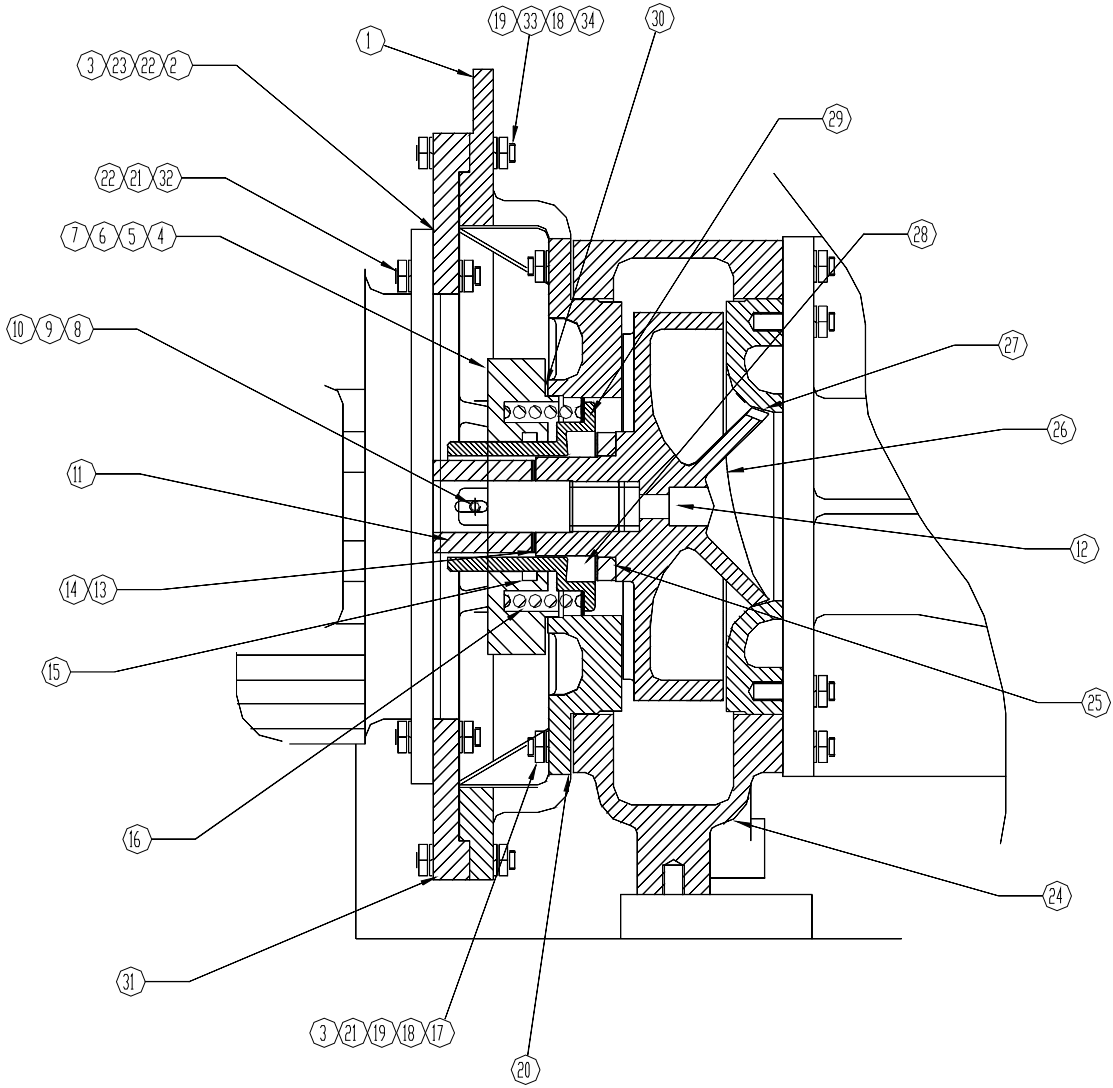


Figure 21 Electric Motor Pump End

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9 APPENDICES

9.1 Associated Publications

Documents listed under this section are for reference and relate only to the equipment bearing the model and serial numbers indicated in this manual.

Ref.	Title	Originator
	T series engine O&M manual	Lister Petter
SY3971032	EC Declaration of Conformity	Andrews Sykes Hire Ltd