Broom Owners Club

Perkins 6-354H and 6-354HT Engines

Survey of

spares availability

and

possible solutions to potential problems

January 2010

Perkins H and HT 6-354 Engines

Much has been said about spares availability for the older Perkins engines and in particular the various versions of the 6-354, but considering the number in use by club members, (136 as of December '09) there have been very few reported problems or cries for help, however, looking to the future efforts have been made to locate at least one and where possible multiple sources for parts or solutions to problems which have occurred in the past or could be anticipated as potential problems for the future.

It is recognised that there is a wide diversity of skills within the B.O.C. and not all members are mechanically minded. This paper therefore does not attempt to deal with major failures which would require specialist knowledge to rectify, but does attempt to provide additional information, much of which is not found in the Perkins workshop manual. All peripheral components are included and when read in conjunction with the workshop manual, (available from the BOC library), most DIY members with a reasonable set of hand tools and a socket set should be able to locate, remove and replace defective components. For those who rely on others for service and repairs, hopefully this paper will help when assessing if what is being said is valid and that the cost of a repair or service is value for money

What is apparent is that the basic engine is a very reliable unit and one would be extremely unlucky to experience a major failure. The 6-354, being 1960s technology, comprises component parts which by and large can be serviced or repaired as opposed to "sealed for life" throw away items common to modern engines so that when a problem does occur, usually with peripheral equipment or fittings, someone has a "fix". The upright version of the engine is particularly well served as thousands are still in service but there are a few issues affecting the horizontal engine which are unique to the model and difficult but not impossible to resolve. Some solutions may not be Perkins approved but never the less, will keep engines running satisfactorily. A significant advantage of the "H" version of the 6-354 is its good access to most components, all of which are bolt on assemblies.

Diperk Power Solutions are the spares arm of Perkins Engines and whilst Perkins do not now officially support our older engines it is always worth contacting Diperk as they may well be holding the part you require. Diperk will require the engine serial number which is stamped on the machined face of the auxiliary drive housing adjacent to the fuel pump. Early engine numbers started with "8" but for most Broom boats the number will commence with "354" followed by a letter, usually "U" and a number. Where appropriate "H" for horizontal and "T" for turbo will be added as a suffix. A typical number would therefore read 354U30967HT. Broom purchased engines as matched pairs with the starboard engine rotating in the opposite direction to normal convention. To denote these contra rotating engines "X" is inserted after the "U".

When left or right hand side is mentioned it assumes one is standing behind the engine looking forward. **All quoted prices are list before any discounts and were valid as of January 2010. Depending on where purchased, p&p may need to be added plus VAT on the total. For small orders there may also be a minimum order surcharge.** Supplier contact details for all companies referred to in the text can be found in appendix 1 at the end of this paper. Web site details are also included for other potential spares sources (appendix II) but the list is by no means exhaustive as a troll around the internet will show. There will be many others that have not been identified so if you have a reliable source for parts please let me know so they can be included for the benefit of all members who have Brooms fitted with 6-354s.

Last but most definitely not least, **C.J. Broom and Sons** have a wealth of experience and suitably equipped workshops capable of dealing with most problems that are likely to be encountered.

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February 2010

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Alternator or dynamo (early engines)

Depending on age, engines were fitted with CAV dynamos of 15 amps output or alternators from either CAV of 31 amps output or Prestolite of 30 amps output and most will have separate voltage regulators mounted on the forward bulkhead. Being of old technology the alternator (or dynamo) and regulator can be dismantled and probably repaired by a local marine or auto electrical engineer. Alternatively CAV Automotive Ltd provide a service exchange scheme for all old CAV and Prestolite rotating electrical equipment including starters, alternators and dynamos. They are also able to upgrade some alternators and dispense with the separate regulator box.

With the ever increasing demand on electrical services an alternative to servicing / repairing an old unit is to fit a modern alternator with increased output and built in voltage regulation. A typical replacement unit would provide an output of say 55amps at 24Vdc, larger outputs being limited by what can be driven by a single "vee" belt. Fitting is usually straightforward utilising brackets from the discarded unit. If a larger output is required the belt drive limitation could be overcome by making modified brackets to push the alternator forward and having a twin "vee" or toothed pulley made which would fit on to the 2" dia power take off extension shaft.

The selected alternator should be of the insulated return type as the engine is not grounded to the battery negative terminal as in normal auto practice. It may be necessary to change the pulley diameter depending on "cut in" speed and maximum permissible revs for the alternator relative to minimum cruising speed and maximum engine revs. For a little more information on alternator speed see the Summer 2007 issue of Sweeping Statements.

Service exchange cost for CAV AC5 alternator	£95.00
Price from Adverc for a new 55 amp 24V dc alternator	£220.00
Price from a commercial auto electrical engineer for a similar alternator starts at	£180 - £200 subject to spec.

Engine / gearbox drive plate

Original drive plate and modern replacement

Signs that the gearbox drive plate needs replacing due to worn splines are usually mechanical rattling noises coming from the back of the engine when on tick over. To remove the gearbox disconnect the prop shaft and push it back as far as possible (it may be necessary to remove the propeller to push the shaft past the rudder to increase clearance behind the gearbox), disconnect the change linkage, oil pressure gauge connection and water hoses to the oil cooler but it is not necessary to remove the oil cooler and oil pipes if mounted directly on top of the box. With a beam across the saloon floor bearers and rope or straps to take the weight, the gearbox can be slid backwards clear of the engine having removed the 6 retaining nuts. The drive plate, usually attached to the flywheel by 9 off ¼ "-28 UNF cap head bolts on a 6.5" PCD, can now be removed using a 3/16" across flats allen key.

Before purchasing a replacement drive plate, check the fixing dimensions as it has been stated that various flywheels were fitted during the production life of the engines and may vary from the above. If the drive plate is original, the cap head bolts were probably wire locked in position but for ease of reassembly it is more straightforward to degrease the bolts and reassemble with "locktite".

Replacement is the reverse process but be prepared for a bit of fiddling to get the gearbox male spline to line up and slide into the drive plate female spline.

Replacement drive plate cost	£82.00
Supplier	A.S.A.P, Lancing Marine, or R & D.

Engine mounts

The engine is attached to the engine beds via a three point mounting system, two mountings attached to the flywheel bell housing and a single mounting located under the front of the engine sitting offset to the right on a suspended fabricated steel cross member.

LH rear mounting.

Front mounting viewed from under the engine facing aft and showing the mount sitting offset on the fabricated cross member.

It is very unlikely that the standard mounts will fail but if they should it is possible to fit "off the shelf " mounts although they are somewhat taller, most needing in excess of 3" clearance between the engine bed and mounting bracket.

As installed the rear mounts are approximately 1¾" high (varied by adjustment for shaft alignment) with the mounting bracket bolted to the flywheel bell housing. As indicated in the LH photo there is a blanked off tapped hole above the bracket which can be used by repositioning the fixing stud to raise the bracket 2", thus providing the necessary clearance.

Access to the left hand rear mount is straightforward but access to the RH unit will require removal of the turbo and exhaust manifold extension.

The front mounting is not so straightforward but there is approx. 5" clearance between the fabricated cross member and the hull, allowing space for the cross member side plates to be extended to sit lower and accept a standard type of mount fitted "up side down" similar to that shown in the photo above.

The three mount system combined with the offset horizontal engine means that each mount carries a different load. Using information supplied by R&D, a gross weight of 750kg and an assumption regarding uneven loading on the mounts, it is estimated that the load on each mount is as follows:- front mount 300kg, LH rear mount 180kg and RH rear mount 270 kg but in order to ensure a satisfactory installation this information would need to be confirmed before installing new mounts.

Typical flexible “super mount” as supplied by R & D Ltd

R & D Marine Ltd have indicated that mounts selected from their “super mount “ range would be a suitable replacement .

Cost	Rear mounts	£31 ea
	Front mount (produced to suit application)	£200 ea.

Engine oil pressure and scavenge pumps

Whilst the oil pressure pump is a standard unit common to the 6 354 range, the scavenge pump is peculiar to the horizontal engine and crucial to its operation. For those not conversant with the scavenge pump concept, the following comments may be of interest.

Lubricating oil is normally held in the sump under an engine but this not so on a horizontal engine in an effort to reduce its overall height, hence it has what is known as a dry sump lubrication system. In effect the engine has two sumps with the oil draining into the bottom of the engine as standard and then being pumped by the scavenge pump into the second sump, called the “sump well” in the Perkins manual, section “K”. It is this second sump, located on the left hand side of the engine and acting as the oil reservoir from which the oil pressure pump draws its supply, houses the oil cooler and dip stick and into which oil is poured during top up or oil changes. This arrangement also explains why there are two manual oil pumps installed for carrying out oil changes (older engines had one pump and a changeover valve between the outlet pipes).

Should the scavenge pump fail oil will build up in the bottom of the engine and starve the lubrication pump with consequent loss of pressure as oil is not being transferred. A sign of failure is oil level not registering on the dip stick when it is known that sufficient oil is in the engine. One method which will confirm failure is after running the engine for several minutes, pump out each sump into individual containers via the manual oil change pumps and compare the quantities. If the scavenge pump is not working the contents from the sump well will be considerably less than that from the engine sump.

If either of the pumps should fail most marine organisations will say it is necessary to remove the engine from the boat with all that entails (and cost) but it is possible to raise the engine and remove the pumps in situ using a block and tackle as illustrated below, by building a gantry over the engine with the uprights secured to the engine beds, having previously disconnected the prop shaft, mountings and all the services and removed the saloon floor bearers. Any lifting equipment and structure should take into account that the engine weighs approx ¾ ton or 750 kg. It needs to be raised approximately 12” but raising it higher makes it easier to work on. After lifting the engine it should be supported on wooden blocks or substantial frames laid across the engine beds and not rely on the lifting tackle alone. The sump well which is bolted on to the side of the engine can then be unbolted and both oil pumps exposed, (illustration shows pressure pump in centre and scavenge pump lower left) all as described in section “K” of the workshop manual.


Cost of service exchange oil pumps	£155 ea.
Supplier	Fining UK Ltd

Scavenge pumps are no longer manufactured so obtaining a replacement is extremely difficult but they have been successfully serviced or repaired by precision engineering companies

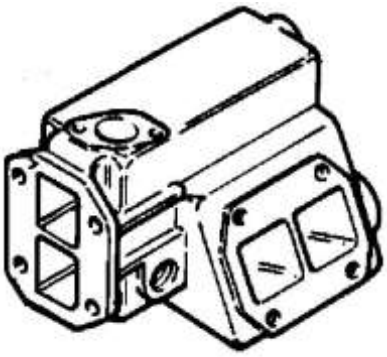
In addition Lancing Marine have a scheme which inserts "tee" fittings into the two pipes leading to the manual oil change pumps (shown above) allowing connection of an external scavenge pump driven either electrically or by one of the fan belts. As of Jan '10 no price was available from Lancing Marine so this potential solution would require further discussion.

Exhaust manifold (water cooled)

The cast iron exhaust manifold has a tendency to suffer from corrosion as it is raw water cooled and has no sacrificial anode protection. Replacement manifolds are however readily available from a number of sources, both in the UK and abroad. Prices in the States appear cheaper (www.powerlinecomponents.com were quoting $750, i.e. approx £500 as of Dec '09) but transport costs and import duty should be considered when deciding where to purchase. (Picture from Italian web site www.motoridiesel.it who were also offering manifolds)

Price for a replacement manifold in UK	£795
Supplier	Lancing Marine

Exhaust manifold extension (water cooled)



Cast aluminium exhaust manifold extension (blue) with turbo mounting.

The cast aluminium exhaust extension specific to the HT engine is liable to corrode as it tends to act as a sacrificial anode, there being no disposable anodes fitted to the engine. Perkins no longer supply the part so new components were until recently like "hens teeth". When leaks occur due to corrosion it is sometimes possible to have the casting welded which will prolong its life but the good news is that a set of original casting patterns has been located and the owners are being encouraged to produce a batch but at the time of writing other priorities were the limiting factor. Whilst researching this component it also came to light that Finning UK Ltd, the Perkins main agent, has recently developed an alternative source for the casting which is now available ex stock. Hopefully two potential sources of supply will bring the cost down.

In the meantime fabricated parts appear to offer an alternative and lower cost solution. In France, a Broom owner is attempting to fabricate mild steel replica fittings including water cooling jackets on the basis that the material is easy and relatively cheap to work and can be protected with sacrificial anodes. He has agreed to keep me informed of progress.

Fabricated stainless replacement

Alternatively, Lancing Marine produce a stainless fabrication (as above) which whilst it looks quite different, replicates the exhaust duct but without the water cooling jacket so will require lagging with fibreglass tape and a minor modification to the raw water cooling system, i.e., connecting the exhaust manifold water outlet directly to the exhaust pipe water injector.

Price for the stainless fabrication	£ 295
Supplier	Lancing Marine
Price for aluminium casting	£826
Supplier	Finning UK Ltd

Supplier and price for the alternatively sourced aluminium direct replacement will be advised as soon as information is available as will any information on the mild steel project.

Exhaust outlet with raw water injector

Original Perkins exhaust outlet showing heavy corrosion and a replacement exhaust manufactured from 316 stainless

Lancing Marine offer a fabricated stainless steel replacement but an alternative route may be through a local stainless steel fabricator and the use of hygienic fittings as used in the food and beverage process industries. Both the 3" dia bend, the 1" dia bend for the water injector and the 4" dia outer tube are all industry standard components available in S316 16 swg marine grade material. In the example shown above the connecting flange was machined to the same sizes as the original (see appendix 111) but standard "tri-clamp" fitting are very similar. Reducers from 4" dia to 3" dia can also be obtained as standard components but the short length of 4" dia outer tube may need to be fabricated if an off cut is not available as most stockists will only supply in 6m (20ft) lengths.

Typical price for a fabricated replacement	£ 295
Supplier	Lancing Marine
Typical prices for 316 stainless steel components	
3" dia 90º bends	£ 9.00
3" dia "tri clamp" end flanges	£ 3.50
1" dia 90º bends	£ 2.20
4" to 3 " reducers	£ 5.80
4" dia pipe	£ 19.50 / m.
Supplier.	United Stainless Ltd

Alternatively local stainless steel suppliers can be found in Yellow Pages under "Stainless Steel Stockholders".

Fan belts (Alternator and water pump drives)

Save old belts as patterns and obtain spares from your local auto parts store. In addition to the length, be careful to check the width as vee belt drive is transmitted by the angled sides and not by the bottom of the vee.

Supplier	Some chandleries, most auto parts stores or transmission component suppliers

Fan belt tensioning pulley (water pump drive)

The fan belt tension pulley runs on a single "sealed for life" ball bearing which is an industry standard. The bearing is the only part likely to fail, but as the bearing / pulley is a pressed assembly, replacement is a simple and straightforward job for a workshop or can be changed on a DIY basis using a bench vice and assorted hard wood blocks.

The pulley is removed from the engine by undoing the central nut which also locks the sliding spindle and acts as the adjuster to tension the belt.

The bearing required is 47mm o/d 20mm i/d and 14mm wide sealed with metal or rubber side seals.

Typical one off bearing cost	£8 - £10.00
Supplier.	Any local bearing supplier.

Filters

Both the fuel and oil filters are industry standards manufactured by many companies so there is no dependence on Perkins for future availability. Some equivalent filters are:-

Company	Oil Filter Pt. No.	Fuel Filter Part No.
Perkins	2654407	26560017 or 26561117
ASAP (Champion)	167060	199206
Champion	C160	
Cooper	AZL 008	AZF013
Crosland	308	522
Delphi	N/A	HDF296
Fram	PH977A	CH869PLI

Fuel lift pump

Two bolt fixing

Four bolt fixing

AC Delco no longer operate in Europe having been sold out to Delphi, however the UF series of fuel pumps, or similar, are manufactured in Italy so replacement lift pumps continue to be available but spares and service kits do not, probably due to the relatively low cost of replacement pumps.

There are two versions of the AC Delco lift pump so if considering the purchase of a spare or replacement take your old one as a sample or check whether you require the two bolt or four bolt fixing version and due to past variations have the supplier check against your engine number.

Local diesel equipment service organisations can be found in Yellow Pages under “Diesel Fuel Injection”.

Cost of new replacement pump	£25 to £30

Fuel pump

If you require a spare or replacement pump, remanufactured or serviced units can occasionally be obtained from local diesel equipment service companies, C. Childs Ltd and other engine dealers or breakers whilst surplus equipment often appears on Ebay and some of the web sites listed below, however before parting with cash make sure the pump on offer matches the details on the number plate on your existing pump.

If removing the pump for the first time, make sure there is a clearly scribed line vertically across the pump body flange and the adaptor plate before slackening the nuts (see Section M, illustration M8 in the Perkins workshop manual).

The line is usually located adjacent to one of the 3 securing nuts (in the photo the line is adjacent to the nut under the end of the throttle return spring) and is used to ensure the pump is reassembled in exactly the same position as if not, timing and performance will be adversely affected.

The pump drive shaft has one tooth missing on the spline which has to match up with a corresponding feature in the drive housing when lowering the pump onto its flange.

Local pump service organisations can be found in Yellow Pages under "Diesel Fuel Injection".

Cost to have pump serviced and tested	£100 upwards
Cost to have pump fully overhauled	£350
Cost for a replacement pump (used but serviceable)	Approx. £400 upwards

Gaskets (all)

Both Finning UK Ltd and C Childs Ltd have confirmed that the complete range of gaskets used on both the turbo and non turbo versions of the 6 -354 H are readily available so this area should not be a problem.

Gauges and associated capillary tubing

Engine installations from the mid 70s onwards incorporated electrically driven gauges as standard but on earlier installations oil pressure gauges (engine and gear box) were connected to the engine by capillary copper tubing and flexible hoses and for turbo oil pressure, by copper capillary tubing only to the top of the turbo oil feed inlet. Over time these capillary systems become susceptible to deterioration and corrosion which if resulting in a fracture whilst underway, could result in hot oil being sprayed around the engine room with the very real risk of fire.

If the turbo oil pressure gauge is still operating as originally installed, standard practice has been to disconnect the capillary tubing from the top of the turbo and blank off the fitting. Whilst this results in the turbo oil pressure gauge being non operational, it does eliminate the area of greatest risk. With regard to the engine and gearbox oil pressure connections, the flexible hoses connecting to the engine should be periodically inspected for signs of deterioration and if in doubt replaced. A more difficult task is to inspect the copper tubing as it is clipped in place to stop movement.

Suitable flexible hoses can be obtained from A.S.A.P, Lancing Marine, some chandleries or local diesel servicing and hydraulic engineering outlets located in Yellow Pages under "Diesel Fuel Injection" or "Hydraulic Engineers"

If existing gauges have failed or need replacing Caerbont Automotive Instruments Ltd or Speedy Cables (London) Ltd can provide replacements or service existing instruments.

The ultimate solution is to replace all hydraulic gauges with modern electrical instruments and senders but would require additional wiring from the ignition switch to the gauges, then to the senders and on to the earth return for each gauge. Most gauges would also require a 24V to 12V dropper as the majority of gauges that have been located are made to suit 12V dc

If going down this route there are two oil pressure tapping points (1/8th NPT but 1/8th BSPT will fit) on the engine block, one just behind the raw water pump and one in front of the flywheel housing as illustrated by the yellow components in the photo. In this case the front unit is a change over pressure switch which operates an oil warning light, the hour meter and the alternator excitation supply and is mounted on a 90º elbow to increase clearance adjacent to the pump. The second unit is the sender for the engine oil pressure gauge. Senders can be selected to drive either single or dual gauges.

For electrical gauges and senders look to A.S.A.P, Lancing Marine, Speedy Cables or Vetus where typical prices for replacement gauges complete with senders start from:-

Engine oil pressure up to 80psi.	£50.00
Gearbox oil pressure up to 150psi	£82.00
Water temperature up to 250F	£42.00

Gearbox

Gearbox repairs are beyond the scope of this document but reference is included in so far as it is relatively easy to separate the box from the engine (as described under Engine to Gearbox Drive Plate) and spares are readily available as the Borg Warner 72c unit is still in production. Should you wish to dismantle and repair a box, detailed service manuals are held in the BOC library but are in American English so some terminology may take a little understanding.

Parts cost	POA
Suppliers	A.S.A.P. and Lancing Marine

Heat exchangers

engine oil cooler
gearbox oil cooler
header tank and engine heat exchanger
turbo intercooler

There were three approved suppliers of heat exchangers to Perkins, E.J. Bowman, Polar and Serc. The good news is that Bowman are still very much in business and the not so good news if you have heat exchangers manufactured by the others is that Polar no longer exist and Serc have virtually withdrawn from the heat exchanger business.

Bowman manufactured the complete range of heat exchangers and has confirmed that all tooling is available to make spares for any component they have previously supplied. All that is required are details from the serial number plate fitted to each unit.

The degree of interchangeability between the different manufacturer's components is not known but with the possible exception of the engine oil cooler where several different designs were used, replacement of complete units should not present problems.

In general heat exchangers appear to be trouble free, the only known failures I am aware of within the BOC being single incidences of a leaking intercooler tube stack, a fractured retaining nut on the header tank and a filler cap which fell apart.

The intercooler tube stack leak was only discovered when the intercooler was removed from the engine to gain access elsewhere and the opportunity used to test it under positive pressure. When under normal operating conditions it probably did not leak as the surrounding air was at positive pressure from the turbo and the cooling water under negative pressure being on the inlet side of the raw water pump.

Machined blind nut which holds the header tank together

The retaining nut on the left hand side of the header tank has an undercut at the end of the internal thread. The nut fractured at the undercut due to metal fatigue allowing the head of the nut and the end cap of the heat exchanger to fall off which in turn allowed most of the cooling water and all of the raw water into the bilges, hence no exhaust cooling. First indications of trouble were a strong smell of burning and a rise in engine temperature. A quick temporary fix was to replace the threaded tie rod with a longer length of ½" – 13 UNC mild steel studding screwed into the right hand end cap, allowing the left hand end cap to be clamped in position with an ordinary nut and washer liberally coated with silicon.

Replacement filler caps are readily available but before purchasing check the pressure setting (typically 7 psi or 50 Kps) which is usually stamped on the top face.

In addition to contacting Bowman direct, both A.S.A.P. and Lancing Marine stock Bowman heat exchangers and parts.

Typical replacement tube stack.	£300
Supplier	E.J. Bowman Ltd
Filler cap	£7.00
Supplier.	A.S.A.P. and auto parts stores.

Injectors

Typical serviced injector with dust caps and replacement washer with the identification letters"DH" above the fuel inlet.

If a spare or replacement injector is required, remanufactured or serviced units can occasionally be obtained from local diesel service companies, C. Childs Ltd and other engine dealers or breakers whilst surplus equipment often appears on Ebay and some of the web sites listed blow.

If removing an injector for the first time, ensure the copper washer is removed from the bottom of its housing in the cylinder head as a serviced unit should be provided with a replacement washer. Both connections and the nozzle should be returned from service protected with dust caps.

Diesel service engineers will hold all necessary setting information but for ease of identification each injector should be identified with one of the following letter groups located above the fuel inlet port,

Normally aspirated engines (non turbo) of 105hp	Y
Normally aspirated engines (non turbo) of 115 hp	ZZ
Turbocharged at 145 hp	DH
Turbocharged at 175 hp	DZ or FE

Local service engineer can be found in Yellow Pages under "Diesel Fuel Injection".

Typical cost to have an injector serviced	£20.00 - £25.00
Typical cost for a replacement injector made up from surplus components to as new condition.	Start at £50

Injector fuel pressure pipes

Spare "get you home" pipe as supplied by Perkins

It's very unlikely that a pressure pipe will fail except due to vibration when inadequately supported, however, damage to the formed ends due to repeated over tightening can cause leakage requiring the complete pipe assembly to be replaced. Injector pipes are 25.5" long before being formed to individual shape and made from 6.0mm o/d and 2.0mm i/d steel tube with formed olives at each end securing captive hollow nuts having M12 x 1.5 internal threads. The local diesel pump service company can often manufacture one off replacements but when supplied and during storage each end should be protected with a rubber dust cap.

For a "get you home" situation it is only necessary to bend the tube sufficient to make the connections but later it should be formed as the original so that it can be correctly supported in the clamps.

Local service organisations can be found in Yellow Pages under "Diesel Fuel Injection".

Cost from local diesel engineer for straight pipe made to suit starts at £20.00

Moulded rubber elbows for raw water cooling system

Raw water system fabricated from 1½" stainless tubing.

Design of the raw water cooling system with the pump in the middle imposes negative pressure on all hose connections and fittings between the inlet sea cock and pump. As a result when moulded rubber elbows age and loose stiffness, there is a tendency for the elbows to collapse when running at higher engine speeds, restricting raw water flow and causing overheating. This can be overcome by inserting tubular metal segments into the elbows to stop collapsing or replacing them with suitably sized (28mm or 35 mm copper or 1.5" dia stainless) formed metal bends connected into the system with short lengths of rubber hose and jubilee clips.

Typical cost for 28mm Yorkshire style copper elbow	£2.50
Typical cost for a 35mm Yorkshire style copper elbow	£15.00
Supplier	Local plumbing supplier
Typical cost of 1½" dia 316 stainless steel components	
1½" dia 90º bends	start at £ 3.50
1 ½" dia 16swg tube	starts at £8.20/m
Supplier	United Stainless Ltd

Alternatively local stainless steel suppliers can be found in Yellow Pages under "Stainless Steel Stockholders".

Raw water pump

The only spare parts likely to be required will be an impellor and end plate gasket. The most common size is 57.1 mm dia. x 31.75 mm long with 12 vanes. Suitable impellors are manufactured by several companies such as Jabsco, Johnson and Globe. A.S.A.P. offer two alternatives with part nos. JP-09-1027B and JAB-1210-0001 for the common size but in the past have also used part no. 214205. Before ordering check the size of impellor required as over the years there have been variations in pump size.

If you don't have an extraction tool, impellors can usually be prised out using 2 small screwdrivers. Re-assembly can be made easier if both the shaft splines and rubber vanes are lightly lubricated with suitable waterproof grease and a useful trick to assist insertion is to compress the vanes with a jubilee clip but to reduce stress on the vanes when staring for the first time, ensure that they are bent backwards when compared with direction of rotation.

If on removing the impellor you notice that some of the vanes are missing, it is essential that they are located and removed as they can cause partial blockage and consequent overheating. More often than not they will be trapped against the tube stack in the engine oil cooler and can be easily removed after disconnecting the cooler inlet hose.

If a complete replacement pump is required, Jabsco's equivalent pump for OEM equipment fitted to the H series 6-354 is part no. 9990-41 according to their web site but be aware that over the

years there has been variations in pump size. Replacement pumps also appear from time to time on web sites such as E bay.

Cost of replacement Jabsco pump pt. no. 9990-01	£314
Cost of pumps seen on E bay	start at £80
Cost of replacement impellors (gasket included)	£16.00 to £23.00
Supplier.	A.S.A.P. and most chandlers.

Raw water pump drive connector

Drive disc in the centre clearly showing wear due to age and vibration

Connection between the engine and pump drive shafts is a disc of hard plastic, 3/8" thick with 4 square slots which engage on two protrusions on flanges fitted to each shaft and over time the slots can elongate due to vibration. No spares source for connectors has been located but satisfactory replacements can been made from 3/8" thick "paxalin" or "tufnol", materials which appear similar in appearance and characteristics to the original but any similar material or hard plastic would suffice and thickness is not too critical as the pump assembly can be slid longitudinally in its circular clamp.

In addition to the material all that is needed is a 64mm dia hollow tank cutter which will create a disc approx 57mm dia, a 7/8" dia hollow tank cutter to cut the central clearance hole (cut the 7/8" hole after cutting the disc so that the pilot drill can be used to keep the hole concentric) and a square file to finish the slots, having marked out the disc using the original as a pattern. The cutters in the photo were obtained from Tool Station but could equally have come from any tool store.

Paxalin or Tufnol can be obtained through local plastic material stockists, R.S. Components and Bay Plastics Ltd.

Starter

The CAV C45 starter was commonly used by several engine manufacturers all of whom had their own specifications and Perkins, as an engine manufacturer supplying many different outlets, also used the C45 starter with varying specifications. In addition, engines provided to Broom were matched pairs with the starboard unit being contra rotating so its starter rotates in the opposite direction. The reason for drawing attention to this possible minefield is that surplus starters often appear for sale on E-bay and other marine equipment outlets but although they can be specified as a C45 24Vdc type there is no guarantee that they will be to the same specification as fitted to your particular engine unless all the features are identical.

As with alternators**, b**eing of old technology the starter can be dismantled and probably repaired if needed, by a local marine or auto electrical engineer. Alternatively CAV Automotive Ltd provide a service exchange scheme for all old CAV rotating electrical equipment including starters and have the knowledge to ensure compatibility with your particular version of the 6-354.

Advertised cost of surplus starters on E bay start at	£ 80.00
CAV Automotive Ltd service exchange	£125.00

Starter relay

The Perkins workshop manual makes no reference to a separate relay linked to the starter although one is shown on the wiring diagram in section Q. The relay is usually located just in front of the starter on the left hand side of the engine and its purpose is to eliminate the need for large currents passing through the ignition switch when starting.

The operating sequence when starting is that the ignition switch energises the relay closing it's contacts which in turn energises a solenoid within the starter which connects the battery directly to the starter motor and to achieve this there are a number of wires connecting the relay with the starter which incorporate "push on" connectors (up to 10).

Sounds involved but in practice works almost instantaneously, however the reason for including this explanation is that it is not unknown for starters to appear to have failed for no apparent reason after operating satisfactorily. The cause: one of the small "push on" connections in this area becoming disconnected due to vibration.

Suitable relays are readily available from auto spares outlets or some marine chandleries specialising in engine spares.

Cost of a suitable replacement relay (100 amp contacts)	£20
Supplier	ASAP, Lancing Marine or most auto electrical equipment suppliers

Tachometer

drive gearbox
flexible drive cable from gearbox to generator
generator

The two differing ends of the flexible tacho drive cable which is 25" long between flanges

The tachometer system was manufactured by Smiths Industries Plc. Early engines had the drive gearbox mounted on the front end of the timing drive case and connected to a generator mounted on the engine bed or front bulkhead by a flexible drive cable which in turn was wired to the rev counter, but sometime during the mid 70's the flexible drive was discarded and the generator and gearbox combined as a single assembly.

If removing or replacing a drive cable treat the securing nuts with care as they are made from aluminium and are easily damaged if using large pliers or mole grips to undo.

In recent years the instrument division of Smiths Industries has passed through several owners but is now known as Caerbont Automotive Instruments Ltd and has an associate, Speedy Cables Ltd, who can effect repair or replacement of all elements of the tachometer system including gauges.

Turbocharger

Holset 3LD turbochargers are no longer manufactured but can be serviced / repaired on a one off basis by many specialist turbocharger repair organisations servicing the automotive industry. Cummins Turbo Technologies Ltd, Holset's parent organisation list authorised distributors/service companies on their web site and two companies that have confirmed that the 3LD can be serviced / repaired are BTN Turbo Ltd of Uxbridge and Turbo Developments and Engineering Ltd of Brentford.

Typical cost for repairing a Holset 3LD turbo (but will depend on condition) £300

For local turbo service companies look in Yellow Pages under "Turbochargers"

Turbocharger exhaust outlet

Corroded flange with large hole

Outlet after fitting replacement flanges and an alternative solution using a 90° stainless bend

The turbocharger outlet which directs the exhaust through 90º, swivels on circular flanges in order to line up with the exhaust pipe. The body is made of stainless steel whilst the flanges are carbon steel and therefore prone to corrosion over time, the indication of pending failure being leakage of exhaust fumes into the engine area. The unit can however be salvaged by carefully cutting off the corroded flange(s) leaving as much of the original formed upstand as possible and welding on new flanges machined from stainless steel. In the L.H. illustration one flange was an internal press fit before welding and the other an external press fit. The outlet was cleaned up for the photo but after 2 years use shows no signs of deterioration.

New outlets are available from Trans Atlantic Diesel Inc (see www.tadiesels.com) but a quick "get you home" flanged elbow can be constructed from standard hygeinic 3" dia bends and "tri-clamp" flanges obtained from a stainless steel component distributor although in the illustration the flanges were machined as shown in appendix III.

Typical cost for replacing exhaust flange outlets £100 to £150

Local stainless steel suppliers can be found in Yellow Pages under “Stainless Steel Stockholders

Typical cost for 3” dia 90º bend	£ 9.00
Typical cost for 3” tri-clamp end fittings	£ 3.50
Supplier	United Stainless Ltd”.

Turbocharger exhaust outlet pressed metal gaskets

A pressed steel gasket is fitted as standard between each swivel joint on the turbo exhaust outlets but are expensive for what they are (if you can get them). One solution which has proved successful is to retain the old gasket but smear each side with an exhaust jointing cement such as Hylomar Exhaust Assembly Paste before reassembly. The cement swells and hardens as it becomes hot producing a gas tight joint.

Typical cost for a replacement gasket	£10.00
Typical cost for a tube of jointing cement	£ 6.00
Supplier	Auto parts stores

Turbocharger outlet flange banjo clamp

Banjo clamp (left hand) which has had the threaded swivel bolt replaced and 2 versions of the 3” tri-clamp.

The two banjo clamps which hold the exhaust system together suffer deterioration due to heat with the nut often seizing on the threaded swivel bolt to such an extent that the bolt shears when attempting to undo the nut. If suitable facilities are available the clamp can be salvaged by replacing the bolt and if so, try to obtain bronze nuts (try your local replacement car exhaust outlet and ask for a suitable manifold nut) to avoid seizure in the future. If the clamp cannot be repaired standard stainless 3” “tri-clamp” hygienic fitting clamps work equally well.

Typical cost for a 3” “tri-clamp” clamp.	£ 3.50
Supplier	United Stainless

Alternatively local stainless steel suppliers can be found in Yellow Pages under “Stainless Steel Stockholders”.

Water circulation pump

The water circulation pump is mounted on the front of the engine and driven by a vee belt with its bearings sealed for life. Failure will usually be due to bearing failure or seal leakage, often one leading to failure of the other. As so often with Perkins there are a number of variants which have been introduced over the years but the specific pump version can be identified by locating the 3 missing digits in the number sequence 37711* * * located on the front of the pump casting.

A number of service companies exist but E.P. Services hold a large quantity of spares, will remanufacture a pump to original spec and provide a lifetime guarantee for the work undertaken.

Typical cost for serviced pump starts at	£65
Supplier	E.P. Services

Appendix I

Suppliers mentioned in the forgoing text

C.J. Broom & Sons Ltd.	Tel	01603 712 334
Brundall	E mail	enquires@broomboats.com
Norwich	Web	www.broomboats.com
NR13 5PX		
A.S.A.P. Supplies Ltd	Tel	0845 1300 870
Beccles	E mail	sales@asap-supplies.com
NR34 7TD	Web	www.asap-supplies.com
Adverc BM Ltd	Tel	01902 380 494
Wolverhampton	E mail	techsales@adverc.co.uk
WV3 7LG	Web	www.adverc.co.uk
Bay Plastics Ltd	Tel	0191 258 0777
North Shields	E mail	sales@plasticstockist.com
NE29 7UZ	Web	www.plasticstockist.com
BTN Turbo Ltd	Tel	01895 466 666
Uxbridge	E mail	sales@btnturbo.com
UB8 2RP	Web	www.btnturbo.com
CAV Automotive Ltd	Tel	01772 788 580
Preston	E mail	sales@cavautomotive.co.uk
PR2 3QH	Web	For temporary site search CAV Automotive on Google.
Caerbont Automotive Instruments Ltd	Tel	01639 732200
Swansea	E mail	sales@caigauge.com
SA9 1SH	Web	www.caigauge.com
CW Childs	Tel	01733 844 362
Ramsey St. Mary		
PE26 2TL		
Cummins Turbo Technologies Ltd	Tel	01484 422 244
Huddersfield	E mail	email.turbo.enquires@cummins.com
HD1 6RA	Web	www.holset.co.uk
Diperk Power Solutions	Tel	01733 334 500
Peterborough	E mail	
PE3 8TZ	Web	www.diperk.co.uk
E.J. Bowman Ltd	Tel	0121 359 5401
Birmingham	E mail	infor@ejbowman.co.uk
B6 4AP	Web	www.ejbowman.co.uk

This e-mail address is being protected from spambots. You need JavaScript enabled to view it **E.P. Services**.

	Tel	01902 452 914
Wolverhampton	E mail	sales@ep-services.co.uk
WV2 2RJ	Web	www.ep-services.co.uk
Finning Uk Ltd	Tel	01202 330 700
Poole	E mail	marine_parts_service@finning.co.uk
BH17 0GL	Web	www.finning.co.uk/

Lancing Marine	Tel	01273 410 025
Portlade	E mail	data@lancingmarine.com
BN41 1XY	Web	www.lancingmarine.com
R & D Marine Ltd	Tel	01462 892 391
Baldock	E mail	info@randdmarine.com
SG7 6PD	Web	www.randdmarine.com
RS Components Ltd	Tel	01536 201 201
Corby	E mail	general@rs-components.com
NN17 9RS	Web	www.rswww.com
Speedy Cables (London) Ltd	Tel	01639 732213
Swansea	E mail	sales@speedycables.com
SA9 1SQ	Web	www.speedycables.com
Tool Station	Tel	0808 100 7211
Bridgewater	E mail	
TA6 4RN	Web	www.toolstation.com
Turbo Developments and Engineering Ltd	Tel	0208 560 3927
Brentford	E mail	sales@turbodevelopments.co.uk
TW8 9NB		
United Stainless	Tel	0118 9767140
Pangbourne	E mail	sales@united-stainless.com
RG4 7JW	Web	www.united-stainless.com
Vetus (MEC Marine)	Tel	01189 401 141
Wargrave	E mail	vetus@mecmarine.co.uk
RG10 8LH	Web	www.vetus.com www.mecmarine.co.uk
Yellow Pages	Web	www.Yell.com

Appendix II

Miscellaneous Web Sites offering Perkins spares or salvaged parts

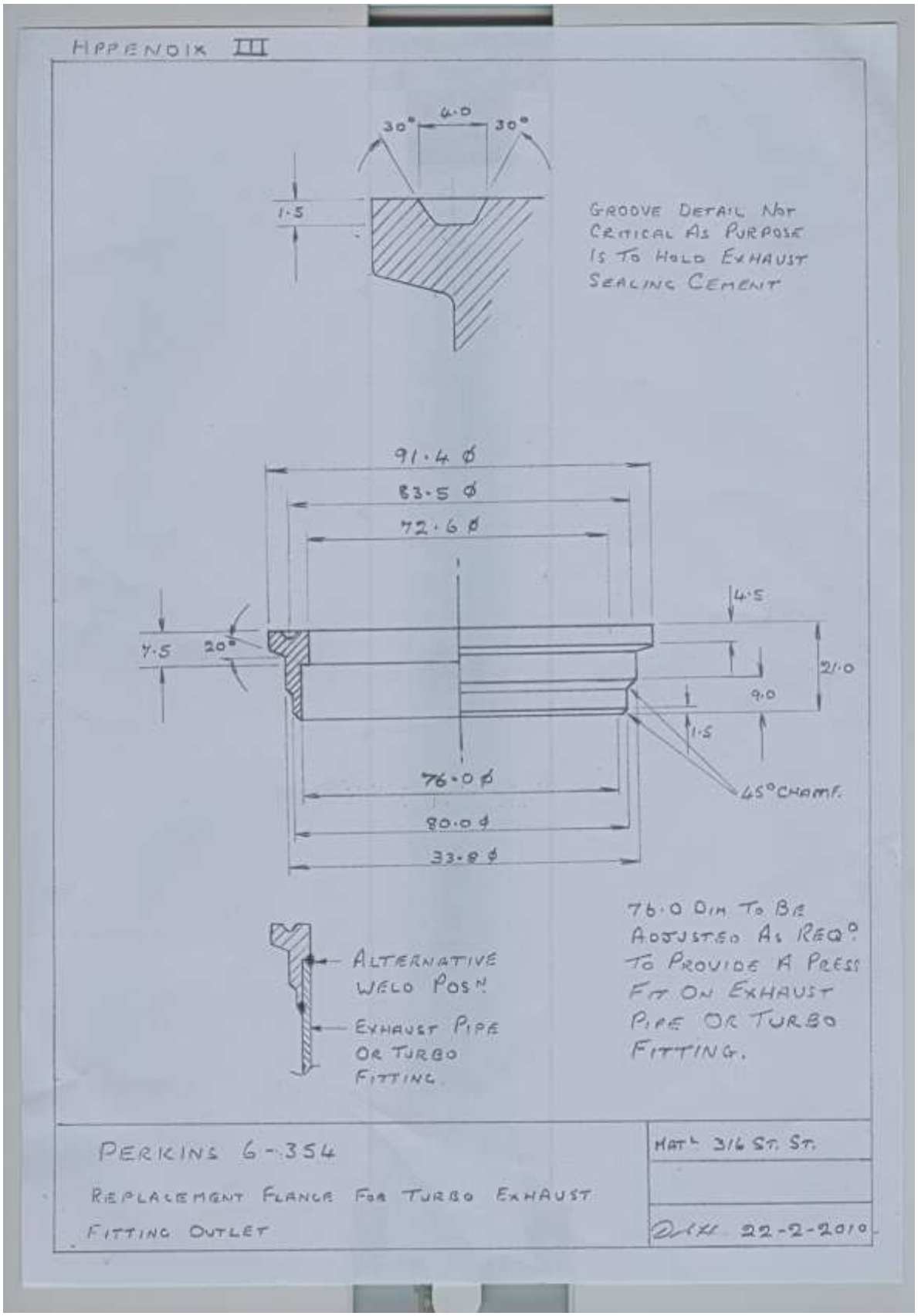
When searching web sites you may find reference to engine identification letters such as :-

TD	which identifies the	H6-354
TE		T6-354
TF		HT6-354

www.apolloduck.com	Search engines from left hand side of page
www.boatsandoutboards.co.uk	Search boat engines inboard/Perkins and engine spares.
www.classicenginesandspares.co.uk	Specialises in sourcing parts for old engines. Also manufactures one off cylinder head gaskets.
www.dormandieselspares.com	Claim to hold spares for older engines and also for Holset turbochargers
www.fwthornton.co.uk	Holds spares for older engines including gaskets
www.go2marine.com	USA Perkins parts company
www.motoridiesel.it	Italian company holding 6 354 parts including exhaust manifolds and water pumps.
www.powerlinecomponents.com	USA Perkins parts company
www.tadiesel.com	US company holding comprehensive stock of Perkins parts
www.woods-group.co.uk	Marine engine dealer and dismantler.

Appendix III

Replacement exhaust flange drawing



Appendix IV

FAULT DIAGNOSIS - Perkins 6-354

The Perkins 6-354 continues to be the most numerous engine type within the BOC fleet and as a result there is a wealth of operating experience within the club. If you are experiencing a particular problem, it is more than likely that a member has previously experienced a similar problem and found the solution, so if in difficulty it may well be worth raising the issue on the forum. In the meantime and whilst not answering every eventuality, the following fault diagnostic schedule is based on practical experience gained by a number of members but should be read in conjunction with fault diagnostic schedules contained in the various Perkins manuals available in the BOC library. Whilst this chart is designed around the 6-354 much of the information could be equally applicable to other types of diesel engine.

The intention is to continually improve and refine this page but to do so needs member's input which will be most welcome, so feel free to contact me by phone or e-mail.

MECHANICAL

Symptom	Possible Fault/Cause
Engine will not start	
	Engine stop lever in "stop" position or cut out solenoid stuck in cut out position.
	Air leaks into fuel system
	Blocked fuel feed pipe
	Blocked fuel filters
	Broken fuel pipe (external to or within fuel tank)
	No fuel
	Perforated diaphragm in fuel lift pump
	Lack of compression
	Defective battery or poor electrical connections
	Defective solenoid switch located adjacent to starter motor
	Not being cranked over sufficiently fast to create combustion
	Starter motor failure or seized "Bendix" gear
Low cranking speed	
	Battery under charged or defective cells
	Faulty starter motor
	Poor cable connections
Lack of power	
	Blocked air intake
	Blocked fuel feed pipes
	Blocked fuel filters
	Blocked fuel tank vent
	Damaged or sticking turbo impellor
	Faulty injectors
	Faulty injector pump
	Leaking cylinder head gasket
	Leaking turbo charger seals

Low oil pressure	
	Blocked oil cooler
	Blocked oil filter
	Blocked oil strainer
	Broken or aged pressure relief valve spring
	Engine running hot
	Incorrect grade of oil
	Insufficient oil in sump
	Oil being diluted with diesel fuel (see "Oil level increasing")
	Oil gauge or sender faulty
	Oil pump worn
	"O" rings on pipe connecting oil pump to relief valve leaking
	"O" ring on sump suction pipe leaking
	Pressure relief valve sticking open
	Restriction in sump suction pipe
	Worn or damaged bearings
High oil pressure	
	Incorrect grade of oil
	Oil gauge or sender faulty
	Pressure relief valve sticking closed
Oil level not registering on dip stick	
	Insufficient oil – needs topping up
	Scavenge pump failure leaving oil in main sump
Oil level increasing or oil contaminated	
	Coolant water leaking into sump due to failed head gasket.
	Coolant water leaking into sump due to cracked cylinder head.
	Diesel fuel from lift pump leaking into sump
	Diesel fuel from fuel injection pump leaking into sump
	Raw water leaking into sump via oil cooler
Overheating	
	Coolant level low
	Circulating water pump fan belt loose or broken
	Circulating water pump bearings faulty causing fan belt to slip
	Faulty thermostat
	Intake hose or rubber connecting hoses between intake strainer and raw water pump blocked or collapsing under negative pressure
	Intake sea cock not fully open
	Intake strainer blocked
	Faulty raw water pump
	Raw water pump impellor blades worn or broken
	Blocked matrix in gearbox cooler
	Blocked matrix in heat exchanger
	Blocked matrix in oil cooler
	Blocked matrix in turbo intercooler
	Cylinder head gasket leaking
	Exhaust pipe restriction
	Incorrect valve timing

	Restricted air intake
	Faulty fuel injector pump

Loss of coolant	
	Circulating pump seals leaking
	Cylinder head gasket leaking
	Heat exchanger seals leaking externally or internally into raw water section
	Leaks in chlorifier system (if fitted)
	Leaking core plugs
Metallic rattle from front of engine	
	Alternator pulley loose
	Alternator cooling fan disc loose
	Water pump bearings worn
	Water pump fan belt tension pulley loose or bearings defective
	Water pump fan belt pulley loose
Metallic noise from rear of engine / front of gear box	
	Drive plate loose on fly wheel
	Drive spline connecting engine to gearbox worn
	Springs in flywheel/gearbox drive plate worn loose
Hull vibration when engine/transmission under load	
	Cutlass bearings worn
	Debris around propeller or shaft
	Engine misaligned
	Engine mounting failure
	Engines not synchronised
	Propeller out of balance or damaged
	Shaft out of true

ELECTRICAL

Ignition light stays on	
	Alternator not charging
	Broken fan belt
	Loose or corroded connections
Ignition light flickers	
	Loose fan belt
	Faulty connections or internal broken wire making intermittent connection
Ignition light does not come on	
	Faulty bulb
	Faulty connections or broken wire
	Faulty alternator
Tachometer not working	
	Broken drive cable to tacho-generator
	Faulty connections between generator and tachometer
	Faulty tachometer
	Sheared gears in take off drive to drive cable

Tachometer needle flicker	
	Engine not running smoothly
	Lack of lubrication in drive to tacho generator

Appendix V

Perkins Marine Engines - Agents, Parts & Service Engineers

Perkins has been a principle supplier of engines to Broom for many years and has an established network of distributors and service engineers throughout the UK. In addition there are a number of independent organisations which provide spares and engine servicing as listed below.

Part 1
The first part is based on information / suggestions / recommendations supplied by members which form the basis of a good network for spares and service and is in addition to the official Perkins dealer network. Inclusion in this section is open to any appropriate service or parts organisation or service engineer who is recommended by a BOC member. Proposed entries are contacted prior to inclusion to confirm the range of services on offer, their scope of work and details of any discounts or other benefits available to BOC members.

Part 11
Part 11 is the official Perkins dealer network for the British Isles which is updated annually following the London Boat Show. If members have used the official dealership services and wish to recommend them through the "comments" column please contact me with the detail.

When enquiring about parts and spares it is imperative that you have to hand the engine serial number and preferably, the date of manufacture as there are many minor variations to each particular type of Perkins due to the length of the time they were in production. For instance there are 4 variants of the HT6-354 which to the uninitiated all look similar.

The serial number on a Perkins is stamped on the cast flange adjacent to the fuel injector pump.

Part I Perkins Local Parts & Service Engineers recommended by members				
Company	**Location**	**Contact**	**Comments**	**Phone No./Fax No./ Web site/e-mail**
Broom Boats Ltd	Brundall NR13 5PX	Andrew Stone	Able to carry out all aspects of servicing on members boats.	T 01603 712 334 F 01603 714 803 http://www.broomboats.com/
C.W. Childs Ltd	Ramsey St Mary Cambridge PE26 2TL	Charlie Childs	Engine stockist holding most parts for Perkins engines. Can rebuild engines if required.	T 01733 844 362 F 01733 844 769
Rose Engine Services	Rowhedge Essex CO5 7HU	Peter Rose	Component supplier	T 01206 728 799 F 01206 728 799 M 0789 989 5344
J.P.D.T. Engineers	Flitwick,Beds.	David Canavan	Independent engine remanufacturer concentrating on Perkins and Cummins. Also a Perkins parts dealer stating that there is no problem obtaining parts for HT 6-354s	T 01525 716 422 F 01525 719 889 jpdt@freeuk.com
	Great Yarmouth NR31 6PN	A. Willis	Independent marine engineer. See Autumn	T 01493 661 183 F 01206 662 850

A.W. Diesel Services			2005 Sweeping Statements for an example of their work	sales@awdiesel.co.uk http://www.awdiesel.co.uk/
Edinapower	Ireland		Also try mobile 0860 257 1231	T (01) 882 400 hire@edina.ie http://www.edinapower.com/
Perkins - Sabre	Poole	Richard Mulligan	Useful contact who can advise best route through the organisation to solve a problem	T 01202 893 720 F 01202 851 700 Post@Sabre-Engines.co.uk
Marlec Marine	Ramsgate	Alan Booth	Has stated they are able to supply all parts for 6-354s with possible exception of scavenge pumps which are becoming like "hens teeth".	T 01843 852 452 alan@marlecmarine.com http://www.marlecmarine.com/
E.P. Services Ltd	Cable Street Wolverhampton WV2 2RJ	Paul King	Specialises in service exchange water pumps with particular reference to 6-354s	T 01902 452 914 sales@ep-services.co.uk http://www.ep-services.co.uk/
M.M.C	Wolverhampton	Angie Haire	Engine and gearbox reconditioners with emphasis on Perkins. Also recondition Mermaid engines.	T 01902 457 711 F 01902 456 611 mail@mmcltd.net

Part II Perkins Appointed Parts and Service Dealers for the British Isles				
Company	**Location**	**Contact**	**Comments**	**Phone No./Fax No./ e-mail/web site**
Head Office				
Sabre Engines Ltd	Wimbourne Dorset BH21 7PW	Richard Mulligan	Useful contact for information if all else fails	T 01202 893 720 F 01202 851 700 Post@Sabre-Engines.co.uk http://www.perkins-sabre.com/
Diperk Uk Ltd	Sturrock Way Peterborough PE3 8TZ		Main UK spares distributor for Perkins Engines	T 0800 073 0424 F 01733 335 533 http://www.diperk.co.uk
South West England				
Finning Uk Ltd	Poole Dorset BH17 0GL	Simon Leopard Jonathan Wellstead		T 01202 330 700 F 01202 330 730 marine_parts_service@finning.co.uk http://www.finning.co.uk/

Oxley Marine Engineering	Brixham. Devon TQ5 9QH	Nick Oxley		T 01803 855 903 F 01803 555 330 oxley.marine@tiscali.co.uk
Pro Marine UK	Plymouth PL4 0LP			T 01752 267 984 F 01752 267 984 mail@promarineuk.com http://www.promarneuk.com
Marine Trak Engineering	Mylor Cornwall TR11 5UF	Terry Percival		T 01326 376 588 F 01326 378 258 marinetrak@mylor.com http://www.mylor.com
Nike Engineering	St Marys Isles of Scilly TR21 0JY	Keith		T 01720 422 991 F 01720 422 505 nike_engineering@btopenworld.com
Southern England				
D.B. Marine	Cookham Berks SL6 9SN	Mark Kennett		T 01628 526 032 F 01628 520 564 sales@dbmarine.co.uk http://www.dbmarine.co.uk/
Golden Arrow Marine	Southampton Hants SO14 5QF	Martin Bizzell		T 02380 710 371 F 02380 710 671 martin.bizzel@goldenarrow.co.uk http://goldenarrow.co.uk
South East England				
French Marine Motors Ltd	Walton on the Naze. Essex CO14 8SL			T 01255 850 303 F 01255 850 303 walton@frenchmarine.com http://www.frenchmarine.com/
French Marine Motors Ltd	Brightlingsea Essex CO7 0AX	Mike French John Harvey		T 01206 305 233 F 01206 305 601 info@frenchmarine.com http://www.frenchmarine.com/
Inchgreen Marine	Rochester. Kent ME1 3HS	Ian Richard Borley	See entry in Part I	T 01634 841 900 F 01634 849 2126 inchgreenmarine@btconnect.c

				om http://www.boatrepairskent.co.uk/
Eastern England				
French Marine Motors Ltd	Ipswich Suffolk IP10 0LN			T 01473 659 882 F 01473 659 882 Suffolk@frenchmarine.com http://www.frenchmarine.com/
French Marine Motors Ltd	Rackheath. Norfolk NR13 6LR	John Scott Shaun Partridge		T 01603 722 079 F 01603 721 311 Norfolk@frenchmarine.com http://www.frenchmarine.com/
Goodchild Marine Services	Great Yarmouth. Norfolk NR31 9PZ			T 01493 782 301 F 01493 782 306 info@goodchildmarine.co.uk
The Midlands				
Albatross Marine	Nuneaton Warwickshire CV11 6RY			T 02476 329 841 F 02476329 914 info@albatross-marine.co.uk http://www.albatross-marine.co.uk
Finning Uk Ltd.	Cannock. Staffordshire WS11 8XW	Paul Youe		T 01543 465 165 F 01543 465 199 pyoue@finning.co.uk http://www.finning.co.uk/
North East England				
Scarborough Marine Engineers	Scarborough. North Yorkshire YO11 1PQ	Alan Parker		T 01723 375 199 F 01723 379 734 info@scarboroughmarine.co.uk http://www.scarboroughmarine.co.uk
Scotland				
A. Robb Engineering	Luing by Oban. Argyll PA34 4TX	Alastair Robb		T 01852 314 217 F 01852 314 378 alastair.robb@virgin.net
M.M.S Scotland Ltd	Clyde Marina Adrossan KA22 8DB			T 01294 604 831 F 01294 604 831 robert@mmsscotland.co.uk http://www.mmsscotland.co.uk

Finning UK Ltd	Hamilton. Glasgow ML3 0EG	Jim Peebles		T 01698 713 713 F 01698 713 712 mail@finning.co.uk http://www.finning.co.uk/
Caledonian Marine	Rhu Marina Rhu G84 8LH	Ian or Sam		T 01436 821 184 F 01436 820 645 sales@caledonianmarine.co.uk http://www.caledonianmarine.co.uk
Sabre Plant & Marine	Aberdeen AB12 3BQ			T 01224 877 667 F 01224 877 461 sales@sabreplantandmarine.co.uk
Wales				
Dale Sailing Co. Ltd	Milford Haven Dyfed SA73 1PY	Barry		T 01646 603 122 F 01646 601 061 info@dale-sailing.co.uk http://www.dale-sailing.co.uk
Channel Isles				
D.K.Collins Marine Ltd	St. Hellier. Jersey JE2 3NB	Roger Billot		T 01534 732 415 F 01534 767 332 dkcolmar@localdial.com
Herm Seaway Marine Ltd	St. Peter Port. Guernsey GY1 1AU	Keith Duquemin		T 01481 726 829 F 01481 714 011 hermsea@gtonline.net http://www.harbourguides.com/
Ireland				
G.E.M.S.	Ballymacarther Greencastle Co. Donegal			T (Int) 353 749 381 448 F (Int) 353 749 381 449 greencastleenergy@eircom.net
Loughree Marine Services	Glasson Athlone Co Westmeath			T (Int) 353 906 485 866 F (Int) 353 906 485 716 loughreemarine@killinure.net http://www.loughreemarine.com
Marine Parts (IRL)	Court Macsherry. County Cork	Chris Guy		T (Int) 353 23 40 170 F (Int) 353 23 40 170 chrisguy@eircom.net
Mooney Boats	Killybegs County Donegal			T (Int) 353 749 731 152 F (Int) 353 749 731 632 info@mooneyboats.ie http://www.mooneyboats.ie