SHIRE CANAL BOAT MANUAL

SHIRE 14 70

&

SHIRE 14 90

Please read in conjunction with
either Yanmar or
John Deere Operational Manual
& the PRM Gearbox Manual

optional:
VDO Travel Power Manual

Enter your engine identification details in the spaces provided above.

E.P. BARRUS LIMITED, Launton Road, Bicester, Oxfordshire. OX26 4UR
Tel: 01869-363636 Fax: 01869-363610 www.barrus.co.uk

Declaration of Conformity for Recreational Craft Propulsion Engine with the requirements of Directive 94/25/EC as amended by 2003/44/EC.

Name of Engine Manufacturer: **Yanmar Co Ltd.**
Address: **Yanmar Europe B.V, Brugplein 11, 1332 BS Almere-de Vaart, Netherlands.**

Name of Authorised Representative: **E.P.Barrus Ltd**
Address: **E.P.Barrus Ltd, Launton Road, Bicester, Oxon, OX26 4UR, England**

Engine type approved according to: Stage II of Directive 97/68/EC, 88/77/EC

Description of Engine(s) and Essential Requirements

Engine Type: Inboard Engine **Fuel Type**: Diesel

Combustion Cycle: 4 Stroke

Identification of Engine(s) covered by this Declaration of Conformity

Engine Model	**Engine Type**	**Engine Family code**	**Type Approval Certificate Number**
Shire 40/45/50	4 TNV 88 DSA	5YDXL2.19K4N	e13*97/68DA*2001/63*0574*06
Shire 70	4 TNV 98 NSA	YD3300DNMGEC	e13*97/68GA*2001/63*0545*11

Essential Requirements	Standards	Other normative document/method.	Technical file	Specify in more detail *= Mandatory standard.
Annex 1.B- Exhaust Emissions				
B.1 Engine Identification	☐	☐	☐	
B.2 Exhaust emission requirements	☐*	☐	☐	* EN ISO 8178- 1:1996
B.3 Durability	☐	☐	☐	
B.4 Owners Manual	☐	☐	☐	
Annex 1. C- Noise Emissions	See Declaration of Conformity of the craft in which the engine(s) has(have) been installed			

This declaration of conformity is issued under the sole responsibility of the manufacturer. I declare on behalf of the engine manufacturer that the engine(s) [is (are) in conformity with the type(s) for which above mentioned EC type-examination or type approval certificate(s) has (have) been issued and][1] will meet the exhaust emission requirements of Directive 94/25/EC as amended by Directive 2003/44/EC when installed in a recreational craft, in accordance with the engine manufacturer's supplied instructions and that this (these) engine(s) must not be put into service until the recreational craft which it is (they are) to be installed has been declared in conformity with the relevant provisions of the above mentioned Directives.

Tim Hart
Sales Director
Signed: Bicester, UK

Declaration of Conformity for Recreational Craft Propulsion Engine with the requirements of Directive 94/25/EC as amended by 2003/44/EC.

Name of Engine Manufacturer: **John Deere Power Systems**
Address: **Usine de Saran, B.P. 11013, 45401 Fleury-les-Aubrais Cedex, France**

Name of Authorised Representative: **E.P.Barrus Ltd**
Address: **E.P.Barrus Ltd, Launton Road, Bicester, Oxon, OX26 4UR, England**

Engine type approved according to: Stage II of Directive 97/68/EC, 88/77/EC

Description of Engine(s) and Essential Requirements

Engine Type: Inboard Engine **Fuel Type**: Diesel

Combustion Cycle: 4 Stroke

Identification of Engine(s) covered by this Declaration of Conformity

Engine Model	**Engine Type**	**Engine Family code**	**Type Approval Certificate Number**
Shire 90	4045DF270BME	5JDXL04.5076	e11*97/68GA*2002/88*0219*00

Essential Requirements	Standards	Other normative document/method.	Technical file	Specify in more detail *= Mandatory standard.
Annex 1.B- Exhaust Emissions				
B.1 Engine Identification	☐	☐	☐	
B.2 Exhaust emission requirements	☐*	☐	☐	* EN ISO 8178- 1:1996
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Tim Hart
Sales Director
Signed: Bicester, UK

PLEASE NOTE:

This manual has been compiled to help you to operate your engine and its associated parts with safety and pleasure. Please read it carefully and familiarise yourself with the engine and its parts before operation.

E.P.Barrus reserve the right to change the specification of its products and manuals without prior notice.

Depending upon the equipment specification of the engine and accessories fitted, there may be discrepancies with the information presented in this handbook. No claims may be pursued in this respect.

WARNING:

THIS MANUAL FORMS AN INTEGRAL PART OF THE ENGINE IT ACCOMPANIES, IF A TRANSFER OF TITLE OCCURS, IT MUST ALWAYS BE HANDED OVER TO THE NEW OWNER.

WARRANTY

This Limited Warranty provides coverage for five (5) years (or 2000 hours which ever occurs first) for recreational users and three (3) years (or 2000 hours which ever occurs first) for commercial users from the date of warranty registration. The repair or replacement of parts, or the performance of service under this warranty, does not extend the life of this warranty beyond its original expiry date.

PRM 260 gearboxes are covered by a three (3) year warranty for recreational users and two (2) years for commercial users.

To ensure that you have been registered for your warranty, please ask your Boat-Builder or Engine supplier to provide your portion of the registration form.

Engine alternator, starter motor and electrical components are only covered by a one (1) year warranty.

CONDITIONS THAT MUST BE MET IN ORDER TO OBTAIN WARRANTY COVERAGE

Warranty coverage is only available from an authorised dealer in the country in which the sale occurred. Routine maintenance outlined in the Owners Manual must be performed using genuine parts in order to maintain warranty coverage. If the customer performs maintenance, Barrus reserves the right to make future warranty coverage possible only with proof of proper maintenance.

WARRANTY CLAIMS

Warranty claims shall be made by an authorised dealer or boat builder.

The dealer or boat builder will then arrange for the inspection and any necessary repairs. If the repairs carried out are not covered by the warranty, purchaser shall pay for all related labour and material, and any other expenses associated with that service.

WHAT IS NOT COVERED

This limited warranty does not cover routine maintenance items, adjustments, normal wear and tear, damage caused by abnormal use, operation of the product in a manner inconsistent with the recommended operation/duty cycle section of the Owners Manual, accident, submersion, improper installation (proper installation specification and techniques are set forth in the Operations and First time running sections in this manual), use of an accessory or part not manufactured or sold by us, or alteration or removal of parts. Expenses related to crane-out, launch, towing, storage, telephone, rental, inconvenience, slip fees, insurance coverage, loan payments, loss of time, loss of income, or any other types of accidental or consequential damages are not covered by this warranty.

Failure to use John Deere approved oils and coolants will invalidate any warranty (Shire 90).

Engine electrical systems fitted with alternator boost charge systems or any other electrical management systems other than those approved by Barrus are not covered by warranty.

Engine and fuel equipment is not covered by warranty if bio-diesel is used in the fuel system. Also if no type of water trap is incorporated into fuel system.

Contents

SECTION 1 - Safety Precautions

1. General

It is the responsibility of the installer/operator to ensure that the finished installation complies with the relevant health & safety requirements and the recreational craft directive before commissioning.

Ensure that the engine battery isolator switch is in the off position and the key removed from the control panel before carrying out any maintenance or repairs.

2. Lifting

The lifting points supplied with the engine are for lifting the engine/gearbox only. A suitable spreader bar must be employed to prevent over-stressing either bracket during any lift.

3. Rotating Shafts and Belts

The engine and its accessories are not intended to be put into operation until it is integrated into the boat as a whole. No person should be in the engine compartment whilst the engine is running.

4. Exhaust System

Exhaust gases may have temperatures as high as 650^{o}c and contain elements which are harmful if ingested. It is therefore essential that exhaust systems are gas tight and lagged to prevent accidental burning.

5. Launching and Lifting Boats

Care must be taken when launching or craning new boats into or out of the waterway, so that water does not enter the engine via the exhaust system or air vents. It is recommended that these are blocked temporarily whilst undertaking this procedure.

6. Batteries

WARNING:
EXPLOSIVE GASES / SULPHURIC ACID

- Batteries can produce explosive gases, keep sparks and flames away from the battery. **NO SMOKING.**
- Batteries contain sulphuric acid; if splashed on skin or eyes, flush well with water and seek medical advice.
- Keep the battery tops and battery compartment ventilated at all times.
- If disconnecting the battery; remove the earth lead **FIRST**; and re-connect it last.
- If charging the battery; ensure that the charger is switched off before connecting and disconnecting.
- Do not tip the battery on its side.
- Please see label on battery or manufacturers instructions for specific information.

SECTION 2 - Engine Identification

Please quote the engine identification number during any enquiry or when ordering spare parts.

This is found engraved into the brass plate, on top of the engine rocker cover and stamped to the crankcase above the starter motor.

An example of the engine identification plate is as follows:

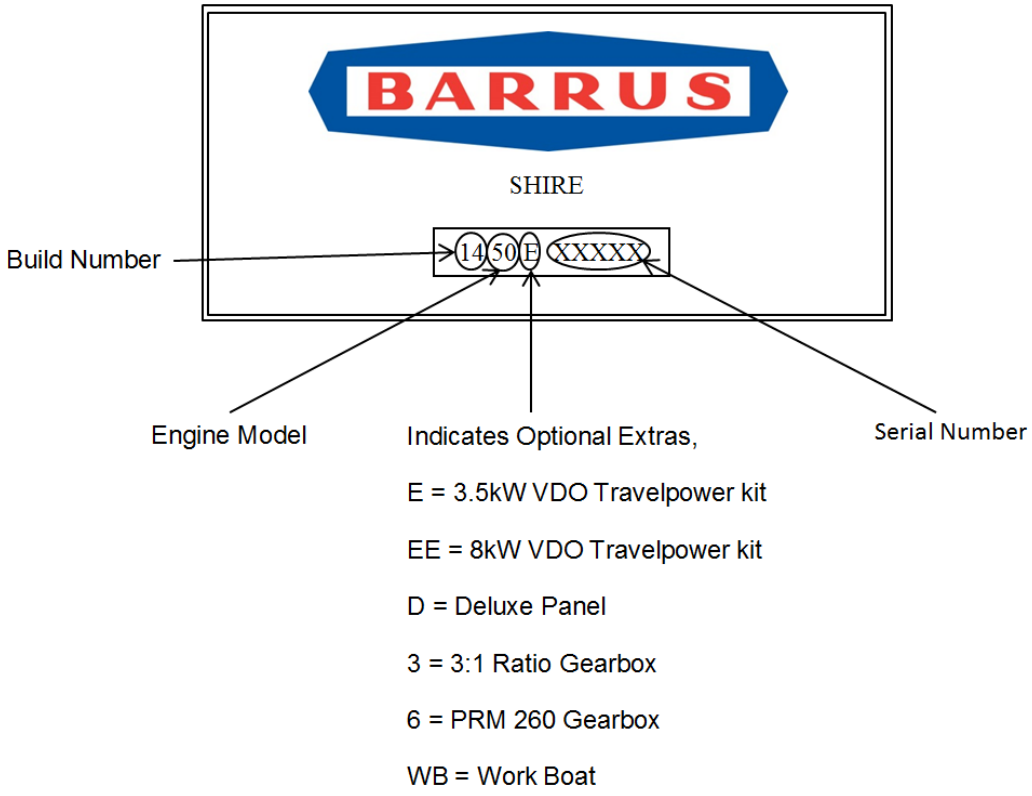


Figure 2-1: Engine Identification Badge

Note: There are a number of optional extras that may be fitted to an engine for particular customer's engine that are not listed here.

A list of common item service part numbers can be found in Shire service parts, in Section 6.

SECTION 3 - Installation

1. Ventilation

- All internal combustion engines radiate heat and require cool, clean air for complete combustion purposes.
- Please ensure that adequate engine room ventilation is provided, by fitting at least two vents of an aperture of not less than 15,000 mm^2 each, (24 in^2).

An allowance must be made for any grills or louvres placed in the airflows and generally, an increase of 25% in area is sufficient to overcome any restriction problems.

2. Engine Beds

- These should be a minimum of 10mm thick and extended rearward and be welded to the hull and forward to the bulkhead. There must be webs or gussets welded in place to prevent flexing.

3. Cooling System

- Ensure pipe work to and from the skin tanks is of sufficient bore. A minimum of 45mm (1 ¾") for Shire 90 and 38-40mm (1 ½") is recommended. Ensure tight bends and elbows are avoided or kept to a minimum.
- For Shire 90; if twin skin cooling tanks or additional floor tanks are used which add greatly to restriction to flow. The water pump drive pulley can be changed for a smaller diameter one to increase pump speed and flow rate. John Deere part no.: R115250

4. Skin Tanks

- The ideal skin tank internal thickness should be not less than 50mm and not exceed 75mm; the table below will indicate a suitable size however volume will not compensate for lack of surface area. It should be recognised that fitting a large calorifier would increase the theoretical cooling capacity only until it is up to temperature. It is unlikely that a boat on the inland waterways will operate at full power for more than short periods. The engine cooling water outlets are on the right hand (starboard) side of the engine, for Shire 70 and inlet on left hand side (port) and outlet on right hand side (starboard) on the Shire 90.

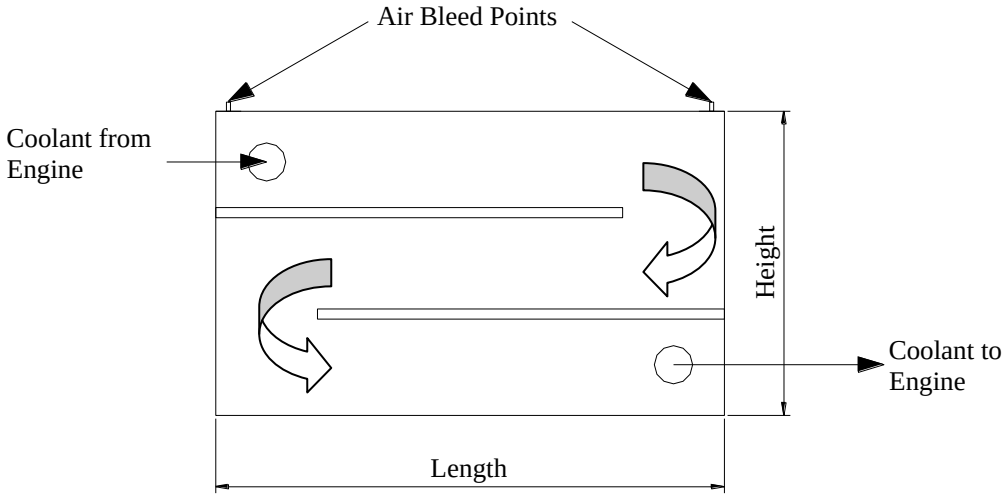


Figure 3-1: Skin Tank Flow Diagram

Recommended Skin Tank Size					
Engine	HP	KW	Skin tank Surface area m^2	Suggested Height mm	Suggested Length mm
90	90	67	2.15	952	2258
70	70	51.7	1.55	840	1850

Note: Skin tank size must be increased by approx. 10% if a hydraulic drive transmission is fitted.

5. Engine Cooling Water Inlet and Outlet Hose

Use a good quality hose that cannot collapse or kink and is capable of working at temperatures in excess of 100ºC.

6. Pressurised Water Header Tank

- The pressurised water bottle should be mounted higher than the level of the engine and no more than 1 metre from the engine. This will prevent cooling system air locks.
- The header tank has two hose connections of different internal diameters.
- Shire 70 - The smaller internal diameter hose tail (left side of tank) should be connected to the top of the twin thermostat housing on the engine. This is the air-bleed. The larger internal diameter hose-tail (right side of tank) should be connected to the lower pipe on the engine. This is the water-fill.

Note: A constant rise on pipework is required to prevent air locks.

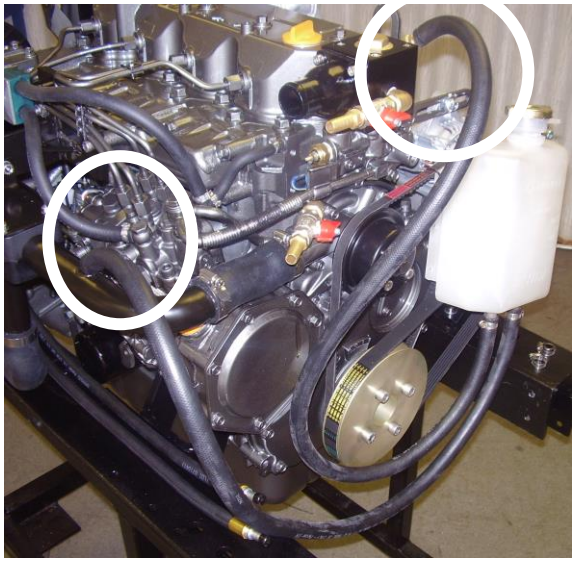


Figure 3-2: Shire 70 Header Tank Connections

- Shire 90 - The smaller internal diameter hose tail (left side of tank) should be connected to the top of the engine. This is the air-bleed. The larger internal diameter hose-tail (right side of tank) should be connected to the lower pipe on the engine (circled left). This is the water-fill.

Figure 3-3: Shire 90 Header Tank Connections

7. Shaft Connection

- Some type of flexible coupling must be used to connect the gearbox output flange to the propeller shaft flange.

8. Engine Anti-Vibration Mounts

- Ensure that the engine feet do not end up at the top of the thread on the engine mounts, this puts undue pressure on them and can result in excessive engine movement and premature mount failure. Mount the engine using the steel packing plates supplied under the engine mounts RDG3906.
- Ensure that the engine has been installed for at least 24 hours before shaft alignment is checked, this allows the mounts time to settle under the engine weight.
- Ensure that the anti-vibration mount centre screw is sufficiently raised so as not to touch the engine bed. If this occurs excessive engine vibration will be experienced through the hull.
- For best results, fit the front anti vibration mounts into the front holes in the engine rails. If engine room space is a problem the mounts can be fitted slightly further back in alternative holes, and the front of the rail cut off – leaving 50mm of material to retain strength (measuring from the centre of the mount hole to the front end of the rail). Note: this procedure is only possible on non VDO travel power engines, and may result in a very slight increase in vibration.
- The anti vibration mounts have a small number stamped in to them, a Shire 70 has 45 and Shire 90 has 55.

Alternative mounting position if engine compartment space is restricted.

Normal mounting position.

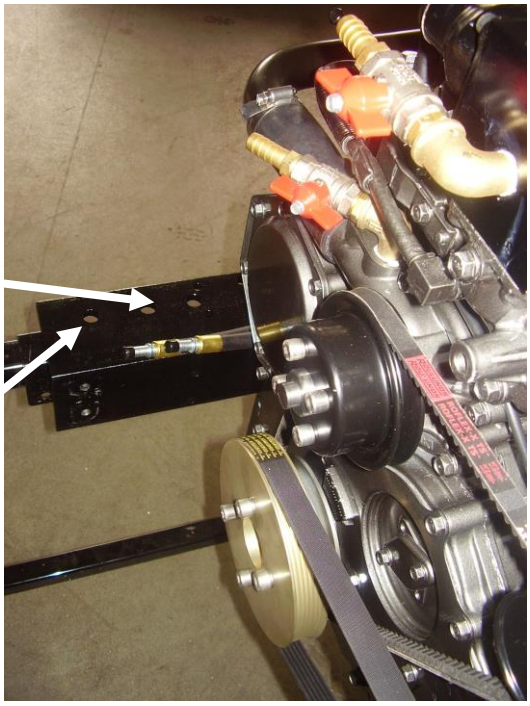


Figure 3-4: Anti-Vibration Mount Installation Points

9. Engine Mount Installation

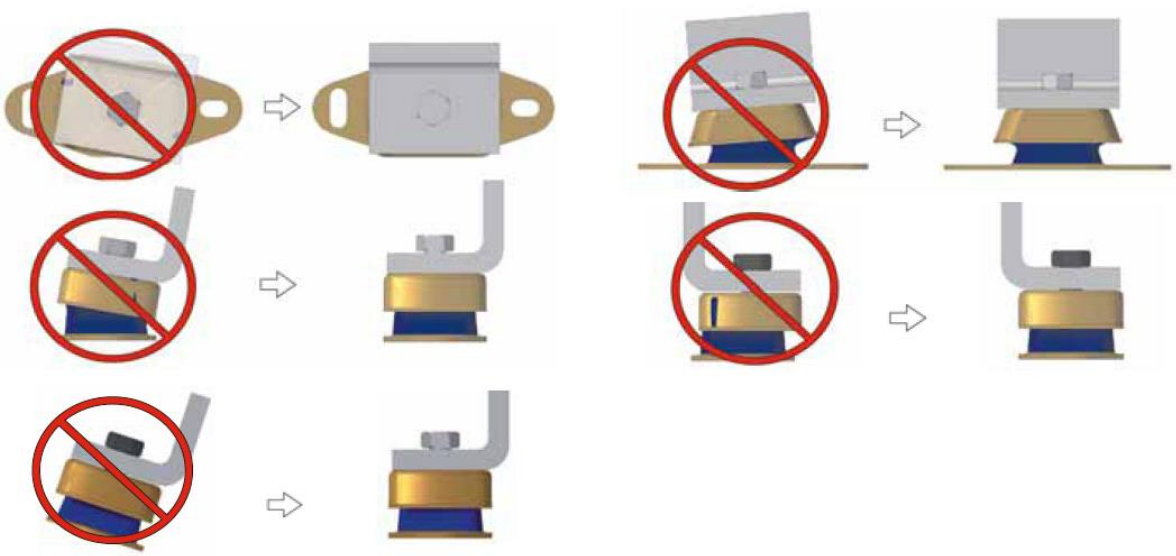


Figure 3-4: Correct Anti-Vibration Mount Installation

- Care should taken to install mounts parallel to the engine rails with the washer and locknut firmly tightened on the cover of the mount. The maximum distance from the top of the locknut to the base of the adjusting nut must not exceed 5mm; any greater adjustment should be made using shims.

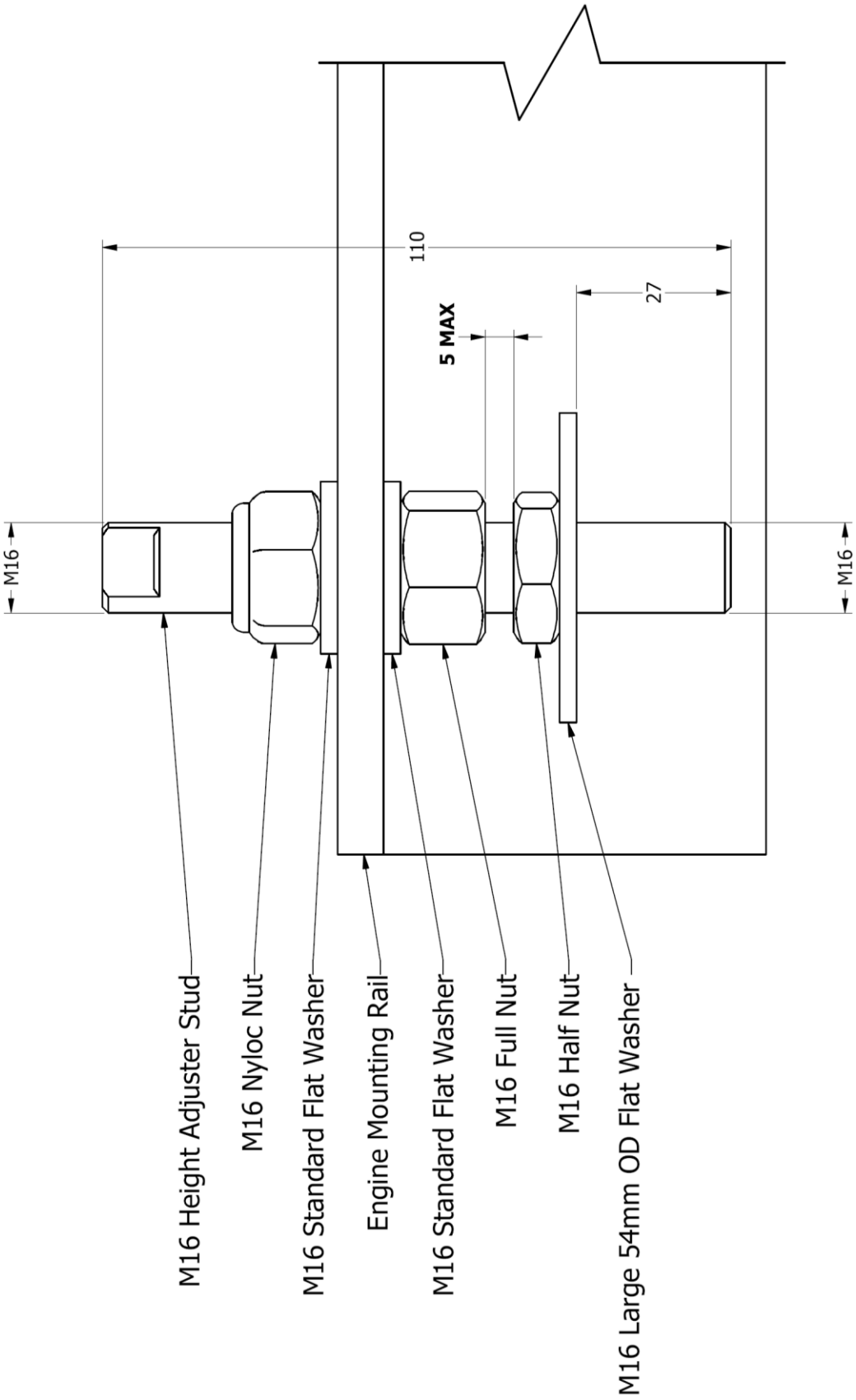


Figure 3-5: Correct Anti-Vibration Mount Installation

10. Engine Alignment

- The gearbox output shaft flange and propeller shaft input flange must be almost perfectly aligned. A maximum of 0.05mm (0.002") misalignment in any plane is acceptable. Ensure alignment is rechecked after the first 4 hours of running, at the end of the first month and annually thereafter.
- If the engine is out of alignment it will result in excessive vibration and possible damage to the stern tube and propeller shaft.
- Boats that are fitted with fully flexible drive couplings should still have the engine and shaft alignment as close as possible. A dummy shaft may be required for this purpose.

  (Note: some types of flexible shaft couplings require the input and output to be misaligned, check with the coupling manufacturer's installation instructions).

11. Electrics

WARNING:

Fit and tension domestic alternator belt, only when domestic battery bank has been connected to domestic alternator.

- Do not attach any part, hose or cable to the engine wiring harness. There is a warning label attached to the harness to remind you of this.
- Connect the wiring extension harness multi plug to the panel plug, and the other end to the engine.
- Connect the start battery positive cable to the engine starter motor solenoid terminal.
- Starter motor battery cable size to be a minimum of 50mm^2.
- Shire 70 - Connect the domestic battery positive cable to the 240 Amp Alternator "Pos out" terminal (see wiring diagram). This ensures that the 50A alternator charges the start battery and the 240A alternator charges the domestic battery. Twin alternators remove the requirement for a split charging system or relay.
- Shire 90 – Connect the domestic battery positive cable to the 120Amp alternator B+ terminal (see wiring diagram). This ensures that the 140Amp alternator charges the start battery. The blue link wire between the 120A Alternator B+ terminal or 160A "pos out" terminal and the starter motor solenoid **must** be removed when the domestic battery is connected.
- Shire 70, cable will need to be manufactured locally and fitted between the lower

240A alternator “pos out” terminal and the domestic battery positive terminal. Cable should have a minimum cross sectional area of 50mm^2 (193amp capacity).

- Shire 90, cable will need to be manufactured locally and fitted between the upper 120A alternator B+ terminal and the domestic battery positive terminal. Cable should have a minimum cross sectional area of 35mm^2.
- Both negative battery terminals can be connected to a common earth point.

12. Electrical Options

- If the engine is fitted with the optional VDO travel power system, refer to the manual supplied with it for correct wiring, control box installation and operation.
- The Shire range can be supplied with an optional additional 12v or 24v alternator. This will be supplied fitted but not wired. It is the responsibility of the boat builder to ensure that this is correctly wired to the boats electrical system.

13. Engine Oil

- All Shire engines are supplied fully run in.
- Check oil levels in engine and gearbox before starting. (The gearbox uses the same grade of oil as the engine).
- Shire 70, use Shire engine oil SAE 15w / 40 API class CD.
- Shire 90, use John Deere engine oil, see Section 7 – Service Schedule.

WARNING:

ENGINE OIL WITH A HIGHER API CLASS THAN SPECIFIED IS UNSUITABLE FOR CANAL BOAT ENGINE OPERATION AND WILL CAUSE ENGINE DAMAGE IF USED.

14. Fuel

- Ensure the main fuel tank is clear of dirt & water.
- A separate water trap is strongly advised. (The engine is supplied with a small water trap as standard).
- Connect fuel feed and return hoses from engine to main fuel tank via supply and return lines. Ensure that they are connected the correct way around.
- Shire 70 – connect the inlet to the electric fuel pump inlet hose.
- Shire 90 – connect to the inlet to the primary fuel filter inlet hose.
- The fuel supply and return hoses are fitted with 10mm (3/8”) hose tails.

- The engine hoses should have sufficient slack to absorb engine movement without placing strain on the hoses, and be securely clipped to prevent accidental damage and chafing.

- Initially fill the fuel system loosening the bleed bolt on the top of the primary fuel filter/water trap. For Shire 70, turn on the ignition to operate the electric fuel pump. For Shire 90, pump the primer on the primary filter. Close when fuel begins to flow clearly (no bubbles). It is rarely necessary to bleed the injection pump or injectors upon installation as the engine will already have fuel in it from the engine run-in and test procedure.

15. Coolant

- Yanmar (Shire 70) recommend a prepared coolant mix of 50% clean tap water and 50% antifreeze, John Deere (Shire 90) recommend that Coolguard must be used (see Section 7 – Service Schedule). This is already mixed and must not have water added to it.
- Open the calorifier taps (where fitted) to fill the calorifier system and displace air.
- To fill the cooling system for the first time. Fill the skin tank via the inlet hose connection or filler plug if fitted.
- Fill engine through the white plastic expansion bottle.
- N.B. After running the engine for the first time, monitor the water level frequently as trapped air bubbles may be expelled. Top up the system as necessary.

16. Calorifier

- The temperature of coolant flowing to the calorifier from the engine can be between 85°C-90°C. A blender valve must be incorporated in the calorifier/hot water system outlet to lower the hot water temperature for domestic use.

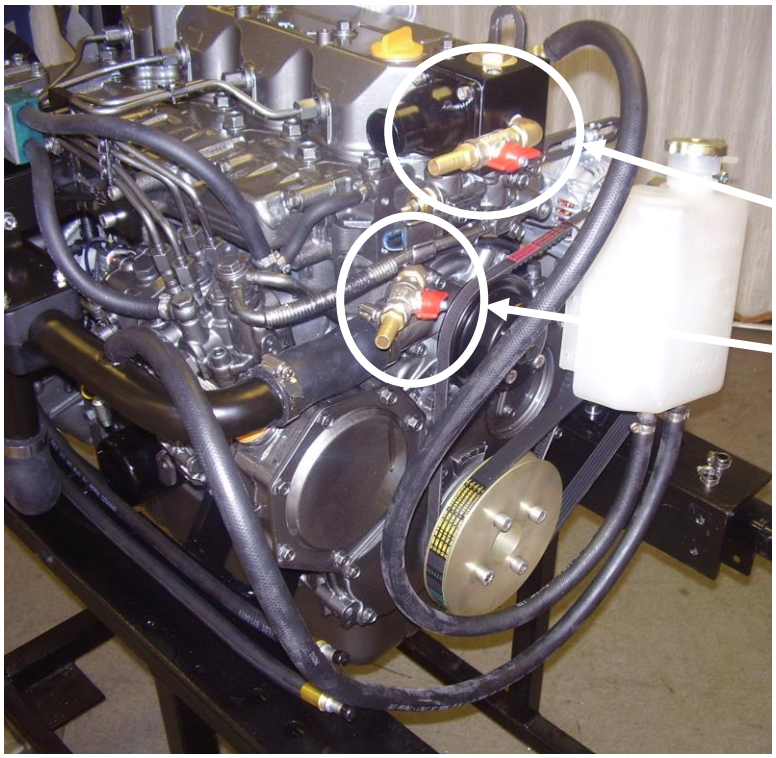
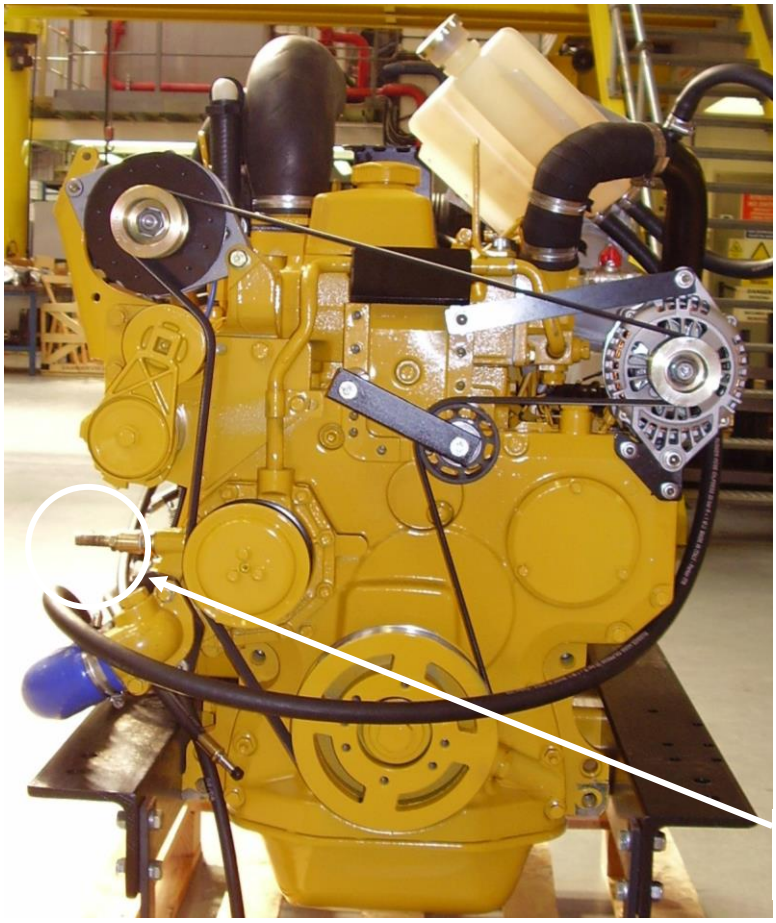


Figure 3-7: Shire 70 Calorifier Connections



Calorifier Outlet (located on rear of engine)

Figure 3-8: Shire 90 Calorifier Connections

17. Control Cables

- Connect throttle and gear shift cables.
- With the engine off, ensure that the engine speed control cable achieves full travel from idle to full speed.
- Check the gearshift selects positively and that the drive direction corresponds with the gearshift lever. Ensure that the gearbox control lever and the gearshift lever are both in neutral before connection.
- Set gearshift control to neutral position, and the speed control to idle.

18. Domestic Battery Bank

Domestic battery banks that are too large create excessive loads on the domestic alternator. Alternators running at maximum output for prolonged periods of time will eventually fail prematurely; alternators that fail due to the battery bank being over the maximum recommended size will not be covered by warranty.

Higher output alternators or travelpower kits are available; if larger battery banks are required discuss your individual power requirements with the boat builder.

- The maximum domestic battery bank is calculated using the following:

Live aboard, three times domestic alternator, maximum output current.

Weekend cruising or hire fleet use, three and a half times domestic alternator, maximum output current.

Example 1:

Live aboard application fitted with a 140 amp domestic alternator

3 x 140 = 420 ampere/hour maximum battery bank size

Example 2:

Weekend cruising or hire fleet application fitted with a 240 amp domestic alternator

3.5 x 240 = 840 ampere/hour maximum battery bank size

19. Control Panel

All Shire engines are supplied with high quality engine control panel that all show RPM and hours run and include warning lights and a warning buzzer, the deluxe panels also have gauges for water temp, oil pressure and 240A (Shire70) and 120A (Shire 90) battery charging. The panels are designed to be splash proof and are correctly installed with the gauges vertical. Do not install so that they remain out in the open, or cover up when not in use.

The control panel engine tachometer is supplied already calibrated to measure correct engine speed, if a new dash panel, tachometer or alternative alternator is fitted the tacho will require re-calibrating.

Dash Panel Calibration Procedure:

- Connect dash panel plug to engine wiring loom plug
- Turn ignition on (do not start engine)
- Press and hold black button on rear of tacho until “H –“ appears on the digital display on the bottom of the tacho (on the front).
- When pressing and holding the black button on rear of tacho, the value displayed will increase/decrease until button is released. Then when pressed again it will increase/decrease in the other direction, keep doing this until the digitally displayed value on bottom of tacho reaches the correct value, according to the type of alternator (see table). Must be set to the alternator with blue and black wire connected to it.
- Confirm settings to tacho meter reader.
- An optical tachometer is required to check the reading.

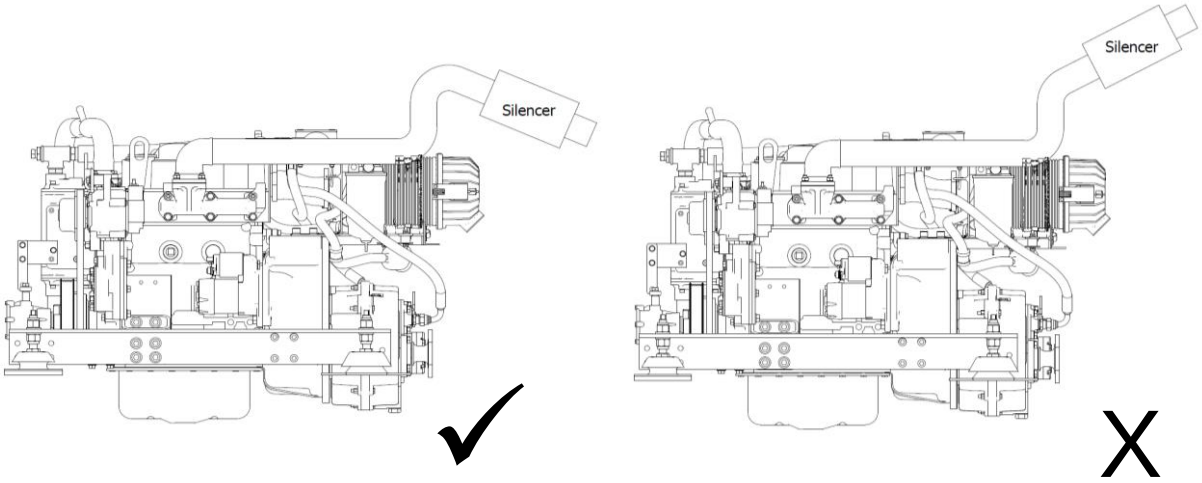
Barrus Alternator (Amps)	Barrus tacho reading
50	10.50 – 11.00
70	15.00
110	18.00
140	19.50 - 20.00
240	22.00

Alternative or non-standard alternators will require calibrating and checking by trail and error with a hand held tacho until the engine speed and indicated tachometer speed are the same.

Engine energise to stop systems are available as an optional extra.

20. Exhaust System

The exhaust outlet size on the engine is 1 $^{1}/_{2}$" BSP female. There must be a flexible exhaust hose of suitable exhaust grade between the engine and the silencer or hull outlet. The outlet must be above the waterline at all times.



- Make sure exhaust increases then decreases in height as shown above

21. Hydraulic Drive Transmissions

If an engine is to have a **Hydraulic Drive Transmission** attached to it, a number of points must be observed.

Bobtail engines (i.e. Engines supplied without a marine gearbox), normally **do not** have a gearbox oil cooler fitted, however if a cooler is supplied, this will only be suitable to cool a conventional marine gearbox.

Hydraulic drive transmissions generate far more heat than a conventional marine gearbox, therefore the size of oil cooler installed must be calculated by the hydraulic drive transmission supplier; to ensure it has sufficient cooling capacity, and is sized appropriately taking into account:

- Maximum engine power
- High ambient summer air temperature
- Summer River/Canal/Sea temperature
- No additional restriction to engine coolant flow is present

Skin tanks will also need to be increased by approx. 10% to accommodate the additional heat dissipation required.

22. Hydraulic Pump Drive (Shire 70)

For SAE type pump (9T).

If a hydraulic pump is required to drive items such as bow thrusters or hydraulic winches then the following parts are required to enable drive to be taken from the engine power take off.

Part No. 129980-26220 incorporates:

- Applicable cover: 121023-26070
- Packing:121023-26061
- Bearings: 129900-26250 x 2pcs (included in the specialised gear case)
- For high discharge volume: above 20cc/rev

Ratio: 1.231

23. Installation Check list

Engine alignment correct, clearance all round, check propeller turns by hand (Ensure ignition is off battery and battery master switch is off)	
Anti-Vibration mounts correct height, spacers if necessary	
Exhaust system as specified	
Battery leads are of correct size, tightened and start battery is charged	
Check tension of alternator belts, wiring connected and belt alignment checked If removed	
Check fuel system is connected correctly and primed	
Fuel line water trap installed and water drained off	
Check header tank and skin tank connections are correct way round, constant pipework rise to header tank	
Check level of coolant in header tank and correct ratio	
All air has been bled from skin tank, calorifier and pipework	
Engine and gearbox oil levels are as specified	
Throttle and gear cables correctly adjusted and operating smoothly	
All pipework and cabling supported and not chaffing, slack to allow movement of engine	
Confirm panel and warning lights operational	
Check for leaks	
Explain/Demonstrate off season storage and maintenance	
Installer's signature	
Installer name/company	

SECTION 4 - Operation

1. Starting The Engine For The First Time

- Remove the ignition key.
- Ensure oil and coolant levels are checked.
- Ensure both engine and domestic batteries are connected or the blue link wire is in place (Shire 90 only).
- Check all connections and mountings are tight.
- Ensure the red protection cap is removed from the air filter inlet.

2. Starting Procedure

Note: Shire engines **do not** have a cold start function as standard. Therefore the glow plug light will not illuminate.

- Ensure the gearshift control is set to **neutral**, and that persons are clear of any moving parts.
- Insert key.
- Ensure the domestic battery isolator is turned to the on position **before** starting the engine, failure to do so may damage the domestic alternator.
- Turn key to first position, **on**.
- Observe warning lights and gauges on panel.
- Listen for warning buzzer.
- Turn key to second position, **start**, and hold to crank.
- Crank the engine for no more than 15 seconds.
- Immediately on engine start, release key.
- Key will return to first position, **on**.
- The warning buzzer will stop and on the deluxe panel the oil pressure gauge will show an oil pressure of 3-4 bar [44-58 psi].
- Should any warning light fail to go out or there is no reading on the oil pressure gauge, the buzzer will continue sounding. In this case stop the engine immediately and check the relevant system. (Note if the charge light does not go out increase the engine speed briefly).
- Stop engine **immediately** if any abnormal noises are detected.
- Visually check the engine for oil, fuel and coolant leaks, (after initial start up and at regular intervals, N.B. engine must be stopped to carry out this check).

3. Stopping Procedure

- Move speed control lever to idle position.
- Turn key to **off** position.

4. Full Load Running

- Running diesel engines near their rated output (maximum load) regularly will disperse accumulated carbon and condensation enhancing engine life and reducing emissions.
- Running the engine at, or near maximum speed whilst in gear may not be possible on inland waterways with speed limits in place. This will have to be carried out whilst moored up. Ensure that the mooring ropes and posts are strong enough to allow this, and that the water is deep enough not to damage the propeller. It is recommended that the engine is run at or near full load for 15 minutes (maximum engine speed, in gear) every 50 hours.

5. Refuelling

- The fuel type for all Shire canal boat engines is diesel. **DO <u>NOT</u> USE BIODIESEL**
- Please note that when the vessel is to be left for any period of time the fuel tank should be left full to eliminate the build up of condensation and water in the tank.

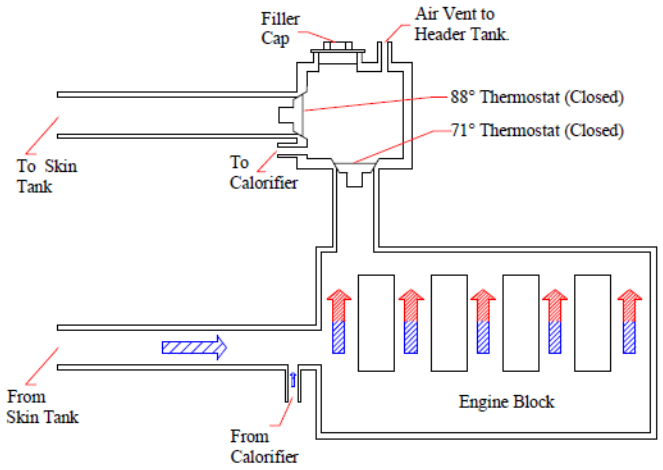
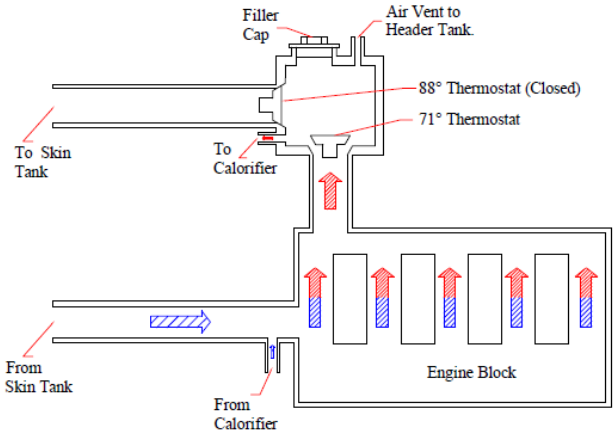
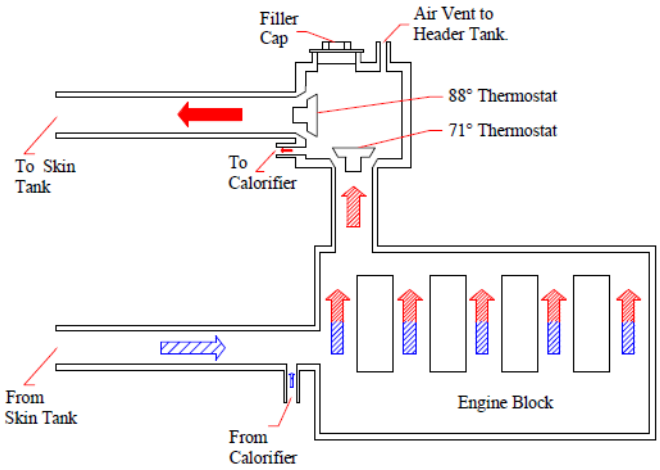
6. Diesel Fuel Additive

The use of diesel fuel additive is strongly recommended on Shanks & Shire engines. The quality of the fuel available when cruising is often unknown; also the fuel may have been in storage for long periods of time. The use of additives will ensure that your engine fuel injection system is in top condition, which should result in many years of smooth reliable operation without the cost and inconvenience of expensive breakdowns due to poor quality fuel. It has also been found that improvements in fuel consumption and startability are an added benefit of using this product.

Diesel fuel additive is available from your Shanks or Shire dealer in a handy 375 ml container, part number RDG80210219.

7. Twin Thermostats

The twin thermostat design is a feature unique to the Shire canal boat engine range (excludes Shire 90). The diagrams on the following page show the operation of the cooling system.

With the engine quickly up to operating temperature, the first 71° thermostat opens. The water now flows to the domestic hot water tank, resulting in hot water being rapidly available.	
When the water stored in the hot water tank has reached full temperature, the second 88° thermostat opens and water can then flow to the skin tank and correctly control engine cooling.	
If the load on the engine reduces and the demand for domestic hot water increases then the system will automatically compensate and re-direct water to ensure that a plentiful supply of hot water is always available.	

8. Exhaust Back Pressure

The back pressure falls within the manufacturers recommended range when using the exhaust system supplied with the engine.

SECTION 5 - Service Procedure

1. Engine Oil and Filter Change

CAUTION:

WEAR DISPOSABLE GLOVES AND BEWARE OF HOT OIL AND ENGINE BLOCK.
REMOVE THE IGNITION KEY BEFORE WORKING IN ENGINE COMPARTMENT.

- Change the engine oil while the engine is still hot.
- Remove the blanking plug in the sump pump spout. [8mm Allen key]. The larger of the two oil extraction pumps is for draining engine oil.
- Place a plastic tube over the spout and into a container. Operate the pump handle to empty the sump. (Remember to refit the blanking plug afterwards).
- Place a drip tray under the engine oil filter to catch the small amount of oil that will escape. Using a filter removal tool, slacken the filter from the engine block in an anti-clockwise direction, remove the tool and spin off the filter.
- Lightly oil the new filter O-ring seal and install the filter onto the engine. Spin on in a clockwise direction and finally tighten **by hand only** as firmly as you can.
- Refill the sump using the oil filler cap in the rocker cover on top of the engine.
- Oil level should be to the top mark on the dipstick.
- Run the engine for 5 minutes to fully circulate the oil and check for leaks. Stop the engine. Wait 5 minutes before checking the oil level with the dipstick and top up if required.
- Do not overfill with oil above the maximum level marker as this may cause damage to the internal components of the engine.

2. Air Filter Check & Change

CAUTION:
WEAR DISPOSABLE GLOVES AND BEWARE OF HOT ENGINE BLOCK. REMOVE THE IGNITION KEY BEFORE WORKING IN ENGINE COMPARTMENT.

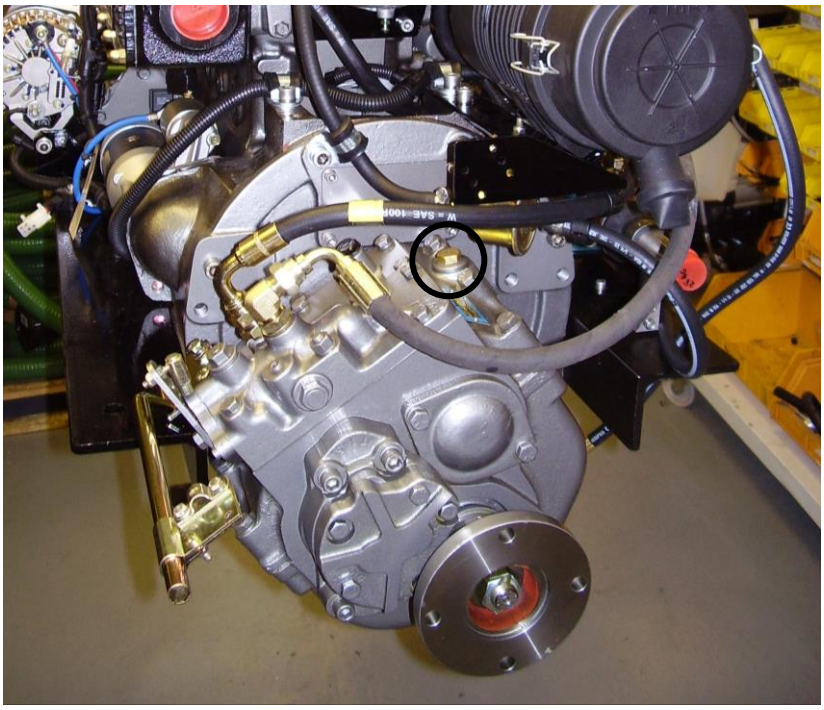
- Release the two spring clips, pull off the end cover to reveal the filter element. The element simply pulls out. Note: the Shire 90 has an inner safety element fitted.
- The air filter element is constructed from pleated paper; inspect it closely for dust or dirt. The air filter cannot be cleaned and must be replaced when dirty. The engine requires clean unrestricted air to run efficiently, failure to maintain the air filter could result in smoke, increased fuel consumption and ultimately engine damage.
- To fit the new element, slide the open end of the filter element into the main body; gently push the element home until fully seated. Refit the end cover.

3. Gearbox Oil Change

CAUTION:
WEAR DISPOSABLE GLOVES AND BEWARE OF HOT OIL AND GEARBOX CASING. REMOVE THE IGNITION KEY, BEFORE WORKING IN ENGINE COMPARTMENT.

- Change the gearbox oil while it is still hot. (Please refer to gearbox manual for more information).
- Remove the plug from the gearbox drain pump; this is the smaller of the two pumps (6mm Allen key).
- Pump contents in a suitable container (not less than 2.2 litres).
- Refill the gearbox with oil to the upper mark on the dipstick. Screw dipstick in fully to establish level. The gearbox uses the same grade of oil as the engine. Refer to PRM manual for more details.
- Section 6 – Service Parts contains details of oil specifications.
- Do not overfill gearbox as this can damage the internal components.

PRM 260 gearbox filler circled in the picture below.



4. Disposal of Oil and Related Items

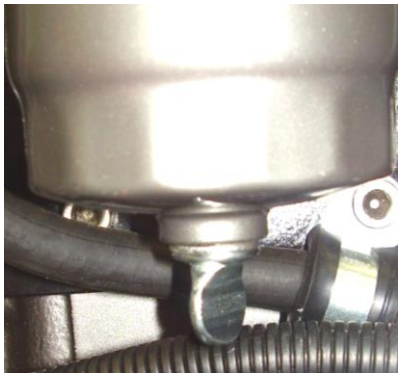
- Please dispose of used oil and oil filters safely with due regard for the environment, and take to your local waste oil disposal point.
- Do not allow oil or contaminated parts enter the inland waterway system.

5. Primary Fuel Filter Water Drain

CAUTION:
WEAR DISPOSABLE GLOVES.
REMOVE THE IGNITION KEY BEFORE WORKING IN ENGINE COMPARTMENT

- Place a small drain bowl under the fuel filter/water separator drain plug
- Loosen the drain screw located on the bottom of the filter.
- Drain off any water.
- After accumulated water has been drained, close the drain screw.
- It is unlikely the complete fuel system will require bleeding.
- Start and run engine for 5 minutes.
- Check that the drain union is tight and that there are no leaks.
- Note: the boat builder may have fitted an additional water trap in the fuel system before the engine.

- Do not over tighten screw.



6. Primary Fuel Filter Change

CAUTION:
WEAR DISPOSABLE GLOVES.
REMOVE THE IGNITION KEY BEFORE WORKING IN ENGINE COMPARTMENT.

- Turn off the main boat fuel supply tap, located on or near the fuel tank.
- Place a small drip tray under the filter body.
- Unscrew and remove the filter.
- Remove metal water drain screw from old filter and refit onto new filter element. (The plastic drain screw does not comply with the British Waterways Boat Safety Scheme).
- Smear some clean engine oil onto the filter rubber gasket sealing face.
- Fit the new filter and tighten by hand.
- Turn the main boat fuel supply tap back on.

7. Secondary Fuel Filter Change

- Refer to Yanmar Operator's Manual, *Periodic Maintenance* (Shire 70).
- Refer to John Deere Operator's Manual, *Lubrication and Maintenance* (Shire 90).

8. Fuel System Bleeding

- Ensure that the fuel tank is more than ¾" full prior to attempting this.
- Refer to Yanmar Operator's Manual, *Before You Operate* (Shire 70).
- Refer to John Deere Operator's Manual, *Lubrication and Maintenance* (Shire 90).

9. Cooling System

WARNING:

DO NOT CHECK THE COOLANT LEVEL WHEN THE ENGINE IS HOT. REMOVE THE IGNITION KEY BEFORE WORKING IN ENGINE COMPARTMENT.

- To check the coolant level, ensure that the engine has been shut down for at least half an hour.
- The coolant level can be checked visually and should be between the two level marks moulded on to the white, plastic expansion tank.
- If required, top up the level with coolant (50% clean tap water and 50% ethylene glycol based anti-freeze) through the expansion tank filler cap. (Shire 70 and Shire 90 use John Deere, coolguard neat)
- Do not use water only to top up mix as this weakens the coolant mix, reducing the level of frost protection and anti-corrosion protection of the coolant.

10. Belt Adjustment

CAUTION:
REMOVE THE IGNITION KEY BEFORE WORKING IN ENGINE COMPARTMENT.

- Depress the longest run of the drive belt to be checked. If the travel exceeds 15 - 20mm using hard finger pressure, the belt needs re-tensioning.
- Loosen the upper adjuster bolts on the alternator, and the lower mounting pivot nut and bolt, either pull out using hand pressure or use the tensioning screw, depending on which alternator is fitted.
- Pull the alternator away from the engine to tighten the belt.
- Hold the alternator in position and re-tighten all the bolts.

  Note: 1 – If the belts are over tightened alternator bearing failure will occur.

  2 – Shire 90: 140Amp and 120Amp alternator belt is self-adjusting.

11. Belt Maintenance

- Do not allow oil to contact the belt, oil attacks the construction of the belt, reduces the drive efficiency and will ultimately cause it to fail prematurely.
- Replace the belt if it cracks, splits, or as the adjustment nears the limit of its travel.
- Note: Some boat builders may remove one or more of the alternators during the installation of the engine. It is essential that when the alternators are refitted that the alignment is perfect or premature belt wear will occur.

12. Belt Replacement

CAUTION:
REMOVE THE IGNITION KEY BEFORE WORKING IN ENGINE COMPARTMENT.

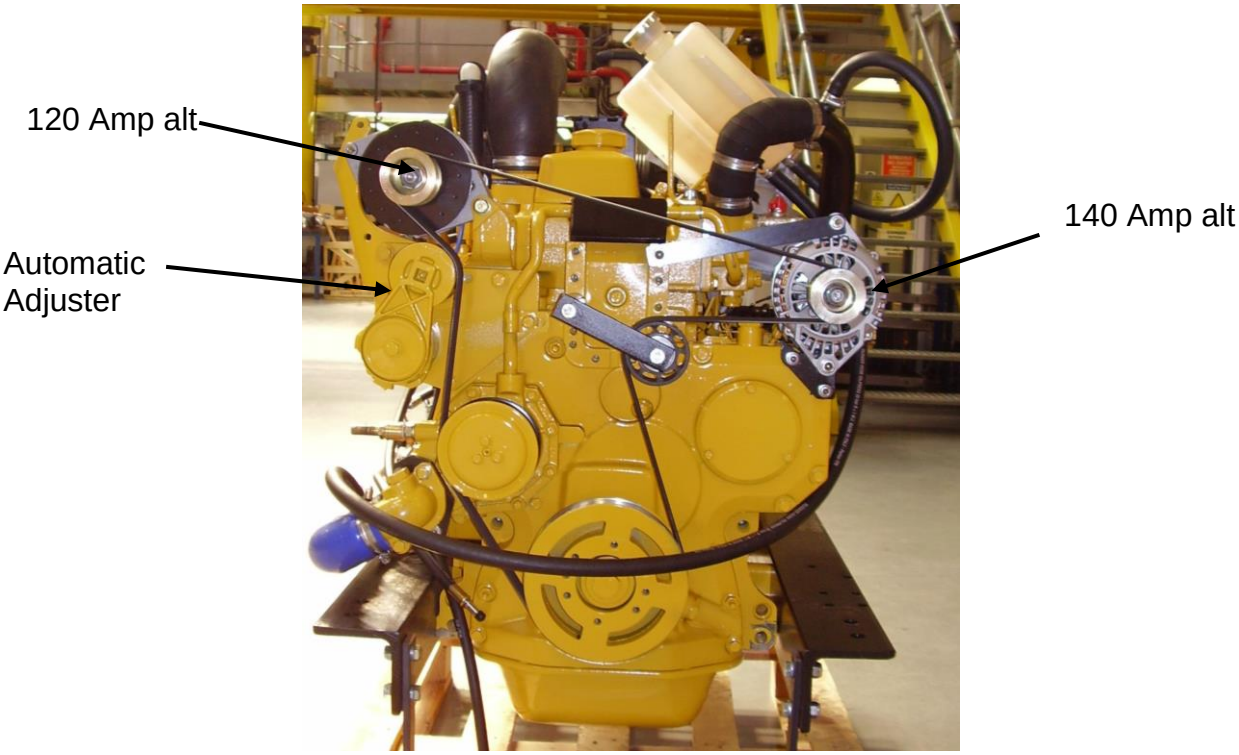
Shire 70:

- Ensure that you have the correct belts before starting this procedure. Some customers may have engines fitted with non-standard optional alternators, which may not have the standard belts listed. Make a note of the belt sizes on delivery.
- Loosen the top adjuster bolts, and the lower mounting pivot nut and bolt.
- Push the alternator towards the engine to loosen the belt.
- Remove the belt.

- Hold the belt in position over the top alternator pulley, rotate the engine, if required, by hand, to guide the new belt into the “vee”.
- Re - tension the belt as above.

Shire 90:

- Insert a ½” drive ‘T’ bar into the highlighted square area of the automatic tensioner.
- Pull lever bar in anti-clockwise direction to slacken off the belt.
- Remove belt.
- Pull lever bar anti-clockwise again and re-fit belt.
- Check that the belt is fitted correctly into all of the pulley grooves.
- Note the tensioner brace bar will need to be removed before the old belt can be removed, and then replaced after the new belt has been fitted.



13. Deluxe Panel Maintenance

CAUTION:

REMOVE THE IGNITION KEY & TURN BATTERY ISOLATOR SWITCHES OFF BEFORE WORKING IN THE ENGINE COMPARTMENT.

Warning Light Bulb replacement

Release the panel from its mounting

1. To replace an illumination bulb.
    a. The bulbs are accessible from the rear of the panel. This can be gently removed by pulling off the wires, unscrewing the nut and pulling out the bulb housing from the panel.
2. To replace any gauge
    a. The gauges are accessible from rear of the panel. Unplug the wire connectors, unscrew and pull the gauge out from the panel.
3. Periodically squirt a lubricant in to the key switch slot with key removed (a lubricant such as WD40 – with silicon, other lubricants are available). Then with the battery master switch turned off operate key switch a couple of times to ensure lubricant works in to mechanism.

SECTION 6 - Service Parts

Shire 70

Spare Part Description	Part No.
Primary Fuel Filter Element	RDG 9188346
Secondary Fuel Filter Element	119802-55800
50A Alternator Belt	GB/T12732-1996
240A Alternator Belt	RDG 0047511
Air Filter Element	RDG 6613
Oil Filter	129150 - 35153
Engine Oil	RDG6110 (5 litre container)
3.5 & 5 kW Alternator Belt (Option)	RDG 0047600
8 kW Alternator Belt (Option)	RDG 0047601

Shire 90

Spare Part Description	Part No.
Primary Fuel Filter Element	RDG 9188346
Secondary Fuel Filter Element	RE62418
Inner Air Filter Element	RDG 6651
Outer Air Filter Element	RDG 6650
Oil Filter	RE504836
Alternator Main Drive Belt	RDG 0047272
3.5 kW Alternator Belt (Option)	RDG 0047581
5 kW Alternator Belt (Option)	RDG 6816
8 kW Alternator Belt (Option)	RDG 6830

Fuses

- The electrical system is fitted with three or four blade type fuses,
- Dash Panel supply 15 amp (RDG3245)
- Engine stop control system 40 amp (RDG3246)
- Engine start control system 20 amp (RDG1152)
- Dash panel live 15 amp (RDG3245) Shire 70 only

Contact a Shire or Yanmar Marine dealer for Spare Parts (see Section 9 – Dealer List).

SECTION 7 - Service Schedule

Specifications and Capacities

	Capacity Shire 70	Capacity Shire 90
Engine, including filter	10.5 Litres	8.5 Litres
PRM260 gearbox including cooler	2.2 Litres	2.2 Litres
PRM500 gearbox including cooler	3.0 Litres	3.0 Litres

Shire 70 – Engine and Gearbox Oil: SAE 15W 40 API Class CD.

Shire 90 – Engine and Gearbox Oil: As below.

Coolant: 50% Clean Water + 50% Ethylene Glycol Antifreeze.(Shire 70)

John Deere Coolguard is supplied ready mixed (Shire 90).

	Check	Change	Notes
Engine Oil & Filter	Daily (level)	Every 250 hours Or 12 Months *	First change after 100 hours
Gearbox Oil	Daily (level)	Every 250 hours Or 12 Months *	First change after 25 hours
Coolant Level	Daily (level)	Every 24 months	
Diesel Fuel Filter		Every 500 hours Or 12 Months *	Drain water every 50 hours, or monthly #
Air Filter Element	100 Hours	24 Months / 500 hours * sooner if required	
Shire 90 Inner Air Filter Element	200 Hours	36 Months / 500 hours * sooner if required	
Drive Belts	Daily	As required	Adjust as necessary
Key Switch	Lubricate	Every 150 hours Or 12 Months *	As per Instructions section 12, Dash Panel Maintenance

* Whichever comes first.

If large quantities of water are found in fuel when filter drained, increase frequency of draining.

Refer to the Yanmar Engine Manual (Shire 70) or the John Deere Engine Manual (Shire 90) for further information.

Engine idle speed for both Yanmar and John Deere units is 850 rpm.

- Engine oil for Shire 70 is available from Barrus in convenient 5 litre containers. Part number RDG6110. NB: This is **not** a suitable grade for Shire 90.
- Engine oil for Shire 90 is also available from Barrus part number VC83070-020**.**

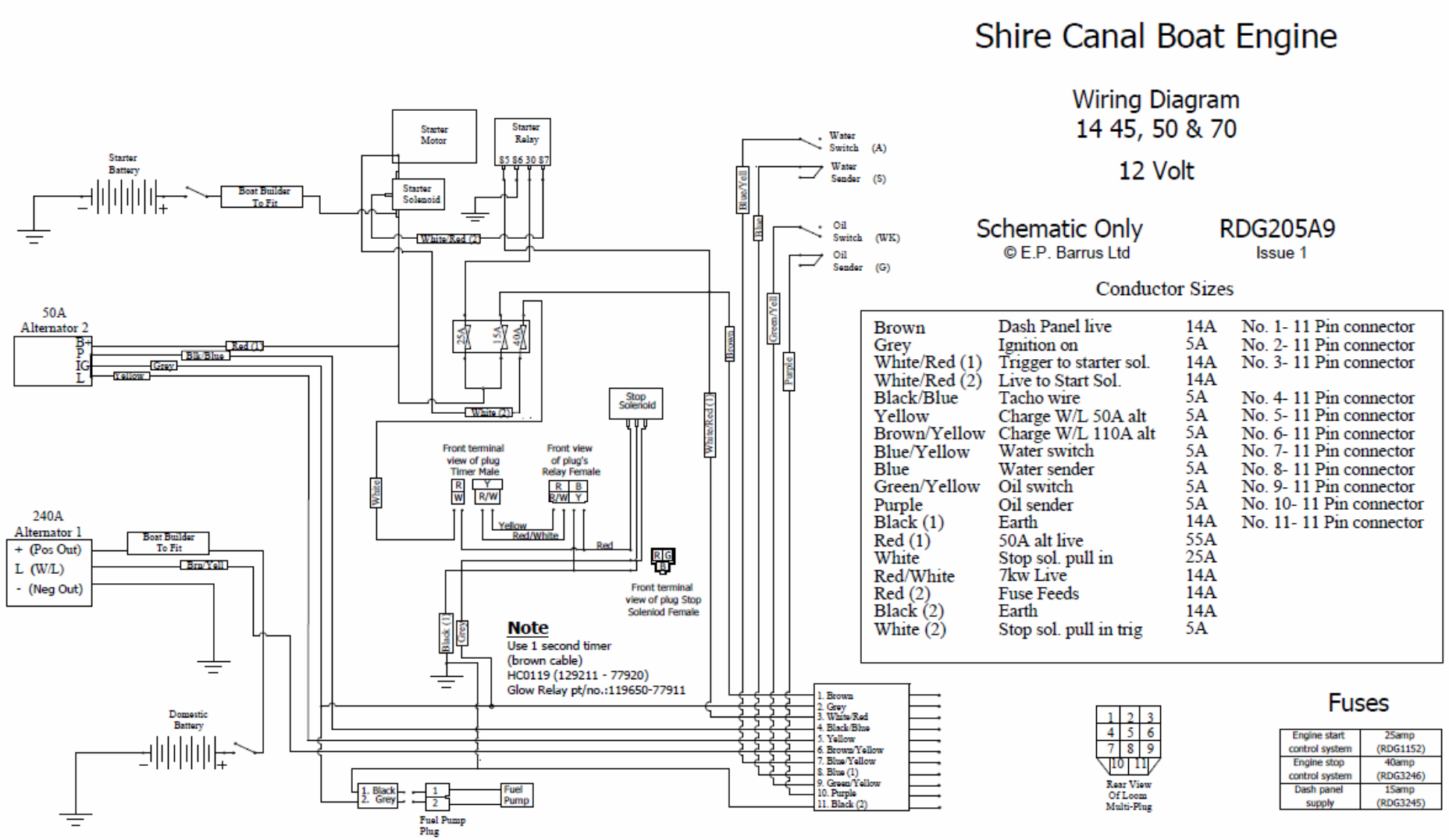
Failure to use John Deere approved oils and coolants will invalidate any warranty.

John Deere “Cool guard” (engine coolant) is also available from Barrus part number EPH76215-020.

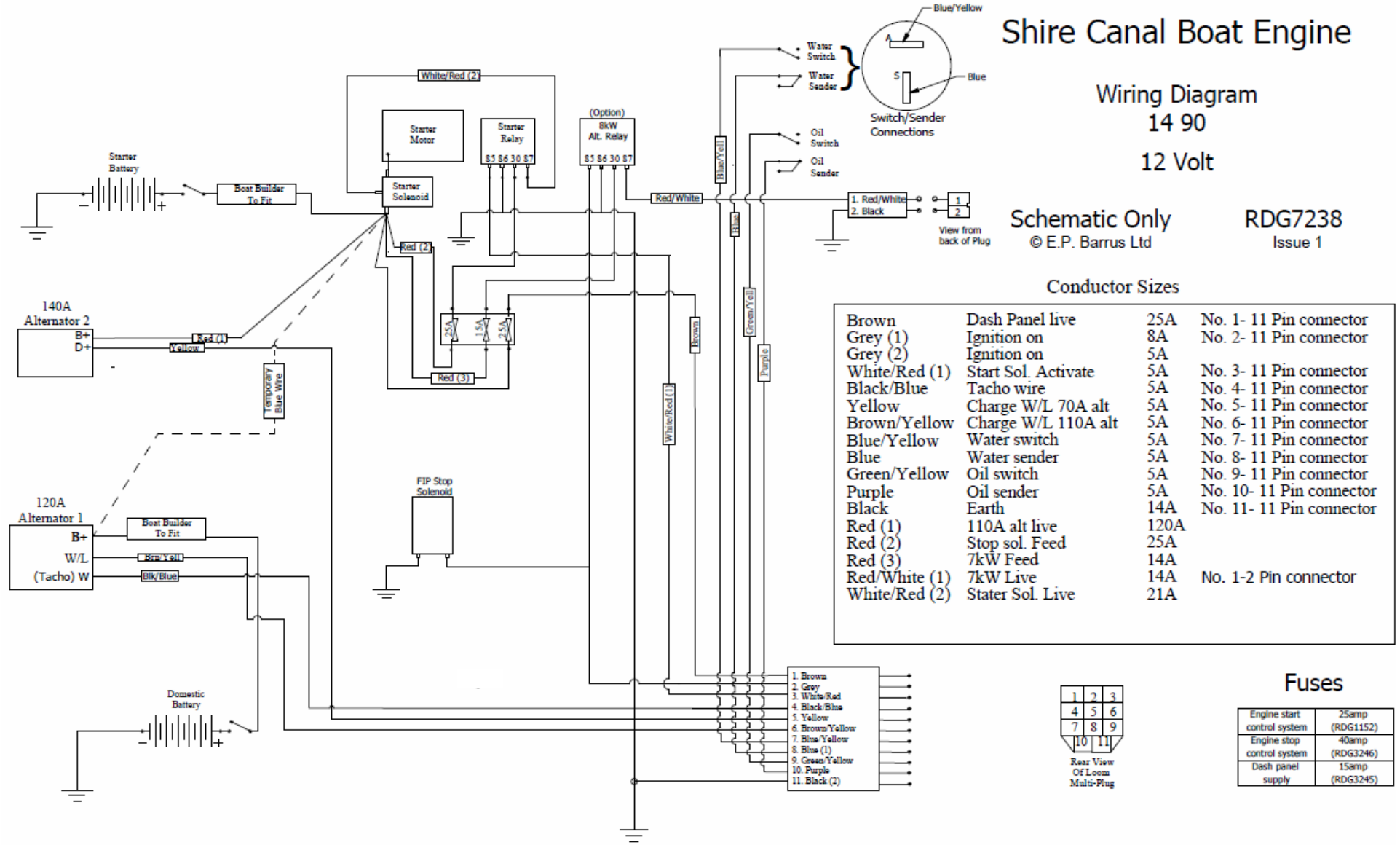
Diesel fuel additive is available from your Shanks or Shire dealer in a handy 375 ml container, part number RDG80210219.

SECTION 8 - Wiring Diagrams

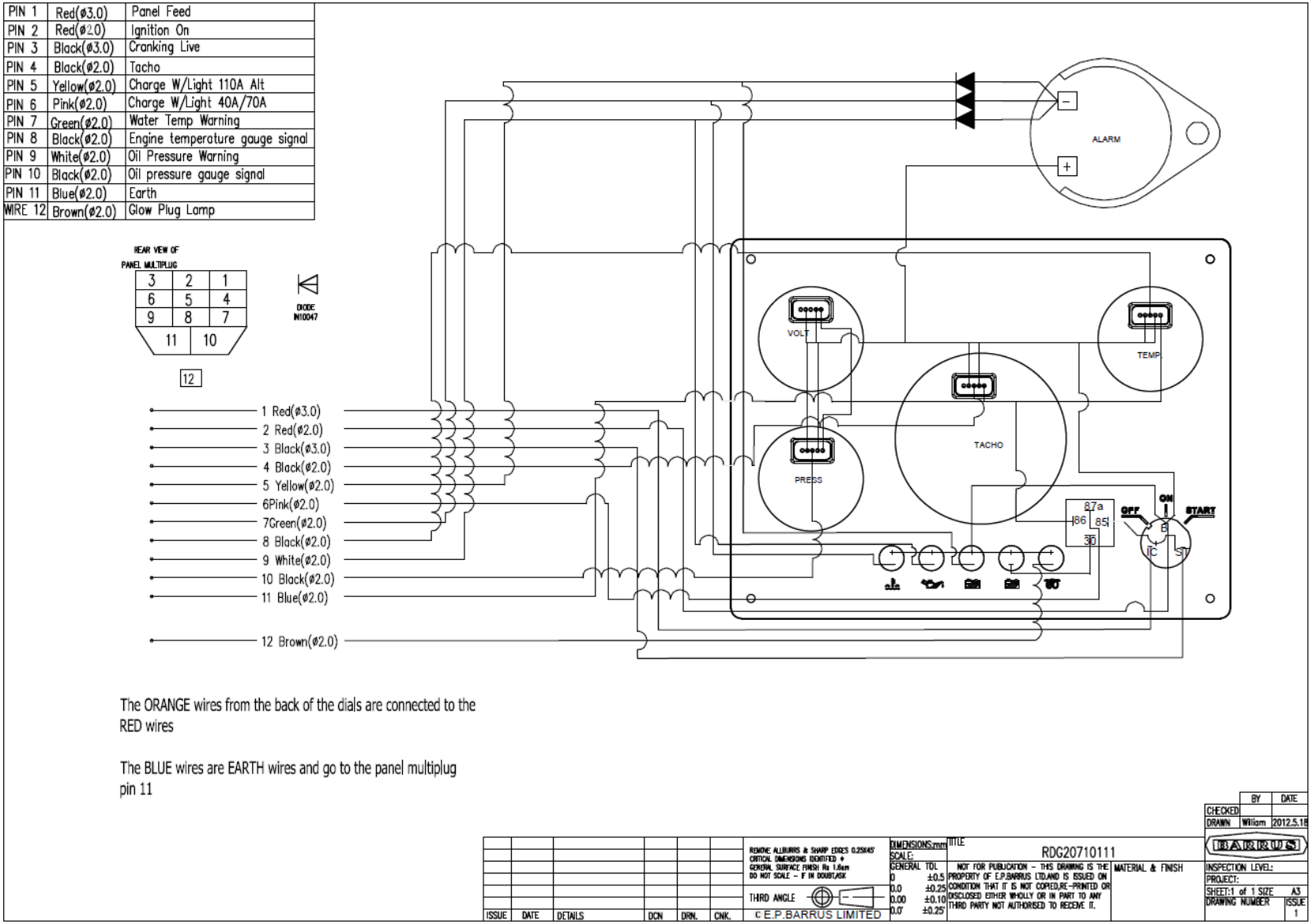
1. Engine Wiring Diagram, Shire 70



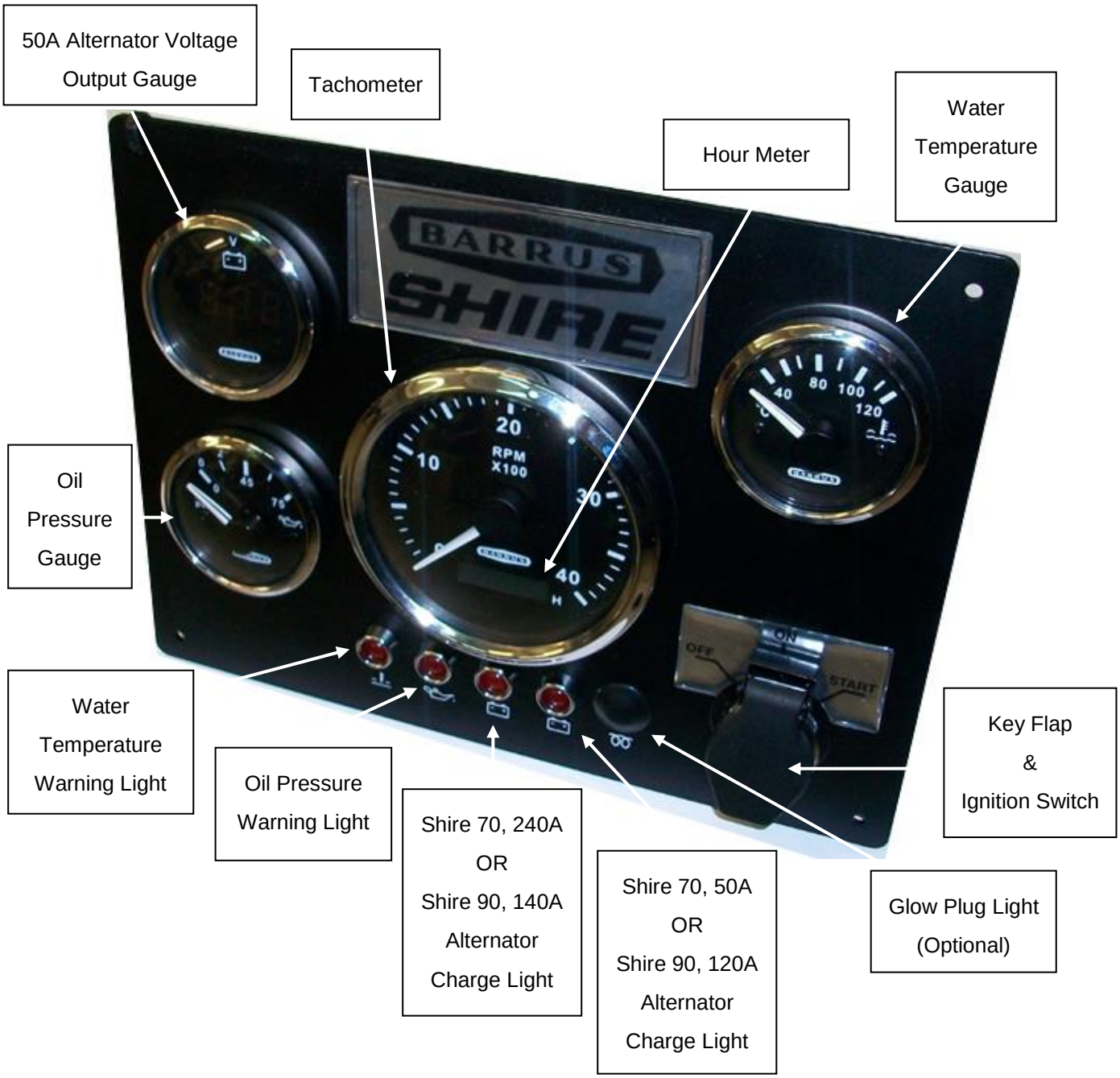
2. Engine Wiring Diagram, Shire 90 (12 Volt)



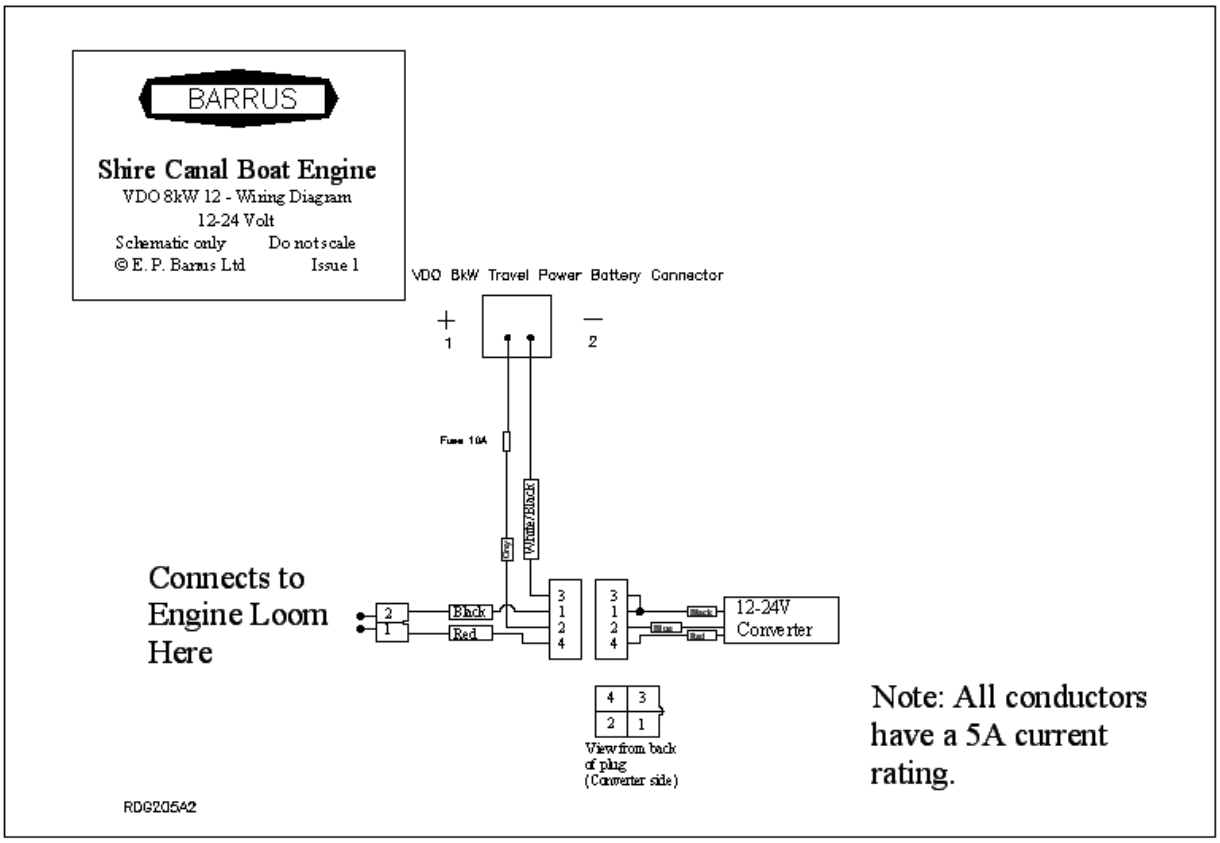
3. Deluxe Panel Wiring Diagram (12 Volt)



4. RDG20710111 - Deluxe Instrument Panel



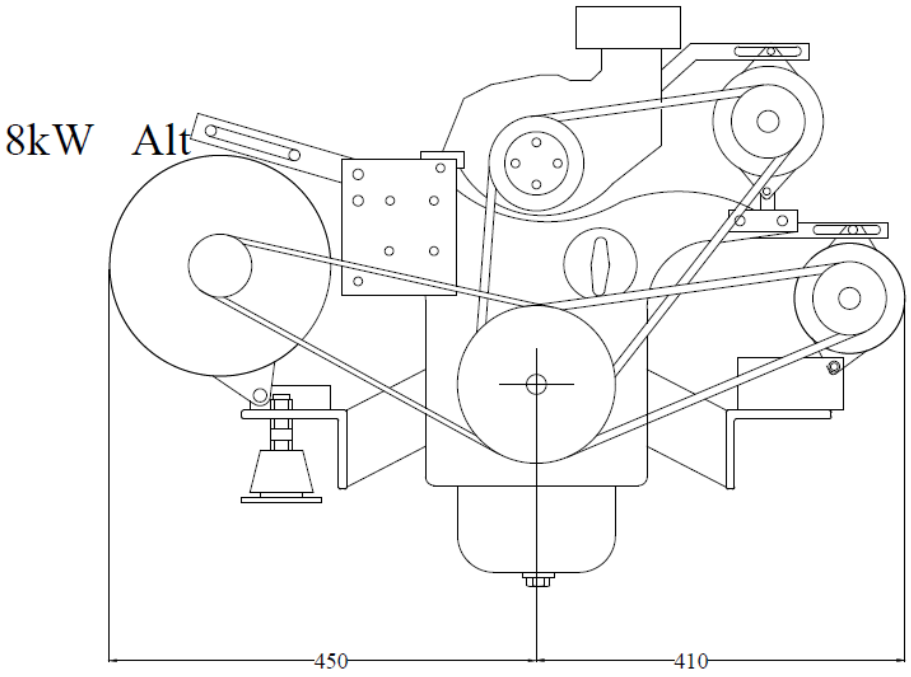
5. VDO 8kW Wiring Diagram and overall dimensions



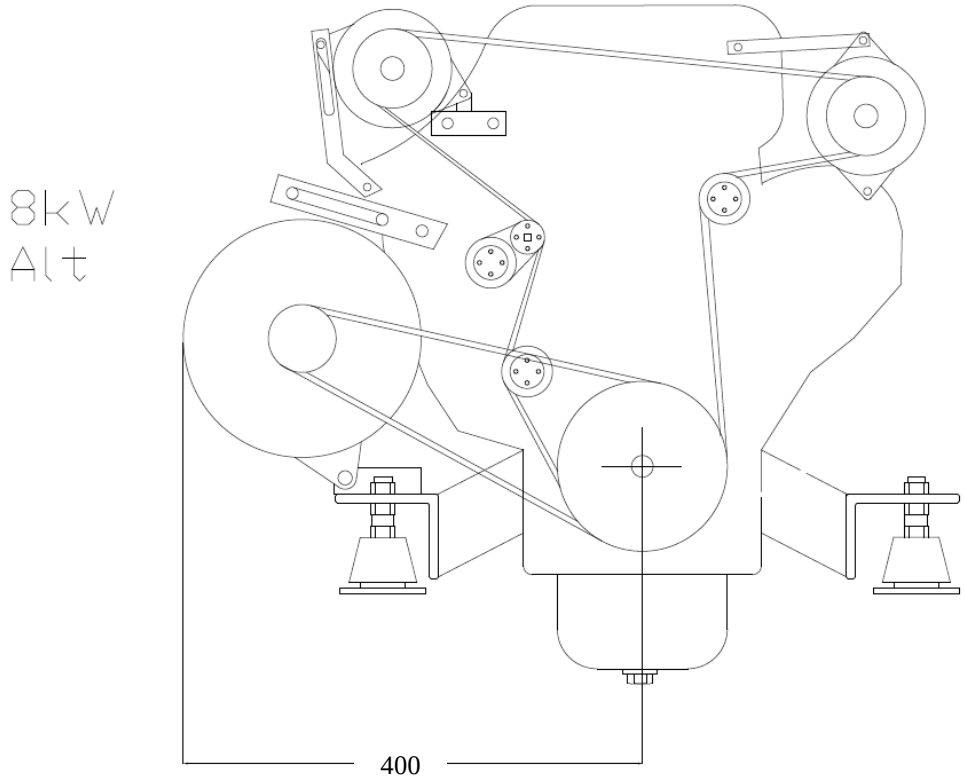
The above diagram shows 12/24 Volt part of the wiring for the 8kW VDO Travel Power system. For the 230 Volt wiring diagram please refer to the VDO Travel Power manual.

WARNING: A QUALIFIED ELECTRICIAN SHOULD INSTALL ALL HIGH VOLTAGE WIRING SYSTEMS.

Shire 70



Front view of alternator positions relative to crankshaft centre.



Front view of alternator set-up, all dimensions taken from crankshaft centreline

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6. VDO 5kW Travel Power System

Shire 90

- This unit is excited by a 12v ignition operated supply the travel power installer can wire to a convenient plug on the existing loom for this purpose.
- When the 12v relay (RDG1396) is placed into the spare relay holder on the engine the black two way plug is energised when the ignition is turned on.
- The wire colours in the plug are: Black - Earth
  Red - Live

Shire 70

- Wiring and a relay have to added to the engine loom to allow this to be supplied with power.

SECTION 9 - Dealer List

Area	Company	Telephone	Email
BERKSHIRE	Bluenine Marine	01189 406482	bluenine@marine7957.fsnet.co.uk
	Aquatec Marine	07880793686	mark@aquatecmarine.com
	Driveline Marine	0118 942 3877	tam@drivelinemarine.com
CHESHIRE	Nantwich Canal Centre	01270 625122	info@nantwichcc.com
CORNWALL	Black Dog Marine	01503 265898	blackdogmarine@googlemail.com
	Cellar Marine	01326 280214	john@cellarmarine.com
DERBYSHIRE	Midland Canal Centre	01283 701933	info@mccboats.co.uk
DEVON	Sleeman & Hawkin Ltd	01626 778266	keith@sleeman-hawkin.co.uk
ESSEX	French Marine Motors Ltd	01206 305233	chris@frenchmarine.com
	French Marine Motors Ltd	01255 850303	info@frenchmarine.com
HAMPSHIRE	Marine Power Ltd	0238 0403918	info@marine-power.co.uk
HERTFORDSHIRE	P & S Marine	01923 248372	(no email contact)
LEICESTERSHIRE	Foxton Boat Services Ltd	01162 792285	tony@foxton-boats.freeserve.co.uk
NORFOLK	French Marine Motors Ltd	01603 722079	info@frenchmarine.com
NORTHAMPTON	Grand Junction Boat Co.	01604 858043	grandjunco@talk21.com
NOTTINGHAM	Farndon Marina	01636 705483	info@farndonmarina.co.uk
STAFFORDSHIRE	JD Boat Services Ltd	01902 791811	jdboats@btinternet.com
	Stone Boatbuilding Company	01785 812688	sales@stonebuilding.co.uk
	Streethay Warf	01543 414770	pat@streethaywarf.freeserve.co.uk
WARWICKSHIRE	Barry Hawkins Narrowboats	01827 711762	boats@hawkinsyard.freeserve.co.uk
	Onboard Energy	02476 393333	sales@onboardenergy.com
	Valley Boat Services Ltd	07990528123	enquiries@valleycruises.co.uk
WEST MIDLANDS	Stephen Goldsbrough Boats	01564 778210	andy@sgboats.com
WORCESTERSHIRE	J L Pinder & Son	01527 876438	sales@jlpinderandsons.co.uk
	Starline Narrowboats	01684 874774	narrowboats@starline.demon.co.uk
YORKSHIRE	Rodley Boat Centre	01132 576132	John.snowdenz@ntlworld.com
MONMOUTHSHIRE	Castle Narrowboats	01873 830001	castlenarrowboats@btinternet.com
EIRE	Dun Laoghaire Marine Services	00353 12104776	info@dlms.ie
EIRE	O'Sullivans Marine	003536 67124524	brian@sulliansmarine.com

SHIRE®

SERVICE RECORD CARD

Model:.....

Engine No:.....

EPB Stamp **Actual Hours:** PDI **Signed:**	**Dealer Stamp** **Actual Hours:** 1st **Signed:**
Dealer Stamp **Actual Hours:** 2nd **Signed:**	**Dealer Stamp** **Actual Hours:** 3rd **Signed:**
Dealer Stamp **Actual Hours:** 4th **Signed:**	**Dealer Stamp** **Actual Hours:** 5th **Signed:**
Dealer Stamp **Actual Hours:** 6th **Signed:**	**Dealer Stamp** **Actual Hours:** 7th **Signed:**

Please refer to Owners Manual for service intervals