SHIRE WORK BOAT MANUAL

SHIRE 14 85 WB

SHIRE 14 130 WB

ISSUE 10

Please read in conjunction with
John Deere Operational Manual
&
PRM Gearbox Manual

optional:
VDO Travel Power Manual

Note there may be several optional extras, or alternative components, that might be fitted to an engine that are not shown in this book.

Enter your engine identification details in the spaces provided above.

E. P. BARRUS LIMITED, Launton Road, Bicester, Oxfordshire. OX26 4UR

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 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 gearboxes are covered by a two (2) year warranty.

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.

The Warranty will only apply if the following have been carried out:
1/ The Installation Check List in the Installation Section has been fully completed.
2/ The boat builder or engine installer has completed the Boat Builder Section on the Service Record Card (located at the back of this manual) regarding hand over and commissioning of boat.

3/ The registration form has been completed and returned to E.P Barrus.

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.

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.

Damage due to rust or corrosion, submersion, or unreasonable exposure to the environment, such as exposure to high humidity, rain fall, or seawater, or conditions resulting in the freezing of cooling water are also not covered.

Dirty Fuel:

Engines that do not operate correctly as a consequence of using fuel that is not of the correct grade, or is contaminated with either dirt, water or biological growth, is not covered by warranty. Also, any replacement parts that are required as a consequence of using incorrect or contaminated fuel are also not covered by warranty. Engine Fuel Injection equipment is only covered by warranty for the period of three years.

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 or any other legislative requirements 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.

Ensure that all installations and boat alterations comply with any appropriate local, regional, national or international regulations. When installing new propulsion systems (that are not identical to the original ones) into existing craft, a new vessel Post Construction Assessment will be required, and carried out by an independent notified body.

2. Lifting

DANGER: CRUSH HAZARD!

NEVER STAND UNDER A HOISTED ENGINE. IF THE HOIST MECHANISM FAILS, THE ENGINE WILL FALL ON YOU, CAUSING SERIOUS INJURY OR DEATH.

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

WARNING:

SEVERE HAZARD! KEEP HANDS AND OTHER BODY PARTS AWAY FROM MOVING/ROTATING PARTS. WEAR TIGHT FITTING CLOTHING AND KEEP YOUR HAIR SHORT OR TIE BACK. REMOVE ALL JEWELLERY BEFORE COMMENCING WORK. CHECK BEFORE STARTING THE ENGINE THAT ANY TOOLS OR RAGS USED DURING MAINTENANCE HAVE BEEN REMOVED FROM THE AREA.

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

WARNING:

EXHAUST HAZARD! NEVER OPERATE ENGINE IN A BOATS ENGINE BAY WITHOUT PROPER VENTILATION. NEVER BLOCK VENTS OR OTHER MEANS OF VENTILATION. ALL COMBUSTION ENGINES CREATE CARBON MONOXIDE GAS DURING OPERATION. ACCUMULATION OF THIS GAS COULD CAUSE ILLNESS OR EVEN DEATH.

WARNING:

BURN HAZARD! WAIT UNTIL THE EXHAUST COOLS BEFORE YOU TOUCH IT.

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

DANGER:
EXPLOSIVE GASES
EXPLOSION HAZARD! NEVER SHORT OUT THE BATTERY TERMINALS, INCLUDING WHEN CHECKING THE REMAINING BATTERY CHARGE THIS WILL RESULT IN A SPARK AND MAY CAUSE AN EXPLOSION OR FIRE.

WARNING:
BURN HAZARD! BATTERIES CONTAIN SULPHURIC ACID. NEVER ALLOW BATTERY FLUID TO COME IN CONTACT WITH SKIN, EYES OR CLOTHING. SEVERE BURNS COULD RESULT. MAKE SURE THE CORRECT PERSONAL PROTECTION EQUIPMENT IS WORN.

- 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 manufacturer's 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:

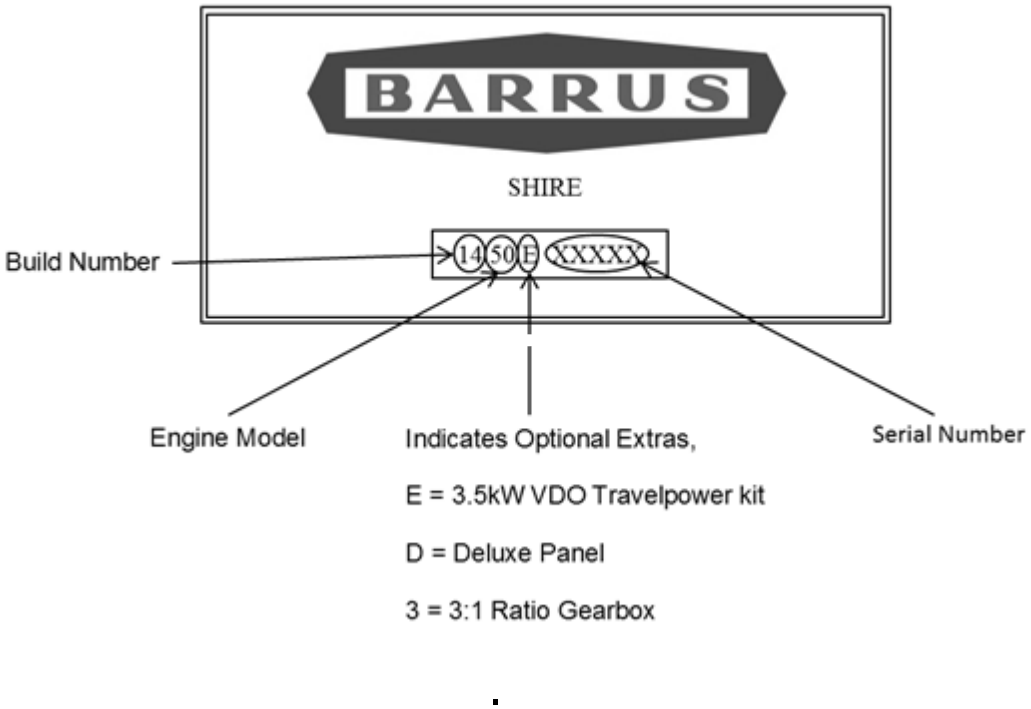


Figure 2-1: Engine Identification Badge

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 Service Parts.

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 midway to prevent flexing. They may be steel or stainless steel glassed into a GRP hull.

3. Pressurised Water Header Tank

- The pressurised header tank should be mounted higher than the level of the engine and no more than 1 metre and not less than 300mm from the engine, to prevent cooling system air locks.

- Shire 14 85 WB - 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. The hoses **MUST** be connected correctly. A constant rise on pipework is required to prevent air locks

  See Figures 3-1 and 3-2

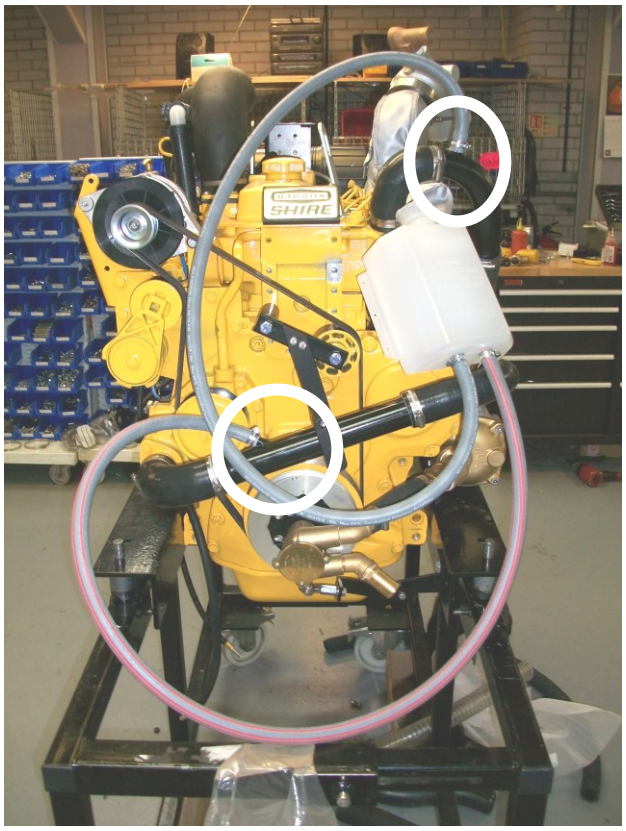


Figure 3-1: Shire 14 85 WB Header Tank Connections (Crank mounted pump)

Figure 3-2: Shire 14 85/130 WB Header Tank Connections (Belt Driven Pump)

4. Shaft Connection and Propeller selection

- Some type of flexible coupling must be used to connect the gearbox output flange to the propeller shaft flange. Various coupling flanges are widely available to assist with this.
- Please note, underperforming engines will not be covered under warranty if the cause of the poor performance is found to be the use of an inappropriate propeller.

5. 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, see general arrangement drawings.
- 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 E Kit/VDO TravelPower engines, and may result in a very slight increase in vibration. The hole positions are show in **Figure 3-6**.
- The Anti Vibration mounts have a small number stamped into them, a Shire 14 85 has “55” (Shore Hardness), and a Shire 14 130 has “65” (Shore Hardness). For Part Numbers, see the Service Parts section.

6. Engine Mount Installation

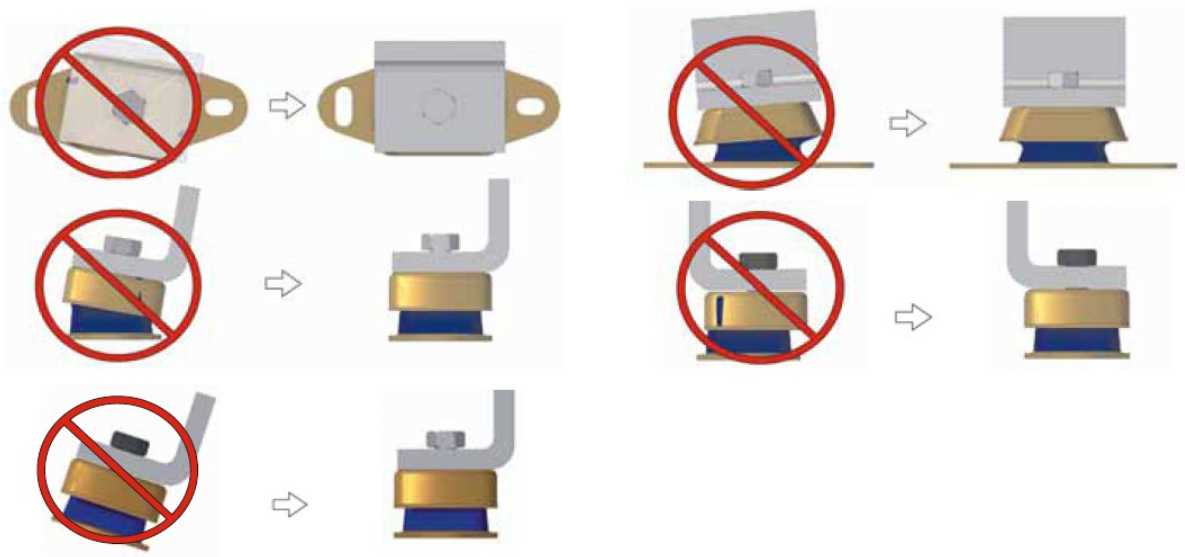


Figure 3-3: Correct Anti-Vibration Mount Installation

- 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.

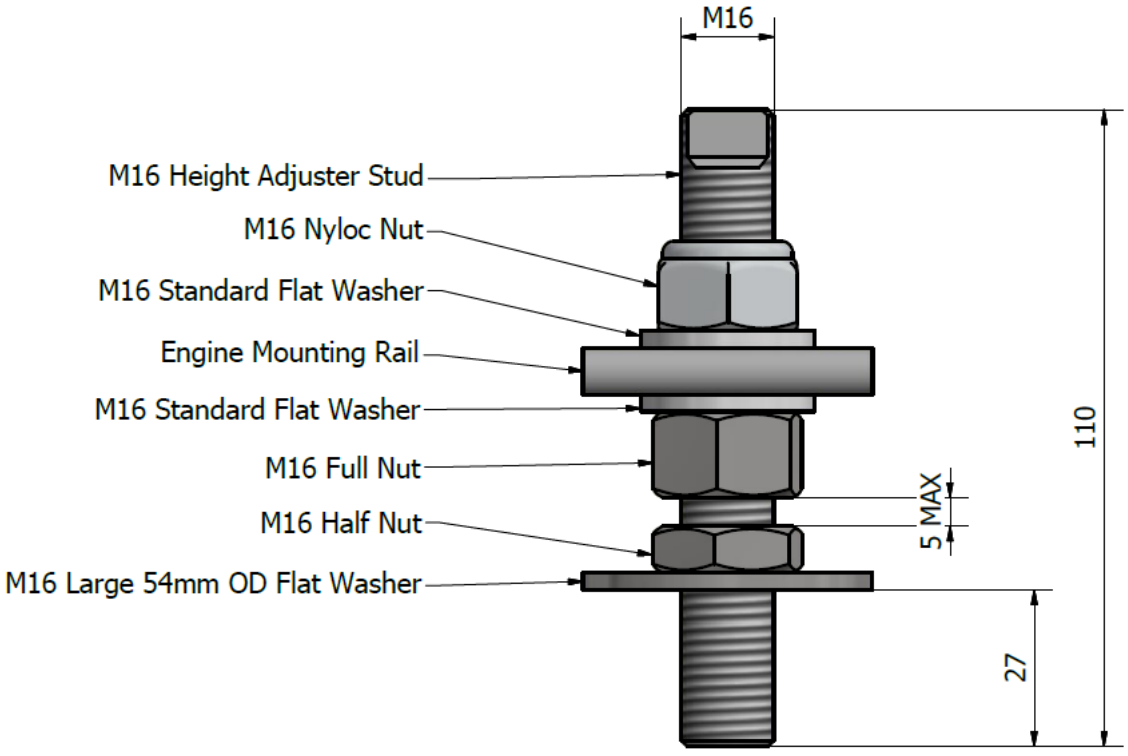


Figure 3-4: Correct Anti-Vibration Mount Installation

Alternative mounting position if engine compartment space is restricted.

Normal mounting position.

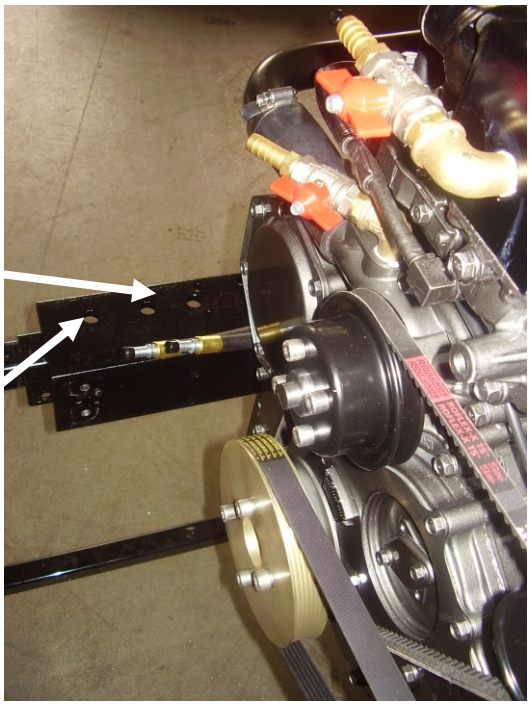


Figure 3-5: Anti-Vibration Mount Installation Points

7. 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.

Some types of flexible shaft couplings require the input and output to be misaligned, check with the coupling manufacturer's installation instructions.

8. Engine Inclination

- The engine installation angle is the angle of the crankshaft centre to the water line (Figure below).
- The Propulsion Efficiency decreases as the engine installation angle increases
- The **maximum** engine installation angle is 15°.

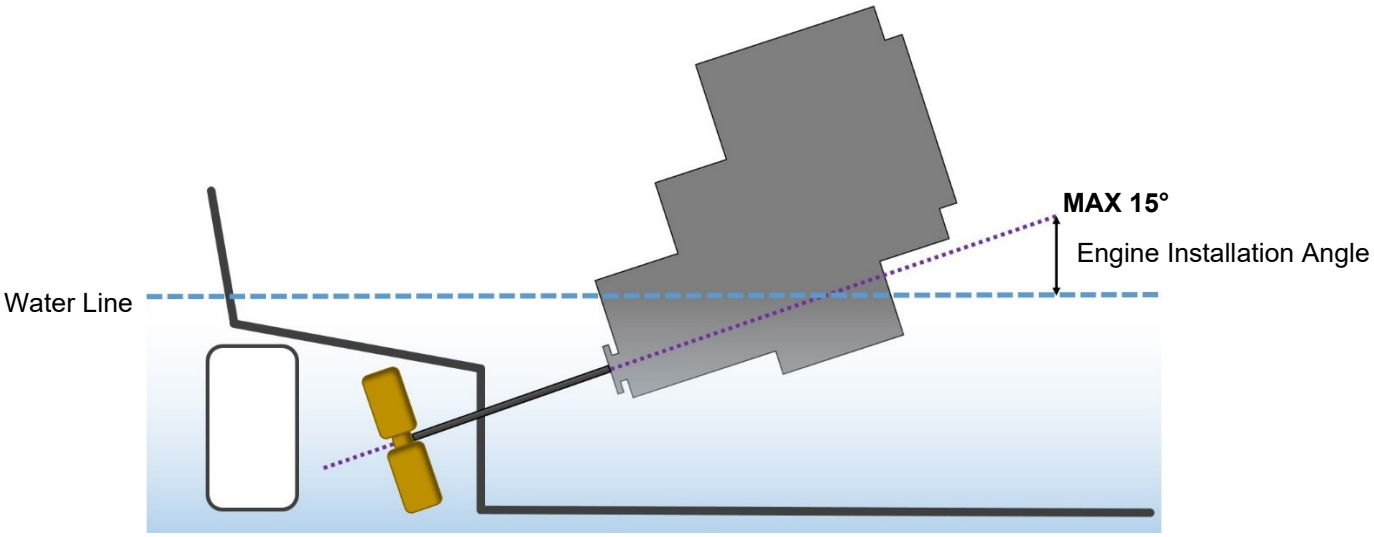


Figure 3-6: Maximum Engine Installation Angle

9. Electrics

WARNING:

The blue link wire must be removed when the domestic battery positive terminal lead has been connected to the terminal post.

Do not run the engine without this wire in place or without the domestic battery positive lead connected otherwise alternator damage will occur.

If the engine is going to run for more than 1 hour with the blue link wire in place, remove domestic alternator drive belt to prevent alternator damage.

- If an optional larger output alternator, or 24V equipment, is fitted to either a new engine, or fitted to an old engine as an upgrade, ensure that all cables, master switches, terminals, split charge relays etc are of sufficient capacity for the increased current/voltage.
- 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.

Single Alternators

- On engines fitted with single alternators, connect the main positive battery cable to the starter motor solenoid terminal.
- 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.

Twin Alternators

- Shire 14 85/130WB - Connect the domestic battery positive cable to the 120A alternator B+ terminal (see wiring diagram). This ensures that the 140A charges the start battery.
- Use 50mm^2 cable for 240A alternator and 40mm^2 cable for 140A
- Both negative battery terminals can be connected to a common earth point.

10. Electrical Options

- If the engine is fitted with the optional 230V 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 other optional additional 12v or 24v alternators. A 24 V Alternator 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.
- If an optional 24V equipment is fitted to either a new engine, or fitted to an old engine as an upgrade, ensure that all cables, master switches, terminals, split charge relays etc are of sufficient capacity for the increased current/voltage.

11. Belt Replacement

CAUTION:

REMOVE THE IGNITION KEY BEFORE WORKING IN ENGINE COMPARTMENT.

- Ensure that you have the correct new belt prior to starting this procedure. 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 seawater pump (may not be required, depending on seawater pump option fitted).
- 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 pulley “V”s check it is correctly seated in the pulley.
- Replace seawater pump (if required).
- Re-tension the belt as above.

Note: Some engines maybe fitted with a side mounted belt driven seawater pump.
A similar belt tightening procedure will apply for this.

12. Engine Oil

WARNING:

BURN HAZARD! WAIT UNTIL THE ENGINE COOLS BEFORE YOU DRAIN THE ENGINE OIL. HOT ENGINE OIL MAY SPLASH AND BURN YOU.

WARNING:

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

- 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 14 85/130 WB - use John Deere engine oil, part number VC50002X020 “Plus 50 II Oil (20 Litres)”, or alternatively VC83070-020 “Torq-Gard Supreme (20 Litres)”, available from Barrus.
- Avoid mixing different types of oil as the additives may interfere with each other.

13. Fuel

WARNING:
DIESEL FUEL IS FLAMMABLE AND EXPLOSIVE UNDER CERTAIN CONDITIONS.

WARNING:
DIESEL FUEL IS HARMFUL TO SKIN. MAKE SURE THE RELEVANT PERSONAL PROTECTION EQUIPMENT IS WORN.

- Ensure the main fuel tank is clear of dirt & water.
- A separate water trap must be fitted to all engine installations. (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 14 85/130 WB – 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 14 85/130 WB, 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.

14. Coolant

WARNING:

SCALD HAZARD! NEVER REMOVE THE COOLANT BOTTLE CAP IF THE ENGINE IS HOT. STEAM AND HOT COOLANT WILL SPURT OUT AND CAUSE INJURY. TIGHTEN THE CAP SECURELY AFTER BEING REMOVED. STEAM CAN SPURT OUT DURING ENGINE OPERATION IF THE CAP IS LOOSE.

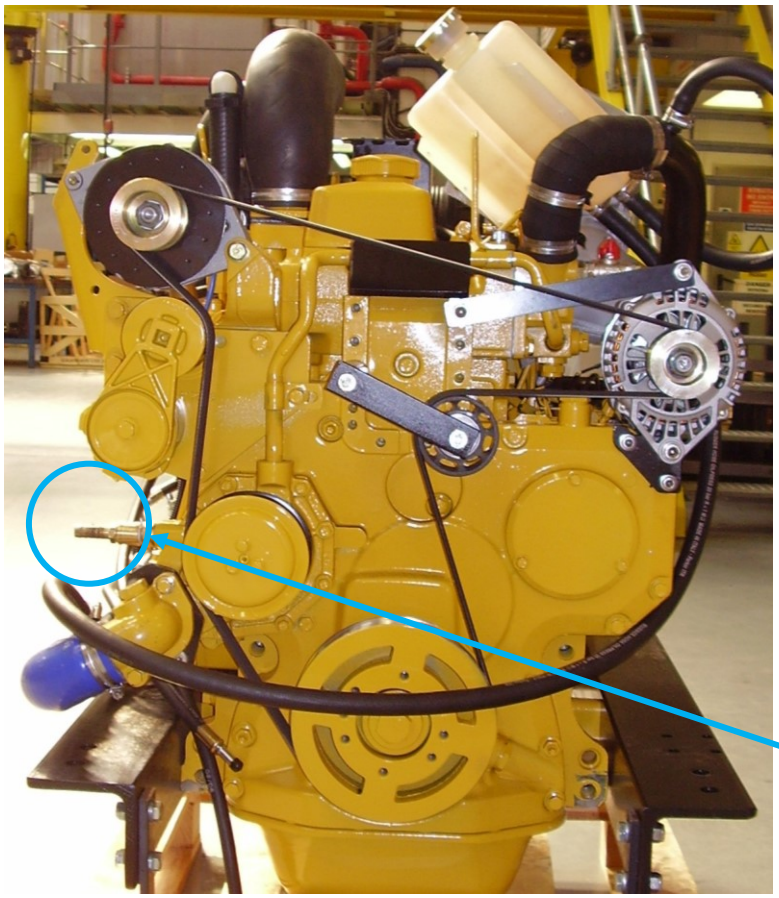
WARNING:

BURN HAZARD! WAIT UNTIL THE ENGINE COOLS BEFORE YOU DRAIN THE ENGINE COOLANT. HOT ENGINE COOLANT MAY SPLASH AND BURN YOU.

- John Deere (Shire 14 85/130 WB) recommends that CoolGuard II be used, part number VC76215-020, available from Barrus**.**
- For more information, see the John Deere Operators Manual.
- Do not mix Ethylene Glycol and Propylene Coolants.
- To fill the cooling system for the first time, add coolant to the engine through the white plastic expansion bottle.
- Open the calorifier taps (where fitted) to fill the calorifier system and displace air.
- Do not use antifreeze that contains sealing additives or cooling system sealing additives.
- Do not use coolants that contain nitrites.

15. Calorifier (optional)

- 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:



Optional:
Calorifier Outlet (located on rear of the Cylinder Head)

Calorifier inlet

Figure 3-7: Shire 85 WB Calorifier Connections

16. 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, achieves full travel, 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.

17. Domestic Battery Bank (with optional Twin Alternator Engines)

DANGER: EXPLOSION HAZARD! NEVER SHORT OUT THE BATTERY TERMINALS, INCLUDING WHEN CHECKING THE REMAINING BATTERY CHARGE THIS WILL RESULT IN A SPARK AND MAY CAUSE AN EXPLOSION OR FIRE.

WARNING: BURN HAZARD!BATTERIES CONTAIN SULPHURIC ACID. NEVER ALLOW BATTERY FLUID TO COME IN CONTACT WITH SKIN, EYES OR CLOTHING. SEVERE BURNS COULD RESULT. MAKE SURE THE CORRECT PERSONAL PROTECTION EQUIPMENT IS WORN.

- 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; 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 charge alternator maximum output current.
  - Hire fleet use; three and a half times domestic charge alternator maximum output current..

Example:

Hire fleet application fitted with 150A domestic charge alternator

3.5 X 150 = 525 Ampere/hour

18. Control Panel

CAUTION

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 120A (Shire 14 85/130) 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 control panel, tachometer or alternative alternator is fitted the tacho will require re-calibrating

Control Panel Calibration Procedure:

- Connect control 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). This 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.
- For the standard 12v 120Amp Actuator, the tacho code is 14.5.

Alternative or non-standard alternators will require calibrating and checking by trial 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.

19. Seawater Strainer

A bulkhead mounted seawater strainer or similar is not supplied with the engine, we recommend that one is fitted between the seawater inlet (seacock) and the sea water pump inlet. The size of the Inlet and connections are:

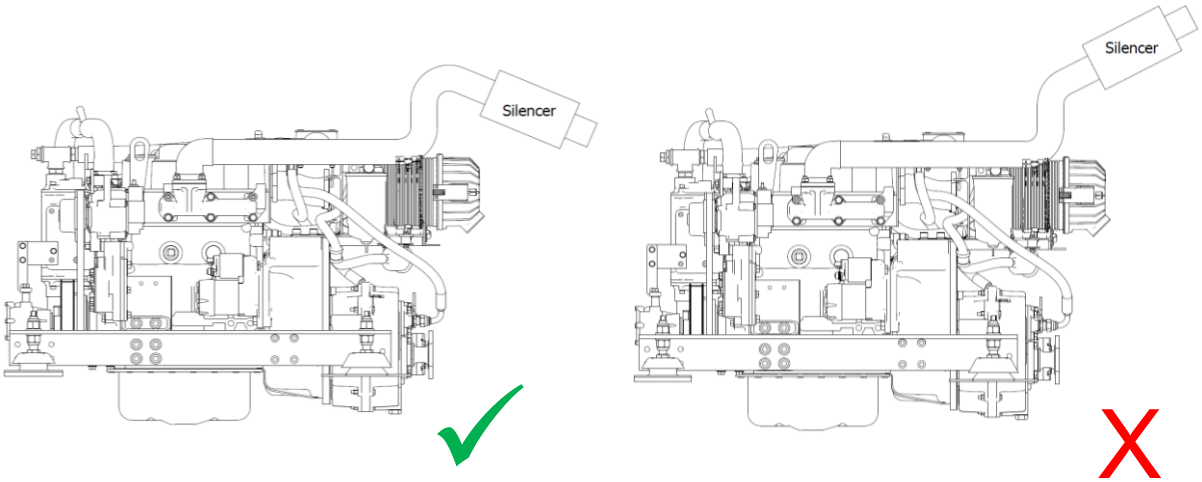
- Shire 14 85WB – 32mm (crank driven pump)
- Shire 14 85WB – 45mm (belt driven pump)
- Shire 14 130WB – 45mm (belt driven pump)

20. Exhaust System (Dry Exhaust)

WARNING:

EXHAUST HAZARD! NEVER OPERATE ENGINE WITHOUT PROPER VENTILATION. NEVER BLOCK VENTS OR OTHER MEANS OF VENTILATION. ALL COMBUSTION ENGINES CREATE CARBON MONOXIDE GAS DURING OPERATION. ACCUMULATION OF THIS GAS COULD CAUSE ILLNESS OR EVEN DEATH.

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

Work Boat with Water Injected Exhaust:

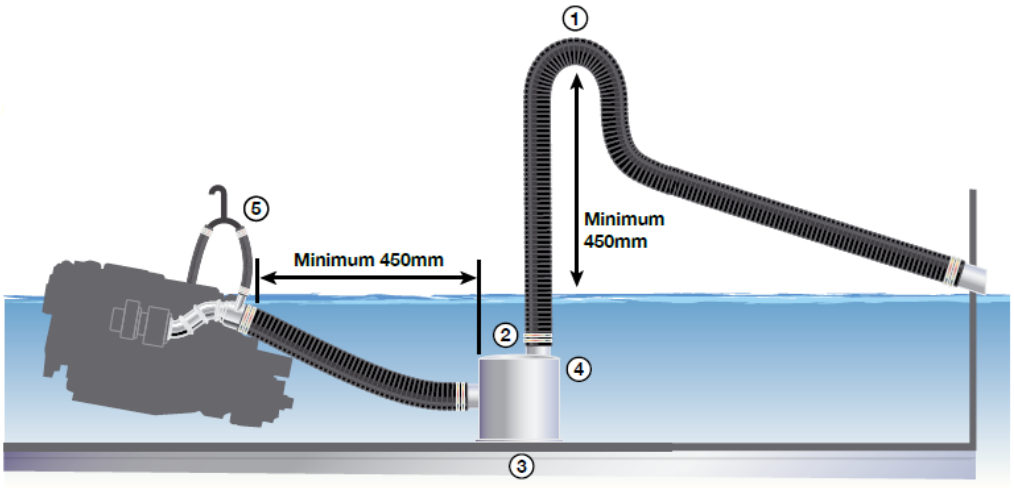
If the engine is installed low down in the boat, below the outside water level, a system such as a Lift Silencer with a siphon break system, must be used to prevent sea water from flowing back down the exhaust and into the engine.

Ideal internal exhaust hose diameter is 100mm (4”) or a minimum of 75mm (3”) ID if space is a problem, but this smaller diameter may cause excessive back pressure in installations with a very complex route.

The maximum engine exhaust back pressure is 7.5 kPa (1.08 psi) initially for the 4045 (Shire 85) and 6068 (Shire 130) Blocks.

Lift Silencer

The correct installation of the lift silencer is vital to safety, and to avoid back flooding of the engine. Error! Reference source not found. shows how to install the lift silencer correctly
(Note: Halyard (M&I) Limited have given Barrus permission to use the diagram).



Correct Installation of the Lift Silencer

1. The swan neck must reach at least 450mm (18”) above the waterline, when installed on hull centreline.
2. The top of the silencer should be at least 300mm (12”) below the water injection point.
3. The silencer must be installed as near as possible to the centreline of the hull, particularly where severe angles of heel are expected. The swan neck must be 450mm above heeled water line.
4. Remember that 15% of the volume of the exhaust hose may be water. The size of the silencer selected must be such that water draining into it will fit it by no more than one third.
5. A siphon break must be used.

 The silencer may only be used in a Water Injected marine exhaust system. The overall design of the system, and choice of components, will have a result on the back pressure in the exhaust which is vital to the performance and life of the engine. The back pressure falls within the manufacturers recommended range when using the optional exhaust system with the engine. **Barrus recommend that Halyard (M&I) Limited are used for the Lift Silencer, Siphon Break and other components. Contact Halyard (M&I) Limited for further information.**

The silencer must be drained before the boat is craned or transported and during the winter.
There must be at least 450mm distance between the water injection point and the position of the silencer to allow adequate cooling of the exhaust gases. Maximum temperature during continuous operation of the silencer is limited to 85 degrees centigrade. Normally in a well-designed system, the temperature of the silencer should be between 50-70 degrees centigrade. Such operation will result in longer exhaust life. Connections to the silencer should be made using suitable exhaust hose, which is type approved by Lloyds and DNV. Do not use oil or grease to lubricate hoses when installing, wetting the inside of the hoses with water will help them slip more easily over the silencer spigots. A minimum of 2 hose clips must be used. Securely tighten all hose clamps, but be careful not to overtighten.

The silencer should be positioned within 300mm of the centre line of the vessel, or to the engine on which it is installed. This is particularly important on sailing vessels where a substantial angle of heel can be encountered. On systems where the exhaust manifold is near or below the water line. A siphon break should be used to prevent the water flow continuing after the engine shut down.
In all installations the silencer should be at the lowest point if the entire exhaust system. The top of the silencer should be at least below the exhaust manifold outlet for the best performance. If a distance less than is allowed, the margin of safety for preventing reverse flow of water toward the manifold will decrease.

- **Siphon Breaker Fitting Instructions**

1. The unit must be positioned upright, well above waterline. The height above waterline will vary from vessel to vessel but will be between 150mm and 2 metres. Please seek guidance on this if you are unsure, or if you are not familiar with the correct way to incorporate a siphon breaker into your particular exhaust system.
2. The inverted “U” bend at the top must be connected to a hose draining into the bilge, or over the side of the vessel. In no circumstances must this drain into a sealed container, such as a bottle due to the risk of back siphoning. After fitting, run the engine and check the unions for leaks. Check again after 5 running hours.
3. The siphon break is equally suitable for use with a marine toilet water inlet.
4. The ½” unit may also be used with 5/8” systems. The 3/4” and 1” units may only be used with the correct hose.

- **Siphon Breaker Maintenance**
    1. On commercial vessels achieving in excess of 150 engine hours per year, the unit should have the small valve removed from the top and this should be thoroughly washed in warm soapy water to remove salt encrustation.
    2. On a pleasure vessel this should be done twice a year.
    3. On reassembly the engine should be run and the unit checked for leaks. The hose junctions should also be checked for leaks as part of the daily inspection procedure for sea cocks, water pipes, oil levels, etc.

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, when a hydraulic drive system or hydraulic bow thruster is used,

Or An additional separate skin tank of suitable capacity with separate water circulating pump will need to be fitted for a hydraulic drive transmission.

Oil coolers should be installed in the seawater cooling system after the engine, not before. Coolers that are installed before the engine will invalidate the engine warranty.

22. Engine Start Battery

For the required specification of the Engine Start Battery, please refer to **Section 10 – Technical Data.**

23. Installation Check list

	Please tick box ✔
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. Make sure all nuts are tight	
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 of antifreeze to water	
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 engine control panel, gauges and warning lights are all operational	
Run the engine for 20 minutes with the boat tied up and in gear (at ½ speed). Check for leaks and that all systems operate correctly	
Check & Set the Engine Idle Speed to 850-875 rpm	
Check for leaks	
Explain/Demonstrate daily/weekly/periodic maintenance checks	
Explain/Demonstrate off season storage and maintenance	
If Applicable: Travel Power 230v AC systems installed by qualified electrician and to BMEA code of practice for Electrical and Electronic installation in Boats: BS EN ISO 13297 (ac)	
Installer's signature	
Installer name/company	

SECTION 4 – Operation

NOTICE:
REFER TO THE JOHN DEERE MANUAL PRIOR TO STARTING THE ENGINE.

1. Starting The Engine For The First Time

- Ensure the start battery is fully charged and is of the correct specification.
- 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. Both battery master switches must be turned on. Failure to do so may damage the domestic alternator.
- 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 start battery is fully charged and is of the correct specification.
- Ensure the gearshift control is set to **neutral**, and that persons are clear of any moving parts and engine compartment
- Insert key.
- 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.
- Once started, check that sea water is coming out of the water cooled exhaust, outlet in the hull of the boat.
- 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. Refuelling

WARNING:
DIESEL FUEL IS FLAMMABLE AND EXPLOSIVE UNDER CERTAIN CONDITIONS.

WARNING:
DIESEL FUEL IS HARMFUL TO SKIN. MAKE SURE THE RELEVANT PERSONAL PROTECTION EQUIPMENT IS WORN.

NO SMOKING

- All Shire Boat Engines run on diesel fuel.
- Refer to the John Deere Operators Manual, particularly on use of John Deere fuel additives and detergents, and on the use of alternative fuels.
- Do not use E-Diesel (Diesel + Ethanol).
- 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 buildup of condensation and water in the tank.
- Turn off the Engine when refuelling.
- The use of renewable and alternative fuels that comply with the EN15940 standard is permitted.
- This refers to GTL (Gas to Liquid), BTL (Biomass to Liquid) and HVO (Hydrotreated Vegetable Oil) fuels.
- If an alternative fuel that does not comply with EN15940 is used, problems such as seizure of the fuel injection pump may occur due to deterioration of fuel lubricity. This will NOT be covered by warranty.
- Alternative fuels that comply with EN15940 have lower density and lower calorific values per unit capacity than those of ordinary diesel fuels, thus it is expected that the engine output will decrease.

5. Diesel Fuel Additive

The use of diesel fuel additive is strongly recommended on 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 500ml container, part number RDG80210219.

6. Exhaust Back Pressure

- Use 100 mm ID suitable machine flexible exhaust hose on both Shire 14 85 & 130 WB. Do not step down to a smaller size.
- The engine exhaust outlet must be at least 200mm (8”) above the outside seawater level of the hull. If not an exhaust high rise kit and/or lock box/Swan neck must be used to prevent sea water flowing back up the exhaust and causing engine damage.
- The maximum engine exhaust back pressure is 7.5 kPa (1.08 psi) initially for the 4045 (Shire 85) and 6068 (Shire 130) Blocks.

7. Shifting in and out of gear

- The engine should only be shifted in and out of gear when the engine is warm, and the idle speed is 850 rpm. If the engine is shifted in and out of gear at a higher speed, when the engine is cold, then gearbox damage will occur.

SECTION 5 - Service Procedure

NOTICE:
REFER TO THE JOHN DEERE MANUAL PRIOR TO CARRYING OUT ANY SERVICE OR MAINTENANCE WORK.

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.
- Add correct grade of oil, see **SECTION 7 - Service Schedule**.
- 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.

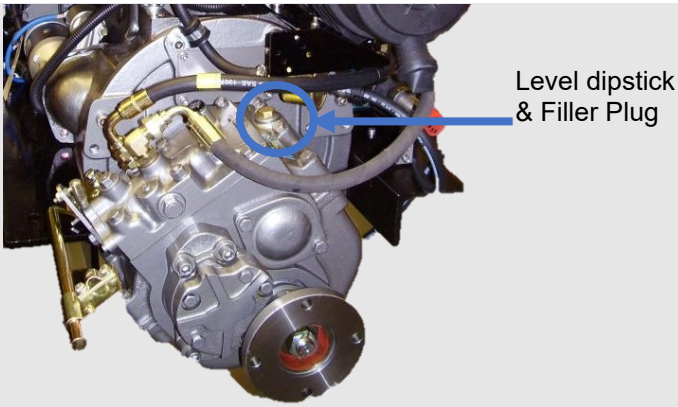
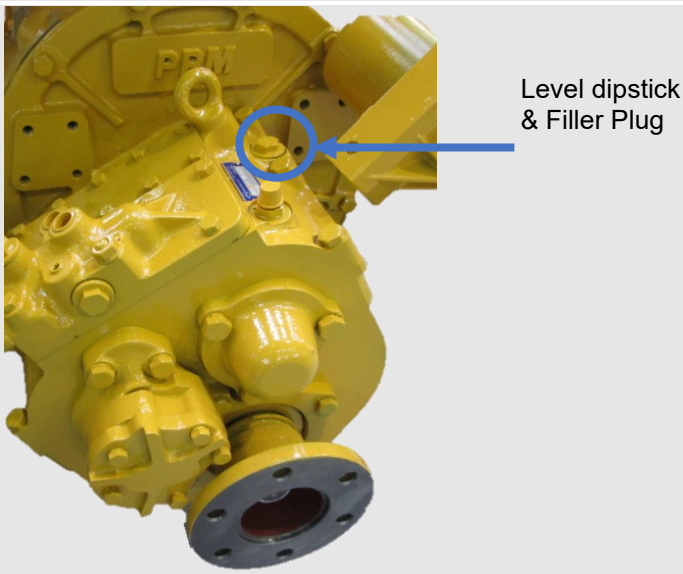
- Release the two spring clips, pull off the end cover to reveal the filter element. The element simply pulls out. Note: there is usually a inner safety element fitted.
- The air filter element is constructed from pleated paper; inspect it closely for dust or dirt. The air filter cannot be cleaned and 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.

WARNING:
BURN HAZARD! WAIT UNTIL THE GEARBOX COOLS SLIGHTLY YOU DRAIN THE GEARBOX OIL. HOT OIL MAY SPLASH AND BURN YOU

- Change the gearbox oil while it is still warm. (Please refer to PRM 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 3 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.
- Do not overfill gearbox as this can damage the internal components.

Gearbox Model	Location of Dipstick / Filler Plug / Drain Plug
PRM 280	
PRM 500 / PRM 750	

4. Disposal of Oil and Related Items

NOTICE:
ALWAYS BE ENVIRONMENTALLY RESPONSIBLE.

- 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 waterway system.

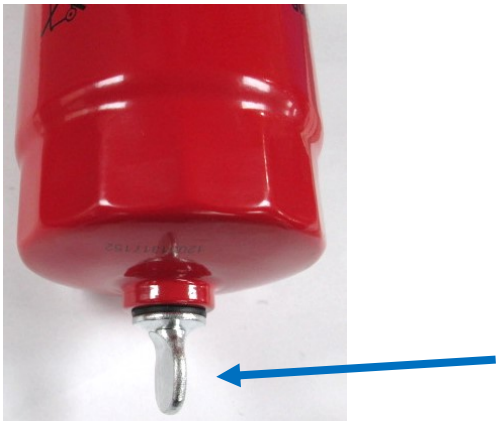
5. Primary Fuel Filter Water Drain

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

WARNING:
DIESEL FUEL IS FLAMMABLE AND EXPLOSIVE UNDER CERTAIN CONDITIONS.

WARNING:
DIESEL FUEL IS HARMFUL TO SKIN. MAKE SURE THE RELEVANT PERSONAL PROTECTION EQUIPMENT IS WORN.

- Place a small drain bowl under the fuel filter/water separator drainpipe and 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. Ensure that this is drained regularly.
- Do not over tighten drain screw.

The boat builder should have fitted an additional water trap in the fuel system. Ensure that this is drained regularly.

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

WARNING:
DIESEL FUEL IS FLAMMABLE AND EXPLOSIVE UNDER CERTAIN CONDITIONS.

WARNING:
DIESEL FUEL IS HARMFUL TO SKIN. MAKE SURE THE RELEVANT PERSONAL PROTECTION EQUIPMENT IS WORN.

6. Primary Fuel Filter Change

- 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). The part number for the drain screw is RDG9189022.
- 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 John Deere Operator's Manual (Shire 14 85/130 WB).
- Shire 85 & 130 WB - Remove metal water drain screw from old filter and refit onto new filter element (Note: The plastic drain screw does not comply with the British Waterways Boat Safety Scheme).

8. Fuel System Bleeding

- Refer to John Deere Operator's Manual (Shire 14 85/130 WB).
- Ensure that the fuel tank is more than ¾" full prior to attempting this.

9. Cooling System

WARNING:

DO NOT CHECK THE COOLANT LEVEL WHEN THE ENGINE IS HOT AS IT MAY SPLASH AND BURN YOU. REMOVE THE IGNITION KEY BEFORE WORKING IN ENGINE COMPARTMENT.

DANGER:

SCALD HAZARD! NEVER REMOVE THE COOLANT PRESSURE CAP IF THE ENGINE IS HOT. STEAM AND HOT COOLANT WILL SPURT OUT AND SERIOUSLY BURN YOU. TIGHTEN THE CAP SECURELY AFTER BEING REMOVED. STEAM CAN SPURT OUT DURING ENGINE OPERATION IF THE CAP IS LOOSE.

- 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.
- Do not use water only to top up as this weakens the coolant mix, reducing the level of frost protection and anti-corrosion protection of the coolant.

10. Belt Adjustment (Twin Alternators)

CAUTION:

REMOVE THE IGNITION KEY BEFORE WORKING IN ENGINE COMPARTMENT.

WARNING:

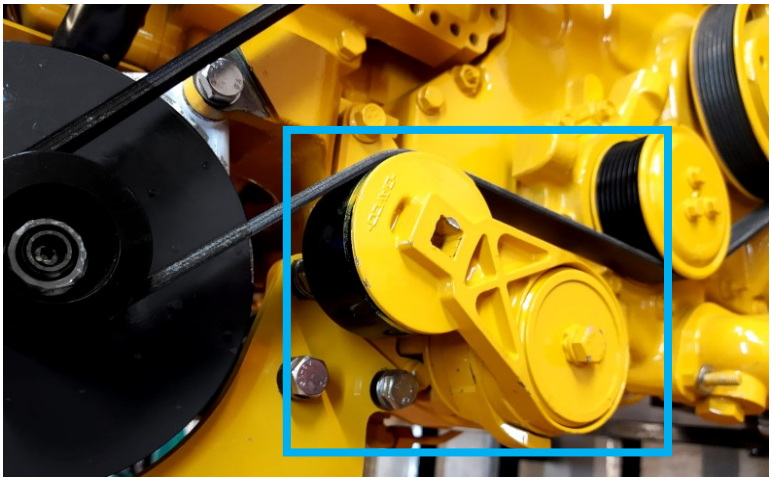
SEVERE HAZARD! KEEP HANDS AND OTHER BODY PARTS AWAY FROM MOVING/ROTATING PARTS. WEAR TIGHT FITTING CLOTHING AND KEEP YOUR HAIR SHORT OR TIE BACK. REMOVE ALL JEWELLERY BEFORE COMMENCING WORK. CHECK BEFORE STARTING THE ENGINE THAT ANY TOOLS OR RAGS USED DURING MAINTENANCE HAVE BEEN REMOVED FROM THE AREA.

- 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 14 85/130 WB 120A alternator belt is self-adjusting on models with Auto Adjusters/Tensioners:



11. Belt Maintenance

WARNING:

SEVERE HAZARD! KEEP HANDS AND OTHER BODY PARTS AWAY FROM MOVING/ROTATING PARTS. WEAR TIGHT FITTING CLOTHING AND KEEP YOUR HAIR SHORT OR TIE BACK. REMOVE ALL JEWELLERY BEFORE COMMENCING WORK. CHECK BEFORE STARTING THE ENGINE THAT ANY TOOLS OR RAGS USED DURING MAINTENANCE HAVE BEEN REMOVED FROM THE AREA.

- Ensure the ignition key is removed before carrying out any maintenance.
- Turn the battery master switch to the off position before carrying out any 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.

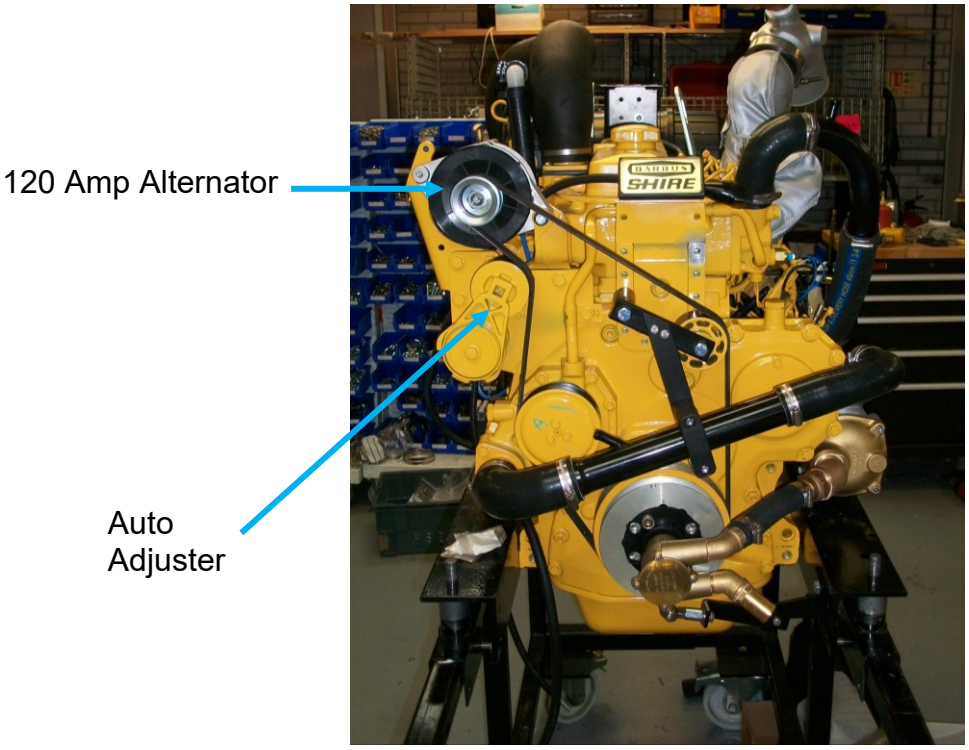
12. Belt Replacement

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

WARNING:
SEVERE HAZARD! KEEP HANDS AND OTHER BODY PARTS AWAY FROM MOVING/ROTATING PARTS. WEAR TIGHT FITTING CLOTHING AND KEEP YOUR HAIR SHORT OR TIE BACK. REMOVE ALL JEWELLERY BEFORE COMMENCING WORK. CHECK BEFORE STARTING THE ENGINE THAT ANY TOOLS OR RAGS USED DURING MAINTENANCE HAVE BEEN REMOVED FROM THE AREA.

Shire 14 85 & 130 WB

- 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:
TURN BATTERY ISOLATION SWITCHES OFF
REMOVE THE IGNITION KEY BEFORE WORKING IN ENGINE COMPARTMENT.

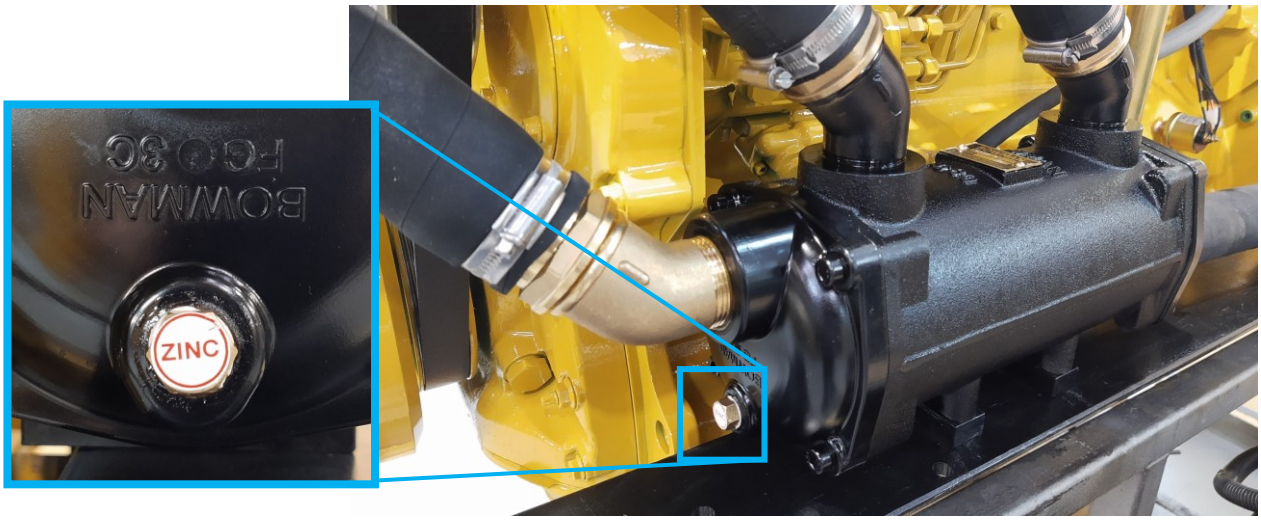
Warning Light Bulb replacement

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.

14. Sacrificial Anode Change

- The anode is located in the larger Bowman Heat Exchanger on the rail with a "Zinc" Anode sticker on it – **NOT** on the smaller one.



- The Anode is replaced with part number RDG5048313, using Pipe Thread Sealant (e.g. Tonsan 1567 or Bondloc 572).

15. Raw Water Pump Impeller Change

The pump is located on the front of the engine bolted to either the P.T.O pulley camshaft drive or side mounted and driven by a belt. Procedure is similar for all.

- Remove the pump cover plate.
- Remove the pump impeller, (special tools are available from chandleries to assist with this task)
- Note, do not lever against the front of the pulley housing as it is easily damaged, and inspect the pump housing and front wear plate.
- Replace the impeller.
- Replace the cover plate gasket if damaged.
- Replace any other worn components as necessary.

16. Engine Heat Exchanger Tube Stack Flushing.

- When the engine is cold, drain the water from the engine block, drain screw is located behind the heat exchanger.
- Drain water from the heat exchanger, the drain plug is in the bottom of the heat exchanger end cap.
- Disconnect pipes and hoses from engine heat exchanger.
- Remove the heat exchanger from the engine.
- Mark position, and remove end caps from engine heat exchanger.
- Carefully remove the tube stack from the centre of the heat exchanger.
- Fully flush between the tubes to remove any dirt or scum build up.
- Inspect the tube stack replace if damaged.
- Reassemble and refit checking the end cap "O" rings are in good condition
- Refill the engine with coolant as described earlier (Section 3 – Installation)

17. Winterization of Seawater Cooling System.

- To prevent frost damage to the seawater cooling circuit components because of water freezing, ensure all seawater or raw water is drained from the system
- Alternatively, run neat anti-freeze through the seawater pump inlet to protect the system

Ensure that the anti-freeze is drained before starting the engine the next season to ensure that it does not get into the marine environment. Dispose of correctly

SECTION 6 - Service Parts

Shire 85/130 WB

Spare Part Description	Part No.
Primary Fuel Filter Element	RDG9188346
Shire 85WB - Engine Fuel Filter Element	RE62418
Shire 130WB - Engine Fuel Filter Element	RE60021
Inner Air Filter Element	RDG6651
Outer Air Filter Element	RDG6650
Oil Filter	RE504836
Engine Oil (20 Litre containers) either “Plus 50 II Oil”, or “Torq-Gard Supreme”	VC50002X020 VC83070-020
230V 3.5kW Alternator Belt Travelpower	RDG0047581
230V 5kW Alternator Belt Travelpower	RDG6816
Standard Belt (Belt driven 120A Alternator and Seawater pump OR 120A Alternator and 150A Alternator with crank driven Seawater pump).	RDG0047272
120A Alternator Belt (Only)	RDG004A196 (PK8 1980)
Optional additional 50A 24V Alternator Belt	R500277
Optional additional 55A 24V Alternator Belt	RDG0047600
Optional additional 80A 24V Alternator Belt	RDG004A196 (PK8 1980)
Anti Vibration Mounts (Shire 85WB) – 55 Shore Hardness	RDG0057319
Anti Vibration Mounts (Shire 130WB) - 65 Shore Hardness	RDG005A28
Belt Driven Sea Water Pump	RDG907A2
Impeller for “Belt Driven Sea Water Pump” RDG907A2	RDG010A2
Cover Plate “O” Ring for RDG907A2	RDG003A23
Cover Plate for Belt Driven Sea Water Pump (with O ring)	RDG010A9
Wear Plate for Belt Driven Sea Water Pump	RDG010A10
Full Cam for Belt Driven Sea Water Pump	RDG010A11
Half Cam for Belt Driven Sea Water Pump	L082-10-H
Crank Driven Seawater Pump	RDG9079564
Impeller for Crank Driven Sea Water Pump	RDG0109627
O Ring for Cover Plate Crank Driven Sea Water Pump	RDG003B1
Cover Plate for Crank Driven Sea Water Pump	RDG403B13
Half Cam for Crank Driven Sea Water Pump	09105-012-H
Lip Seal for Crank Driven Sea Water Pump	09105-005
Mechanical Seal for Crank Driven Sea Water Pump	L082-04
Modified Zinc Anode (on DC80 Heat Exchanger) “Zinc” Sticker for Anode	RDG5048313 RDG6028406

Fuses - The electrical system is fitted with three or four blade type fuses,

- Control Panel supply & live 15A (RDG3245)
- Engine stop control system 40A (RDG3246)
- Engine start control system 20A (RDG1152)

SECTION 7 - Service Schedule

Specifications and Capacities

	Capacity Shire 85WB	Capacity Shire 130WB
Engine, including filter	8.5 litres	19.0 litres
PRM280 gearbox including cooler	2.2 litres	
PRM500/750 gearbox including cooler	3.0 litres	3.0 litres

John Deere CoolGuard II is supplied ready mixed (Shire 85/130 WB).

	Check	Change	Notes
Engine Oil	Daily (level)	Every 250 hours or 12 Months *	First change after 100 hours (Change Filter as well)
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	
Inner Air Filter Element	200 Hours	36 Months / 500 hours* sooner if required	
Drive Belts	Daily	As required	Adjust as necessary
Sacrificial Anode	250hrs	Every 500hrs or 12 months*	Check and change more frequently if local conditions require it.
Raw Water pump Impeller	250hrs	Every 500hrs or 12 months*	Change more frequently if operating in shallow or sandy waters.
Main Heat Exchanger	500hrs		Check more frequently if local conditions require. Remove & clean as instructions Section 5.16
Key Switch	Lubricate	Every 150 hours Or 12 Months*	As per Instructions Section 5.13, Control Panel Maintenance

* Whichever comes first.

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

Refer to the John Deere Engine Manual (Shire 85/130 WB) for further information.

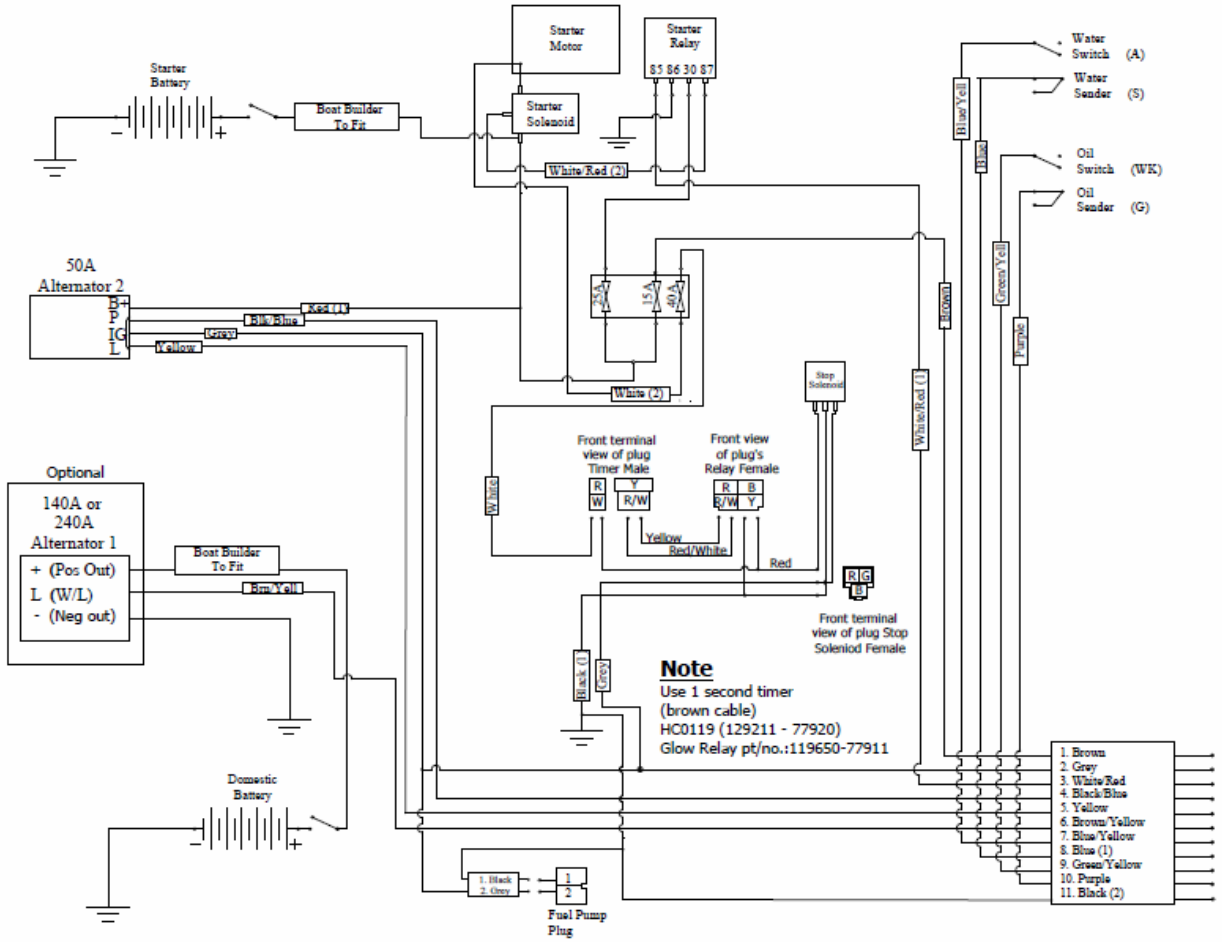
Engine idle speed for John Deere units is 850 rpm.

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

- Engine Oil for Shire 14 85/130 WB is available from Barrus in 20 litre containers, part number VC50002X020 “Plus 50 II Oil”, or alternatively VC83070-020 “Torq-Gard Supreme”
- John Deere “Cool Guard II” (engine coolant) is also available from Barrus part number VC76215-020.

Diesel fuel additive is available from your Shire dealer in a handy 500ml container, part number RDG80210219.

SECTION 8 - Wiring Diagrams



Shire Work Boat Engine

Wiring Diagram
14 70
12 Volt

Schematic Only — RDG205A9

Issue 1

Conductor Sizes

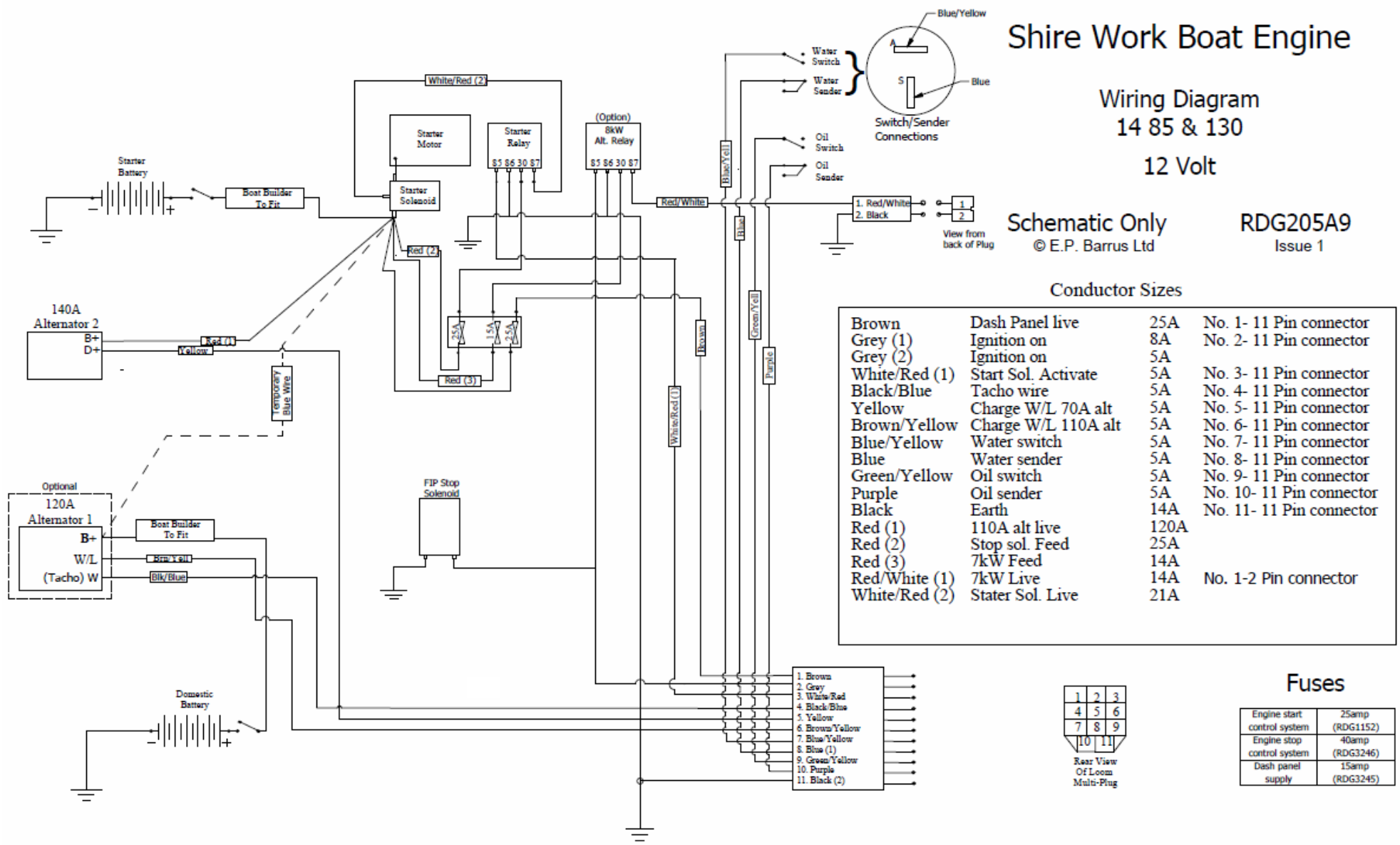
Brown	Dash Panel live	14A	No. 1- 11 Pin connector
Grey	Ignition on	5A	No. 2- 11 Pin connector
White/Red (1)	Trigger to starter sol.	14A	No. 3- 11 Pin connector
White/Red (2)	Live to Start Sol.	14A	
Black/Blue	Tacho wire	5A	No. 4- 11 Pin connector
Yellow	Charge W/L 50A alt	5A	No. 5- 11 Pin connector
Brown/Yellow	Charge W/L 110A alt	5A	No. 6- 11 Pin connector
Blue/Yellow	Water switch	5A	No. 7- 11 Pin connector
Blue	Water sender	5A	No. 8- 11 Pin connector
Green/Yellow	Oil switch	5A	No. 9- 11 Pin connector
Purple	Oil sender	5A	No. 10- 11 Pin connector
Black (1)	Earth	14A	No. 11- 11 Pin connector
Red (1)	50A alt live	55A	
White	Stop sol. pull in	25A	
Red/White	7kw Live	14A	
Red (2)	Fuse Feeds	14A	
Black (2)	Earth	14A	
White (2)	Stop sol. pull in trig	5A	

Rear View Of Loom Multi-Plug

Fuses

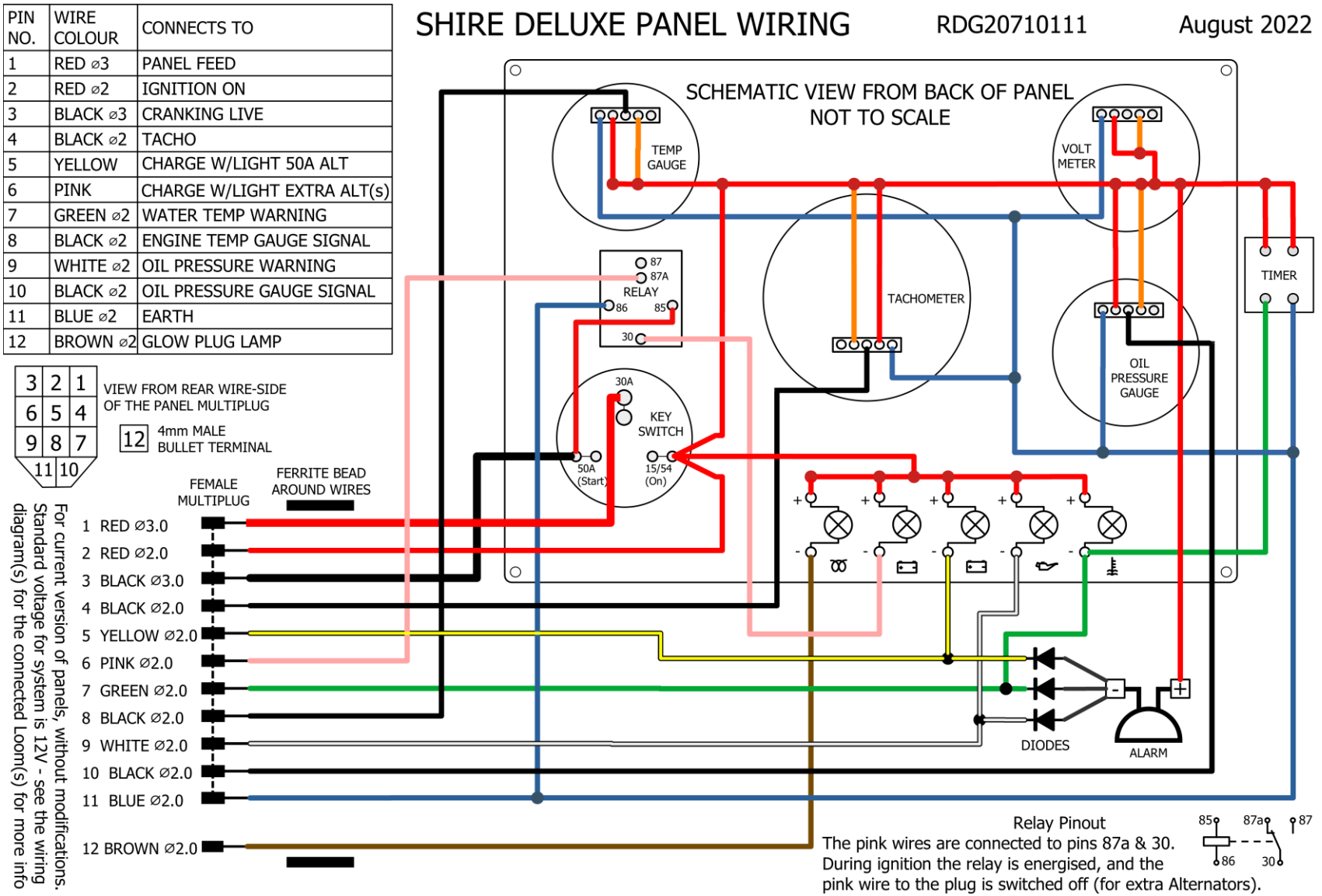
Engine start control system	25amp (RDG1152)
Engine stop control system	40amp (RDG3246)
Dash panel supply	15amp (RDG3245)

1. Engine Wiring Diagram, Shire 14 85/130 WB

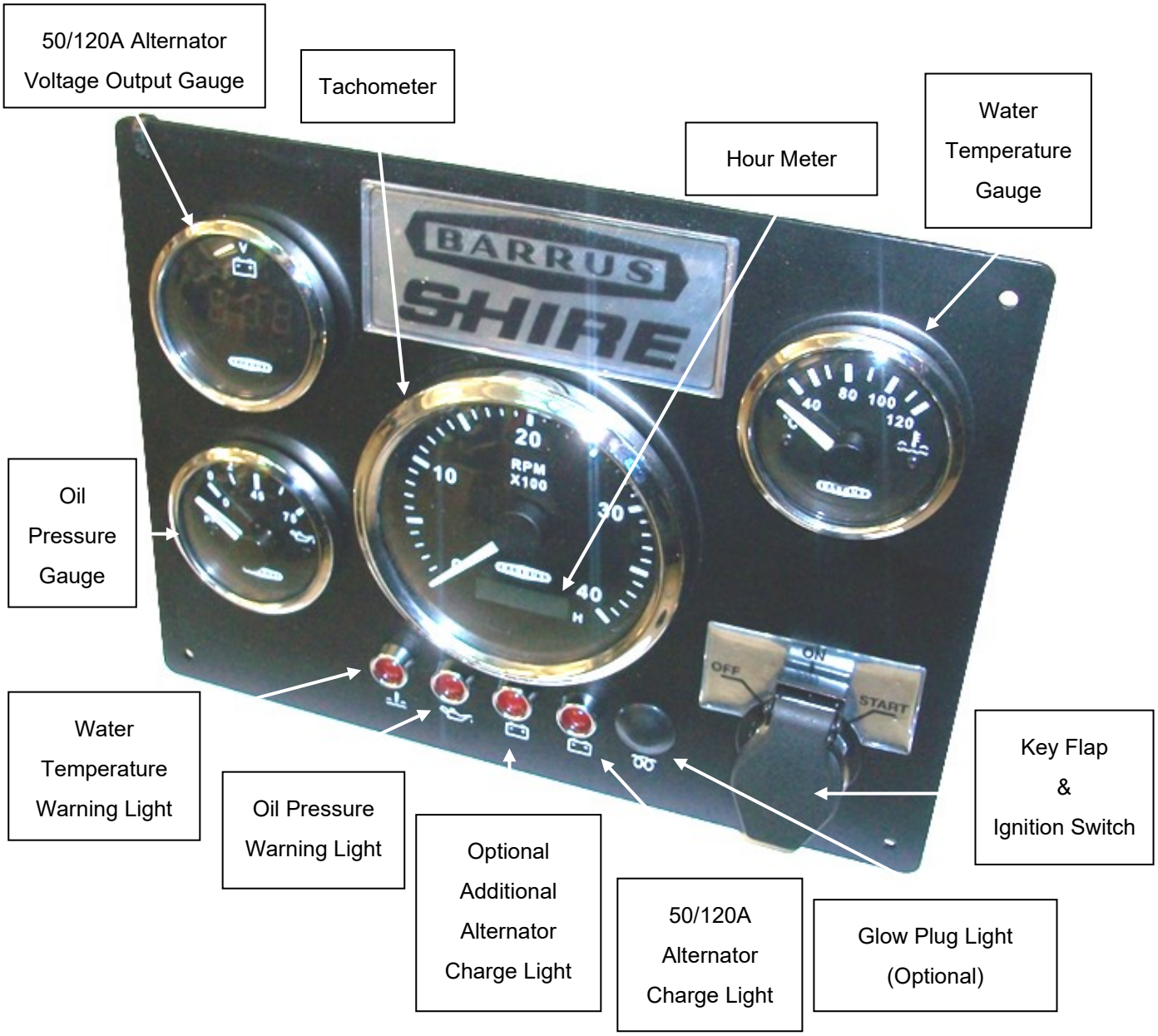


2. Deluxe Control Panel Wiring Diagram

PIN NO.	WIRE COLOUR	CONNECTS TO
1	RED ⌀3	PANEL FEED
2	RED ⌀2	IGNITION ON
3	BLACK ⌀3	CRANKING LIVE
4	BLACK ⌀2	TACHO
5	YELLOW	CHARGE W/LIGHT 50A ALT
6	PINK	CHARGE W/LIGHT EXTRA ALT(s)
7	GREEN ⌀2	WATER TEMP WARNING
8	BLACK ⌀2	ENGINE TEMP GAUGE SIGNAL
9	WHITE ⌀2	OIL PRESSURE WARNING
10	BLACK ⌀2	OIL PRESSURE GAUGE SIGNAL
11	BLUE ⌀2	EARTH
12	BROWN ⌀2	GLOW PLUG LAMP



3. RDG20710111 - Deluxe Control Panel



4. 5kW VDO Travel Power System

- 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
- For more information see the VDO Travel Power manual.

SECTION 9 – Afterlife Recycling

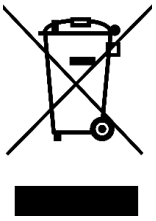
When it becomes necessary to dispose of your engine, it may be possible at recycling centres; however, it will likely require careful disassembly first before disposal. For further information please contact your local recycling centres for disposal advice to see what they will accept for disposal.

Engines are primarily steel, cast iron and aluminium; and are recyclable after removal of other parts. Larger components such as the engine block may only be handleable by a few centres, unlike say smaller plastic components.
Most of the other parts require special disposal as they include hazardous waste, and must be separated and declared upon disposal, including:

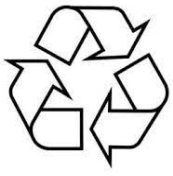
Fluid Disposal
You must make sure that all unused oil, fuel and coolant is drained out carefully and disposed of correctly at a local recycling centre. Under NO circumstance must any oil, fuel or coolant be put down any drains or leaked into waterways or the environment.

Contact local recycling centres or garages, or check their websites to find out whether they take or recycle engine fluids. If they don't, they may be able to direct you to your nearest drop-off point depending on the volume. Recycle your coolant/oil/fuel in distinct well-sealed containers that are clearly labelled.

Waste Electrical Electronic Equipment (WEEE) and Battery recycling
Parts contain WEEE waste or batteries should not be disposed of in your domestic waste. You should recycle WEEE or batteries in accordance with your local authority or recycling centre's directions. Batteries will need declaring separately for safety purposes.



Packaging materials that are unwanted should be sorted, with cardboard, wood, and paper recycled where possible. Some Local Authorities and recycling centres may accept plastic bags, films and bubble wrap for recycling. Polystyrene is very rarely recycled and may have to be disposed of in general rubbish, inside bags.



Reduce, Reuse, Recycle

For further information about disposal please contact your Local Authority. You can also get more advice and guidance about recycling in your area at the following website http://www.recycle-more.co.uk.

SECTION 10 - Dealer List

A map of Barrus Shire Dealers can be found under Shire Workboat and Shire at https://www.barrus.co.uk/dealer-locator/?bn=Shire

Area	Company	Telephone (UK)	Email
BERKSHIRE	Drive Line Marine	0118 942 3877	tam@drivelinemarine.com info@drivelinemarine.com
CHESHIRE	Nantwich Canal Centre	01270 625122	
CORNWALL	Armada Engineering	01326 375566	sales@armadamh.co.uk
	Black Dog Marine	01503 265898	blackdogmarine@googlemail.com
	Cellar Marine	01326 280214	john@cellarmarine.com
	Smith's Boat Yard	01208 862815	info@smithsboatyard.co.uk
CUMBRIA	Windermere Aquatic Ltd	01539 442121	service@aquaticboatcentres.com
DERBYSHIRE	Midland Canal Centre	01283 701933	info@mccboats.co.uk
DEVON	Darthaven Marina	01803 752242	admin@darthaven.co.uk
	Mobile Marine	01297 631821	mobilemarine@btconnect.com
	Sleeman & Hawkin Ltd	01626 778266	keith@sleeman-hawkin.co.uk
	Tonto Marine	01803 844399	enquiries@tontomarine.co.uk
DORSET	Purbeck Marine	01202 686592	purbeckmarine@aol.com
	Rob Perry Marine	01297 631314	sales@robperrymarine.co.uk
ESSEX	French Marine Motors Ltd	01206 305233 01255 850303	info@frenchmarine.com
HAMPSHIRE	Marine Power Ltd	0238 0403918	info@marine-power.co.uk
HEREFORDSHIRE	Starline Marine	01684 593443	narrowboats@starline.demon.co.uk
HERTFORDSHIRE	P & S Marine	01923 248372	pandsmarinellp@gmail.com
LANCASHIRE	British Waterways	01257 481054	emmalene.foster@bwml.co.uk
LEICESTERSHIRE	Foxton Boat Services Ltd	01162 792285	tony@foxton-boats.freeserve.co.uk
LONDON	De La Hunty Marine	02089 792121	delahuntymarine@btinternet.com
MONMOUTHSHIRE	Castle Narrowboats	01873 830001	castlenarrowboats@btinternet.com
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
SHROPSHIRE	Maestermyn (Marine) Ltd	01691 662424	enquiries@maestermyn.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

WARWICKSHIRE	Onboard Energy	02476 393333	sales@onboardenergy.com
	Springwood Haven Leisure Ltd	0845 4566572	enquiries@springwoodhaven.co.uk
	Valley Boat Services Ltd	07990528123	enquiries@valleycruises.co.uk
WEST MIDLANDS	Stephen Goldsbrough Boats	01564 778210	andy@sgboats.com
WILTSHIRE	Foxhangers Marine	01380 828795	info@foxhangers.co.uk
WORCESTERSHIRE	J L Pinder & Son	01527 876438	sales@jlpinderandsons.co.uk
	Starline Narrowboats	01531 632003 01684 874774	enquiries@starlinenarrowboats.co.uk narrowboats@starline.demon.co.uk
YORKSHIRE	Rodley Boat Centre	01132 576132	John.snowdenz@ntlworld.com
EIRE	Dun Laoghaire Marine Services	00353 12104776	info@dlms.ie
	O'Sullivans Marine	003536 67124524	brian@sulliansmarine.com

SERVICE RECORD CARD

Model: ..... **Engine No: .....**	
Carried out by E.P.Barrus **Print Name:** **Actual Hours:** PDI **Signed:**	**Boat Builder Stamp:** **Commission of Boat and Hand Over to Customer. (Refer to the Installation Check List Page in this Manual).** **Date:** **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:**

Please refer to Owner's Manual for service intervals