



Canaline Marine Engines

Owners Handbook

Engines Models

Canaline 38

Canaline 42

Canaline 52

Canaline 60

Canaline 70T

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Introduction

This Canaline Marine diesel engine is based on the Kioti diesel engine which is manufactured by Daedong Industrial Co Ltd.

Engines Plus Ltd wishes to thank you for purchasing your new Canaline Marine Diesel engine. Your new engine is the result of many years of research and development, and high quality manufacturing. This engine is designed based on strict quality standards applied to and use of Kioti genuine components. Its knowledge on the operation of the diesel engine is based on faithful service and reliability for years. This manual makes users familiar with the diesel engine and provides useful information on safety, operation, and maintenance of the diesel engine.

To get the fullest use and benefit from your marine engine, it is important that you install, operate and maintain it correctly. This manual, along with gearbox operators' handbook, is designed to help you do this.

Please read this manual carefully and follow its operating maintenance recommendations, along with the installation guidelines. This will ensure many years of trouble-free and economical engine operation.

Should you require further advice, technical assistance or an engine service, please contact your nearest marine engine outlet, he knows your engine best and is ready to meet your requirements.

On completion of the warranty registration card, please return it to Engines Plus Ltd, where we can log it.

All information, illustrations, and specifications contained in this Manual are based on the latest product information available at the time of publication.

Engines Plus Ltd is a mariniser of industrial diesel engines, of which the Canaline product is part of our product portfolio. Engines Plus Ltd produces this manual for use on the Canaline marine engine based on the Kioti Diesel engine.

Engines Plus Ltd reserves the right to make changes in this manual at any time without prior notice.

The information given is subject to the company's current conditions of Tender and Sale, is for the assistance of users, and is based upon results obtained from tests carried out at the place of manufacture and in vessels used for development purposes. We do not guarantee the same results will be obtained elsewhere under different conditions.

Engine Identification

NOTE: In all communications with the Engines Plus Ltd or a local dealer the engine serial number and engine type must be quoted.

The engine serial number is on a decal affixed to the top surface of the Rocker Cover, as shown below. The Kioti Engine Number is also stamped on the Engine Block, outboard of the Injection Pump Flange.

As part of your engine warranty please return your registration card, which is supplied loose, as soon as possible.

Engine Information

Fill in your engine information below, so you have it to hand when contacting your local dealer.

Engine Type:	
EP Serial No:	
Gearbox Type:	
Gearbox Number:	
Date of Installation:	

Engines Plus Ltd
Engine Serial Number Decal



Kioti Engine Serial Number Stamping



Symbols in the Manual and on Engines



General operational note

Prescription-Indication notices (rectangle); it is obligatory to adopt the protective measures shown in the notices to perform the operation in question in total safety.



Protect hands (Gloves)



Protect eyes (Safety Glasses)



Protect respiratory passages (Mask)



Danger! General Danger situation



Danger! Electrical Discharges



Danger! Sources of Heat



Danger! Engine Coolant Pressure

Danger Warning-Attention Notices (triangular); General Attention regarding personal safety and protection of the engine



The operation indicated in the text *is strictly prohibited*

Prohibition Notices (Circular) indicating potentially hazardous situations.



Danger! From moving Parts ~ do not perform maintenance work.



Engine Coolant Level

Identification Notices (No Border)



Engine Oil Level



Engine Lubricating Oil ~ Fill Point



Lifting Point ~ Engine & Gearbox ONLY



Engine Coolant ~ Fill Point



Read the Manual.

Safety Precautions

Keep the engine, gearbox and surrounding area clean, including the area immediately below the engine.



Drives – Power Take Off Areas

Gearbox Output Flange

The purpose of the marine diesel propulsion engine is to provide motive power to propel a vessel. Accordingly the gearbox output shaft rotates and its flange is designed to be coupled to a propeller shaft by the installer. Steps must be taken to ensure adequate guarding.

Forward End Drive

Engines are supplied with unguarded vee and poly vee belt drives to power the fresh water pump and battery-charging alternator. The installer must ensure that it is not possible for injury to occur by allowing accessibility to this area of the engine. The drives can cause injury if personnel or clothing come in contact with the moving belts or pulleys, when the engine is running.



Exhaust

Do not touch Hot Surfaces

Exhaust Outlet

Diesel marine propulsion engines emit exhaust gases at high temperatures – around 400 - 500°C. Engines are supplied with either wet exhaust outlet (water injection bend) or dry outlet (dry exhaust stub) – see engine price list. At the outlet next to the heat exchange header tank, the exhaust outlet can become very hot and if touched, can injure. This must be lagged or avoided by ensuring adequate guarding. It is the responsibility of the installer to lag the exhaust system if a dry system is used. Exhaust gases are harmful if ingested, the installer must therefore ensure that exhaust lines are routed overboard and that leakage into the vessel does not occur.



Fuel

Do not ingest liquids

Fuel Lines

Diesel engines are equipped with high pressure fuel injection pumps, if leakage should occur, or pipes fracture, fuel at high pressure can be harmful. Skin must be thoroughly cleaned in the event of contact with diesel fuel.

Fuel Supply Connections

Engines are supplied with 8mm fittings. The installer must ensure that when connections are made, they are clean and free of leaks.

Oil



Do not ingest liquids

The Canaline marine propulsion package is supplied with 2 dipsticks, one for the engine and one for the gearbox. Ensure dipsticks are returned and secure after checking. If not, oil leaks can cause infection when touched. Do not remove dipsticks whilst engine is running, as this can cause oil to blow out. All oil must be removed from the skin to prevent infection.

Scalding



Do not remove Pressure Cap when Hot

An engine running under load will have a closed circuit fresh water temperature of 71° to 85°C. The pressure cap on the top of the header tank must not be removed when the engine is running. It should only be removed when the engine is stopped and has cooled down.

Transportation/Lifting



Engines are supplied on transportable pallets. Lifting eyes on engines are used for lifting engine and gearbox assembly only, not the pallet and associated kit.

GENERAL DECLARATION

This machinery is not intended to be put into service until it has been incorporated into or with other machinery. It is the responsibility of the purchaser/installer/owner, to ensure that the machinery is properly guarded and that all necessary health and safety requirements, in accordance with the laws of the relevant country, are met before it is put into service.

Note: Recreational Craft

Where applicable, the purchaser/installer/owner and operator must be responsible for making sure that Directive 2013/53/EU is complied with.

Canal Boat Engines – Technical Data

Model		Canaline 38	Canaline 42	Canaline 52	Canaline 60	Canaline 70T
Cylinders		4	4	4	4	4
Bore	mm	83.0	83.0	87.0	87.0	87.0
Stroke	mm	92.4	92.4	92.4	102.4	102.4
Displacement	cc	1999	1999	2179	2430	2430
Combustion		Indirect Injection				
Cooling		Keel Cooled				
Power Output	Bhp	38	42	52	57	65
ISO 8665 Rated Power @ Speed	kW	29.2	32.6	32.6	35.2	41.9
	r/min	2600	2600	2600	2600	2600
Max Torque	Nm	125	131	145	158	192
	r/min	1600	1600	1600	1600	1800
Oil Capacity	litres	8.0	8.0	8.0	9.7	9.7
Weight	kg	235	237	248	256	256
Engine Coolant Capacity	Litres	7.5	7.5	7.5	8.3	7.3
Alternator	Amps	75 & 100	75 & 175	75 & 175	75 & 175	75 & 175
Starter Motor	kW	1.7				
Air Intake restriction	kPa	2.45 max				
Exhaust Back Pressure	kPa	10.0 max				
Ventilation required	M3/min	2.25	2.25	2.65	3.07	3.15
Gearbox		PRM 125	PRM 150	PRM 150	PRM 150	PRM 150
Starter Battery size		Minimum recommended size - 700 CCA / 100 Ah				

Note: The specification details above are for standard configurations.
BHP* ~ to EN ISO8665

Starting and Stopping



Important checks prior to use

Your engine has been filled with new oil for both engine and gearbox when it leaves the factory. However, please check, see the section on engine maintenance.

Ensure the engine is free to turn without obstructions, and daily checks have been carried out.

Ensure battery is fully charged and connected (the isolator is in the 'ON' position).

Ensure Morse speed and gearbox cables are fitted correctly and that cable travel lengths are correct.

Ensure fuel taps from fuel tank have been turned on

CAUTION: for safety's sake conduct checks above, with engine stopped, before starting.

Engine starting

Check the engine and gearbox oil levels are correct ~ see relevant section in this manual for further information.

- Set the engine throttle to 1/3, out of gear.
- Turn the Key to the "1" Position.

The panel will go through a procedure to ensure all lights and the buzzer are working, once this has been completed you can then start the engine.

- Turn the Key to Pre-Heat, and hold **until the Yellow light goes out**.
- Turn the Key to the Start/Crank position and release when the engine fires.

Ensure alarm buzzer is not sounding and red warning lights are off.

Note:

If the alternator warning light is still on then increase the engine speed to excite the alternator, then return to idle. The light should then go out.

Make sure the engine is running smoothly, with no smoke and sounds normal.

Repeated engagement of the starter to the flywheel ring gear without a break will result in damage to the starter pinion gear and flywheel ring gear. It will also cause excessive build-up of heat in the Starter Motor Windings.

It may also cause the Engine Stop Solenoid to burn out due to heat build-up.

Crank for no longer than 20 seconds, with at least a 20 second break between attempts.

The oil pressure gauge on the deluxe engine control panel may read high on start-up and whilst the engine is cold. This is normal, and it will then decrease to the running level.

STOPPING

Every propulsion engine is fitted with a stop solenoid. To stop engine simply turn the key to the "0" position and the engine will stop.

When leaving the boat for an extended period, turn off battery isolator.

Canaline Engine Control Panels

Canaline Engine control panels feature LED Module to indicate as listed below. An Intermediate Panel is shown for illustration only.



1. Yellow ~ Timed Preheat LED
Illuminates when Key is switched to preheat position to indicate Preheat time.
2. Red & Buzzer ~ Engine Coolant Temperature
LED Illuminates and Buzzer sounds if Engine Temperature is too high.
3. Red & Buzzer ~ Starter Alternator
LED Illuminates and Buzzer sounds if no charge from Alternator or Belt breaks.
4. Green ~ Panel Power
LED illuminates when Key is switched on.
5. Red & Buzzer ~ Engine Oil Pressure
LED Illuminates and Buzzer sounds if Oil Pressure is too low.
6. Red & Buzzer ~ Auxiliary / Domestic Alternator
LED Illuminates and Buzzer sounds if there is no charge from Alternator or Belt breaks.

Checks during operation

While operating the engine, keep checking whether all parts of the engine are operating smoothly and correctly.



COOLING SYSTEM

Do not remove Pressure Cap when Hot

If steam or coolant is escaping from the overflow tube; stop the engine, allow it to cool, and check the following and correct as needed.

1. Check for cooling system leaks.
2. Check for obstructions that block cooling air.
3. Check and adjust the fan belt tension.
4. Ensure that the system is filled to the correct coolant level with the proper mix of Coolant Concentrate (anti-freeze) and water.
5. Check the radiator cap for proper type and condition.

IMPORTANT

To avoid personal injury:

DO NOT remove the Manicooler cap while the engine is hot.

Pressurized steam or coolant will escape and cause serious injury to you and any bystanders.

Open the cap at least 10 minutes after the engine is stopped.

OIL PRESSURE LED

The oil pressure LED comes on when the oil pressure drops below a safe level. If the lamp comes on while the engine is operated at or above 850 rpm, immediately stop the engine and check the engine oil level.

FUEL

The fuel tank should never be allowed to become completely empty. An empty tank will allow air into the fuel system; and the engine will not operate without bleeding the fuel system.

EXHAUST SMOKE

The engine exhaust should be colorless during normal operation within the rated output of the engine. Continuous dark emissions or smoke may indicate improper usage or an engine malfunction.

STOP THE ENGINE IMMEDIATELY:

1. If the engine speed suddenly changes.
2. If there is an unusual noise.
3. If the engine exhausts suddenly darkens.
4. If the oil pressure, temperature light or alternator comes on.

Fuel and Oil Specifications

Fuel

Important

- It is advisable to fit a fuel/water separator in the fuel supply system. Water in the fuel can damage the injection system. However if the engine is being fitted into an existing boat (re-installation), it is compulsory to fit a fuel/water separator
- If a fuel supply shutoff valve is fitted do not use a taper tap, only use a ball valve tap. The ball valve type are more reliable and less likely to let air into the fuel system.
- Do not use Kerosene, which is very low in cetane rating and lubricity, and may adversely affect the engine.
- Be careful not to let the fuel tank become empty, or air can enter the fuel system, necessitating bleeding before next engine start.

Fuel selection

The following criteria is required for the diesel fuel...

1. Must be free from minute dust particles.
2. Must have adequate viscosity.
3. Must have high cetane value.
4. Must have high fluidity at low temperature.
5. Must have low sulphur content.
6. Must have little residual carbon.

Diesel fuels

Applicable standard	Recommendation
JIS (Japanese Industrial Standard)	NO. 2
DIN (Deutsches Institut für Normung)	DIN 51601
SAE (Society of Automotive Engineers)	
Based on SAE-J-313C	NO.2-D
BS (British Standard)	BS EN590:2009

If fuel other than specified is used, engine functions will be lowered.

Fuel Requirements

NOTICE: The fuel injection pump, injector or other parts of the fuel system and engine can be damaged if you use any fuel or fuel additive other than those specifically recommended by Canaline / Kioti.

Such damage is not the responsibility of Canaline / Kioti and is not covered by their Warranty.

To help avoid fuel system or engine damage, please read the following:

- Some service stations mix used engine oil with diesel fuel. Some manufacturers of large diesel engines allow this; however for your diesel engine, do not use diesel fuel, which has been contaminated with engine oil.
- Do not use any fuel additive (other than as recommended under “Biocide” in this section). At the time this manual was printed, no other fuel additive was recommended. (See your authorisation dealer to find out if this has changed).



Fuel system air bleeding

The entry of air into the fuel system will cause difficult engine starting or engine malfunction. When servicing such as emptying the fuel tank, draining the Water Sedimenter, and the fuel filter element change, be sure to bleed air.

Air Bleeding Procedure:

1. Please refer to the Changing the Fuel Filter section.
2. Start the engine and thoroughly check the fuel system for leaks.

CAUTION: the water/diesel fuel mixture is flammable and could be hot. To help avoid personal injury and/or property damage do not touch the fuel coming from the drain valve and do not expose the fuel to open flames or sparks. Be sure you do not overfill the container. Heat (such as from the engine) can cause the fuel to expand. If the container is too full, fuel could be forced out of the container. This could lead to a fire and the risk of personal injury and/or vehicle or equipment damage.

Biocides

In warm or humid weather, fungus and/or bacteria may form in diesel fuel if there is water in the fuel.

NOTICE: fungus or bacteria can cause fuel systems damage by plugging the fuel lines, fuel filters or injector. They can also cause fuel system corrosion.

If fungus or bacteria has caused problems, you should have your authorised dealer correct these problems. Then, use a diesel fuel biocide to sterilise the fuel system (follow the biocide manufacturer’s instructions). Biocides are available from your dealer, service stations, parts stores and other automotive places. See your authorised dealer for advice on using biocides in your area and for recommendations on which biocides you should use.

Smoke suppressants

Because of extensive testing of treated fuel versus untreated fuel, the use of a smoke suppressant additive is not recommended. This may enhance the possibility of stuck rings and valve failure, resulting from extensive ash deposits.

Fuels used should contain no more than 7% Biodiesel. Exceeding this amount will invalidate Warranty and may affect compliance with Emission Approval.

Lubricant

The quality of engine oil may affect engine performance, start-ability and engine life. The use of unsuitable oil may result in piston ring stick, piston and cylinder seizure, and accelerate sliding surface wear causing increased oil consumption, lowered output and possible engine failure.

To avoid this, use the specified engine oil.

Engine Oil Selection

Engines Plus Ltd recommends oil to the following specifications...

API CC or CD specification is used in Canaline 38, 42, 52 & 60 Marine engines.

API CH is used in Canaline 70T Marine engines.

Either 10W/40, 10W/30 or 15w/40 is acceptable for temperate climates.

Do NOT use Synthetic or Semi-Synthetic Oils in Canaline Marine engines.

The correct grade oil is available from your local marine dealer.

- 5 litres API CC 10W/40 – EPL Part No - EP710008 - CL38~60
- 25 litres API CC 10W/40 – EPL Part No - EP710009 – CL38~60

- 5 litres API CH-4 15W/40 – EPL Part No - EP710560 – CL70T **ONLY**
- 25 litres API CH-4 15W/40 – EPL Part No - EP710561 – CL70T **ONLY**

Coolant

Two main types of Coolant Concentrate (Anti-freeze) are available, and either may be used...

1. Blue ~ standard Coolant Concentrate, which has a typical service life of 12months.
2. Red/Orange ~ Long Life Coolant Concentrate which has a typical service life of 2~3 years.

Both types should be mixed with clean water, up to a maximum concentration of 50%. Refer to the product container or specification sheet for frost protection vs concentration, and recommended service life.

Maintenance



Schedule

Daily or every 8 hours running.

- Check engine oil level.
- Check gearbox oil level, see gearbox manual.
- Check coolant level.
- Check drive belt tension, adjust if necessary.
- Check colour of exhaust fumes and unusual engine noise on start up.
- Check stern gland lubrication.

After first 50 hours.

- Change gearbox lubricant (see separate gearbox manual).
- Change engine lubricating oil.
- Change oil filter and fuel filter.
- Check fuel contamination and drain off water trap/Agglomerator if fitted.
- Check Air Filter Element for contamination, and change if necessary.
- Check all water pipes are not chaffing and for any leaks, and adjust if necessary.
- Check all fuel pipes are not chaffing and for any leaks, and adjust if necessary.
- Check exhaust system for any leaks, etc, and adjust if necessary.
- Check wiring looms and cables are not chaffing, and adjust if necessary.
- Check coupling alignment and ensure all bolts are tight.
- Check bolts/nuts on the anti-vibration mounts are tight and secure.
- Check control cables installation to ensure gearbox is correctly being engaged, and adjust if necessary.

Every 250 hours or every year.

- As 50 hours and the following -
- Check air cleaner element and replace if necessary.
- Change oil and oil filter.

Every 500 hours.

- As 50 & 250 hours and the following -
- Change air cleaner element.
- Change fuel filter.
- Change anti-freeze.
- Check electrical equipment, condition of hoses and belts, replace as necessary.

Annually

The front crankshaft pulley to ensure its security, where retained by a nut. Remove the retaining nut and crank pulley, clean the nut and crankshaft threads, re-fit securing nut with Bondloc B638 on the threads. Torque back to 137.3~156.9Nm.

First Service

A new marine engine will require an engine service and check over **at 50 hours**. The LCD display in the tachometer shows the engine running hours. It is very important that this is carried out, as this includes many checks to ensure the engine has settled down correctly. **All services are chargeable and is the owner's responsibility to organise, failure to do so may invalidate warranty.**

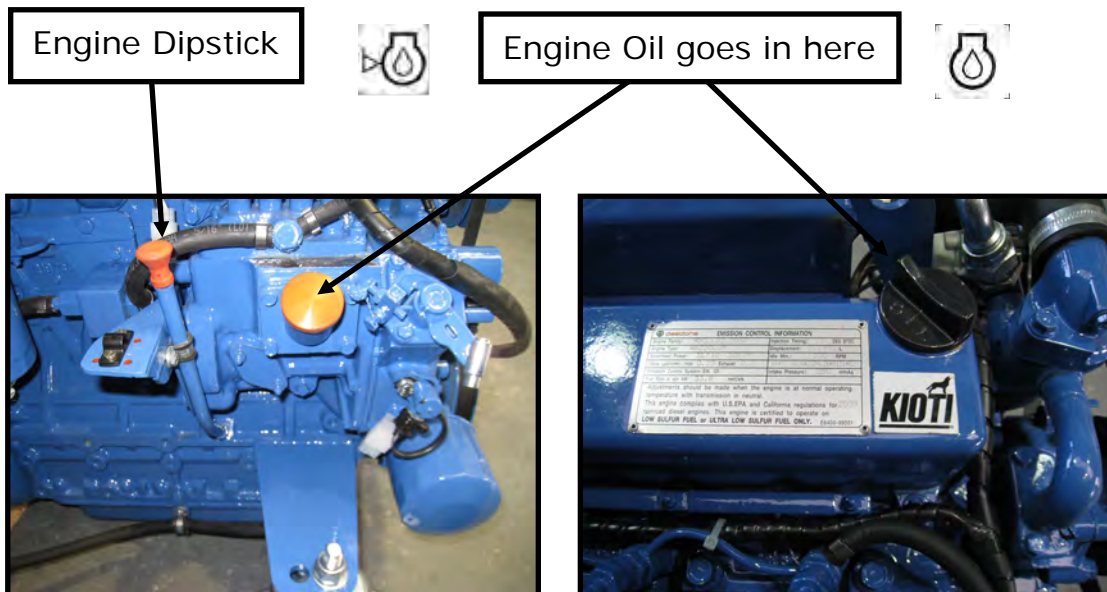
Checking engine oil level



Do not ingest liquids

For quantities of oil please refer to page 7. When checking the engine oil level, do so before starting or more than five minutes after stopping.

1. To check the oil level, draw out the dipstick, wipe clean, re-insert it and draw it out again. Check to see that the oil level lies between the two major marks on the dipstick. (please ignore the middle smaller mark)
2. If the level is too low add new oil via the oil filler port, to the specified level – do not overfill.



Important

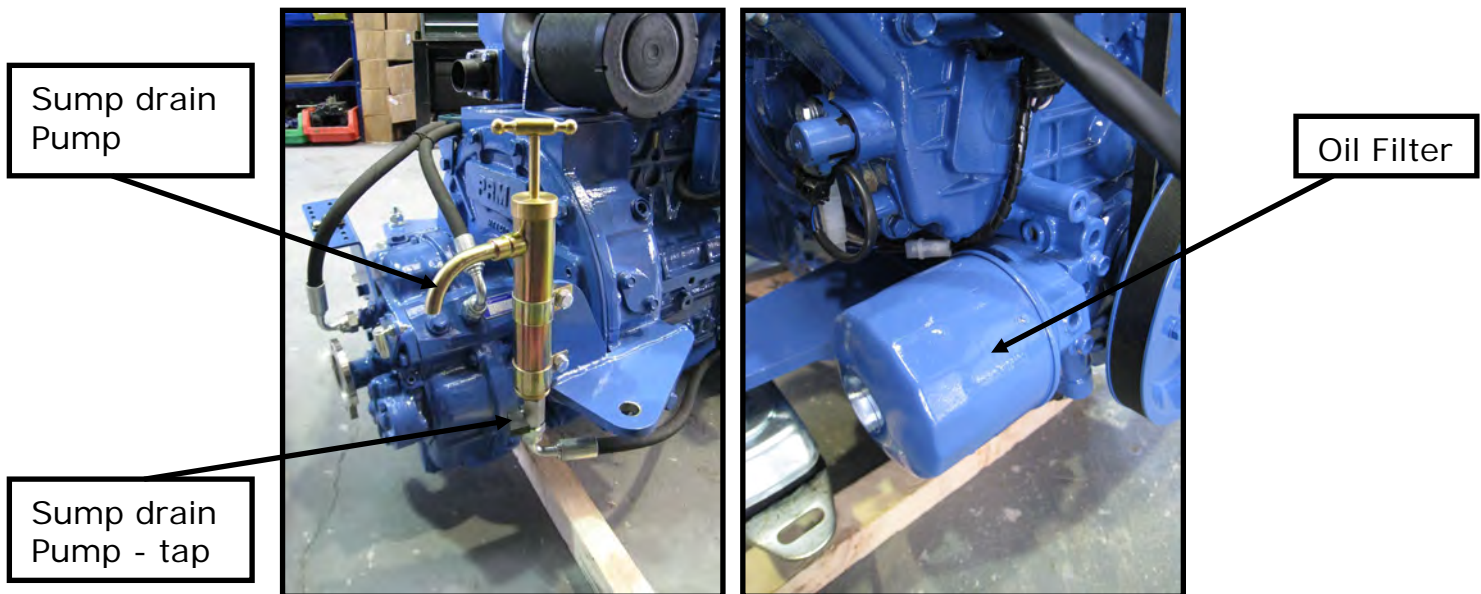
When using oil of different make or viscosity from the previous one, drain old oil. Never mix two different types of oil. Engine oil and filter should be changed after the first 50 hours running time and then every 200 hours or every year. Oil filter is a cartridge type mounted on the side of the engine.

Changing Engine Oil



Do not ingest liquids

1. Run the engine for 10 minutes to warm up the oil.
2. Your engine is provided with a sump drain pump. Turn the tap to "on". Use the hand pump as shown to pump out the oil into a bucket. Turn the tap to off position and replace end cap.
3. Unscrew the oil filter and replace with a new one. See diagram below



Note: it is best to wrap a plastic bag around the filter, to catch any oil left in the system. (Always keep your bilges clean!) Before screwing in the new filter spread a thin film of oil round the rubber gasket to ensure a good seal and screw in – hand tight.

4. Fill the engine with new oil, refer to page 13 for specification, as described above.

Note: once you have re-filled the engine with oil, run the engine for about 5 minutes, so the oil can be pumped around the engine and into the new filter. Stop the engine, and let it settle for about 10 minutes, and re-check the oil level, fill if required.

Changing the fuel filter



1. The fuel filter is a spin-on Cartridge.
Remove by turning anti-clockwise when viewed from below, see picture....
2. Replace the fuel filter cartridge every 400 hours
3. Remove metal bung and O Ring from the old fuel filter and fit to new fuel filter (see below)
4. Apply fuel oil thinly over the filter gasket and tighten into position – hand tight
5. Prime fuel system...
Place a rag or receptacle under the Fuel Filter
Slacken the Bleed Screw
Pump the Fuel Primer until air free fuel comes from the Bleed Screw, then tighten the Bleed Screw
Continue to pump until a reasonable effort is required.
6. Check for leaks

Fuel Primer

Bleed Screw



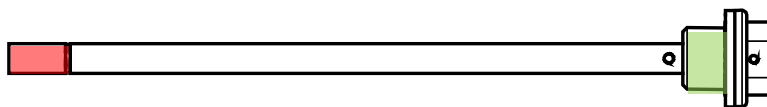
Fuel Filter

Note: Do not get fuel on the flexible engine mounts

Metal bung in Fuel filter, must be transferred to new fuel filter



Checking Gearbox Oil Level – please refer to gearbox manual, but on the **PRM 120 & 125D** mechanical gearboxes, please ensure the following



Ensure the oil mark is below the marker on the dipstick (shaded).

Ensure thread (shaded) is fully screwed down into case with its relevant bonded seal when measuring the oil level.

Never exceed the maximum oil level on the dipstick!

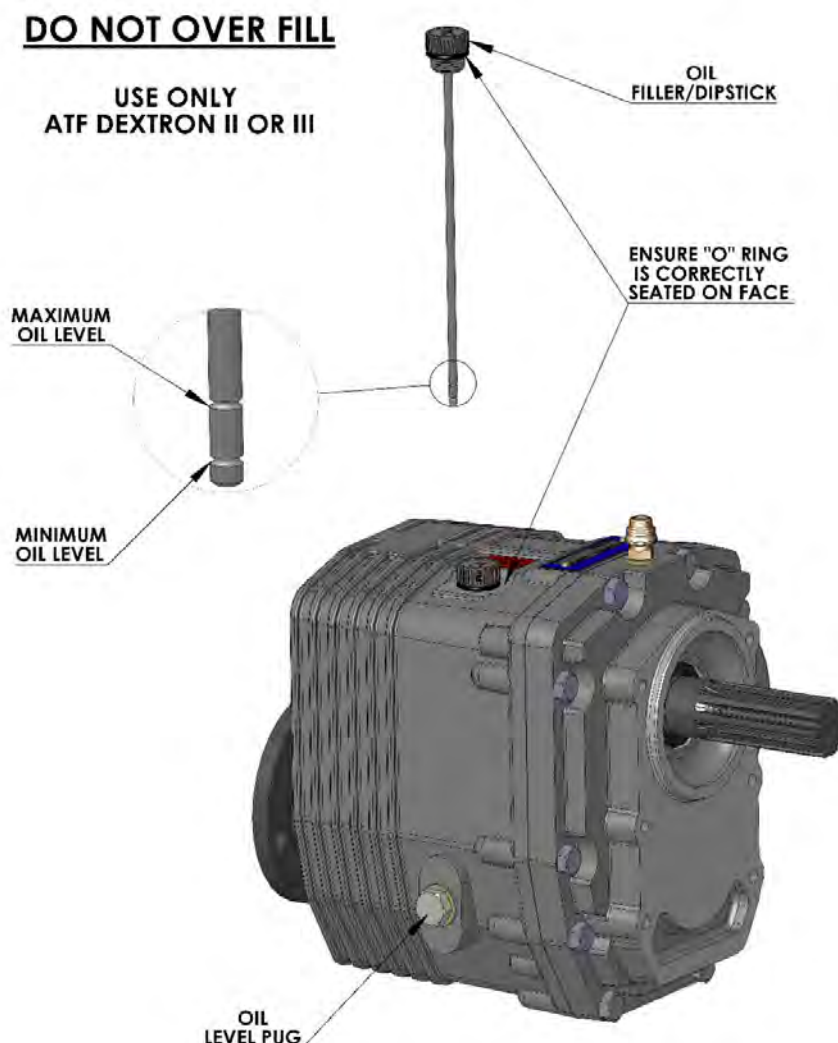
Always use ATF Dextron II or III for your gearbox

PRM125D

The PRM125D Gearbox is fitted with a Level Plug, as shown below. This should be used when re-filling the gearbox with oil after draining, to allow an easy and quick reference.

NOTE: When checking the oil level, ensure the Gearbox is in neutral, start and run the engine for a short time to circulate oil. Stop the engine and allow the oil to settle for 2 minutes. Check the oil level with the Dipstick.

NOTE: The Dipstick should be secured firmly when checking the oil level.



Freshwater Cooling System



New engines are supplied with the freshwater drained off.
The following instructions must be followed to fill the system.

- (a) Mix up in a clean bucket a solution of 50% anti-freeze/water mix.
- (b) Fill engine with the freshwater/anti-freeze solution through the top of the header tank with the filler/pressure cap removed.
- (c) Fill the header tank to the top of the filler neck and replace cap. Press down firmly on filler cap and hand tighten in a clockwise direction.

Note: for keeled cooled engines a larger volume of freshwater/anti-freeze mix is required depending on the size of the keel cooling tank – refer to the builder.

- (d) Run the engine for 5 minutes on no load (out of gear) and then check the coolant level. Top up if necessary.
- (e) Check the complete system for leaks, including the Calorifier circuit if fitted.

Note: for keel cooled engines it is very important to bleed all the air out of the system before the engine is run on load (check the boat builders' instructions).

- (f) If a Calorifier is fitted care must be taken to see that this is also full of coolant and all air is expelled. (see Calorifier notes in installation section)
- (g) Run the engine on one third speed for 15 minutes, preferably with the boat tied up. As the system warms up coolant may be expelled from the overflow pipe into the bilge. Stop the engine and allow the engine to cool down before removing the pressure cap and top up the coolant to 25mm below the filler neck.

Important

Removal of the pressure cap from a hot engine, can cause severe injury from hot coolant under pressure. Always allow the engine to cool and then use a large cloth when turning the cap anti-clockwise to the stop. This allows the pressure to be released. Press firmly down on the cap and continue to turn anticlockwise to release the cap.

- (h) Repeat (g) if coolant level is more than 25mm below the base of the filler neck when the engine has cooled down.
- (i) Run engine on $\frac{2}{3}$ speed for 20 minutes, check for leaks and repeat (g)
- (j) Anti-freeze solutions should be drained off every 400 hours or 2 years whichever is sooner, and replaced with a new solution, dependant on the type of Antifreeze used.



Engine water filler cap, integrated into the header tank.

Changing the Air filter

The Air filter should be changed every 400 hours, once per year or sooner if necessary.

The air cleaner fitted to the Canaline 38~60 marine engines, has a replaceable element, part no EP110529.

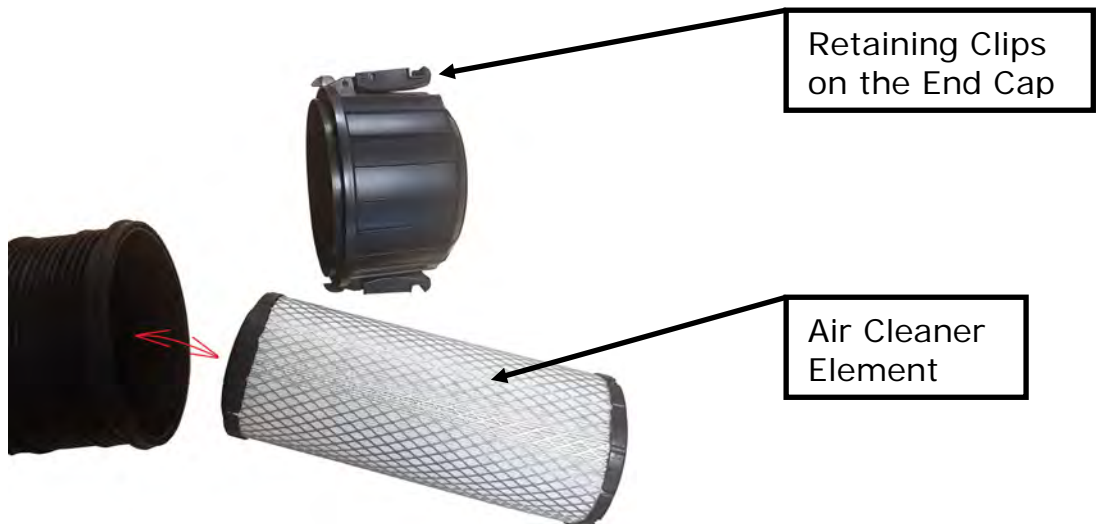
1. Remove Air cleaner lid, by unscrewing anti-clockwise.
2. Remove the old element.
3. Wipe the inside of the Air Cleaner Body clean.
4. Replace a new element.
5. Re-locate lid, and turn clockwise until it clicks.



Air Cleaner Element

The air cleaner fitted to the Canaline 70T marine engine, has a replaceable element, part no EP110550.

1. Remove Air cleaner lid, by unclipping the 2 retaining clips.
2. Remove the old element.
3. Wipe the inside of the Air Cleaner Body clean.
4. Replace a new element.
5. Re-locate lid, and secure with the 2 clips, ensuring the dust valve is facing downwards.



Retaining Clips on the End Cap

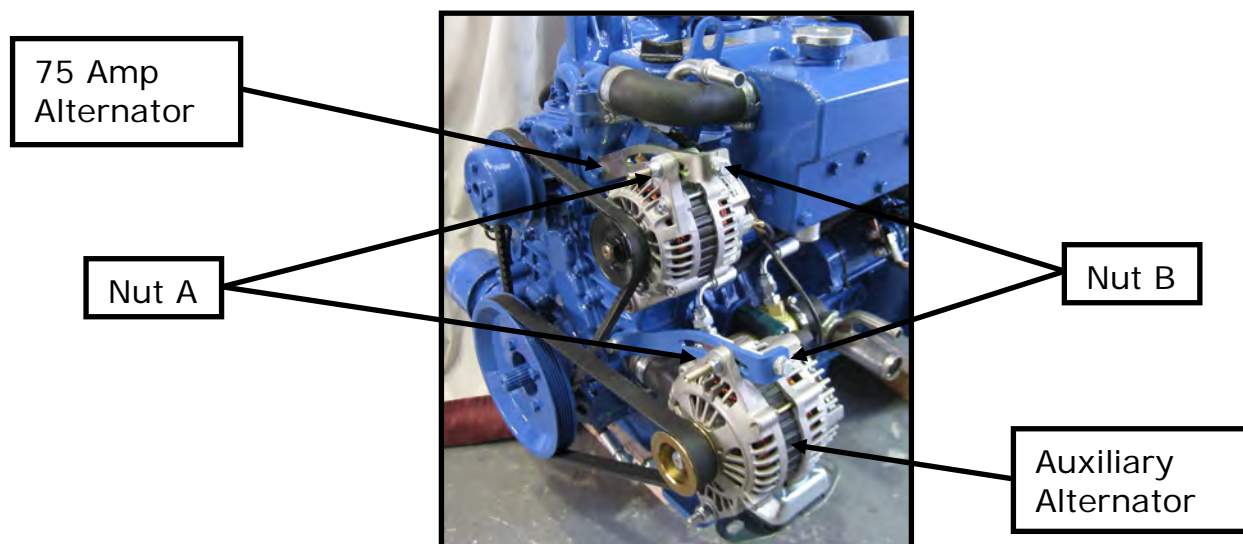
Air Cleaner Element

Alternator Drive Belts



It is important to check both alternator drive belts to ensure both engine performance and that batteries are charged

The 75 Amp alternator drive belt also drives the engine water pump.



To tighten both belts, please follow these instructions

1. Loosen nuts A
2. Use bolt B to tighten belt
3. Adjust accordingly
4. Retighten nut A after finish

Note: Low belt tension can result in engine overheating and insufficient battery charging. A belt that is too tight may cause bearing failure and belt life may be shortened

Note: 75 Amp Alternator fitted to the Canaline 38 engines are not fitted with a jacking bolt style tensioner link.

Engine Wiring Diagram Index

Engine Type

Drawing Number

Canaline 38 / 42 / 52 / 60 / 70T

Engine Wiring Loom	WD910524.2
Intermediate Engine Control Panel	WD910506.1
Deluxe Engine Control Panel	WD910507.1
Hirefleet Engine Control Panel	WD910559.2

Starter Battery.....

For all Canaline Engines in this manual we would recommend a minimum Starter Battery capacity of 700CCA / 100Ah

Starter Battery Cable Sizes...

The Starter Battery, should be positioned as close to the engine as is feasible, and safe.

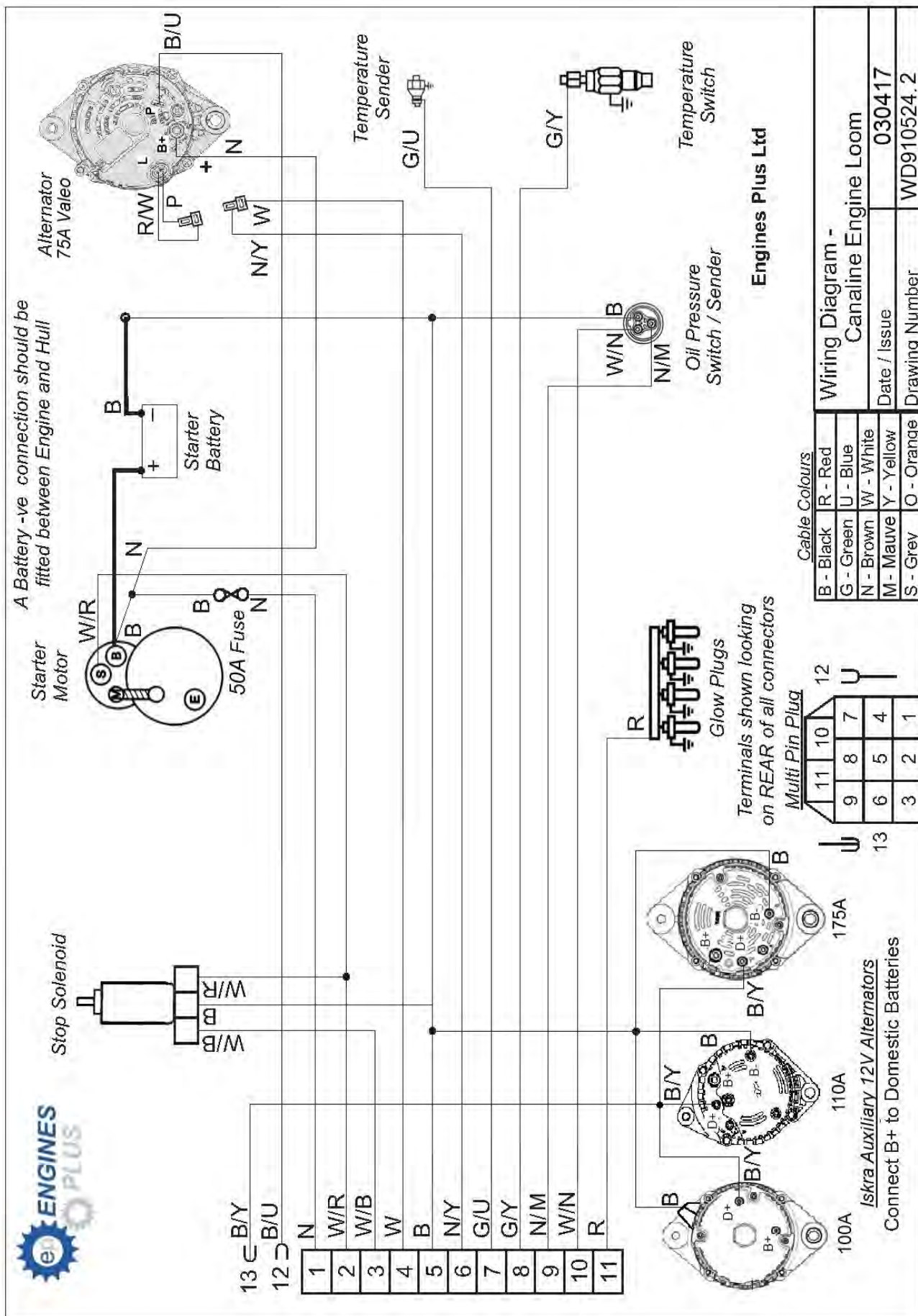
For all Canaline engines, where the TOTAL cable run, ie from Battery to the engine and back does not exceed ...

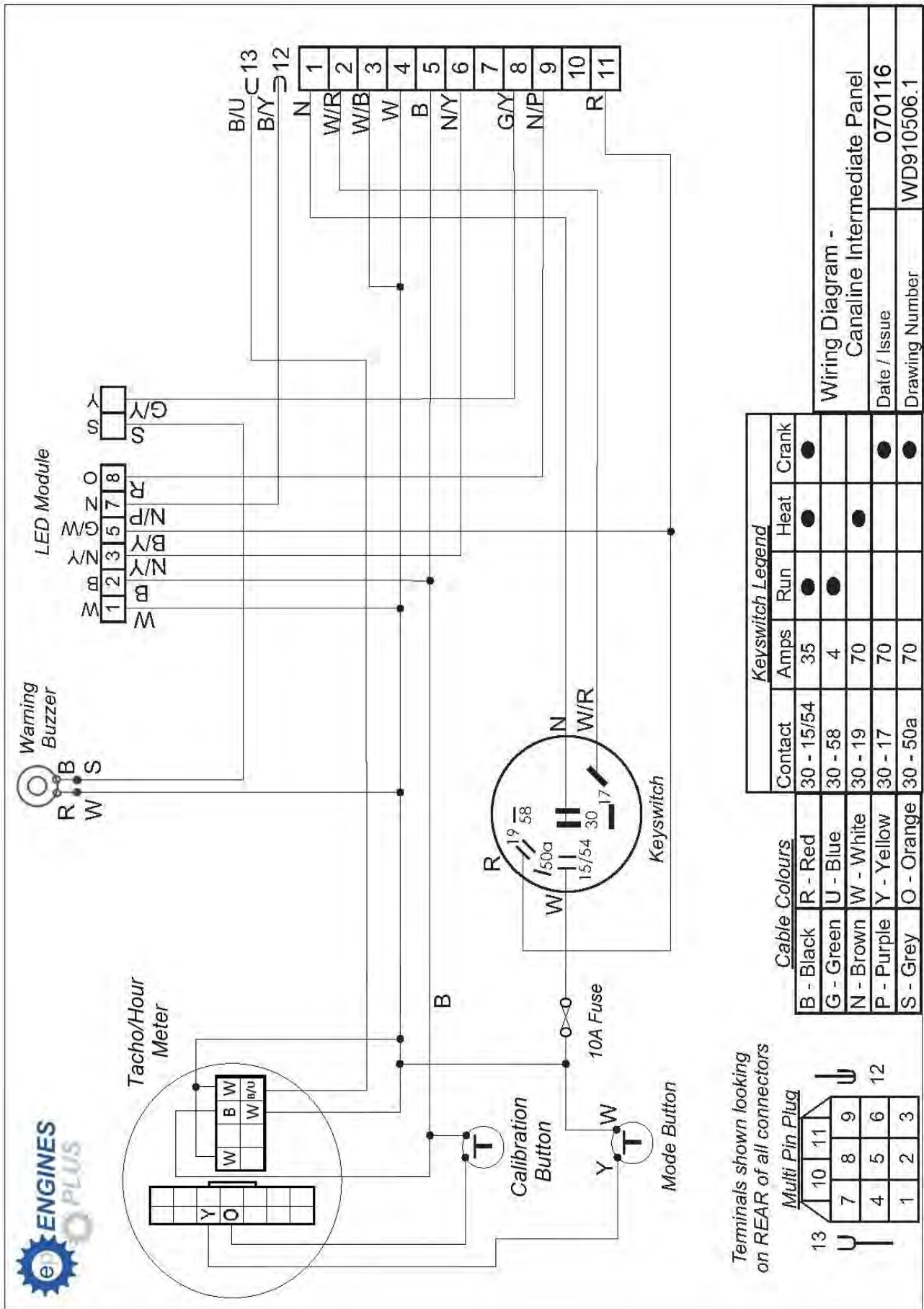
2.5m, use 25mm² cable.

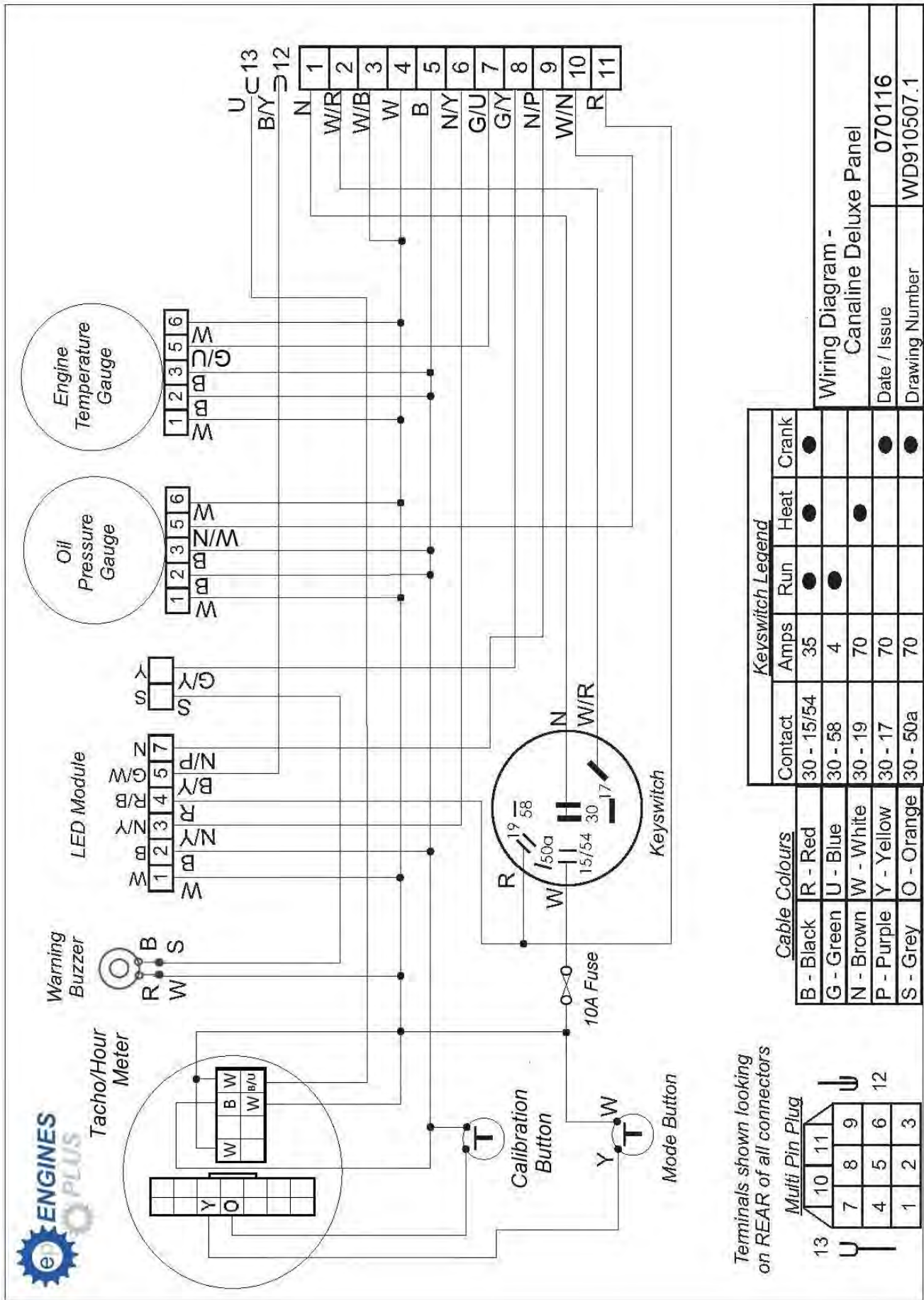
3.5m, use 35mm² cable.

7.5m, use 70mm² cable.

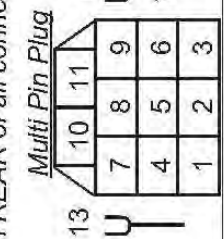
Battery Cables which are too small will create excessive voltage drop and may overheat and catch fire.





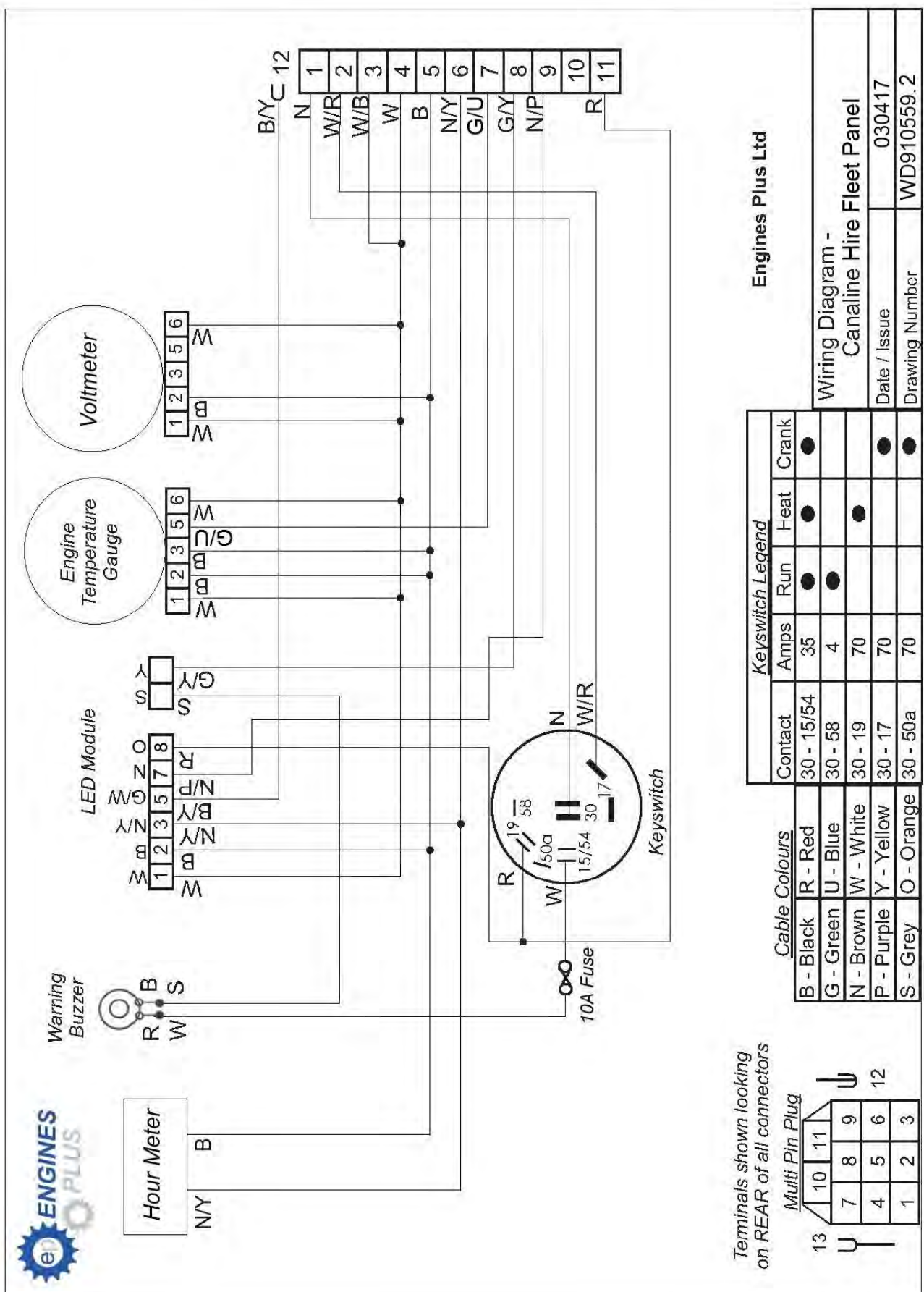


Terminals shown looking on REAR of all connectors



Cable Colours		Keyswitch Legend			
Contact	Amperes	Run	Heat	Crank	
B - Black	30 - 15/54	35	●	●	●
G - Green	30 - 58	4	●	●	●
N - Brown	30 - 19	70	●	●	●
P - Purple	30 - 17	70	●	●	●
S - Grey	30 - 50a	70	●	●	●

Wiring Diagram - Canaline Deluxe Panel	
Date / Issue	070116
Drawing Number	WD910507.1

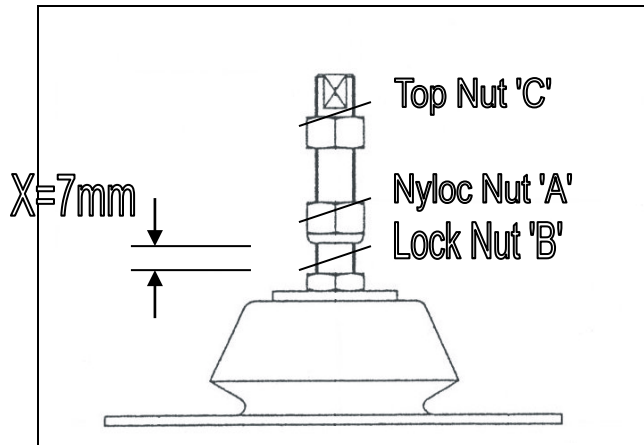


Marine Engine Installation Information

Anti-vibration Mount Installation

These mounts are supplied for use where accurate alignment is required, e.g. between the gearbox output shaft and propeller shaft on marine installations. They also provide isolation of the power unit, to minimise the transmission of vibration into the hull.

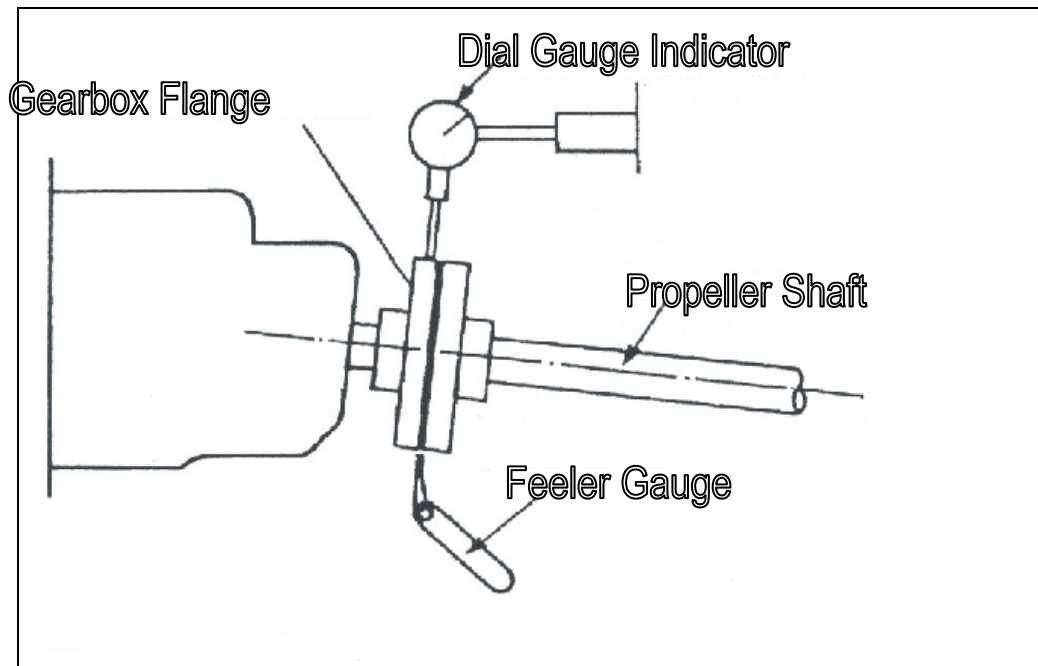
Assembly and adjustment is as below:



Set the gap 'X' between the lower face of the Nyloc Nut 'A' and the upper face of Locknut 'B' to 7mm.

1. Attach each mount to the engine bearers and secure by tightening Top Nut 'C'
2. Lower the propulsion unit, complete with mounts onto the beds or support structure, ensuring that the base of each mounts is fully seated. If any clearance between the underside of the mounts and beds is found, proceed as below:
3. (i) If the gap is less than 2mm, re-adjust Nyloc Nut 'A', until the base of the mount contacts the bed face.
(ii) If the gap exceeds 2mm, a separate packing piece / shim should be fitted.
4. Fit and tighten the bolts fixing the mounts to the bed. Tighten Top Nut 'C'. Alignment between the Gearbox and Propeller Shaft Flanges should now be checked, preferably using a dial indicator for concentricity and feeler gauges for angular misalignment (see sketch).

Adjust the alignment by raising or lowering the Nyloc Nut 'A', to achieve alignment within the limits of the Gearbox to Propeller Shaft Coupling, as specified by the manufacturer. If a rigid coupling is used, then it is suggested that eccentricity should not exceed 0.25mm (0.010") total indicator reading and, angular misalignment should be within 0.025mm (0.001") per 25mm of flange diameter.



Coupling alignment procedures should be re-checked after 10/15 hours of operation, during which time any "settling" of the system should have taken place. If this is not possible, the power unit should be raised approximately 1mm on each mount after completing the alignment procedure.

5. If the distance between the underside of Nyloc Nut 'A' and the top of Locknut 'B' exceeds 15mm, then a 5mm Packing Piece should be inserted between the base of the mount and top face of the beds. Nyloc Nut 'A' should then be adjusted to compensate.
6. Following any height adjustment on the mountings, alignment of the Coupling Flanges should be re-checked after tightening the Top Nut 'C' and Mount to Bed Bolts securely.

NOTE.....Locknut 'B' should NOT be loosened or adjusted at any time.

Exhaust System

Exhaust Back Pressure must remain within the limits specified in the Technical Data section, to maintain Emission Compliance. This figure should be checked at the Manicooler or Turbocharger Outlet Flange.

We recommend the use of the following Exhaust Silencer & piping size: ...
 Canaline 38, 42, 52 & 60... 1.5"BSP
 Canaline 70T... 2"BSP

Where Exhaust Systems incorporate turns, it is preferable to use bends rather than elbows, to minimise back pressure. A flexible bellows section should be fitted immediately after the engine exhaust outlet.

Calorifier Connection Points – CL 38/42/52/60/70T

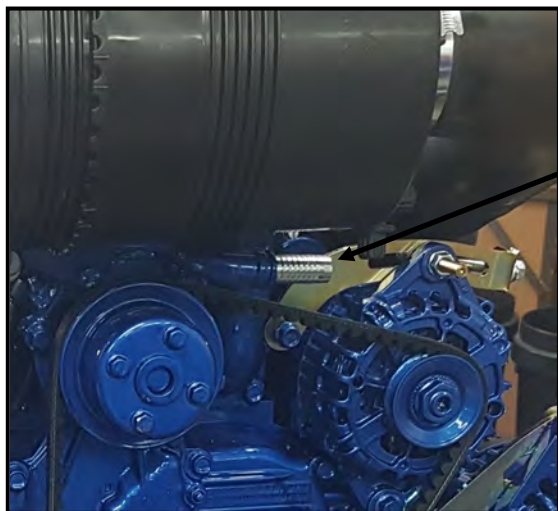
Calorifier connection points are as shown below. Connection stubs are provided and are suitable to accept 15mm (5/8") dia bore flexible hose. The hose must be secured with suitable hose clips to give a watertight connection capable of withstanding a water pressure of 15 psi. Hoses are not supplied by Engines Plus.



HOT WATER OUTLET
To Calorifier

WATER RETURN
From Calorifier

If no Calorifier is fitted, the connections must be blanked off, They MUST NOT BE CONNECTED DIRECTLY TOGETHER, Blanking plugs are available on request.



Canaline 70T
HOT WATER OUTLET
To Calorifier

Calorifier Position

The Canaline Marine range has been developed to operate with approximately 3m of piping between the engine and Calorifier, with a minimum number of bends and restrictions in this pipework. We recommend the Calorifier Inlet and Outlet connections be no more than 400mm above the top of the engine nor below the bottom of the engine sump.

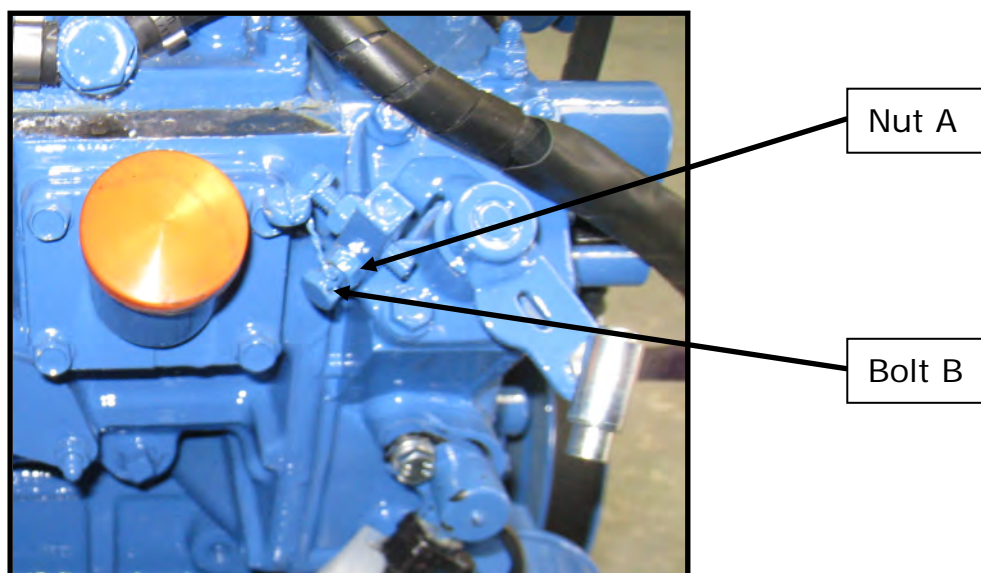
Provided these criteria are applied and the system is fully bled of air, then satisfactory performance should result.

Both Feed and Return connections are situated on the engine side of the Thermostat, and water is therefore allowed to circulate around the Calorifier Circuit at all times. It should be noted that during long periods of engine operation, when no hot water is drawn from the Calorifier, that the hot water temperature within could approach 80 degC. Under these circumstances, extreme care should be taken when using the hot water circuit.

Engine Idle Speed

The Canaline Marine engines idle speed should be set between 850 – 900 r/min, however this can be adjusted by the installer if the engine idle speed is incorrect without affecting the engines warranty.

To change idle speed, please adjust accordingly



Loosen nut A, and adjust idle speed with bolt B, then re-tighten nut A to lock the idle speed, please ensure the cable is then re-adjusted accordingly

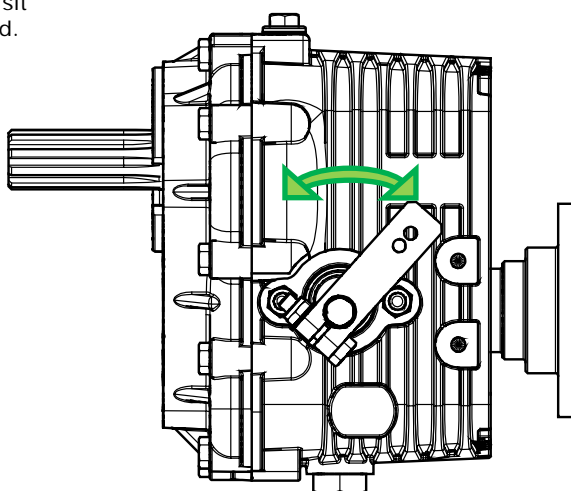
NOTE... where a Hydraulic Gearbox is fitted, the idle speed should be 850 r/min minimum, to maintain sufficient hydraulic oil pressure in the Gearbox.

PRM 125 Morse control cable installation

It is highly important the Morse control cable and lever installation is performed correctly, otherwise this may well lead to the early failure of your gearbox, which would not be covered by warranty.

Ensure the cable that operates the selector lever allows the lever to travel fully to the stops in the forward and reverse positions at all times, we would recommend that you use the inside hole on the lever to ensure the lever fully engages and keep the gearbox firmly in gear.

The lever has a section of over throw that the lever should sit in when the gear is selected.



The adjustment should be regularly checked as cables can stretch.

Laying-up procedure for Canal Boat Marine Engines

Where an engine is to be standing idle for periods of over 6 months consideration should be taken to minimise the deterioration of components.

The engine should be stored in a clean, dry environment, which is free from frost and damp. It is best stored in its delivered state from Engines Plus Ltd.

If the engine is to be installed and not used, it is best that the engine is not run prior to its lay-up. The vessel containing the engine should be stored in a dry, frost free environment.

When storage for above 6 months is necessary, then the engine should be inhibited. Failure to do so could promote corrosion internally. Contact Engines Plus Ltd for more details.

Parts Bulletin for Canal Boat Marine Engines

Engine Type : <i>Kioti Engine designation</i>	<u>Canaline 38</u>	<u>Canaline 42</u>	<u>Canaline 52</u>	<u>Canaline 60</u>	<u>Canaline 70T</u>
	4A200LWS	4A200LWS	4A220LWS	4B243LWS	4B243TLWS
Oil Filter Element	E6201-32443				
Fuel Filter Element	E4682-43172				
Air Filter Element	EP110529				EP110550
Thermostat	E5800-73011				
Fan Belt - A section	E6300-72532			E5800-72531	
Starter Motor	E5500-63016				
75 Amp Alternator	E7251-64011				
100 Amp Auxiliary Alternator	EP910655	N/A			
110 Amp Auxiliary Alternator	N/A	EP910586			
175 Amp Auxiliary Alternator	N/A	EP910346			
Glow Plugs	E6301-65512				
Oil Pressure Switch	E5500-39013				
Oil Pressure Switch / Sender	EP910039				
Engine Temperature Switch	EP910512				
Engine Temperature Sender	EP910041				
Top Hose	EP410511				EP410693
Aux Alt Drive Belt (80 / 100 A) - A Sec	EP810975	N/A			
Aux Alt Drive Belt (110/175 Amp)	N/A	EP811065			
Engine Oil - 5 Litre	EP710008				EP710560
Engine Oil - 25 Litre	EP710009				EP710561

Genuine Parts

In order to protect your engine warranty, only Genuine Canaline parts must be used. These parts are available from our Dealer Network, or direct from Engines Plus Ltd.

Engines Parts – Availability

All engines parts are available through your local dealer or direct from Engines Plus Ltd.

Our latest dealer network is available on our website – www.canaline-engines.co.uk .

Alternatively, all our fastmoving consumable spares are available to order on line at

www.enginesplus.co.uk/product-category/canaline-engine-spares/

Servicing of the engine

We would always recommend that the engine is serviced by a qualified engineer. We have Dealers and Mobile Service Engineers, see website - www.canaline-engines.co.uk for the latest information.

EU Declaration of Conformity for Recreational Craft Propulsion Engines
Exhaust Emission Certification to the requirements of Directive 2013/53/EU.

Name of Engine Manufacturer:	Daedong Industrial Co Ltd.
Name of Authorised Representative:	Engines Plus Ltd
Address of above:	Unit F, The Aquarius Centre, Edison Road, Waterwells Business Park, Quedgeley GL2 2FN. UK
Name of the Notified Body for Exhaust Emission assessment:	TUV SUD Product Service Gmbh
Address of above:	Ridlerstrabe 65, 80339 Munich, Germany

This declaration of conformity is issued under the sole responsibility of the manufacturer, the private importer or the person referred to in Article 19(3) or (4) of Directive 2013/53/EU.

Engine Model	Engine Family	EC-Type examination Certificate
Canaline 38	4A200 3016-2613	SBSA 103241 0001 Rev. 00
Canaline 42	4A200 3016-2613	SBSA 103241 0001 Rev. 00
Canaline 52	4A220 3415-2613	SBSA 103241 0001 Rev. 00
Canaline 60	4B243 3617-2613	SBSA 103241 0002 Rev. 00
Canaline 70T	4B243T 4421-2623	SBSA 103241 0003 Rev. 00

The object of the declaration described in point 4 is in conformity with the relevant Union Harmonisation Legislation: 2013/53/EU.

References to the relevant harmonised standards used or references to the other technical specifications in relation to which conformity is declared: Conformity of the engines above is declared in accordance with Exhaust Emissions Type Approval to RCD2.

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 2013/53/EU 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.

Signed for on behalf of Engines Plus Ltd



Name: Mr H Beavis, Managing Director

(Identification of the person empowered to sign on behalf of the engine manufacturer or his authorised representative)

Date: 05/04/2019

Ref: RCD DofC 2013/53/EU Iss 3

Emission Durability Statement for Recreational Craft Propulsion Engines
As referred to in Directive 2013/53/EU Annex 1/B/3

Provided engines are installed in accordance with the installation and maintenance instructions contained in the Owner's Manual, then engines will continue to comply with the Emission Certification as specified in Directive 2013/53/EU Annex 1/B/2.2 throughout the normal life of the engine and under normal conditions of use.

Normal life of the engine for CI engines in Directive 2013/53/EU Annex 1/B/3 is defined as 480 hours or 10 years, whichever occurs first.

Compliance will depend on many factors, such as Installation, Ventilation, Fuel and Lubricants, Maintenance and the mode of operation and storage.

Fuels and Lubricants should conform to the specifications contained in the Owners Handbook.

Fuel settings on the engines are protected with Tamperproof Caps. Should any adjustment be made to these settings, then Emissions Compliance, and compliance to the Directive will be invalidated, as will any Warranty or Guarantee on the engine.

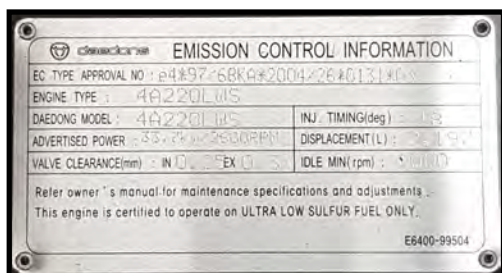
Exhaust systems are not generally supplied by Engines Plus Ltd, but must meet the specifications in the Owners Handbook. Particular attention should be paid where multiple bends, and especially elbows, are fitted. Allowance must be made for these. Back Pressures stated should be measured at the Engine Exhaust Outlet Flange. This is at the Manicooler or, where applicable, the Turbocharger Outlet.

To maintain the manufacturer's Warranty, and Emission Compliance only Genuine Replacement Parts should be used. It is the responsibility of the owner to ensure regular maintenance is carried out competently, in accordance with the guidelines in the Owners Handbook

Where engines are to be unused for a period of more than 6 months, they should be "laid up" according to the guidelines contained in the Owners Handbook. Failure to do so may lead to deterioration of components, resulting in reduced performance, and possible non-compliance of the Directive.

From experience of engines operating under the RCD over many years, with correct maintenance and operation, we have found that performance is maintained, and durability will far exceed that specified in the Directive.

Emissions Compliance Plate ~ attached to Rocker Cover.



Date: 2016/11/01

Ref: RCD Emission Durability 2013/53/EU Iss 1

Warranty Terms and Conditions

INTRODUCTION

Your new Canaline Marine Engine is covered by the Engines Plus Ltd warranty according to the conditions and instructions contained within this document.

Engines Plus Ltd warranty covers only the engine and its ancillary parts. /
The gearbox is covered by the gearbox manufacturer's warranty.

OWNER'S OBLIGATIONS

The operation, maintenance and care of your Canaline Marine engine, in accordance with the instructions and requirements listed in your Operators Manual, is your responsibility. Records should be kept of all maintenance services performed, including engine oil and filter changes. This record of correct maintenance is required for the purpose of determining warranty coverage on repairs and should be transferred to each subsequent owner.

It is your responsibility to ensure that the warranty registration is completed (self-certification) and returned to Engines Plus Ltd, as this information forms part of the validation of your engine warranty.

The warranty registration must be returned completed to ensure the warranty on your engine is valid, this is the responsibility of the owner.

REPORT OF A DEFECT

It is the responsibility of the owner of any Canaline product referred to herein to report any defect to Engines Plus Ltd, Distributor, Dealer, Workshop or Boat builder. Such a report must be made as soon as possible and no later than fourteen (14) days from the date when the user first observed the defect.

WARRANTY TERMS AND CONDITIONS

1.0 In the event that Goods supplied are defective in that they have a defect that existed at the time of delivery, Engines Plus Ltd shall (at its option) meet the cost of replacing or repairing such defective Goods or part thereof subject to the following: -

- 1.1 Labour costs will be paid in accordance with Engines Plus Ltd's standard repair times and standard rates, which are agreed upon before work is carried out.
- 1.2 Engines Plus Ltd has the sole discretion to determine whether the Goods shall be returned to Engines Plus Ltd's premises or repaired at any other location, which Engines Plus Ltd may nominate.
- 1.3 Engines Plus Ltd will pay for lubricating oil, coolant concentrate, filter elements, belts, hoses, gaskets and other maintenance items that are not reusable due to such defect. (at its discretion)
- 1.4 Only distributors, dealers or workshops authorized by Engines Plus Ltd may carry out warranty repairs.

- 1.5 No incidental, consequential or related costs such as costs for travelling, transport, extra costs due to the installation in making the products accessible, docking or cranes, loss of use, loss of income, loss of time, loss of profits or damages of any other parts or goods shall be payable under this condition 1.0 by Engines Plus Ltd.
- 2.0 The warranty in condition 1.0 above does not cover Goods which in Engines Plus Ltd's opinion have been damaged during transportation, installation or repair or through abnormal use, overload, carelessness, insufficient lubrication, normal wear, use of spare parts other than genuine parts approved by Engines Plus Ltd or through any type of incorrect installation, abuse, misuse, accident or through neglect or failure to follow instructions in the applicable owner's manual, maintenance instructions or installation instructions.
- 3.0 The warranty in condition 1.0 above will be void if You or your representative, employees or contractors have taken abnormal risks or if modifications have been performed, which in the judgement of Engines Plus Ltd have caused or enhanced the damage, or if the security seals have been broken, or settings altered, or if the Goods or any part thereof have been used in violation of the law, or for an unintended purpose.
- 4.0 The warranty does not cover expendable parts, such as all kinds of filters, belts, gaskets, rubber hoses, fuses, brushes, etc and lubricants.
- 5.0 The operation, maintenance and care of the Goods in accordance with the instructions and requirements listed in the owner's manual and the warranty and service booklet provided by Engines Plus Ltd is your responsibility. Records must be kept of all maintenance services performed, including engine oil and filter changes. This record of proper maintenance is required for the purpose of determining warranty coverage on repairs and should be transferred to each subsequent owner of the Goods.
- 6.0 All warranty claims must be advised to Engines Plus Ltd prior to work being carried out, and an authorisation number being allocated, to the distributors, dealer or authorized by Engines Plus Ltd workshop. No claims for warranty will be accepted unless previously authorised by Engines Plus Ltd.

7.0 The period of cover relating to the warranty in condition 1.0 above is as follows: .

	MULTIUSER or HIRE USE	PRIVATE USE
Pleasure boats	The earlier of either 18 months from the date of despatch from Engines Plus Ltd's factory or 12 months or 2,000 hours from engine installation	The earlier of either 42 months from the date of despatch from Engines Plus Ltd's factory or 36 months or 1,500 hours from engine installation
Pleasure boats Electrical equipment and turbocharger	As above	12 months or 1,500 hours
Work boat engines and associated products	The earlier of either 18 months from the date of despatch from Engines Plus Ltd's factory or 12 months or 2,000 hours	The earlier of either 18 months from the date of despatch from Engines Plus Ltd's factory or 12 months or 2,000 hours
Gearbox	This is covered by the gearbox manufacturer, please consult the gearbox operators handbook	

8.0 Save where the Goods are sold to a person dealing as a consumer (within the meaning of the Unfair Contract Terms Act 1977) all warranties conditions or other terms implied by law or custom are excluded to the fullest extent permitted by law.

9.0 Engines Plus Ltd shall under no circumstances be liable for any indirect or consequential loss, loss of profits, loss of savings, loss of business or loss of contract. Engines Plus Ltd's liability whether in contract, tort (including negligence), breach of statutory duty or otherwise shall not exceed the price of the Goods in respect of which any claim arises PROVIDED THAT nothing in these Conditions shall restrict or exclude Engines Plus Ltd's liability for death or personal injury caused by its negligence.

Service Record

Proof of Service – 50 Hour	Actual Engine Hours:
Date:	Dealer:
Proof of Service – 250 Hour	Actual Engine Hours:
Date:	Dealer:
Proof of Service – 500 Hour	Actual Engine Hours:
Date:	Dealer:
Proof of Service – 750 Hour	Actual Engine Hours:
Date:	Dealer:
Proof of Service – 1000 Hour	Actual Engine Hours:
Date:	Dealer:
Proof of Service – 1250 Hour	Actual Engine Hours:
Date:	Dealer:
Proof of Service – 1500 Hour	Actual Engine Hours:
Date:	Dealer:



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