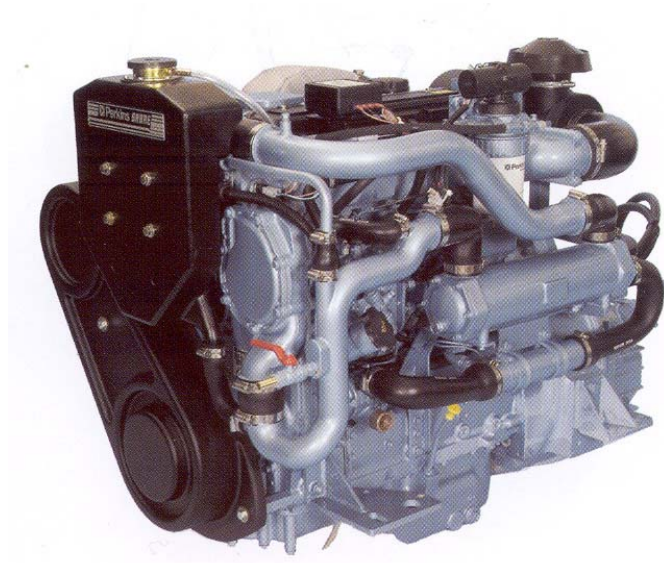




Customer Information Pack

Perkins Sabre M92B



September 2008



Perkins Sabre M92B

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- q Installation Data
- q General Arrangement Drawings
- q Power Curve
- q Testimonials



Diesel Engine - Marine Propulsion Engine M92B 64 kWm 2400 rev/min

The M92B engine is the successor to the very successful M92. It has been inspired by and led by the future requirements of our customers to meet the needs of the marine industry.

Built to the most demanding standards, the M92B engine meets all the requirements of both EC Stage 2 and USA EPA Tier 2 off-highway emissions legislation from 2004 and brings significant improvements over its predecessor, the highly successful M92.

The M92B is a quiet 4.4 litre unit delivering improved performance and reduced operating costs in an efficient package ideal for a range of marine applications.

Class leading performance

The M92B provides an increase in torque capability over its highly successful predecessor. Improvements have also been made to the torque curve of the engine to give up to 12% more low speed torque with torque back up, increasing to 26%.

Cleaner and quieter

The M92B operates with smoke levels barely visible to the naked eye. Improvements of up to 3dBA have also been made to bare engine noise over its predecessor. Concentrating on reduced noise levels throughout the complete operating range of the engine from idle through to full load rated speed. This has been achieved through numerous individual product developments, including a new cylinder block design and developments to the front end gear train.

Quality by design

Product design and manufacturing process improvements have been implemented from concept to enhance both engine reliability and durability. Perkins Sabre have also taken the opportunity to improve the 'design for assembly' through simplified sub-assemblies and improved joint and sealing technologies.

Ease of installation

The changeover for existing M90/M92 to EC Stage 2 and USA EPA Tier 2 product is made easy through the carryover of existing envelope size and mounting points therefore minimising installation issues in repowering projects.

Lower operating costs

Service intervals are now set at 500 hours as standard and the warranty period has been extended to 2 years with 3 years on majors. In addition, fuel economy has improved by as much as 6%.

Product support

Total worldwide service continues to be provided through a network of 4000 distributors and dealers. This is enhanced by the introduction of TIPSS (The Integrated Parts and Service System) which represents a step change in diesel engine support. TIPSS enables customers to electronically specify and order parts as well as service electronic and mechanical engine with online guides and service tools.

designed to perform... delivered with choice

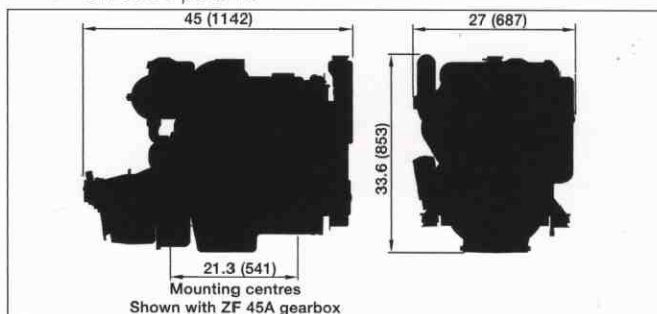
M92B

Standard Engine Specification

- Base engine
- Fresh water heat exchanger cooled engine with gear driven self priming raw water and fresh water pumps or keel cooling adaption
- Fresh water cooled exhaust manifold, intake manifold and heat exchanger
- Air intake filter
- High inclination engine sump with sump drain pump
- Inverted spin-on element lub oil filter
- Transmission oil cooler
- Totally enclosed engine breather
- High mounted single element fuel filter
- Manual control adaption parts
- Alarm switches and warning siren

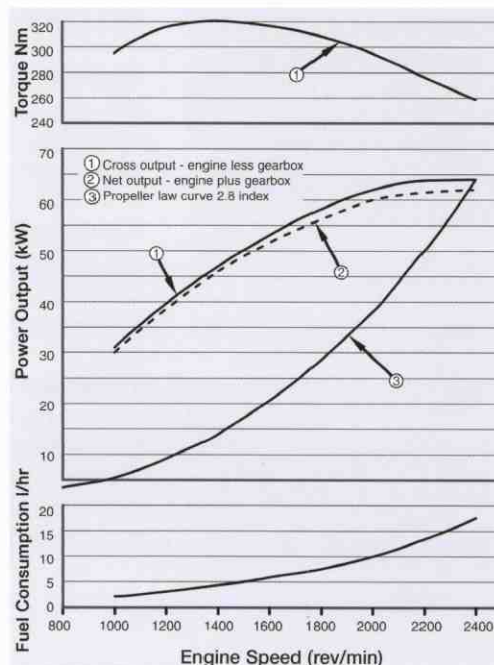
Optional Equipment

- **Backends** – suitable for a range of transmissions
- **Marine Transmissions** (Standard)
 - Hurth HSW 450A
 - Newage PRM 500D / PRM 260D
 - Borg Warner 72C
- **Electrical**
 - 12 volt insulated
 - 24 volt insulated
- **Exhaust Outlets**
 - Water injected outlet
 - Dry exhaust flange
- **Instrumentation** – single and dual station instrumentation including audible and visual alarms with gauges, senders, switches, loom and varying lengths of interconnecting cables. Simple tachometer panels are also available
- **Power Take Off** – crankshaft PTO extension shaft with pulley drives
- **Mountings** – solid mounting brackets – flexible engine mountings with alignment shims, optional brackets and flexible mountings
- **Miscellaneous**
 - Keel cooling option
 - Belt cover
 - Solid or flexible output couplings
 - Engine mounted electro-magnetic bilge pumps
 - Fuel pre-filter with water alarm
 - Flexible fuel feed and return pipes
 - Calorifier connections
 - Tool kit
 - On-board parts kit



General Data

Bore / Stroke	105mm x 127mm
Cubic Capacity	4.4 litres
Cycle	4 stroke
Number of Cylinders	4 in-line
Aspiration	Naturally aspirated
Combustion System	Direct injection
Engine Rotation	Anti-clockwise viewed from rear
Fuel Pump	Delphi rotary with electric stop
Engine Operating Angles	Maximum continuous operating angles 20° front up; 25° sideways (35° sideways intermittent operation).
Power Take Off	Available from front end drive (for drive limitations refer to Sabre Engines Ltd)
Wet Weight	423kg engine only 460kg with Hurth HSW 450A 504kg with PRM 500D



Perkins Engines Company Limited

For more information regarding the product please contact:
 Wimborne Marine Power Centre
 22 Cobham Road, Ferndown Industrial Estate
 Wimborne, Dorset, BH21 7PW
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 Fax: +44 (0) 1202 851700
 Email: Wimborne_MPC_post@cat.com
 www.perkins-sabre.com

Perkins Sabre M92B Installation Data



Basic Technical Data

Rated power (gross)	64 kW (85.6 bhp) to ISO8665 standards
Rated engine speed	2400 rev/min
Number of cylinders	4
Cylinder arrangement	Vertical in-line
Cycle	4 stroke
Induction system	Naturally aspirated
Combustion system	Direct injection
Bore	105.0 mm (4.13 in)
Stroke	127 mm (5.00 in)
Compression Ratio	18.23:1
Cubic Capacity	4.4 litres (269 in ³)
Direction of rotation	Clockwise viewed from front
Firing order	1, 3, 4, 2
Total weight (wet)	423 kg (933 lbs) engine only 460 kg (1014 lbs) with Hurth HSW 450A gearbox 504 kg (1111 lbs) with PRM 500D gearbox

Cooling System

Recommended coolant inhibitor	Sabre Extended Life Coolant 50/50 Mix
Fresh water flow at rated speed	193 litres/min (42.5 UK gal/min; 51 US gal/min)
Coolant pump drive type	Gear driven
System capacity	19 litres (4,18 UK gal; 5.02 US gal)
Pressure cap setting	50 kPa (7 lbf/in ²)
Protection switch setting	96°C (205°F)
Sea water pump type	Jabsco 25.4 mm (1 in)
Sea water suggested inlet hose internal diameter	32 mm (1.25 in)
Minimum sea cock size	Full flow 25.4 mm (1 in)
Sea water strainer	A sea water strainer must be included in the suction side of the circuit
Maximum sea water temperature	38°C (100°F)
Sea water flow at rated speed	98 litres/min (21.5 UK gal/min; 25.9 US gal/min)

Fuel System

Recommended fuel specification	BS2869 Class A2 - D975-91 Class 2-2DA
Fuel injection pump	Bosch EPVE
Governor type	Mechanical
Fuel lift pump	Electrical
Pipe sizes:	
• Fuel feed pipe - outside diameter	8.0 mm (0.313 in)
• Fuel feed pipe - bore	6.5 mm (0.26 in)
• Return fuel pipe - outside diameter	6.35 mm (0.25 in)
• Return fuel pipe - bore	4.93 mm (0.194 in)
Maximum fuel lift pump lift	1,500 mm (60 in)
Fuel consumption at full power	17.62 litres/hr (3.88 UK gal/hr; 4.65 US gal/hr)

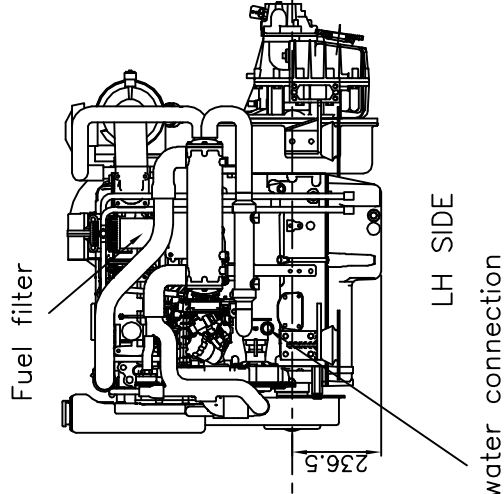
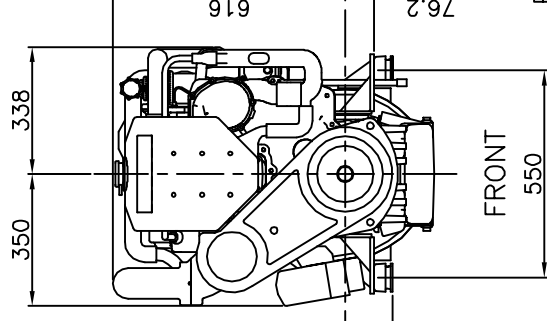
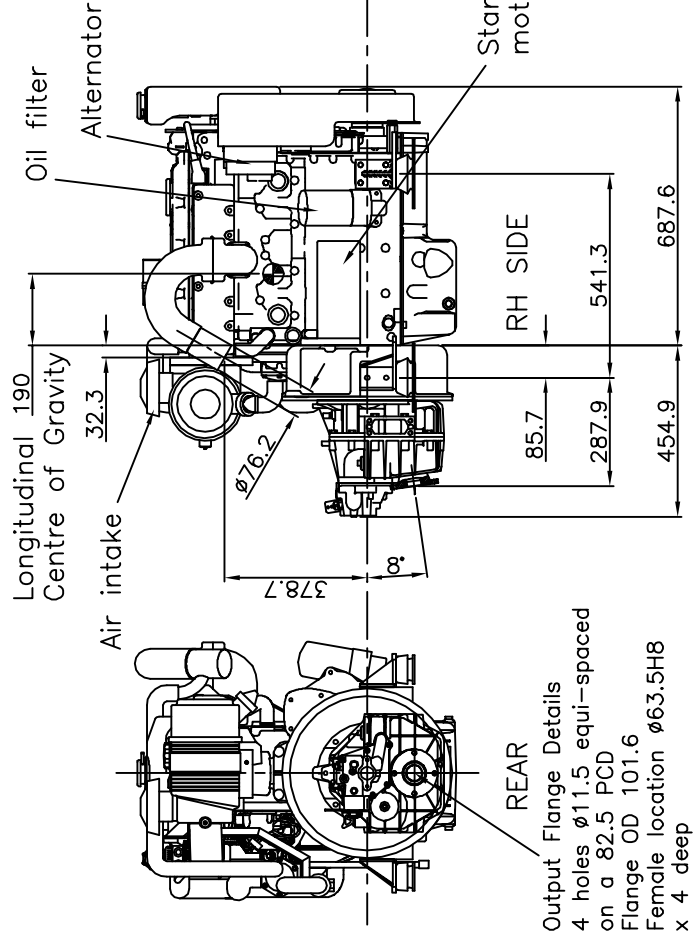
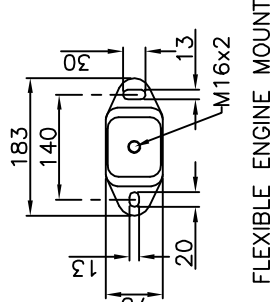
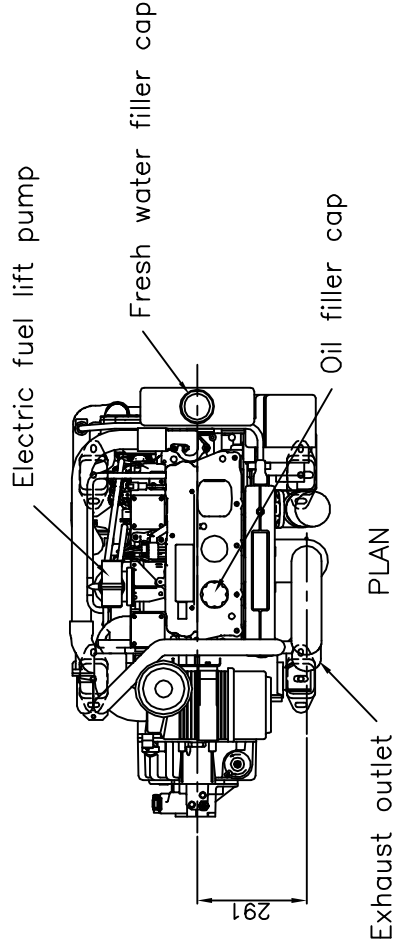
Air Intake

Combustion airflow	4.2 m ³ /min (148 ft ³ /min)
Maximum engine compartment air temperature	60°C (140°F)
Maximum air temperature at engine inlet	52°C (126°F)
Ventilation - maximum engine room depression	125 mm WG (5 in WG)
Suggested ventilation airflow including combustion air	8.4 m ³ /min (296 ft ³ /min)
Minimum cross-section of air duct (per engine)	139 cm ² (21,5 in ²) for temperate climates 277 cm ² (42,9 in ²) for hot climates

Exhaust System								
Exhaust gas flow				12.3 m ³ /min (434 ft ³ /min)				
Maximum restriction measured within 305 mm (12 in) of outlet at maximum rated speed				15 kPa (4.43 in Hg; 112 mm)				
Recommended exhaust pipe bore (wet exhaust system)				76 mm (3 in)				
Minimum rise from sea water level to exhaust outlet centre line				203 mm (8 in)				
Lubricating Oil System								
Recommended lubricating oil				AP1 CG4/CH4, ACEA E3/E5 (for approved oil change periods up to 500 hours)				
Sump capacity maximum				7 litres (12.3 UK pints; 7.4 US quarts)				
Total capacity				9.25 litres (16.3 UK pints; 9.8 US quarts)				
Maximum installation angle plus planing angle for continuous operation				20° nose up				
Heel angle to port or starboard (standard sump)				25° continuous, 35° intermittent				
Oil pressure in operating speed range				3.0 to 3.7 bar (43.5 to 54 lbf/in ²)				
Low oil pressure switch setting				0.8 bar (12 lbf/in ²)				
Electrical System								
Alternator type (insulated)				Prestolite AS128e – 12 volt (90A) or 24 volt (55A)				
Starter Motor type (insulated)				Prestolite S115 12 and 24 volt				
Number of teeth on flywheel				126				
Number of teeth on starter motor				10				
Cold Start Limits								
Minimum cold start temperature				-10°C 1 off 12 volt 520 amp to BS 3911 2 off 12 volt 440 amp to BS 3911				
Without aid								
Batteries								
				12 volt system				
				24 volt system				
Note								
Where starting at temperatures below freezing is an important requirement, a 24 volt system is the preferred choice								
Starter Cables								
Starter Cables for 12 or 24 Volt Systems								
Maximum Total Length*		Cable Size Metric	Nominal Cross Sectional Area		Nominal Resistance in Ohms		Approximate Equivalent Size	
Metre	Feet		mm ²	in ²	Per Metre	Per Foot	English Imperial	America B&S SAE
5,6	19.00	61/1,13	61	0.0948	0,000293	.0000890	61/.044	00
9,0	28.30	19/2,52	95	0.1470	0,000189	.0000600	513/.018	000
*The length of all cables in the starter circuit (whether positive or negative), should be added together to give the 'Total Length'								
Power Take Off								
Axial power take-off from front of crankshaft pulley				Full load through the engine speed range				
Belt driven auxilliaries from crankshaft power take-off pulley				Contact Sabre Engines Ltd for details and approval				

Perkins Sabre M92B Marine Diesel Engine
shown with ZF 45A gearbox with reduction ratios
up to and including 2.03:1 (550mm transverse mounting centres)

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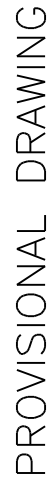
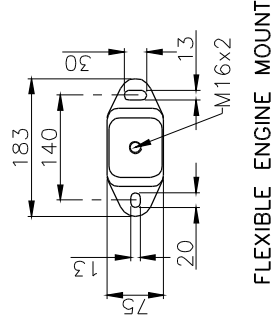
Output Flange Details
4 holes $\phi 11.5$ equi-spaced
on a 82.5 PCD
Flange OD 101.6
Female location $\phi 63.5H8$
x 4 deep

PROVISIONAL DRAWING

Rev 1 - C of G & widths added - 20.10.05 - GM

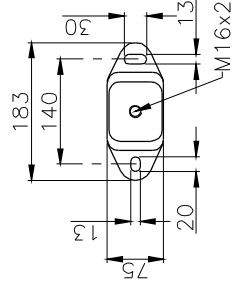
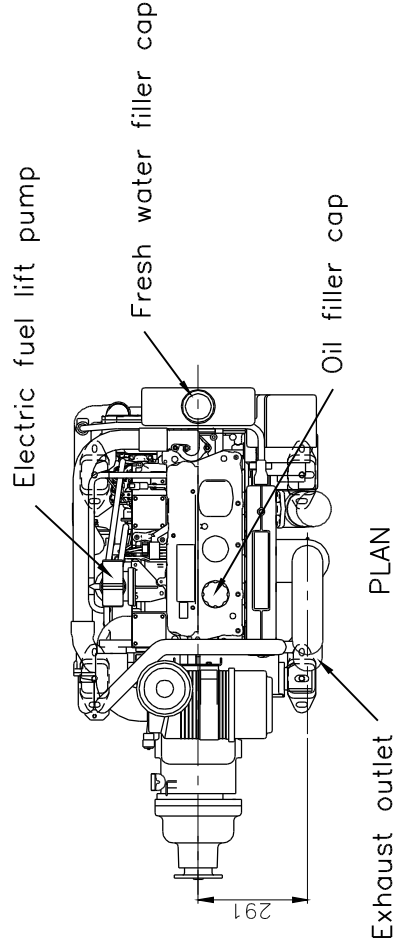
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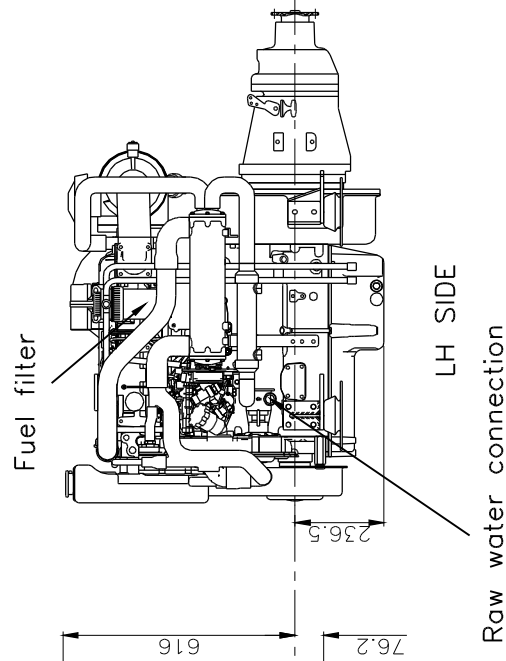
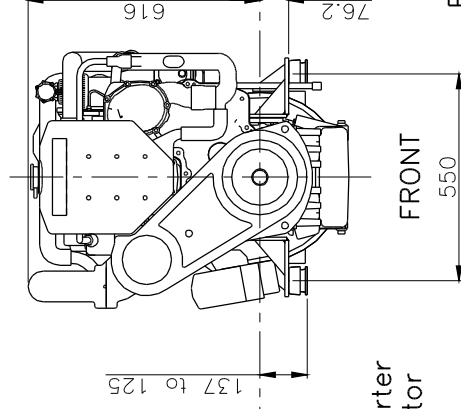
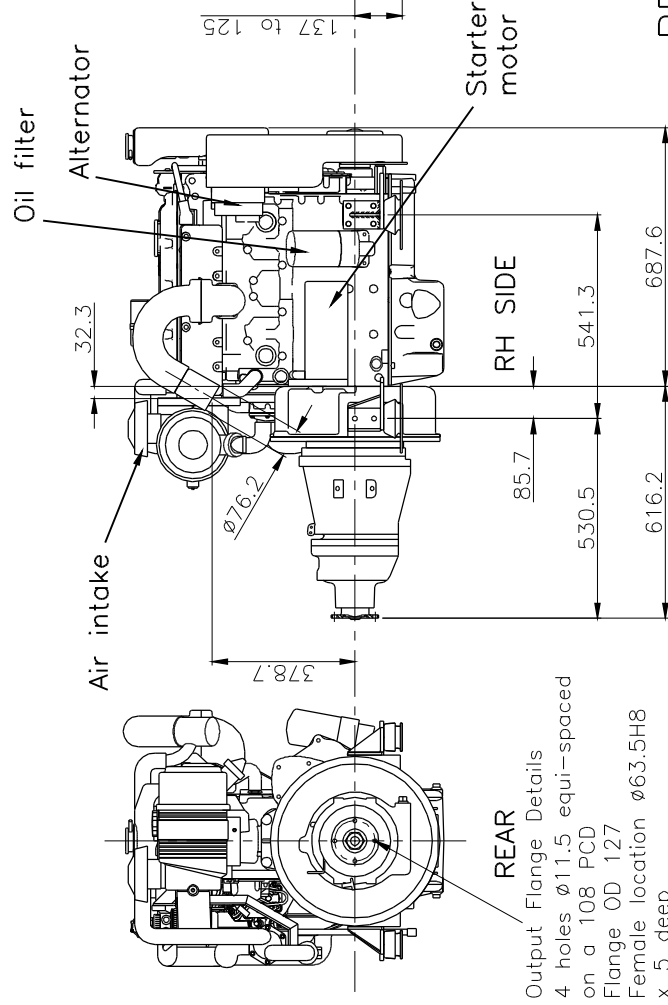


Perkins Sabre M92B Marine Diesel Engine
shown with Borg Warner 72CR gearbox with reduction ratios
up to and including 2.10:1 (550mm transverse mounting centres)

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FLEXIBLE ENGINE MOUNT



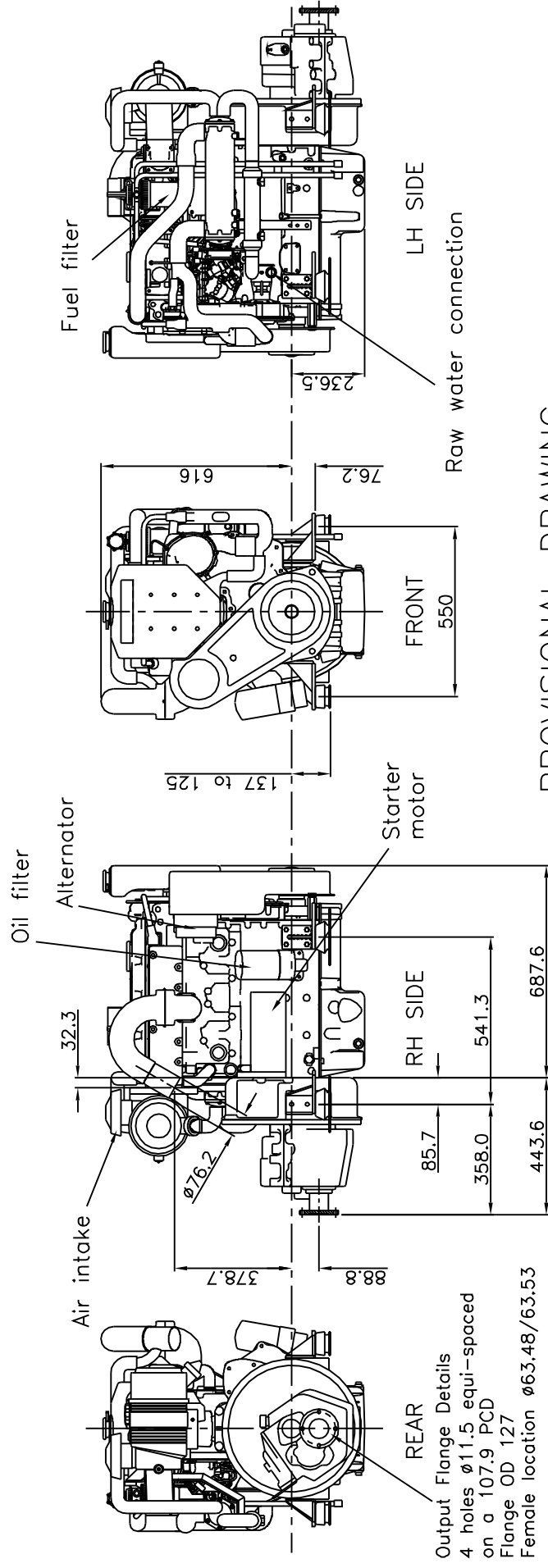
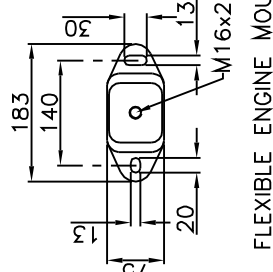
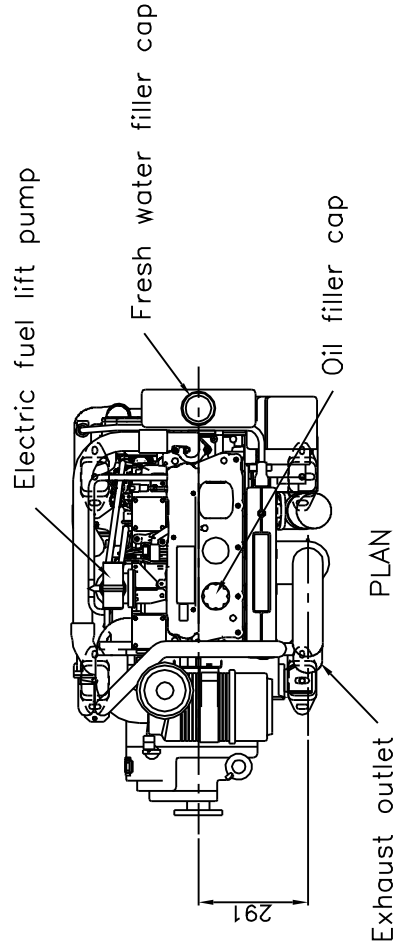
REAR
Output Flange Details
4 holes $\phi 11.5$ equi-spaced
on a 108 PCD
Flange OD 127
Female location $\phi 63.5H8$
x 5 deep
Ensure mating flange has
clearance for gearbox flange
retaining nut.

PROVISIONAL DRAWING

Doc No. 7354-1-04

Perkins Sabre M92B Marine Diesel Engine
 shown with PRM 260D gearbox with reduction ratios
 up to and including 2.94:1 (550mm transverse mounting centres)

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PROVISIONAL DRAWING

Doc No. 7355-1-04

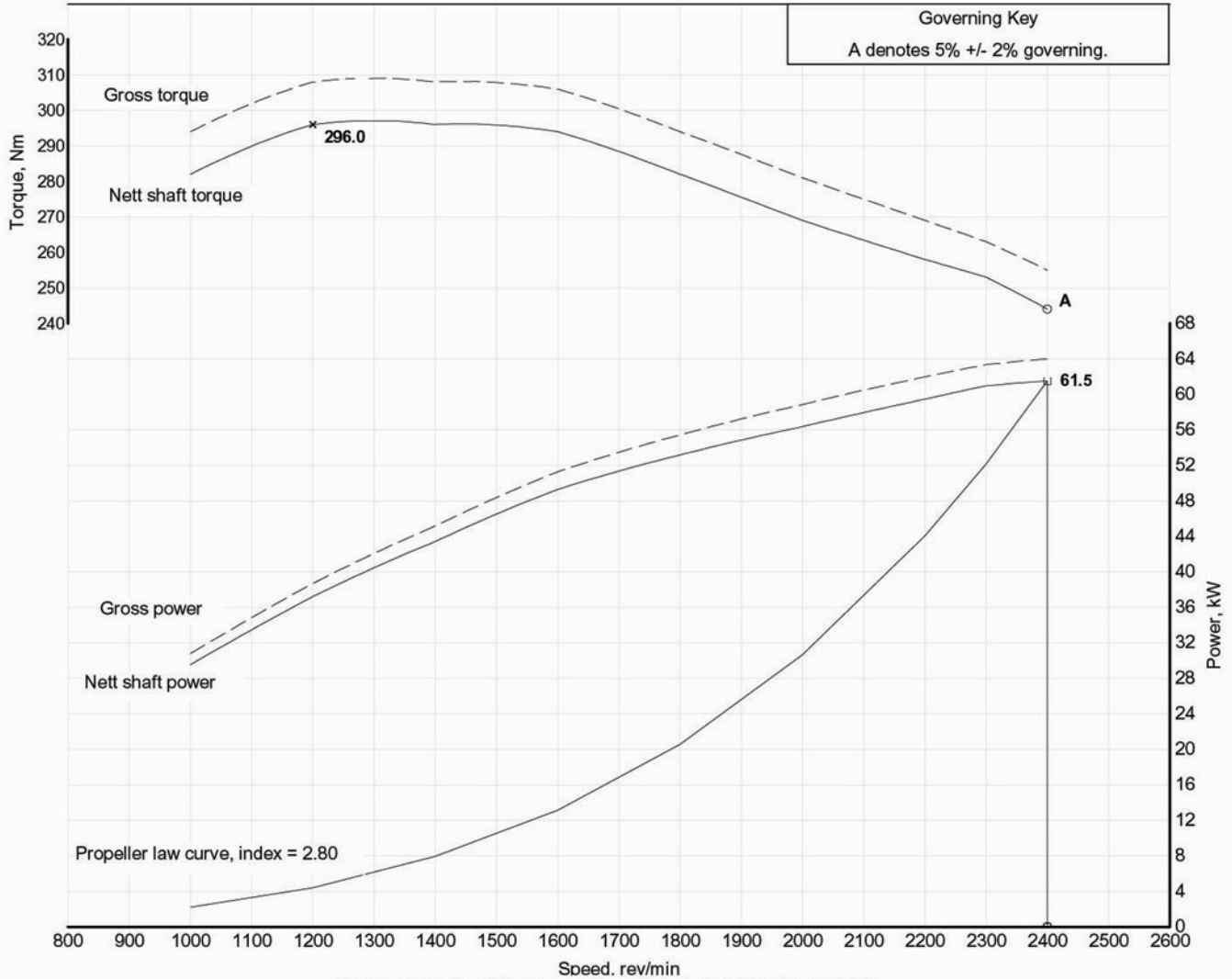
Rating Standards:

Production Tolerance On Power Output: +5%, -5%
Total Barometric Pressure (kPa): 100
Vapour Pressure (kPa): 1
Air Inlet Temperature (°C): 25

ISO 14396: 2002

Fuel Types:

Fuel Specification:	Europe Off Highway	USA FED Off Highway
Density (kg/l @ 15°C):	CEC RF-75-T-96	EPA 2D 89.330 1999
Viscosity (mm²/s @ 40°C):	0.835 - 0.845	0.845 - 0.85
Viscosity (mm²/s @ 40°C):	2.5 - 3.5	2.0 - 3.2
Sulphur Content (% mass):	0.1 - 0.2	0.03 - 0.4
Cetane No:	45 - 50	40 - 48



Performance after 60 hours operation with fuel oil at 40°C at pump inlet.

Notes:

1. For duty cycle refer to Perkins Engines (Peterborough) Limited statement on Product Duty Usage Limitations.

Exhaust Quality Standard

Smoke:

Certification Refs (Rated Speeds)

Emissions:

CCNR Rhine River Regulation Stage 1. Not yet certified (2400)

Power Standard

Certification Refs (Rated Speeds)

Auxiliaries fitted to engine:

Alternator - off load.
Balancer - not fitted.
Sea Water Pump - fitted.
Gearbox - Hurth p/n: HSW450A with ratio 2.03 : 1.

Compiled by:

B. Law
(Chief Engineer)

Date: 17-Feb-2005

Accepted by:

M. Wilson
(Product Manager)

Date: 21-Feb-2005

Issued by:

D.J. Campbell
(Legislation Manager)



Power Solutions



'Les coches d'eau'

Application

- Two new purpose-built sightseeing boats operated by Les coches d'eau on the Cape d'Agde a few kilometres from Montpellier in the south of France.
- The stylish 60-seater boats are used for tourist trips around the popular Mediterranean resort.

Boat details

Both aluminium boats have been fitted with a pair of Perkins Sabre M92B engines, coupled to Twin Disc MG5050 transmissions. The decision by Les coches d'eau's owner, Monsieur Héry, to fit this particular engine is in keeping with his long-standing tradition of relying on Perkins Sabre power. The boats were designed by Fourre Technologies Marines.

- Length overall: 12 metres
- Cruising speed: 3 knots

Customer view

Monsieur Héry, Les coches d'eau's owner.

"At Les coches d'eau, we look for easy, low cost servicing, so the M92B's standard 500 hour service interval helps to keep our boats in the water and earning money for longer than competitor's engines with shorter service intervals. In the first five or six months, both boats clocked-up in excess of 1,000 hours trouble-free service, which surely goes a long way towards explaining why I have chosen Perkins Sabre in the past and will no doubt continue to do so in the future."

"The M92B has proved to be a very popular engine in France, particularly with sightseeing boat operators along the Mediterranean coast, where ensuring the least possible impact on the environment is a major consideration. This is a beautiful part of France and Perkins Sabre engines' low emissions help us to keep it that way."

Total Marine Technology in Action

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PS Les coches d'eau 089

Power Solutions



'Lagom'

Application

- A replica Dutch barge a design derived from the classic wide-beamed Dutch commercial barge.
- The heavy-gauge steel boat was designed by Simon Piper and built at the Piper Boats yard at Biddulph, Stoke on Trent.

Boat details

Lagom which is Swedish for "just right" has a semi-Vee shaped hull and is built to RCD [Recreational Craft Directive] Category C standard. Currently moored on the Thames, it is powered by an M92B engine.

- Length overall: 16.8 metres
- Beam: 3.8 metres
- Draft: 0.76 metres

Customer view

Simon Piper, Piper Boats.

"Piper Boats specialises in narrow boats and Dutch barges in the 12-metre to 21-metre range and we have successfully fitted Perkins Sabre engines, particularly the M92B, to numerous boats. The increased torque capability over its predecessor, the M92, means that the engine is little more than idling when Lagom is running with the river's flow. There is also plenty of power in reserve for running upstream against a fast current."

"Environmentally-sensitive performance has also always appealed to our owners, and the M92B ticks all of the boxes. They like the fact that the M92B's smoke levels are barely visible to the naked eye, even at cold start-up, and that noise and vibration levels throughout the engine's entire operating range are greatly reduced. On Lagom, we decided to further improve on this by incorporating additional sound-deadening insulation in the engine room."

Total Marine Technology in Action

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PS Lagom 091