full ahead into the seventies with...

polar la power

The Marine Power Unit for the Seventies—that's what we call it in Trollhättan
Of course, we are biased—not surprisingly; but just check for yourself some of the points that we think make the Polar 'F' a remarkably efficient marine engine.

The Polar 'F' is a result of careful design and laboratory tests.

The laboratory tests commenced in 1959 and before the first production engine was put into service in 1962, 12,000 running hours had been accumulated in the laboratory.

Today, the experience from hundreds of marine engines operating in the field confirms the reliability of the design. We can now offer a product which we know meets the requirement for service in icebreakers, tugs, container vessels, fishing vessels, etc., and in fully automated power plants where quick start with cold engine and instantaneous full load pick-up are essential requirements.

LONG TROUBLE-FREE LIFE

How often do owners wish that they could send a vessel to sea and be confident of its performance. Well, we've gone a long way towards that.

The design has been laid out to give over 100,000 hours of operation with nominal maintenance. For example, we offer 10,000 hours without any cylinder head-valve inspection and 20,000 hours without any piston withdrawals.

If anything does go wrong, every part of the engine is accessible with the minimum of trouble.

OUTSTANDING POWER/WEIGHT RATIO

With an output range from 375 to 2,800 b.h.p., we believe we offer one of the most attractive power/weight ratios available today for a "WIDE RANGE PURPOSE" engine.

MAXIMUM EFFICIENCY

Two inlet and two exhaust valves in the individual cylinder heads (with the valve seats separate and interchangeable) give excellent gas flow conditions, clean cylinders and low fuel consumption.

MINIMUM NOISE

Concentration on design during the early stages of development were aimed at reduction of noise level. The cylinder block is cast with good sound-damping properties, inlet pipes are of cast silumin, exhaust pipes are of cast iron and the gearwheels have sound-damping rubber discs.

ECONOMY

The engine fuel consumption is low but we make no extravagant claims; much depends on the fuel used and the operating conditions but you will find our fuel consumption performance curve satisfactory.

We believe that the engine requirements for ships operating in the 1970's are for long life exceeding 100,000 hours with low outlay for maintenance and spare parts. The engine must also be designed to allow for reduced supervision by application of automation. If you agree, a comparison of the Polar 'F' with other similar engines will highlight the advantages we are able to offer.

Polar power all over the world

Name of Ship	Type of Ship	Owner	Shipyard	Engine Type	B.H.P.	R.P.M.	Delivered
Ardrossan	M/T	Shell-Mex & B.P. Ltd., London, Great Britain.	Hall, Russell & Co. Ltd. Aberdeen, Great Britain.	SF112VS	1350	750	1968
Esso Slagen	M/T	Esso Petroleum Co., Oslo, Norway.	AB Lindholmens Varv, Gothenburg, Sweden.	SF15RS x 2	660 x 2	750 x 2	1968
Scandic	M/S	Rederi AB Transatlantic, Gothenburg, Sweden.	Kalmar Varv, Kalmar, Sweden.	SF116VS x 2	2400 x 2	750 x 2	1968
Grangemouth	M/T	Shell-Mex & B.P. Ltd., London, Great Britain.	Hall, Russell & Co. Ltd. Aberdeen, Great Britain.	SF112VS	1350	750	1968
—	Floating Dock	USSR-owner.	Oresundsvarvet AB, Landskrona, Sweden.	SF15RS x 4	560 x 4	750 x 4	1968
	Floating Dock	USSR-owner.	Oresundsvarvet AB, Landskrona, Sweden.	SF15RS x 4	560 x 4	750 x 4	1968
—	Floating Dock	USSR-owner.	Oresundsvarvet AB, Landskrona, Sweden.	SF15RS x 4	560 x 4	750 x 4	1969
Grey Fish	Supply Vessel	N.V. Rederij Feronia, Rotterdam, Netherlands.	Ateliers & Chantiers Ziegler Frères, Dunkerque, France.	SF18VS x 2	1100 x 2	750 x 2	1968
Black Fish	Supply Vessel	Société Anonyme de Gerance et d'Armement, Paris, France.	Ateliers & Chantiers Ziegler Frères, Dunkerque, France.	SF18VS x 2	1100 x 2	750 x 2	1969
White Fish	Supply Vessel	Société Anonyme de Gerance et D'Armement, Paris, France.	Ateliers & Chantiers Ziegler Frères, Ziegler Frères, Dunkerque, France.	SF16RS x 2	1050 x 2	750 x 2	
—	M/T	Esso Petroleum Co., Helsinki, Finland.	Sölvesborgs Varv & Rederi AB, Sölvesborg, Sweden.	SF16RS x 2	820 x 2	750 x 2	
—	Tug	Bergnings- och Dykeriab Neptun, Stockholm, Sweden.	Ulstein Mek. Verksted A/S, Ulsteinvik, Norway.	SF116VS x 2	2800 x 2	750 x 2	
—	Tug	Bergnings- och Dykeriab Neptun, Stockholm, Sweden.	AB Asiverken, Amål, Sweden.	SF116VS x 2	2800 x 2	750 x 2	
—	Supply Vessel	Société Anonyme de Gerance et d'Armement, Paris, France.	Société Provencale des Ateliers Terrin, Marseille, France.	SF16RS x 2	1050 x 2	750 x 2	
—	Supply Vessel	Société Anonyme de Gerance et d'Armement, Paris, France.	Société Provencale des Ateliers Terrin, Marseille, France.	SF16RS x 2	1050 x 2	750 x 2	
Prinsessan Christina	Ferry	Rederiaktiebolaget Göteborg-Frederikshaven-Linjen, Gothenburg, Sweden.	Aalborg Vaerft A/S Aalborg, Denmark.	SF112VS x 8 SF16RS x 3	1950 x 8 1050 x 3	750 x 8 750 x 3	1969
—	Ferry	Rederiaktiebolaget Göteborg-Frederikshavn-Linjen.	Aalborg Vaerft A/S Aalborg, Denmark.	SF112VS x 8 SF16RS x 3	1950 x 8 1050 x 3	750 x 8 750 x 3	
—	M/T	Leif Höegh & Co. A/S, Oslo, Norway.	Kawasaki Dockyard, Kobe, Japan.	SF16RS x 2	1010 x 2	720 x 2	
—	M/T	Leif Höegh & Co. A/S, Oslo, Norway.	Kawasaki Dockyard, Kobe, Japan.	SF16RS x 2	1010 x 2	720 x 2	

Performance

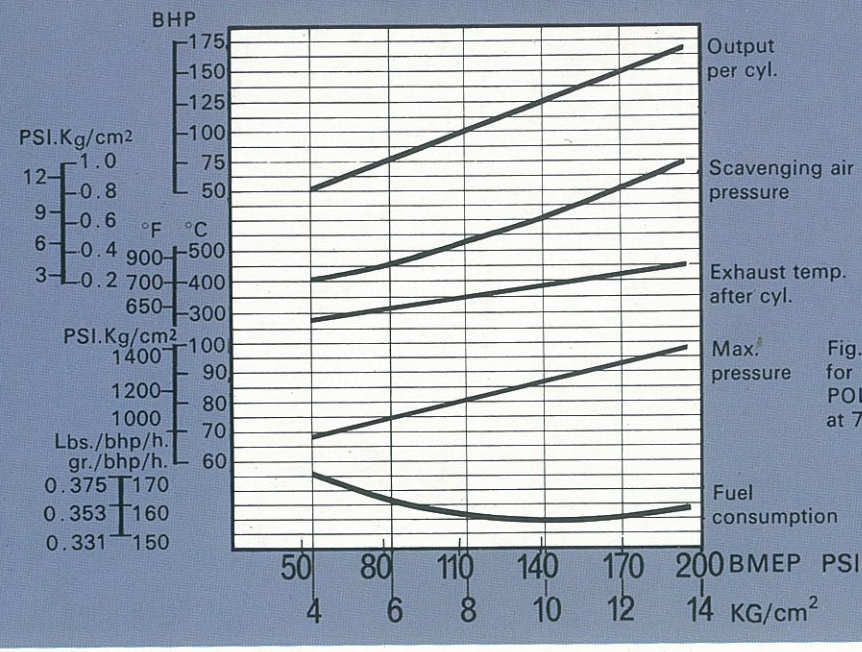
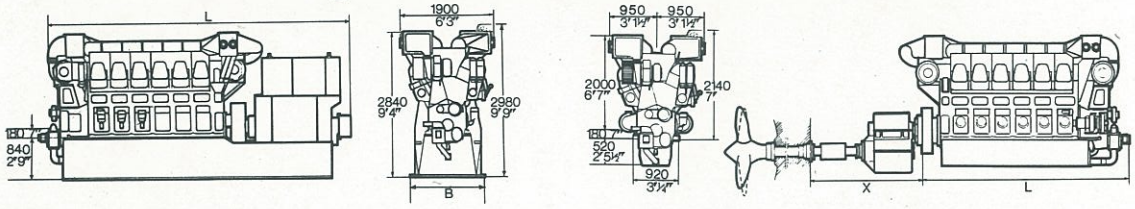
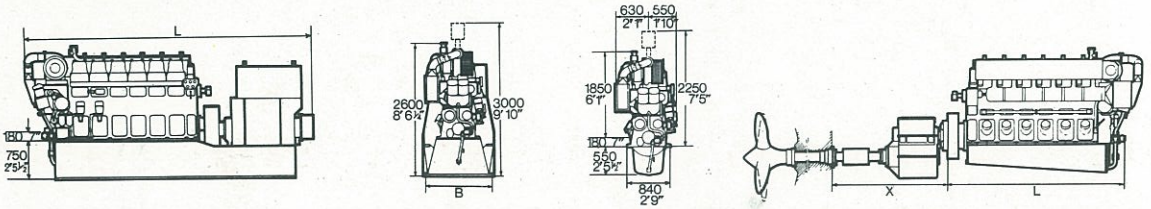


Fig. 5. Performance curves for an 8-cylinder NOHAB POLAR F-engine, in V-form, at 750 rpm.

Outputs Dimensions



Engine type	No. of cyl.	Engine [3] speed r.p.m.	Engine [4] output b.h.p.	Engine b.m.e.p. kg/cm²	Weight (engine without flywheel) Tons Kg	With alternator						With reduction gear and propeller					
						Altern. output kVA	L mm	L feet	B mm	B feet	Weight complete unit Tons Kg	Prop. rpm	L mm	L feet	X min. mm	X min. feet	Weight complete unit Tons Kg
SF18VS	8	720 750	1345 1400	14.2	9.4 (9,400 kg)	1160 1210	5500	18' 1"	1340	4' 5"	18.8 (18,800 kg)	240 250	3300	10' 10"	2600	8' 6"	16.9 (16,900 kg)
SF112VS	12	720 750	2020 2100	14.2	12.4 (12,400 kg)	1745 1820	6000	19' 8"	2000	6' 7"	24.3 (24,300 kg)	240 250	4250	13' 11"	2750	9'	22.9 (22,900 kg)
SF116VS	16	720 750	2690 2800	14.2	15.4 (15,400 kg)	2320 2420	7600	24' 11"	2260	7' 5"	28.9 (28,900 kg)	240 250	5100	16' 9"	2900	9' 6"	28.2 (28,200 kg)



Engine type	No. of cyl.	Engine [3] speed r.p.m.	Engine [4] output b.h.p.	Engine b.m.e.p. kg/cm²	Weight (engine without flywheel) Tons Kg	With alternator						With reduction gear and propeller					
						Altern. output kVA	L mm	L feet	B mm	B feet	Weight complete unit Tons Kg	Prop. rpm	L mm	L feet	X min. mm	X min. feet	Weight complete unit Tons Kg
SF13RS	3	720 750	500 525	14.2	3.9 (3,900 kg)	430 455	4300	14' 1"	1180	3' 10½"	9.3 (9,300 kg)	360 375	2300	7' 7"	2200	7' 3"	7.0 (7,000 kg)
SF14RS	4	720 750	670 700	14.2	4.8 (4,800 kg)	580 605	4750	15' 7"	1180	3' 10½"	11.0 (11,000 kg)	360 375	2700	8' 10"	2300	7' 7"	8.0 (8,000 kg)
SF15RS	5	720 750	840 875	14.2	5.7 (5,700 kg)	725 755	5200	17' 1"	1180	3' 10½"	13.2 (13,200 kg)	360 375	3100	10' 2"	2300	7' 7"	9.4 (9,400 kg)
SF16RS	6	720 750	1010 1050	14.2	6.6 (6,600 kg)	875 910	5600	18' 5"	1340	4' 4¾"	14.6 (14,600 kg)	360 375	3500	11' 6"	2600	7' 11"	10.9 (10,900 kg)

1) 60 c.p.s. 2) 50 c.p.s. 3) Lower engine speed and outputs if desired. 4) Continuous rating at 20°C (68°F) temperature, min. barometer reading 736 mm Hg (29 in. Hg.) and max. 60% relative humidity.

The NOHAB Polar 'F'

Power for weight one of the most outstanding marine power units of our time

OPERATING ADVANTAGES

Compact design

The 6-cylinder engine on the centre spread develops 1050 bhp and weighs only 7.2 tons.

Wide power range

In-line engines cover an output range of 375 up to 1050 bhp and V-engines 1000 up to 2800 bhp.

Robust and durable

Rigid cylinder block, pressure lubrication of bearings and advanced valve mechanism.

Economical running

Fuel consumption per bhp/hour

Main engines:

1/1 load 0,347 lbs. (155 g)
3/4 load 0,343 lbs. (153 g)
1/2 load 0,345 lbs. (154 g)

Auxiliary engines:

1/1 load 0,343 lbs. (153 g)
3/4 load 0,338 lbs. (151 g)
1/2 load 0,345 lbs. (154 g)

Lubricating oil consumption per bhp/hour.
Approx. 0,0022 – 0,0033 lbs. (1 – 1,5 g)

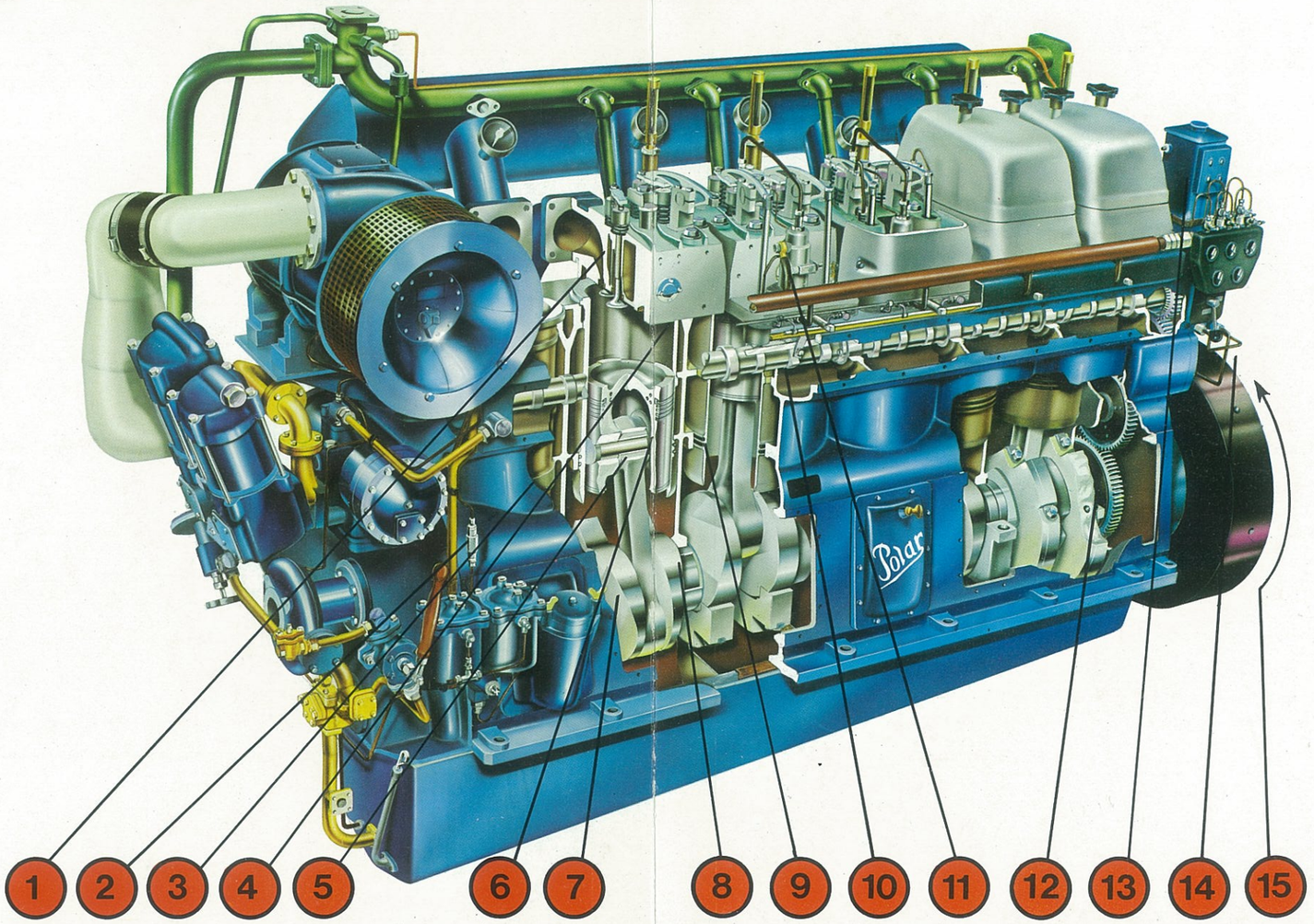
The values for the main engines are based on outputs in accordance with the propeller curve, and are valid with 5% tolerance assuming the use of fuel oil with a calorific value of at least 18 180 B.T.U./lbs. (10 100 kcal/kg).

The following direct driven pumps are included:
Main engines: two water pumps, one lub. oil pump and one fuel feed pump.

Auxiliary engines: one water pump, one lub. oil pump and one fuel feed pump.

Quick and reliable service

Servicing direct from depots in selected ports.
Exchange service for complete assemblies.

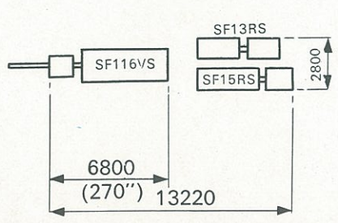


DESIGN FEATURES

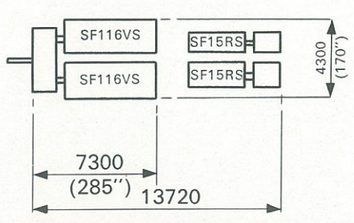
1. **Valve mechanism** Simple standard parts for the two inlet and two exhaust valves. The rocker box covers, of light metal, have a shape which completely separates the fuel injection equipment from the valve mechanism. No fuel contamination is therefore possible.
2. **Cylinder block** One-piece casting with separate oil sump.
3. **Cylinder liners** Water cooled, separate and easily replacable. The liners have three different circumferential supports against the block in order to give maximum rigidity.
4. **Cylinder heads** One for each cylinder, easily removable. Two inlet and two exhaust valves fitted in each head, all of the same design and of high alloyed quality steel. Face and stem are stellited. Valve seats in the cylinder head are replaceable.
5. **Top end bearing bushes** Of special bronze and pressure lubricated.
6. **Pistons** Of light alloy with cast in coil for oil cooling.
7. **Crankshaft** Of high-grade steel to the requirements of all classification societies.
8. **Main and big end bearing shells** Steel-backed lead-bronze lined with galvanically applied running layer of lead-tin-copper.
9. **Connecting rods** Drop-forged toughened steel, obliquely split to facilitate easy exchange of the big end bearing shells.
10. **Camshaft** Gear driven and carried in white-metal lined steel bushes. Located at the top of the cylinder block.
11. **Injection system** Bosch type with one fuel pump for each cylinder and short delivery pipes.
12. **Gearwheels** Fitted with rubber damping plates to reduce noise.
13. **Governor** Woodward hydraulic UG-8 type governor as standard. Woodward hydraulic PG "load limiting" governor on request.
14. **Starting** By compressed air (standard) or if desired with electromotor.
15. **Direction of rotation** Normally clockwise, when viewed from the flywheel end of the engine. For multi engine installations counter clockwise rotation is arranged.

MACHINERY PROPOSALS FOR MULTI-ENGINE INSTALLATIONS

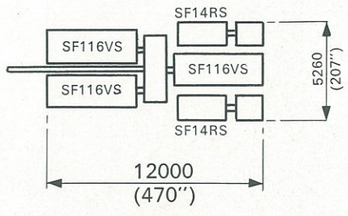
4000 HP



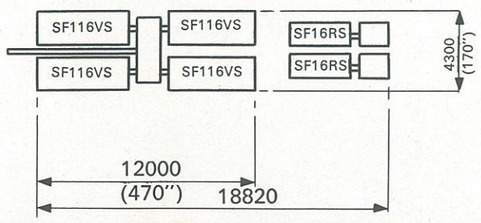
7000 HP



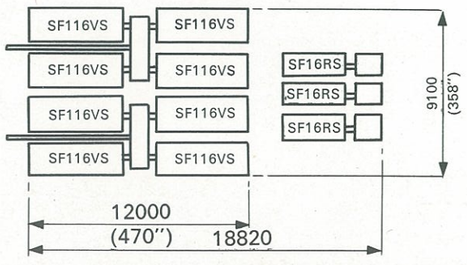
10000 HP



13000 HP



23000 HP



Easy maintenance

The dismantling of the big-end bearings can be done very simply as the connecting rod is split obliquely.

All big-end bearing bolts are easily accessible from the one side of the engine.

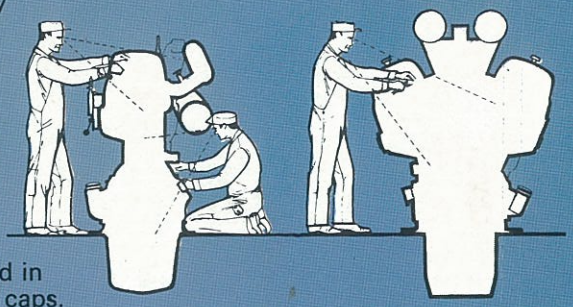
A special tool is delivered to keep the piston in position during work with the big-end bearing.

The cylinder head flanges mating with the inlet—and exhaust manifolds and the water pipes are inclined 4 degrees so that the cylinder heads become free at once when released.

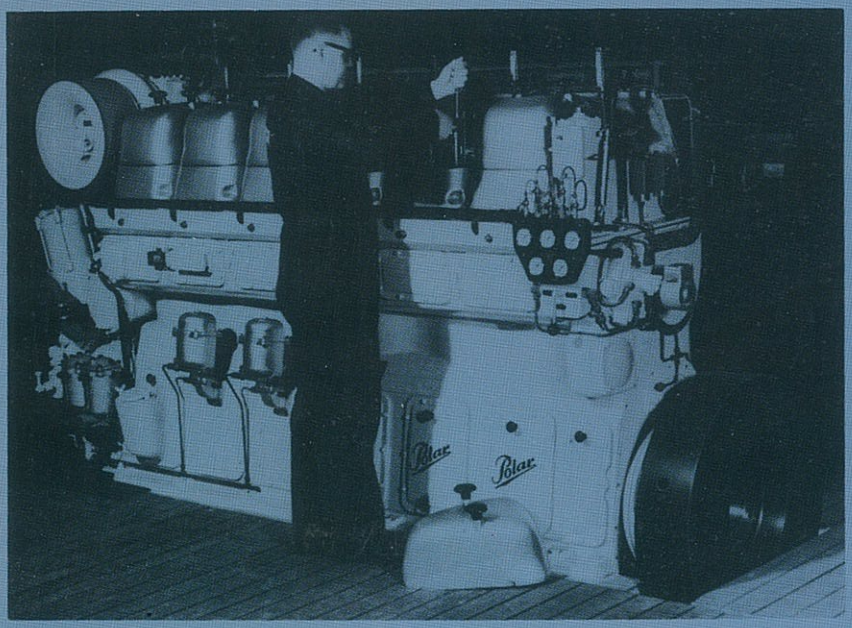
The camshaft is gear driven from the crankshaft and is dismantled in the engine's longitudinal direction without removing the bearing caps.

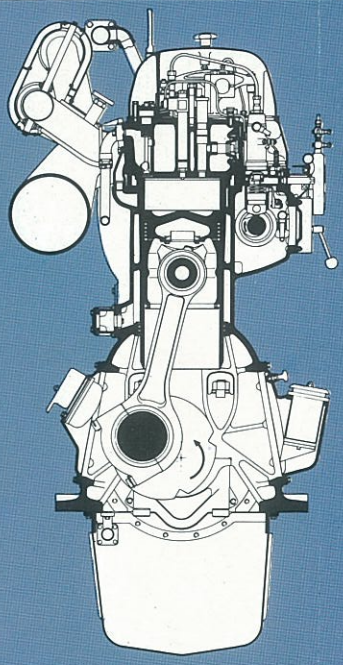
The camshaft can be dismantled in parts with a length of max. 3 cylinders.

The floating type of gudgeon pin can easily be dismounted.

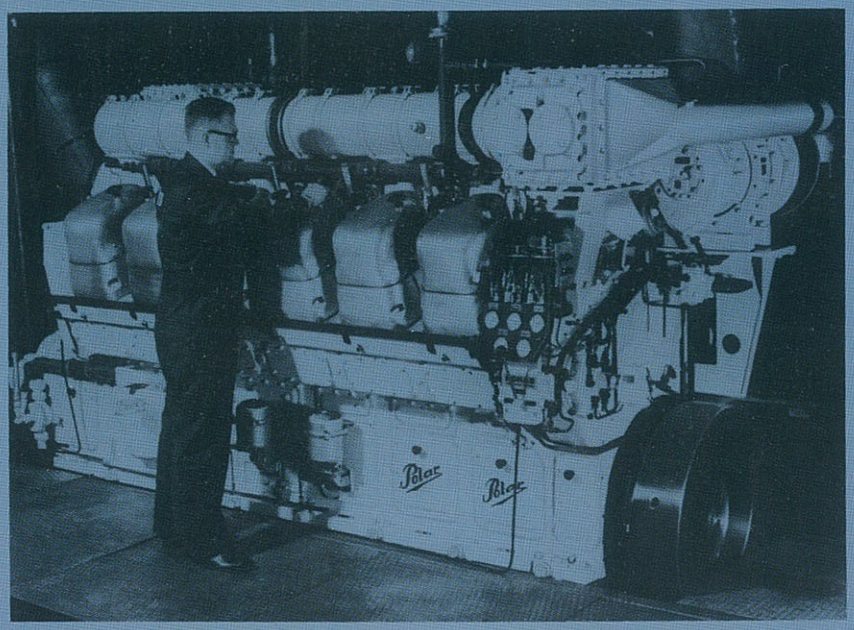


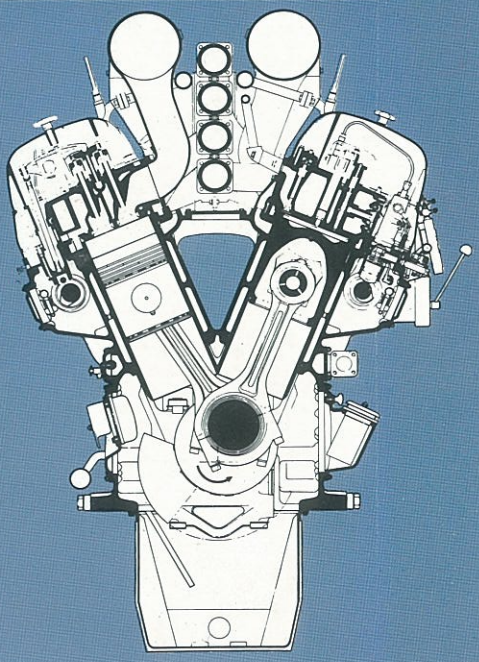
NOHAB POLAR - F in - line form, 375 up to 1050 bhp. Bore x stroke—$9\frac{7}{8}$" x $11\frac{3}{4}$"





NOHAB POLAR - F in V - form, 1000 up to 2800 bhp. Bore x stroke—$9\frac{7}{8}$" x $11\frac{3}{4}$"





Technical specification

STANDARD EQUIPMENT ON THE ENGINE

For air:
Turbocharger of Brown Boveri manufacture complete with air filter.
Charge air cooler of GEA or equivalent manufacture.
Turbocharger cleaning equipment to operate whilst the engine is running.

For fuel oil:
Fuel feed pump of gear type, direct driven.
Fuel filter which can be cleaned whilst the engine is running.
Injection pumps of Bosch type, one for each cylinder.
Injection nozzles of Bosch type, chromium-plated and fuel oil cooled as standard.
High pressure pipes of short equal lengths.

For lubricating oil:
Lub. oil pump of gear type, direct driven.
Lub. oil filter (by-pass) of the centrifugal type which can be cleaned whilst the engine is running.
Hand operated pre-lubricating oil pump.

For starting:
Admission valve.
Air distributor.
Starting valve.
Operating lever for starting and stopping the engine.

For speed control:
Propulsion Engine:
Hydraulic governor of the Woodward UG8 type with pneumatic actuator for remote control.
Load sensing governor of the Woodward PG type can be supplied if required **at extra cost.**

Auxiliary Engine:
Hydraulic governor of the Woodward UG8 type with electric sensing for remote control.
Load sensing governor of the Woodward PG type can be supplied if required **at extra cost.**

Instrumentation:
Tachometer generator with dial indicator.
Instrument panel with pressure gauges for starting air, scavenger air, lub. oil and fuel oil.
Thermometers for cooling water and exhaust gases after each cylinder and scavenger air after intercooler.
Alarm switches for low lub. oil pressure and high cooling water temperature.
Electro-pneumatic overspeed trip.

Flywheel (with coupling bolts)
Torsional vibration damper (if necessary)
Turning gear:
The 12 and 16-cylinder engines are equipped with hand-operated turning gear as standard.

STANDARD EQUIPMENT SEPARATELY MOUNTED

Lub. oil filter (main filter) which can be cleaned while engine operating.
Lub. oil cooler.
Lub. oil thermostat valve.
Fresh water cooler.
Fresh water thermostat valve.
Starting air receiver.
Exhaust gas silencer.
Set of tools.
Fuel valve test pump.

PROPULSION ENGINE

Extra Equipment:
Power take-off shaft at the forward end for driving starting air compressor, trawl winch, etc.
Fresh water pump, direct driven.
Sea water pump, direct driven.
Bilge pump, belt or independently driven.
Starting air compressor, belt or independently driven.
Bridge control equipment.
Bridge instrument panel.
Gear unit.
Standby pumps.
Controllable pitch propellers.
Stern gear.

AUXILIARY ENGINE

Extra Equipment:
Fresh water pump, direct driven.
Sea water pump, direct driven.
Alternator.
Alternators, of single bearing type, can be delivered for 50 or 60 cycles. standard voltage 390 or 450 v.
Built-on exciter of the rectifying type which ascertains quick load response.
Engine and alternator are mounted on common bedplate.
DC generator sets as well as automatic auxiliary installations and automatic stand-by power sets.

All the above quoted on request.

AB NOHAB

TROLLHÄTTAN · SWEDEN
TELEPHONE 18000
CABLES NOHAB
TELEX 42084