

## FEATURES AND BENEFITS

### AFTERCOOLED FOR HIGH POWER DENSITY

Northern Lights pioneered the marinization of this engine, and still leads the way in Engineering quality. Case in point: the exclusive M1066 aftercooler. Because cooler air is more oxygenated than warm, it makes for better combustion. This aftercooler, along with electronically controlled fuel injection, give you more kW output.

### ELECTRONIC SYSTEM PROFILER

"ESP" is a window to your set's real time operating condition. The ECU that controls the electronic fuel injection produces a SAE J1939 data stream of engine information that can be shown on an optional CAN Bus monitor panel.

### SUPERIOR PMG GENERATOR ENDS

Northern Lights generator ends achieve  $\pm 0.5\%$  voltage regulation. All have low temperature rise ratings that meet or exceed classification society requirements including ABS and Lloyds. All M1066 generator sets have Permanent Magnet Generators for 300% short circuit capability required for classed vessels.

### COMMITTED TO PROVIDING COMPLETE SOLUTIONS

Northern Lights products are thoroughly factory tested and go through a complete quality control program to ensure your total satisfaction. Our design philosophy allows us to provide comprehensive solutions to your power production needs. Because engine room space is always at a premium, Northern Lights offers Low-Profile generator sets that save valuable inches where you need it most. Our line of options and accessories are designed to integrate into a total power system specifically built for your vessel. PTO's, sound enclosures and custom panels are among the options that make your power system as unique as your boat.

## COMPONENT SPECIFIC FEATURES

### ENGINE BLOCK

- Lugged six cylinder, four cycle, in-line, liquid cooled, overhead valve, marine diesel based on heavy-duty industrial engine block.
- Balanced, forged, hardened crankshaft with induction hardened journals and rolled fillets.
- Bimetallic valves have chrome stems & rotators.
- Replaceable valve seats and guides.
- Three ring aluminum alloy pistons with Ni-Resist insert for the top ring. Keystone piston ring reduces carbon buildup under light loads.
- Torsional crankshaft vibration damper for smooth operation.
- 8 groove, poly-vee drive belt powers the DC alternator & freshwater coolant system pump.
- Replaceable, wet cylinder liners for long life and low rebuild costs.

### FUEL SYSTEM

- Direct fuel injection systems (see feature box below)
- Ring clamp fuel filter with air bleed and drain.
- Diaphragm-type, mechanically driven fuel transfer pump with manual priming lever. Electric fuel transfer pump on M1066A2 and A3.
- Flexible fuel lines routed to fuel manifold on base frame for easy installation of vessel's hard piping.

### LUBRICATION SYSTEM

- 500 hour oil change interval when fuel and oil requirements are met.
- Positive displacement gear-type oil pump.
- Full flow, spin-on oil filter.
- Oil spray cooling reduces piston crown temperature for longer life.
- Freshwater, plate-type, full flow oil cooler reduces heat and thermal breakdown of lube oil.
- Large capacity oil pan.
- Cast aluminum rocker arm cover traps valve noise and acts as a closed loop crank-case vent to keep oil vapor in the engine.
- Lube oil drain for quick oil changes.

### FRESHWATER COOLING SYSTEM

- 2 thermostats for safety and quicker warm-ups.
- Heat exchanger cooling includes:
- Gear driven, flexible impeller seawater pump. Easy to clean, tube-type heat exchanger is made of cupro-nickel for long life.
- Cast iron, expansion tank with brass filler neck for easy filling.
- Cast-iron exhaust manifold has double pass freshwater flow for even temperature control, fast warm-up and no hot spots.
- Zinc anode electrolysis protection.

### SPECIAL EQUIPMENT

- Hydrolastic mounts isolate 98% of set vibration from hull.
- Welded steel base frame with drip pan. Easy to clean.
- Beltguard protects operator.
- Sparkling white, IMRON® poly-urethane paint protects your set.
- Operator's and parts manuals.
- Optional low profile sound enclosure for industry best attenuation in smaller package.

### AIR SYSTEM-TURBOCHARGER-AFTERCOOLER

- Dry air filter cleans air and reduces air intake noise.
- M1066A1, A2 and A3 models have aftercooler with aircraft quality, 70/30 cupro-nickel, two pass element. Oval water tubes are easy to clean and stronger than round tubes. Corrugated air cooling fin design supports tubes better than plate fin type. Seawater piping is cast bronze and stainless steel. Water never touches the cast aluminum air ducts. No gaskets; all components are machined and have o-ring seals. Seawater direct from the pump for maximum cooling. Dry bolt holes protect cylinders. Turbocharged to increase output. The turbocharger turbine housings are freshwater cooled for safety.
- US EPA Tier II certified for use in non-US flagged vessels.

### DC ELECTRICAL SYSTEM AND ELECTRONIC SYSTEM PROFILER

- Standard, S-3B remote mount control panel with NEMA enclosure has engine hour meter, coolant temperature gauge, oil pressure gauge, DC voltage meter, start-stop switch and shutdown bypass switch.
- Low oil pressure and high coolant temperature safety shutdowns.
- Northern Lights ESP supplies SAE J1939 data stream through a CAN bus plug for optional engine monitor.
- Negative ground, 12 volt DC system has circuit breaker, starter motor and battery charging alternator with regulator.
- Reliable relay based DC system is easy to trouble shoot and repair. Each relay is inexpensive and simply plug-in. No expensive printed circuit board to fail. Relays make multi-panel installation up to 110 ft from set quick & easy. Engine and panel are pre-wired and have terminal strips.

### AC GENERATOR

- Direct coupled, single bearing, 12 lead, re-connectable AC generator. Maintenance free brushless design.
- Generators meet or exceed ABS standards and include class H insulation, accessible diodes, oversized ball bearings and marine grade shafts. Conservative heat rise rating of 95°/50° on T, A Series and 60 Hz H units. (Heat rise rating of 110°/45° on 50 Hz H units.)
- Engines and generators are torsionally matched for long life.
- Isochronous electronic governor for 0% AC frequency droop.
- Automatic voltage regulator gives fast response to electrical load changes. Voltage is regulated to  $\pm 0.5\%$  (one half of one percent) over the entire range from no load to full load.
- All M1066 models have PMG (permanent magnet generator) to power the automatic voltage regulator for 300% short circuit capability needed by classed vessels.

### CLASSIFICATION STANDARDS

ABS Type approval on M1066A1 A2 and A3 models. Lloyd's Register states that Northern Lights marine generator sets have been successfully tested in accordance with relevant requirements of Lloyd's Register for Marine Generator applications.



# SPECIFICATIONS AND DIMENSIONS

AC Output <sup>1</sup>	M1066TL	M1066A	M1066A1	M1066A2	M1066A3
60 Hz, 1800 RPM <sup>1</sup> kW	99 kW	n/a	130 kW	145 kW	160 kW
50 Hz, 1500 RPM <sup>1</sup> kW	80 kW	99 kW	105 kW	115 kW	n/a
Voltage regulation and PMG	All models: ±0.5% (±1/2 of 1 percent) voltage regulation & permanent magnet generator AVR power supply.				
Frequency droop control	All models: Isochronous 0% frequency droop control				
Phase and power factor	All models: 3 phase-0.8 power factor is standard				
Generator full load temperature rise	All models (except where noted): 95°C temperature rise at 50°C ambient <sup>2</sup>				
<b>Lugger Marine Diesel Engine Data</b>					
Inline cylinders/Operating cycle	All models: Inline six / four cycle				
Aspiration	Turbocharged	Turbo Aftercooled	Turbo Aftercooled	Turbo Aftercooled	Turbo Aftercooled
Displacement - cid (liter)	All models: 414 (6.8)				
Bore/Stroke - inches (mm)	All models: 4.19/5 (106/127)				
HP @ 1800 RPM (1500 RPM) <sup>3</sup>	150 (114)	n/a (149)	200 (160)	228 (172)	256 (n/a)
Max. front power take off HP - 60 Hz (50 Hz)	149 (114)	n/a (149)	190(158)	190 (158)	190 (n/a)
Oil capacity with filter - quarts (ltr)	20 (19)	34 (32.5)	34 (32.5)	34 (32.5)	34 (32.5)
<b>Engine Cooling System</b>					
Approx. heat exchanger cooling capacity - gal (ltr)	All models: 6.5 (24.7)				
Min. seawater inlet/discharge through hull dia. - in (mm)	1.25 (32)	2 (51)	2 (51)	2 (51)	2 (51)
Sea water pump inlet hose ID - in (mm)	1.25 (32)	2 (51)	2 (51)	2 (51)	2 (51)
Heat rejection to jacket water - BTU min 60Hz/50Hz	CF	n/a / 4553	CF	CF / 5110	CF (n/a)
Freshwater pump capacity - 60 Hz - gpm (lpm)	60 (227)	n/a	60 (227)	60 (227)	60 (227)
50 Hz - gpm (lpm)	50 (189)	50 (189)	50 (189)	50 (189)	N/A
Seawater pump capacity - 60 Hz - gpm (lpm)	24 (91)	n/a	42 (159)	42 (159)	42 (159)
50 Hz - gpm (lpm)	20 (76)	35 (133)	35 (133)	35 (133)	N/A
Max. seawater pump suction head - in (m)	All models: 39 (1)				
Consult factory for keel and skin cooler data					
<b>DC Electrical System</b>					
DC starting voltage - standard (optional)	All models: 12 (24)				
Min. battery capacity - amp hr/12V CCA (24V CCA)	All models: 225/800 (570)				
Starter rolling amps @0° 12VDC (24VDC) 920 (600)	All models: 920 (600)				
12Volt battery cable size up to 10 ft - 3m	All models: 000				
<b>Air &amp; Exhaust Systems</b>					
Generator cooling air flow 1&3 phase - 60 Hz (50 Hz)/cfm	1100 (915)	n/a (915)	1100 (915)	1100 (CF)	1100 (N/A)
Air consumption - 60 Hz - cfm (m <sup>3</sup> /m)	352 (9.2)	n/a	420 (11.9)	452 (12.8)	494 (14)
50 Hz - cfm (m <sup>3</sup> /m)	240 (6.8)	297 (8.4)	318 (9.0)	348 (9.9)	N/A
Exhaust gas volume - 60 Hz - cfm (m <sup>3</sup> /m)	851 (24.1)	n/a	1081 (30.6)	1162 (32.9)	1306 (37)
50 Hz - cfm (m <sup>3</sup> /m)	600 (17)	756 (21.4)	995 (28.2)	1070 (30.3)	N/A
Exhaust gas temp - 60 Hz - F° (C°)	984° (529°)	n/a	966° (519°)	966° (520°)	991° (533)
50 Hz - F° (C°)	945° (507°)	935 (502)	1076° (580°)	1076° (580°)	N/A
Approx. heat radiated to air BTU/min -60 Hz (50 Hz)	812 (656)	n/a (969)	1060 (861)	1189 (984)	1312 (N/A)
Max. exhaust Back Pressure - inch H <sub>2</sub> O (mm H <sub>2</sub> O)	All models: 30 (762)				
<b>Fuel System</b>					
Fuel injection pump type and control	Rotary Electronic	Rotary Electronic	Electronic	Electronic	Electronic
Min. suction & return line - in (mm)	All models: 3/8 (9.5)				
Max. fuel transfer pump suction lift - in (mm)	All models: 36 (914)				
Max. fuel flow to transfer pump - gph 60 Hz (50 Hz)	23.5 (22.7)	n/a (23.7)	25.6 (24.7)	49.6 (47.9)	49.6 (N/A)
Full load fuel returned to tank - gph 60 Hz (50 Hz)	15.6 (16.4)	n/a (16.4)	14.5 (15.6)	38.2 (38.7)	36.9 (N/A)
Specific fuel consumption max load - 60 Hz - lbs.hp.hr.0.377	n/a	0.359	0.352	0.351	
50 Hz - lbs.hp.hr.	0.355	0.349	0.347	0.347	N/A
Approx. fuel rate at 60 Hz full load - gph (lph) <sup>4</sup> 7.92 (30)	n/a	11.12 (42)	11.33 (42.9)	12.66 (47.9)	
50 Hz full load - gph (lph) <sup>4</sup>	6.35 (24)	7.32 (27.7)	9.19 (34.8)	9.30 (35.2)	N/A
<b>Maximum Engine Operating Angle</b>					
Continuous, with separate expansion tank.	All Models	Front Down: 0-5°, (0-10°). Rear Down: 0-12°. Left or Right Down: 0-5°, (0-23°)			
Intermittent - 2 minutes.	All Models	Front or Rear Down: 0-30°. Left or Right Down: 0-30°			
<b>Dimensions and Weight - Low Profile</b> <sup>5,6</sup>					
Set length - inch (mm)	81.0 (2058)	90.0 (2286)	90.0 (2286)	90.0 (2286)	90 (2286)
Set width - inch (mm)	All models: 42 (1066)				
Set height - inch (mm)	All models: 41.5 (1054)				
Approx. wet weight HE 3 phase 60 Hz - lbs (kg)	2886 (1306)	3541 (1646)	3541 (1646)	3630 (1646)	3734 (1694)
50 Hz - lbs (kg)	2886 (1306)	3630 (1646)	3630 (1646)	3630 (1646)	3734 (1694)
Sound enclosure length - inch (mm)	TBA (TBA)	90.0 (2286)	90.0 (2286)	90.0 (2286)	90.0 (2286)
Sound enclosure width - inch (mm)	38.0 (965)	42.0 (1067)	42.0 (1067)	42.0 (1067)	42.0 (1067)
Sound enclosure height - inch (mm)	41.0 (1041)	42.0 (1067)	42.0 (1067)	42.0 (1067)	42.0 (1067)
Sound enclosure weight - lbs (kg)	TBA (TBA)	436 (198)	436 (198)	436 (198)	436 (198)

\* All Models: US EPA Tier II; Available for non-US flagged vessels only.

## NOTES:

- CF = consult factory representative or [www.northern-lights.com](http://www.northern-lights.com) for current information.
1. Prime kW ratings for 3Ø at 0.8 power factor. Consult factory for deration factors.
  2. Lloyd's Register classed M1066H @ 50 Hz = 110°C temperature rise at 45°C ambient
  3. Net flywheel hp rating for fully equipped engine at rated speed under SAE J816b.
  4. Based on prime kW rating at 1800 and 1500 RPM. Fuel rate may vary depending on operating conditions.
  5. Date for units with hydrostatic mounts, heat exchanger cooling and 3 phase generator ends. Dimensions and weight are affected by optional equipment, AC output, phase, exhaust and cooling configuration.
  6. Consult factory for data on enclosures for single phase sets or sets with InSp.



Northern Lights, Inc. is ISO 9001 certified through Lloyds Register Quality Assurance  
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