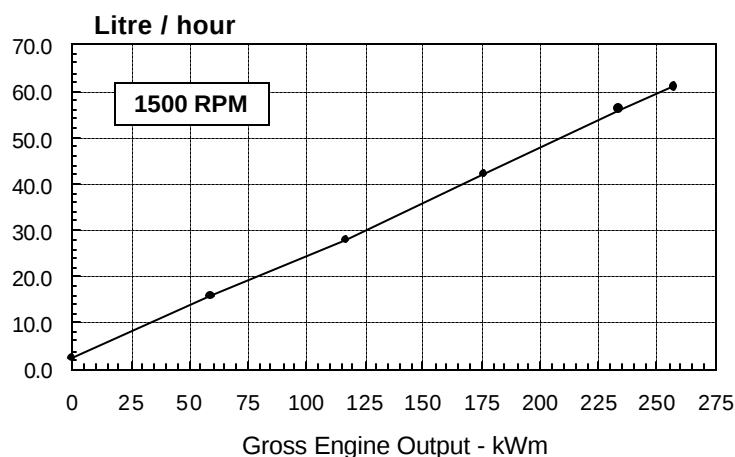


	CUMMINS ENGINE COMPANY, INC Columbus, Indiana 47201 ENGINE PERFORMANCE CURVE	Basic Engine Model: QSM11-G1	Curve Number: FR-2930	<i>G-DRIVE</i> QSM 1
		Engine Critical Parts List: CPL: 8062	Date: 21Oct05	
Displacement : 10.8 liter (661 in³)		Bore : 125 mm (4.92 in.) Stroke : 147 mm (5.79 in.)		
No. of Cylinders : 6		Aspiration : Turbocharged and Charge Air Cooled		

Engine Speed RPM	Standby Power		Prime Power		Continuous Power	
	kWm	BHP	kWm	BHP	kWm	BHP
1500	257	345	234	314	199	267
1800	295	395	268	359	228	305

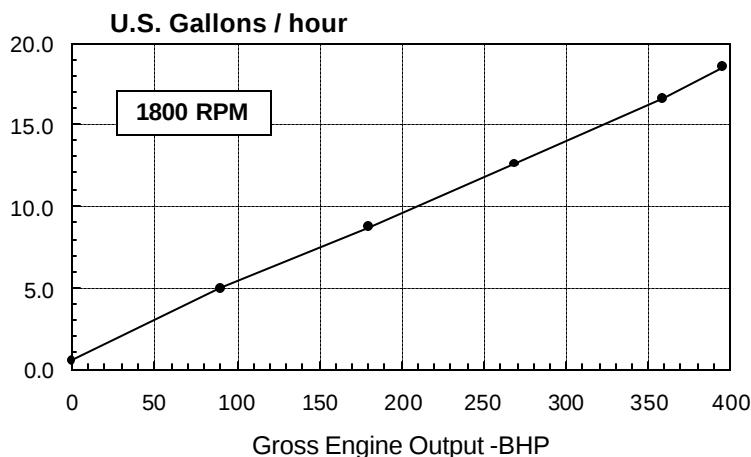
Engine Performance Data @ 1500 RPM

OUTPUT POWER			FUEL CONSUMPTION			
%	kWm	BHP	kg/ kWm·h	lb/ BHP·h	liter/ hour	U.S. Gal/ hour
STANDBY POWER						
100	257	345	0.199	0.327	61	16.0
PRIME POWER						
100	234	314	0.201	0.331	56	14.7
75	176	236	0.201	0.331	42	11.0
50	117	157	0.204	0.335	28	7.5
25	59	79	0.223	0.367	16	4.1
CONTINUOUS POWER						
100	199	267	.201	.331	48	12.5



Engine Performance Data @ 1800 RPM

OUTPUT POWER			FUEL CONSUMPTION			
%	kWm	BHP	kg/ kWm·h	lb/ BHP·h	liter/ hour	U.S. Gal/ hour
STANDBY POWER						
100	295	395	0.202	0.332	70	18.5
PRIME POWER						
100	268	359	0.199	0.327	63	16.5
75	201	269	0.201	0.330	48	12.6
50	134	180	0.209	0.343	33	8.7
25	67	90	0.233	0.383	19	4.9
CONTINUOUS POWER						
100	228	305	.200	.329	54	14.2



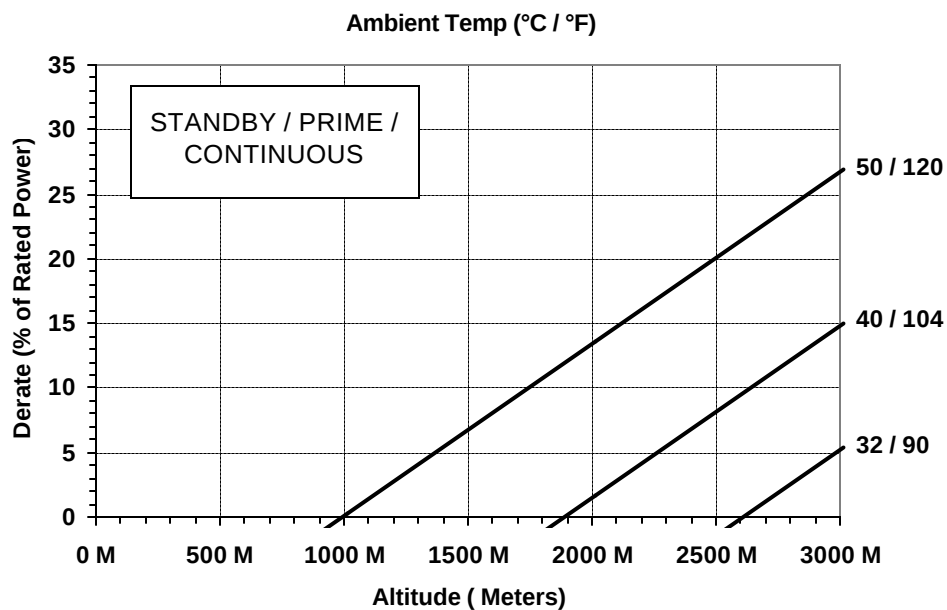
CONVERSIONS: (liters = U.S. Gal x 3.785) (Engine kWm = BHP x 0.746) (U.S. Gal = liters x 0.2642) (Engine BHP = Engine kWm x 1.34)

Data shown above represent gross engine performance capabilities obtained and corrected in accordance with ISO-3046 conditions of 100 kPa (29.53 in Hg) barometric pressure [110 m (361 ft) altitude], 25 °C (77 °F) air inlet temperature, and relative humidity of 30% with No. 2 diesel or a fuel corresponding to ASTM D2. See reverse side for application rating guidelines.

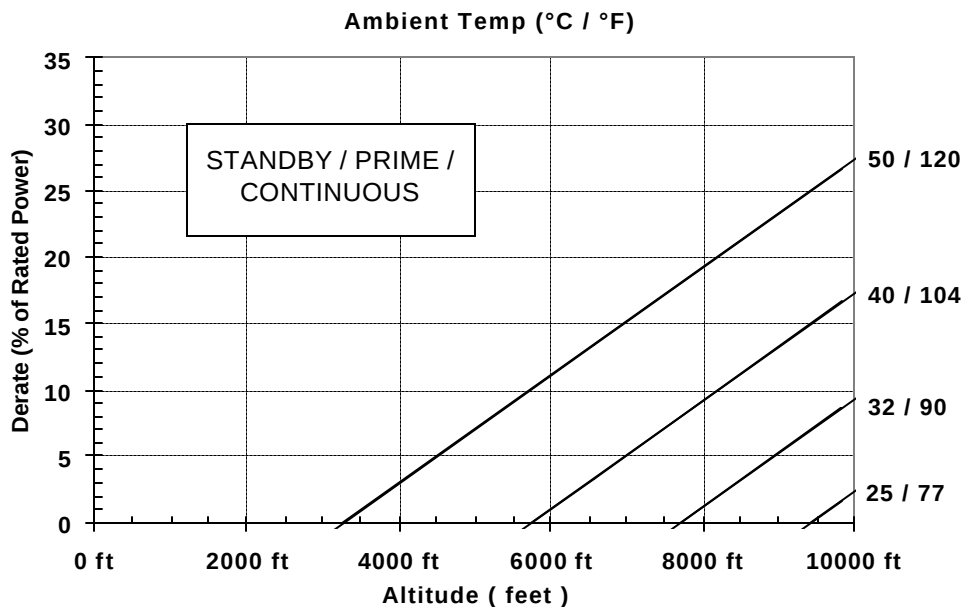
The fuel consumption data is based on No. 2 diesel fuel weight at 0.85 kg/liter (7.1 lbs/U.S. gal).

Power output curves are based on the engine operating with fuel system, water pump and lubricating oil pump; not included are battery charging alternator, fan, optional equipment and driven components.

QSM11-G1 1500 RPM



QSM11-G1 1800 RPM



Reference Standards:

BS-5514 and DIN-6271 standards are based on ISO-3046.

Operation At Elevated Temperature And Altitude:

The engine may be operated at:

1800 RPM up to 1000m (3280 ft) and 50°C (122°F) without power deration.

1500 RPM up to 1000m (3280 ft) and 50°C (122°F) without power deration.

Note: Derates shown are based on 10 in H₂O air intake restriction and 2 in Hg exhaust back pressure.

POWER RATING APPLICATION GUIDELINES FOR GENERATOR DRIVE ENGINES

These guidelines have been formulated to ensure proper application of generator drive engines in A.C. generator set installations. Generator drive engines are not designed for and shall not be used in variable speed D.C. generator set applications.

STANDBY POWER RATING is applicable for supplying emergency power for the duration of the utility power outage. No overload capability is available for this rating. Under no condition is an engine allowed to operate in parallel with the public utility at the Standby Power rating.

This rating should be applied where reliable utility power is available. A standby rated engine should be sized for a maximum of an 80% average load factor and 200 hours of operation per year. This includes less than 25 hours per year at the Standby Power rating. Standby ratings should never be applied except in true emergency power outages. Negotiated power outages contracted with a utility company are not considered an emergency.

CONTINUOUS POWER RATING is applicable for supplying utility power at a constant 100% load for an unlimited number of hours per year. No overload capability is available for this rating.

PRIME POWER RATING is applicable for supplying electric power in lieu of commercially purchased power. Prime Power applications must be in the form of one of the following two categories:

UNLIMITED TIME RUNNING PRIME POWER

Prime Power is available for an unlimited number of hours per year in a variable load application. Variable load should not exceed a 70% average of the Prime Power rating during any operating period of 250 hours.

The total operating time at 100% Prime Power shall not exceed 500 hours per year.

A 10% overload capability is available for a period of 1 hour within a 12 hour period of operation. Total operating time at the 10% overload power shall not exceed 25 hours per year.

LIMITED TIME RUNNING PRIME POWER

Prime Power is available for a limited number of hours in a non-variable load application. It is intended for use in situations where power outages are contracted, such as in utility power curtailment. Engines may be operated in parallel to the public utility up to 750 hours per year at power levels never to exceed the Prime Power rating. The customer should be aware, however, that the life of any engine will be reduced by this constant high load operation. Any operation exceeding 750 hours per year at the Prime Power rating should use the Continuous Power rating.

Cummins Engine Company, Inc.

Engine Data Sheet

ENGINE MODEL :QSM11-G1

CONFIGURATION NUMBER : D353017GX03

DATA SHEET : DS-2930

DATE : 21Oct05

PERFORMANCE CURVE : FR-2930

INSTALLATION DIAGRAM

• Fan to Flywheel : 3170471

CPL NUMBER

• Engine Critical Parts List :8062

GENERAL ENGINE DATA

Type	4 Cycle; In-line; 6-Cylinder Diesel
Aspiration	Turbocharged and Charge Air Cooled
Bore x Stroke..... — in x in (mm x mm)	4.92 x 5.79 (125 x 147)
Displacement	661 (10.8)
Compression Ratio	16.3 : 1
Dry Weight..... — lb (kg)	2145 (973)
Wet Weight	2220 (1007)
Moment of Inertia of Rotating Components	
• with FW 2141 Flywheel	62.4 (2.63)
Center of Gravity from Front Face of Block	17.7 (450)
Center of Gravity above Crankshaft Centerline.....	7.5 (190)
Maximum Static Loading at Rear Main Bearing	TBD (TBD)

ENGINE MOUNTING

Maximum Bending Moment at Rear Face of Block	1000 (1356)
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EXHAUST SYSTEM

Maximum Back Pressure at Standby Power Rating.....	3 (76)
Maximum Bending Moment to the Turbo Flange	11 (15)

AIR INDUCTION SYSTEM

Maximum Temperature Rise Between Engine Air Inlet and Intake Manifold	45 (25)
Maximum Intake Air Restriction Including Air Filter Plumbing	
• with Dirty Filter Element	25 (635)
• with Clean Filter Element.....	15 (381)

COOLING SYSTEM

Maximum Allowable Pressure Drop from Turbo Outlet to Intake Manifold	
— @ 1800 rpm..... — in Hg (mm Hg)	4 (102)
— @ 1500 rpm..... — in Hg (mm Hg)	2.5 (64)
Coolant Capacity — Engine Only	10 (9.5)
Maximum Coolant Friction Head External to Engine — 1800 rpm.....	10 (69)
— 1500 rpm..... — psi (kPa)	8 (55)
Maximum Static Head of Coolant Above Engine Crank Centerline.....	46 (14)
Standard Thermostat (Modulating) Range	180 - 200 (82 - 93)
Minimum Pressure Cap	10 (69)
Maximum Top Tank Temperature for Standby / Prime Power	220 / 212 (104 / 100)

LUBRICATION SYSTEM

Oil Pressure @ Idle Speed (Minimum).....	10 (69)
@ Pressure Range	
— Cold	60 - 70 (414 - 483)
— Warm	35 - 40 (242 - 276)
Maximum Oil Temperature	275 (135)
Oil Capacity with OP 2082 Oil Pan : High - Low	9.0 - 8.0 (34 - 30)
Total System Capacity (Including Filter)	9.7 (36.7)
Intermittant Angularity of OP 2082 Oil Pan	
— Front Down.....	25°
— Front Up	25°
— Side to Side	30°

FUEL SYSTEM

Type Injection System.....	Cummins Select	
Maximum Restriction	— With Clean Fuel Filter	4 (102)
	— With Dirty Fuel Filter	8 (204)
Maximum Allowable Head on Injector Return Line (Consisting of Friction Head and Static Head).....	— in Hg (mm Hg)	2.5 (63)
Maximum Fuel Flow to Injection Pump.....	— US gph (liter / hr)	75.1 (284)
Maximum Fuel Inlet Temperature	— °F (°C)	160 (71)
Maximum Return Fuel Flow	— US gph (liter / hr)	73.0 (276)
Return Fuel Temperature @ 104°F (40°C) Fuel Inlet Temperature.....	— °F (°C)	176 (80)

ELECTRICAL SYSTEM

Cranking Motor (Heavy Duty, Positive Engagement).....	— volt	24
Maximum Allowable Resistance of Cranking Circuit.....	— ohm	0.002
Minimum Recommended Battery Capacity		
• Cold Soak @ 50 °F (10 °C) and Above.....	— 0°F CCA	600
• Cold Soak @ 32 °F to 50 °F (0 °C to 10 °C).....	— 0°F CCA	640
• Cold Soak @ 0 °F to 32 °F (-18 °C to 0 °C).....	— 0°F CCA	900

COLD START CAPABILITY

Minimum Ambient Temperature for Cold Start with Coolant Heater to Rated Speed	— °F (°C)	7 (-14)
Minimum Ambient Temperature for Unaided Cold Start to Low Idle Speed	— °F (°C)	25 (-4)
Minimum Ambient Temperature for NFPA 110 Cold Start (90°F minimum coolant temperature).....	— °F (°C)	32 (0)

PERFORMANCE DATA

- All data is based on:
- Engine operating with fuel system, water pump, lubricating oil pump, air cleaner and exhaust silencer; not included are battery charging alternator, fan, and optional driven components.
 - Engine operating with fuel corresponding to grade No. 2-D per ASTM D975.
 - ISO 3046, Part 1, Standard Reference Conditions of:

Barometric Pressure	: 100 kPa (29.53 in Hg)	Air Temperature	: 25 °C (77 °F)
Altitude	: 110 m (361 ft)	Relative Humidity	: 30%

Steady State Stability Band at any Constant Load	— %	+/- 0.25%
Estimated Free Field Sound Pressure Level of a Typical Generator Set;		
Excludes Exhaust Noise; at Rated Load and 15 m (25 ft); 1800 rpm / 1500 rpm	— dBA	80 / 75
Exhaust Noise at 1 m Horizontally from Centerline of Exhaust Pipe Outlet Upwards at 45°; 1800 rpm / 1500 rpm	— dBA	124.5 / 123

	STANDBY		PRIME POWER	
	60 hz	50 hz	60 hz	50 hz
Governed Engine Speed.....	1800	1500	1800	1500
Engine Idle Speed	675 - 750	675 - 750	675 - 750	675 - 750
Gross Engine Power Output.....	395 (295)	345 (257)	359 (268)	314 (234)
Brake Mean Effective Pressure	262 (1809)	275 (1899)	239 (1646)	250 (1727)
Piston Speed.....	1737 (8.8)	1448 (7.4)	1737 (8.8)	1448 (7.4)
Friction Horsepower	41 (30.6)	30 (22.4)	41 (30.6)	30 (22.4)
Engine Water Flow at Stated Friction Head External to Engine:				
• 2.5 psi Friction Head.....	91 (5.7)	77 (4.8)	91 (5.7)	77 (4.8)
• Maximum Friction Head.....	78 (4.9)	64 (4.0)	78 (4.9)	64 (4.0)
Turbo Compressor Outlet Pressure	28 (190)	26 (177)	25 (175)	24 (167)
Turbo Compressor Outlet Temperature.....	333 (167)	315 (157)	315 (157)	304 (151)
Intake Air Flow	820 (387)	685 (320)	780 (370)	660 (310)
Exhaust Gas Temperature.....	916 (491)	929 (498)	851 (455)	890 (477)
Exhaust Gas Flow	2000 (940)	1660 (785)	1800 (850)	1565 (740)
Air-to-Fuel Ratio	26.7 : 1	25.6 : 1	28.4 : 1	26.9 : 1
Radiated Heat to Ambient	2050 (36)	2050 (36)	1950 (35)	1900 (33)
Heat Rejection to Coolant.....	4700 (83)	4250 (75)	4300 (75)	3950 (70)
Heat Rejection to Exhaust	13450 (237)	11400 (201)	11850 (208)	10500 (185)
Heat Rejection to Fuel *	200 (3.5)	150 (2.6)	200 (3.5)	150 (2.6)
Heat Rejection to Aftercooler	2900 (51)	2200 (39)	2550 (45)	2000 (36)

* Maximum heat rejection which occurs at rated speed, no load.

N.A. - Data is Not Available

N/A - Not Applicable to this Engine

TBD - To Be Determined

CUMMINS ENGINE COMPANY, INC.

Columbus, Indiana 47202-3005

ENGINE MODEL : QSM11-G1

DATA SHEET : DS-2930

DATE : 21Oct05

CURVE NO. : FR-2930