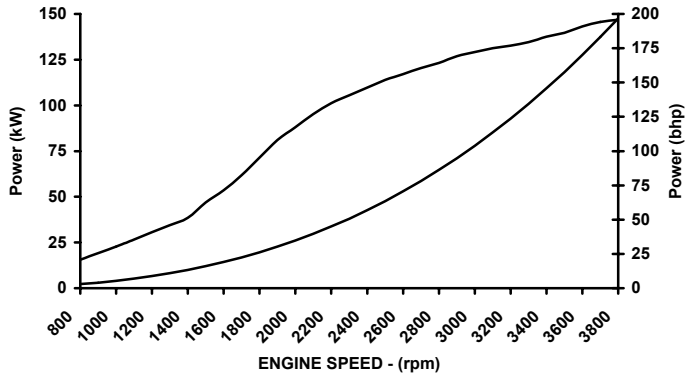
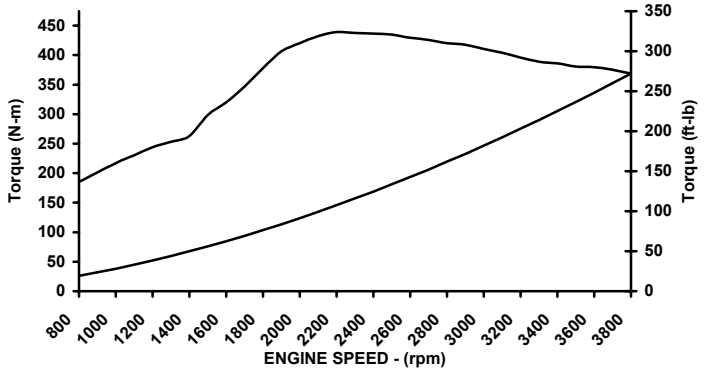
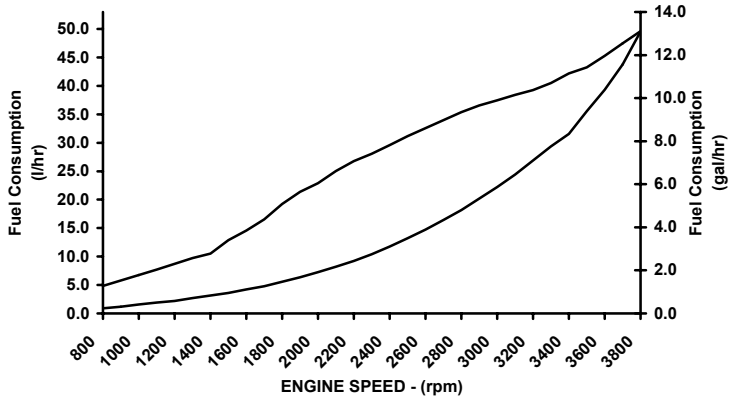
	CUMMINS MERCRUISER DIESEL Charleston, SC 29405 Marine Performance Curves	Basic Engine Model: 2.8L EI 200	Curve Number: BC9102	
		Engine Configuration: D933001MX03	Inboard	Date: 15-Oct-04

Displacement:	**2.8 liter**	**[169 in^3]**	kW [bhp, mhp] @ rpm	
Bore:	**94 mm**	**[3.7 in]**	Advertised Power:	**147 [197, 200] @ 3800**
Stroke:	**100 mm**	**[3.94 in]**		
Fuel System:	**Bosch VP37**		Aspiration:	**Turbocharged / Sea Water Aftercooled**
Cylinders:	**4**		Rating Type:	**High Output**

CERTIFIED: This marine diesel engine conforms with the NOx requirements of the International Maritime Organization (IMO), MARPOL 73/78 Annex VI, Regulation 13 as applicable.







RATED POWER OUTPUT CURVE

rpm	kW	bhp
3800	147	197
3600	143	192
3400	138	185
3200	133	178
3000	129	173
2800	123	165
2600	117	157
2400	110	147
2200	101	136
2000	88	118
1800	71	96
1500	47	63
1000	23	30

FULL LOAD TORQUE CURVE

rpm	N-m	ft-lb
3800	369	272
3600	380	280
3400	386	285
3200	396	292
3000	411	303
2800	420	310
2600	430	317
2400	437	322
2200	439	324
2000	420	310
1800	378	279
1500	298	220
1000	217	160

FUEL CONSUMPTION - PROP CURVE

rpm	l/hr	gal/hr
3800	49.6	13.1
3600	39.3	10.4
3400	31.6	8.3
3200	26.9	7.1
3000	22.2	5.9
2800	18.2	4.8
2600	14.8	3.9
2400	11.7	3.1
2200	9.2	2.4
2000	7.2	1.9
1800	5.6	1.5
1500	3.6	1.0
1000	1.6	0.4

Rated Conditions: Ratings are based upon ISO 8665 and SAE J1228 reference conditions; air pressure of 100 kPa [29.612 in Hg], air temperature 25 deg. C [77 deg. F] and 30% relative humidity. Power is in accordance with IMCI procedure. Member NMMA.

Rated Curves (upper) represents rated power at the crankshaft for mature gross engine performance capabilities obtained and corrected in accordance with ISO 3046. Propeller Curve (lower) is based on a typical fixed propeller demand curve using a 2.7 exponent. Propeller Shaft Power is approximately 3% less than rated crankshaft power after typical reverse/reduction gear losses and may vary depending on the type of gear or propulsion system used.

Fuel Consumption is based on fuel of 35 deg. API gravity at 16 deg. C [60 deg. F0 having LHV of 42,780 kj/kg [18390 Btu/lb] and weighing 838.9 g/liter [7.001 lb/U.S. gal].

High Output Rating: This Rating is for use in variable load applications where full power is limited to one (1) hour out of every eight (8) hours of operation. Also, reduced power operations must be at or below 200 RPM of the maximum rated RPM. This rating is for pleasure/non-revenue generating applications that operate 300 hours per year.

James D Kuhlenbeck

CHIEF ENGINEER

Marine Engine Performance Data

Curve No.: BC9102

DATE: 15Oct04

General Engine Data		
Engine Model		2.8L EI 200
Rating Type		High Output
Rated Engine Power	kW [bhp]	147 [197]
Rated Engine Speed	rpm	3800
Rated HP Production Tolerance	±%	5
Rated Engine Torque	N•m [ft•lb]	369 [272]
Peak Engine Torque @ 2200 rpm	N•m [ft•lb]	439 [324]
Brake Mean Effective Pressure	kPa [psi]	1115 [162]
Indicated Mean Effective Pressure	kPa [psi]	N/A
Minimum Idle Speed Setting	rpm	700
Normal Idle Speed Variation	±rpm	50
High Idle Speed Range Minimum	rpm	4220
Maximum	rpm	4280
Maximum Allowable Engine Speed	rpm	4280
Maximum Torque Capacity from Front of Crank[2]	N•m [ft•lb]	0
Compression Ratio		17:1
Piston Speed	m/sec [ft/min]	12.7 [2493]
Firing Order		1-3-4-2
Weight (Dry) Engine With Heat Exchanger System - Average	kg [lb]	335 [738]
Fuel System[1]		
Fuel Consumption @ Rated Speed	l/hr [gal/hr]	49.6 [13.1]
Approximate Fuel Flow to Pump	l/hr [gal/hr]	67 [18]
Maximum Allowable Fuel Supply to Pump Temperature	°C [°F]	60 [140]
Approximate Fuel Flow Return to Tank	l/hr [gal/hr]	18 [5]
Approximate Fuel Return to Tank Temperature	°C [°F]	70 [158]
Maximum Heat Rejection to Drain Fuel[5]	kW [Btu/min]	1 [77]
Fuel Transfer Pump Pressure Range @ 2500 rpm	kPa [psi]	N.A.
Air System[1]		
Intake Manifold Pressure	kPa [in Hg]	190 [56]
Intake Air Flow	l/sec [cfm]	200 [424]
Heat Rejection to Ambient	kW [Btu/min]	23 [1309]
Maximum Air Cleaner Inlet Temperature Rise Over Ambient	°C [°F]	17 [30]
Exhaust System[1]		
Exhaust Gas Flow	l/sec [cfm]	450 [954]
Exhaust Gas Temperature Turbine Out	°C [°F]	550 [1022]
Manifold	°C [°F]	N.A.
Cooling System[1]		
Sea Water Pump Specifications Restriction	kPa [in.Hg]	17 [5]
Flow	l/min [gal/min]	114 [30]
Pressure Cap Rating (With Heat Exchanger Option)	kPa [psi]	103 [15]
Coolant Flow to Engine Heat Exchanger/Keel Cooler	l/min [gal/min]	226 [60]
Standard Thermostat Operating Range Start to Open	°C [°F]	80 [176]
Full Open	°C [°F]	95 [202]
Heat Rejection to Engine Coolant[3]	kW [Btu/min]	140 [7970]

TBD = To Be Decided **N/A = Not Applicable** **N.A. = Not Available**

[1]All Data at Rated Conditions
[2]Consult Installation Direction Booklet for Limitations
[3]Heat rejection values are based on 50% water/ 50% ethylene glycol mix and do NOT include fouling factors. If sourcing your own cooler, a service fouling factor should be applied according to the cooler manufacturer's recommendation.
[4]Consult option notes for flow specifications of optional Cummins seawater pumps, if applicable.
[5]May not be at rated load and speed. Maximum heat rejection may occur at other than rated conditions.

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