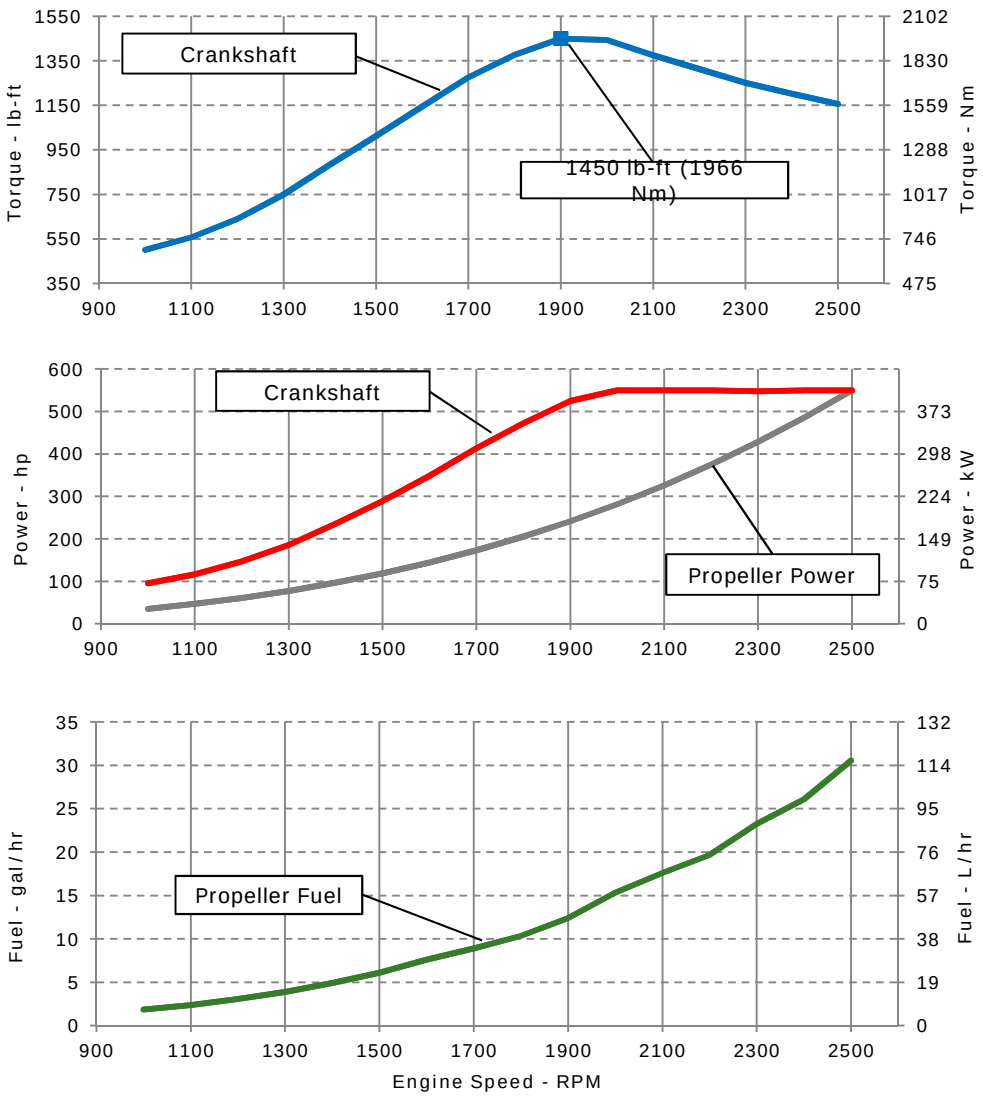
ENGINE PERFORMANCE CURVE

JOHN DEERE

Rating: M5 - 550hp (410kW) @ 2500 RPM
Application: Marine

PowerTech™ 9.0L Engine
Model: 6090SFM85



REFERENCE CONDITIONS

Air Intake Restriction.....12 in.H_2O (3 kPa)
Exhaust Back Pressure..... 30 in.H_2O (7.5 kPa)

Rated speed and power
Gross power guaranteed within ±5% at SAE J1995 and ISO 3046
J1995 and ISO 3046 conditions:
77 °F (25 °C) air inlet temperature
29.31 in.Hg (99 kPa) barometric pressure
104 °F (40 °C) fuel inlet temperature
0.853 fuel specific gravity @ 60 °F (15.5 °C)

Ambient air temperature is defined to be the temperature of ambient air close to operating vessel that is not influenced in any manner by operating characteristics of the vessel (free field temp).

Conversion factors:
Power: kW = hp x 0.746
Fuel: 1 gal = 7.1 lb, 1 L = 0.85 kg
Torque: N·m = lb-ft x 1.356

All values from currently available data. Subject to manufacturing and measurement variations and to change without notice.
Actual performance is subject to application and operation conditions outside of John Deere control.

Notes:

M5: The M5 rating is for marine recreational and light duty commercial propulsion applications that operate between 300-1,000 hours per year and have load factors below 35 percent. This rating is for applications that use full power for no more than 30 minutes out of each 8 hours. The remaining time of operation is at or below cruising speed.

Possible applications: recreational boats, tactical military vessels and rescue boats.

Designed/Calibrated to meet:	Certified by:
• EPA Commercial Marine Tier 3 • IMO MARPOL Annex VI Compliant • NRMM (97/68/EC), as amended	Adam Paull
Ref: Engine Emission Label	9-Mar-14

Performance Curve: 6090SFM85_E

All values at rated speed, power, and standard conditions, per SAE J1995 unless otherwise noted.

Engine Installation Criteria

General Data

Model	6090SFM85			
Number of Cylinders	6			
Bore	118.4	mm	4.66	in
Stroke	136	mm	5.35	in
Displacement	9.0	L	549	in^3
Compression Ratio	16.3:1			
Valves per Cylinder, Intake/Exhaust	2/2			
Combustion System	Direct injection			
Firing Order	1-5-3-6-2-4			
Engine Type	In line, 4 Cycle			
Aspiration	Turbocharged and Aftercooled			
Aftercooling System	Seawater cooled			
Engine Crankcase Vent System	Closed			

Cooling System*

Total Engine to Seawater Heat Rejection**	309.6	kW	17622	BTU/min
Aftercooler Heat Rejection	116	kW	6603	BTU/min
Coolant Flow	417	L/min	110	gal/min
Thermostat Start to Open	82	°C	180	°F
Thermostat Fully Open	94	°C	202	°F
Min. Coolant Fill Rate	12	L/min	3.2	gal/min
Min. Pressure Cap	110.3	kPa	16	psi
Max. External Coolant Restriction	40	kPa	5.8	psi
Normal Operation Max Top Tank Temperature	100	°C	212	°F
≤ 5% of Total Operating Time Top Tank Temperature	100-110	°C	212-230	°F
Absolute Max Top Tank Temperature	110	°C	230	°F
Recommended Fuel Cooler	10	kW	573	BTU/min
Engine Radiated Heat	58	kW	3303	BTU/min

Physical Data

Length to rear face of block	1293	mm	50.9	in
Length maximum	1714	mm	67.5	in
Width maximum	975	mm	38.4	in
Height, crank centerline to top	662	mm	26.1	in
Height, crank centerline to bottom	320	mm	320	in
Weight, with oil, no coolant (includes engine, flywheel housing, flywheel, and electronics)	1056	kg	2327	lb
Center of Gravity Location, X-axis From Rear Face of Block	408	mm	16.1	in
Center of Gravity Location, Y-axis Right of Crankshaft	38	mm	1.5	in
Center of Gravity Location, Z-axis Above Crankshaft	200	mm	7.9	in
Max. Allowable Static Bending Moment At Rear Face of Flywheel Housing with 5-G Load	814	Nm	600	lb-ft
Thrust Bearing Load Limit, Forward Continuous	8.6	kN	1933	lbf
Thrust Bearing Load Limit, Forward Intermittent	13	kN	2923	lbf
Thrust Bearing Load Limit, Rearward Continuous	4	kN	899	lbf
Thrust Bearing Load Limit, Rearward Intermittent	6	kN	1349	lbf

Electrical System

Min. Recommended Battery Capacity, 12V @32 °F (0 °C)	1100	amps
Min. Recommended Battery Capacity, 24V @32 °F (0 °C)	750	amps
Starter Rolling Current, 12V @32 °F (0 °C)	500	amps
Starter Rolling Current, 24V @32 °F (0 °C)	300	amps
Min. Voltage at ECU during Cranking, 12V	6	volts
Min. Voltage at ECU during Cranking, 24V	10	volts
Max. Allowable Start Circuit Resistance, 12V	0.002	ohms
Max. Allowable Start Circuit Resistance, 24V	0.0012	ohms
Recommended Starter Cable, 12V 100"	#00	
Recommended Starter Cable, 24V 100"	#2	
Recommended Starter Cable, 12V 200"	#0000 or 2#00	
Recommended Starter Cable, 24V 200"	#0	
Electrical Component Maximum Temperature Limit	125 °C	257 °F

* The cooling system should be capable of typical at ambient up to the maximum conditions in which the vessel will operate.
Typical operation is defined as the average load sustainable in the vessel over 10 min.
** Reference 32 ˚C Sea Water Temperature

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Engine Installation Criteria

Fuel System

ECU Description		L14		
Fuel Injection Pump		HPCR		
Governor Type		Electronic		
Volumetric Fuel Consumption	116	L/hr	30.5	gal/hr
Mass Fuel Consumption	98.3	kg/hr	217	lb/hr
Total Fuel Volumetric Flow	251	L/hr	66.3	gal/hr
Total Fuel Mass Flow	213	kg/hr	470	lb/hr
Max. Fuel Inlet Restriction*	20	kPa	80	in.H2O
Max. Fuel Inlet Pressure	20	kPa	80	in.H2O
Max Fuel Return Pressure	20	kPa	80	in.H2O
Max. Fuel Height Above Transfer Pump	2.4	m	7.9	ft
Max. Leak-off Return Height	2.4	m	7.9	ft
Max. Fuel Inlet Height Above Fuel Tank Supply	2.4	m	7.9	ft
Normal Operation Fuel Temperature	40	°C	104	°F
Max. Fuel Inlet Temperature	100	°C	212	°F
Min. Recommended Fuel Line Inside Diameter	8.53	mm	0.34	in
Min. Recommended Fuel Line Size		6	(-) AN	
Primary Fuel Filter		10	mic	
Secondary Fuel Filter		2	mic	

Lubrication System

Oil Pressure at Rated Speed	270	kPa	39	psi
Oil Pressure at Low Idle (650rpm)**	145	kPa	21	psi
Max. Crankcase Pressure	2	kPa	8	in.H2O
Maximum Installed Angle, Front Down		0	deg	
Maximum Installed Angle, Front Up		12	deg	
Engine Angularity Limits Any Direction, Continuous***		20	deg	
Engine Angularity Limits Any Direction, Intermittent***		30	deg	

Seawater Pump System

Seawater Pump Flow	375	L/min	99	gal/min
Max. Suction Lift	3	m	9.8	ft
Max. Outlet Pressure	140	kPa	20	psi
Max. Inlet Restriction	30	kPa	4	psi

* With clean filters

** With John Deere Plus-50 II™ 15w-40, not applicable with break in oil.

*** With 1932 option

Air Intake System

Engine Air Flow	33.6	m^3/min	1187	ft^3/min
Intake Manifold Pressure	262	kPa	37.3	psi
Manifold Air Temperature	51.4	°C	125	°F
Maximum Manifold Air Temperature	67	°C	152.6	°F
Max. Allowable Temperature Rise, Ambient Air to Engine Inlet	17	°C	30	°F
Max. Air Intake Restriction, Clean Air Cleaner	3	kPa	12	in.H_2O
Max. Air Intake Restriction, Dirty Air Cleaner	6.25	kPa	25	in.H_2O
Min. Ventilation Area	0.207	m^2	320	in^2

Performance Data

Rated Power	410	kW	550	hp
Rated Speed		2500	RPM	
Peak Torque Speed		1900	RPM	
Low Idle Speed		650	RPM	
Rated Torque	1566	Nm	1155	ft-lb
Peak Torque	1966	Nm	1450	ft-lb
BMEP, Rated	2187	kPa	317	psi
Rated Pferdestärke (metric hp)		557	ps	
Front Drive Capacity, Intermittent	955	Nm	704	lb-ft
Front Drive Capacity, Continuous	955	Nm	704	lb-ft

Exhaust System

Exhaust Flow	76.7	m^3/min	2709	ft^3/min
Exhaust Flow @ gas STP	32.4	m^3/min	1144	ft^3/min
Exhaust Temperature	437	°C	818.6	°F
Max. Allowable Exhaust Restriction	7.5	kPa	30	in.H_2O
Max. Shear on Turbocharger Exhaust Outlet	11	kg	24.3	lb
Max. Bending Moment on Turbocharger Exhaust Outlet	7	Nm	15.4	lb-ft
Min. Exhaust Pipe Diameter, Dry	139.7	mm	5.5	in
Min. Exhaust Pipe Diameter, Wet	152.4	mm	6.0	in

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Engine Performance Data Table

Engine Speed	Crank Power		Crank Torque		* Prop Power		* Prop Fuel		* Prop BSFC
RPM	kW	hp	Nm	lb-ft	kW	hp	L/hr	gal/hr	g/kW-hr
2500	410	550	1567	1156	410	550	116	31	240
2400	410	550	1631	1203	363	487	99	26	231
2300	409	548	1696	1251	319	428	88	23	234
2200	410	550	1780	1313	280	375	75	20	227
2100	410	550	1864	1375	243	326	67	18	233
2000	410	550	1958	1444	210	282	58	15	235
1900	391	525	1966	1450	180	241	47	12	221
1800	352	472	1867	1377	153	205	39	10	217
1700	308	413	1730	1276	129	173	34	9	222
1600	260	349	1552	1144	108	144	29	8	228
1500	216	289	1372	1012	89	119	23	6	221
1400	176	235	1198	883	72	97	19	5	219
1300	138	186	1017	750	58	77	15	4	218
1200	109	146	868	640	45	61	12	3	219
1100	87	117	755	557	35	47	9	2	219
1000	71	95	678	500	26	35	7	2	227

* Theoretical 3.0 exponent propeller curve , measured at flywheel

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