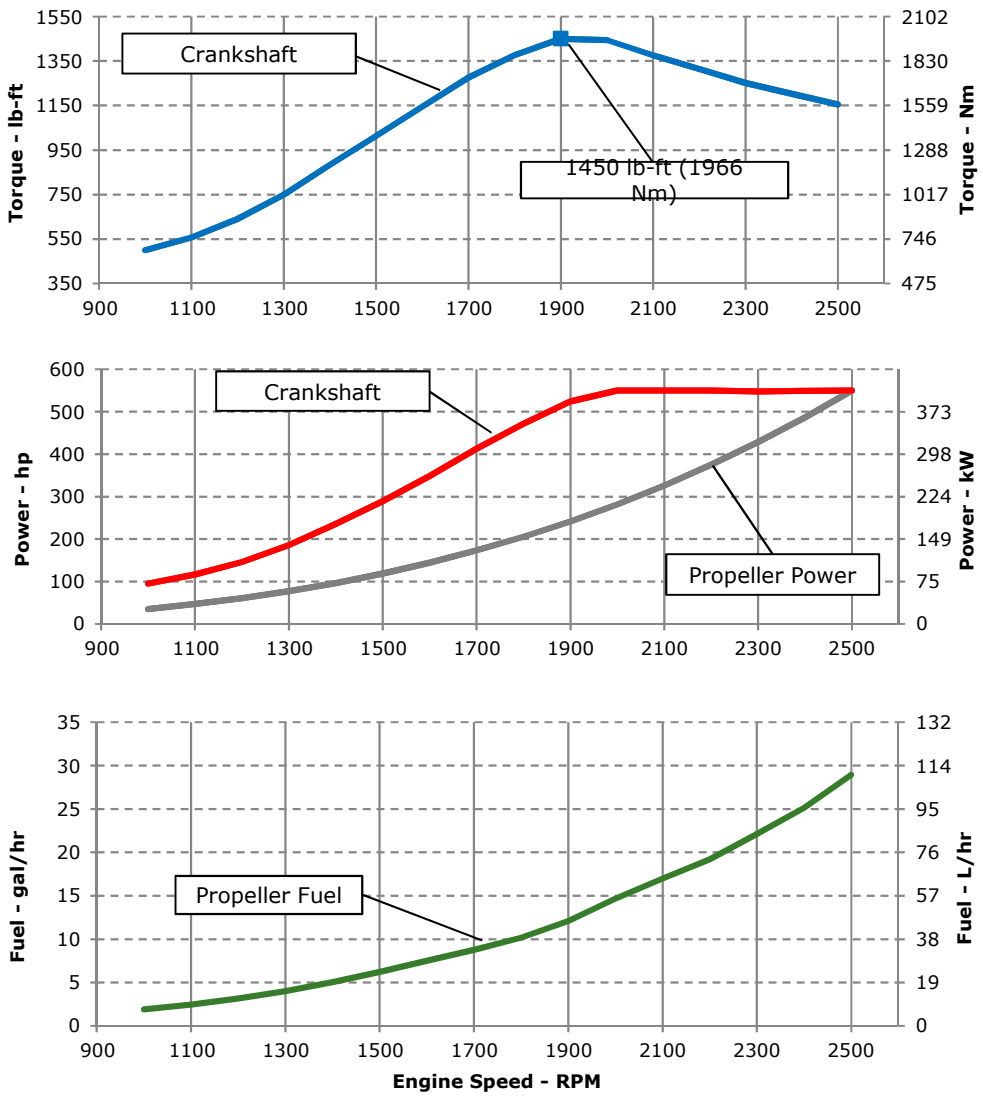
ENGINE PERFORMANCE CURVE

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 ISO 8665/SAE J1228 and ISO 3046/SAE J1995
Test 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.

All pressures shown in gauge pressure

Notes:

M5: The M5 rating is for marine proprulsion applications that operate 1000 hours or less per year and have load factors below 35%. This rating is for applications that use full power for no more than 30 minutes out of each 8 hours and cruising speed the remainder of the 8 hours, and do not operate for the remaining 16 hours of the day.
Possible applications: Recreational boats in the U.S., tactical military vessels, and rescue boats outside the U.S.

Designed/Calibrated to meet:	Certified by:
• EPA Marine Tier 3 Commercial (40 CFR 1042) • IMO Tier II Compliant (MARPOL Annex VI) • EU Stage IIIa Inland Waterways (NRMM 97/68/EC, as amended) • Recreational Craft Directive 2 (2013/53/EU)	Scott D. Ochsner
Ref: Engine Emission Label	9-Jun-20

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*

Jacket Water Heat Rejection**	309.6	kW	17622	BTU/min
Aftercooler Heat Rejection	116	kW	6603	BTU/min
Coolant Flow	417	L/min	110	gal/min
Min. Coolant Pump Inlet Pressure	30.3	kPa	4.4	psi
Thermostat Start to Open	82	°C	180	°F
Thermostat Fully Open	94	°C	202	°F
Engine Coolant Capacity, HE	38	L	10	gal
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	2.9	kW	166	BTU/min
Engine Radiated Heat	27	kW	1565	BTU/min

Physical Data

Length to rear face of block	1297	mm	51.1	in
Length to rear face of flywheel housing (SAE #2)	1415	mm	55.7	in
Length maximum	1712	mm	67.4	in
Width maximum	974	mm	38.3	in
Height, crank centerline to top	664	mm	26.1	in
Height, crank centerline to bottom	319	mm	12.6	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 (for installations up to 5-G)	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		
Electrical Component Maximum Temperature Limit	125	°C	257	°F
Maximum ECU Temperature	105	°C	221	°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	110	L/hr	28.9	gal/hr
Mass Fuel Consumption	93.1	kg/hr	205	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
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

Air Intake System

Engine Air Flow	33.6	m^3/min	1187	ft^3/min
Intake Manifold Pressure	242	kPa	39.0	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
Max. CAC Delta Pressure	16.5	kPa	66.2	in.H2O

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

* With clean filters

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

*** With 1932 option

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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	110	29	227
2400	410	550	1631	1203	363	487	95	25	223
2300	409	548	1696	1251	319	428	84	22	223
2200	410	550	1780	1313	280	375	73	19	221
2100	410	550	1864	1375	243	326	64	17	225
2000	410	550	1958	1444	210	282	55	15	225
1900	391	525	1966	1450	180	241	46	12	216
1800	352	472	1867	1377	153	205	38	10	214
1700	308	413	1730	1276	129	173	33	9	219
1600	260	349	1552	1144	108	144	28	8	225
1500	216	289	1372	1012	89	119	23	6	225
1400	176	235	1198	883	72	97	19	5	225
1300	138	186	1017	750	58	77	15	4	224
1200	109	146	868	640	45	61	12	3	225
1100	87	117	755	557	35	47	9	2	227
1000	71	95	678	500	26	35	7	2	233

*** Theoretical 3.0 exponent propeller curve , measured at flywheel**

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