



FOUR STROKE OUTBOARD PETROL ENGINE HOMOLOGATION FILE

International Homologation File Number: 00537		
Homologation Valid from:	2019	Expiry: Dec 31, 2028
Valid for classes:	P1 Superstock, V2, Offshore 3	
Manufacturer:	Mercury Marine	
Engine Model:	Mercury Racing 300R	
Number Manufactured:	250+	
At the date:	Dec 31, 2018	
Certified by the National Authority of:		
At the date:		
UIM Homologation Group Inspector:	Mikael Lundblad	
At the date:	Jan 21, 2019	
UIM Certification Approval:	Union Internationale Motonautique	
At the date:	March 4, 2019	
Running Production Changes		
Change Detail		Page No.
Date Approved for Use		Approved by
Change Detail		Page No.
Date Approved for Use		Approved by

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PICTURES

Photo of the complete engine, 45°
from the front at the port side.



Photo of the complete engine, 45°
from the front at the starboard side.



Photo of the complete engine, 45°
from the rear at the port side.



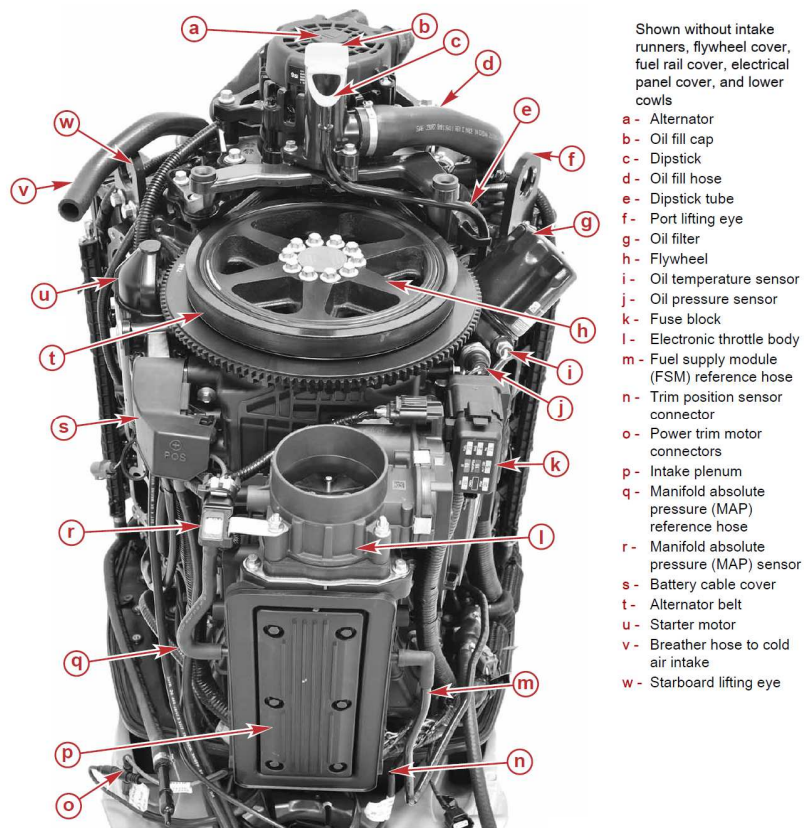
Photo of the complete engine, 45° from the
rear at the starboard side.



PICTURES

Photo of the complete engine, from the rear. 	Picture of the complete engine, 45° from the front port side without top cowl. 
Picture of the complete engine, 45° from the front starboard side without top cowl. 	

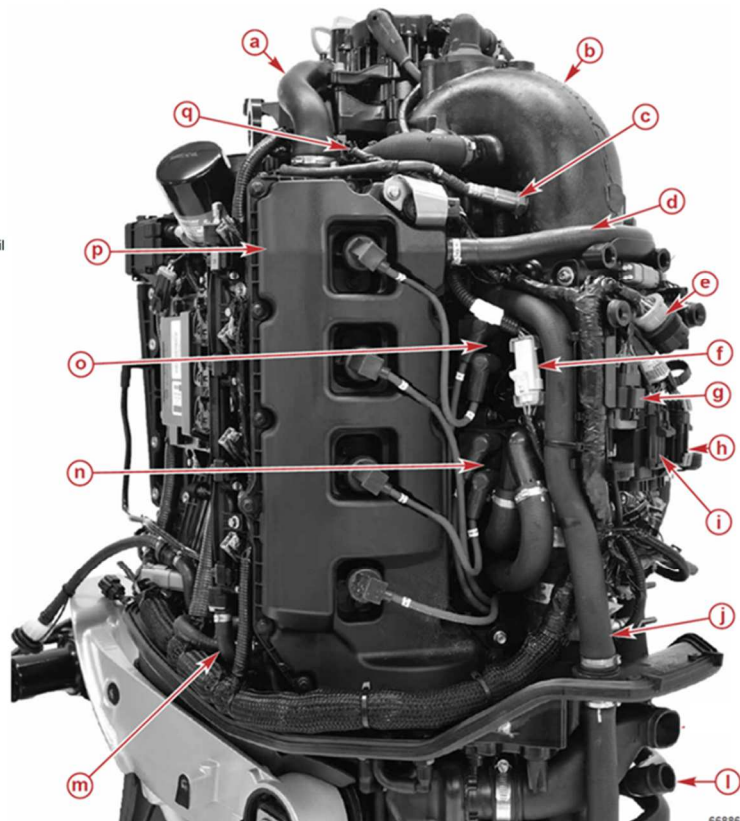
Front view of lay out.



Port aft view of lay out.

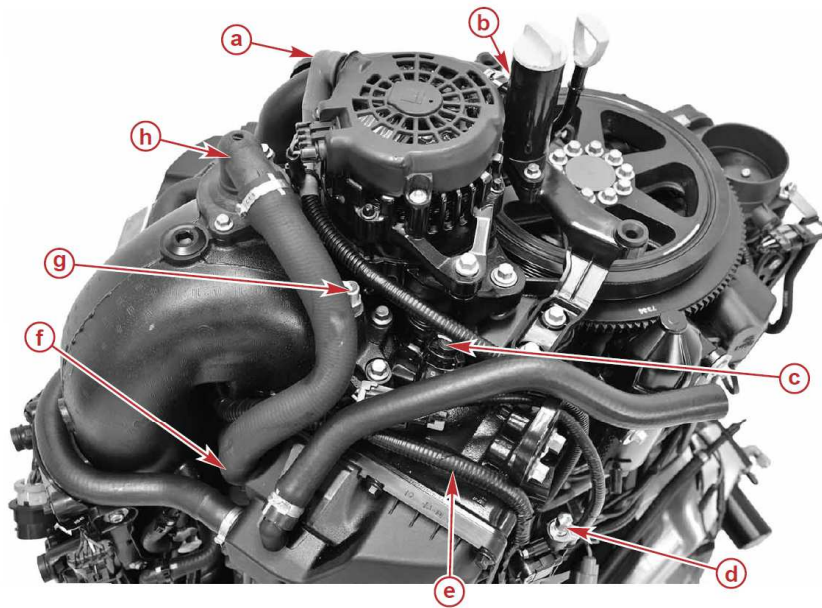
Shown without intake runners, flywheel cover, fuel rail cover, electrical panel cover, and lower cowls

- a - Oil fill hose
- b - Exhaust tube
- c - Oxygen sensor
- d - Breather hose
- e - 14-pin connector
- f - Ignition coil primary lead connector
- g - 10-pin CAN terminator
- h - 6-pin boat harness connector
- i - 3-pin power steering connector
- j - Thermostat dump hose
- l - Idle exhaust relief
- m - Fuel hose from fuel supply module (FSM)
- n - #6, #7 ignition coil
- o - #5, #2 ignition coil
- p - Port camshaft cover
- q - Crankshaft position sensor connector



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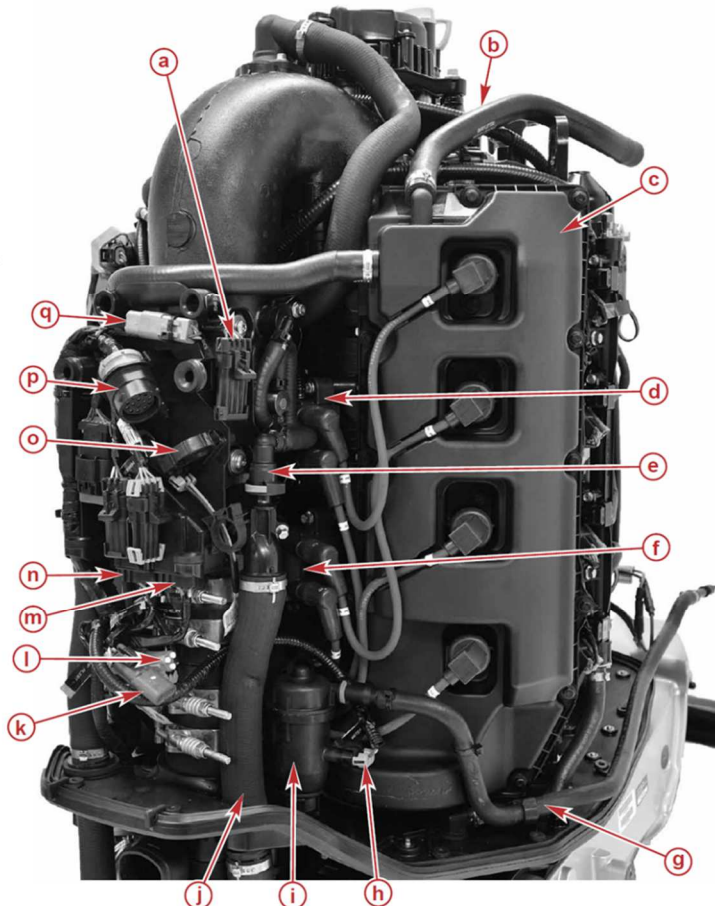
Starboard aft top view of lay out.



Shown without intake runners, flywheel cover, fuel rail cover, electrical panel cover, and lower cowls

- a - Positive charge lead from the alternator
- b - Oil fill tube
- c - Block water pressure sensor
- d - Schrader valve on starboard fuel rail
- e - Starboard injector harness
- f - Thermostat dump hose
- g - Engine coolant temperature sensor
- h - Thermostat housing

Starboard aft view of lay out.



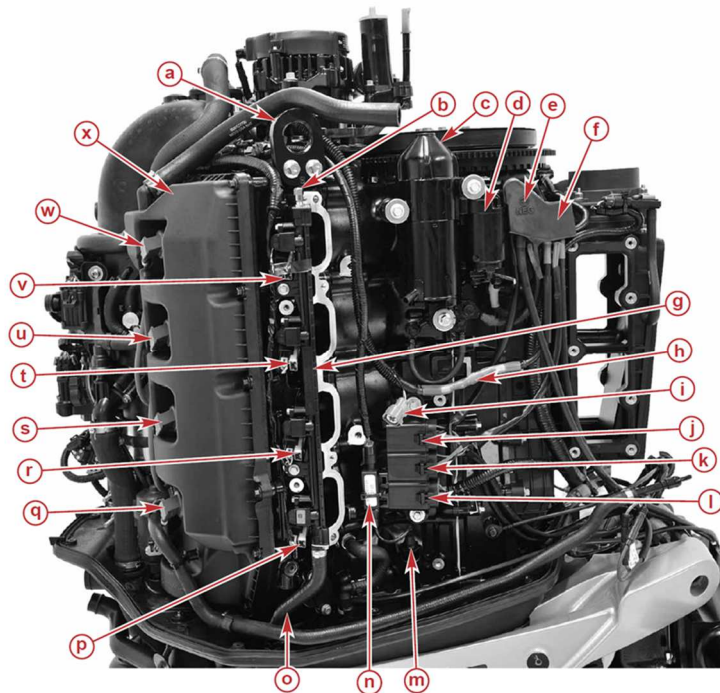
Shown without intake runners, flywheel cover, fuel rail cover, electrical panel cover, and lower cowls

- a - 4-pin depth transducer connector
- b - Breather hose to cold air intake
- c - Starboard camshaft cover
- d - #1, #4 ignition coil
- e - Water strainer fitting
- f - #3, #8 ignition coil
- g - Fuel inlet hose
- h - Water-in-fuel (WIF) sensor connector
- i - Fuel filter
- j - Cooling water supply hose
- k - CAN X termination resistor
- l - Moving propeller (MP) alert connector
- m - Start relay
- n - Fuel pump relay
- o - Ring clip for 14-pin data harness
- p - 14-pin connector
- q - Analog gauge connector

Starboard view.

Shown without intake runners, flywheel cover, fuel rail cover, electrical panel cover, and lower cowls

- a - Starboard lifting eye
- b - Schrader valve
- c - Starter motor
- d - Starter solenoid
- e - Negative battery cable connection (under cover)
- f - Positive battery cable connection (under cover)
- g - Starboard fuel rail
- h - 150-amp fusible link
- i - Manifold air temperature (MAT) sensor connector (sensor is on intake runner)
- j - Trim down relay
- k - Trim up relay
- l - Main power relay
- m - Oil level sensor
- n - Oil level module
- o - Fuel hose from fuel supply module (FSM)
- p - #7 injector
- q - Cylinder #7 high-tension lead
- r - #5 injector
- s - Cylinder #5 high-tension lead
- t - #3 injector
- u - Cylinder #3 high-tension lead
- v - #1 injector
- w - Cylinder #1 high-tension lead
- x - Starboard camshaft cover



Port view of layout

Shown without intake runners, flywheel cover, fuel rail cover, electrical panel cover, and lower cowls

- a - Oil filter
- b - Port lifting eye
- c - Cylinder #2 injector
- d - Camshaft position sensor
- e - Cylinder #2 high-tension lead
- f - #4 injector
- g - Cylinder #4 high-tension lead
- h - #6 injector
- i - Cylinder #6 high-tension lead
- j - Cylinder #8 high-tension lead
- k - #8 injector
- l - Flush hose
- m - Fuel supply module (FSM) reference hose
- n - Port fuel rail
- o - PCM
- p - Fuse holder
- q - Schrader valve

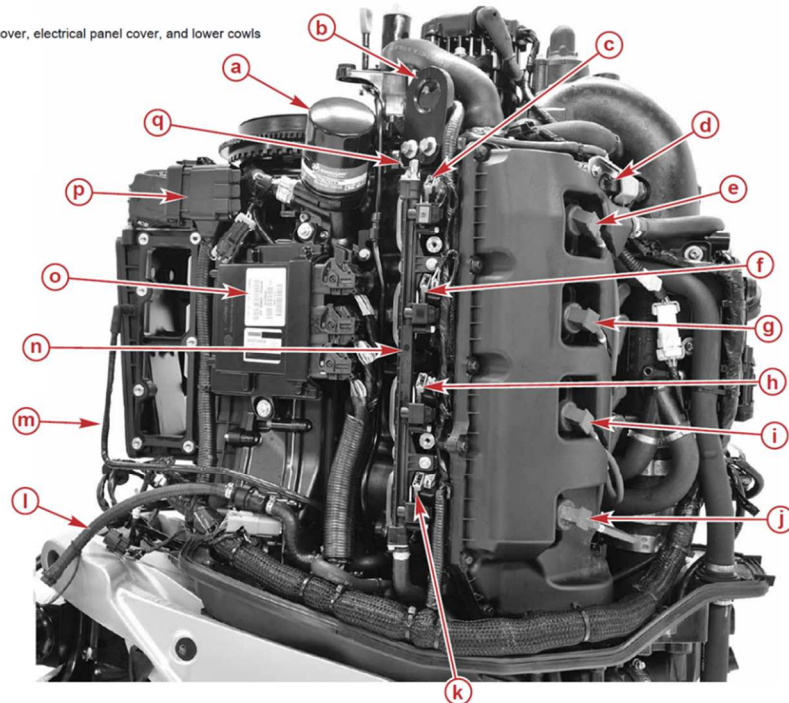


Photo without engine covers, 45° from the front, port side



Photo without engine covers, 45° from the front, stbd side



Photo without engine covers, 45° from the rear, port side



Photo without engine covers, 45° from the rear, stbd side



Midsection assembly, 45° from the aft, stbd side



Midsection assembly, 45° from the aft, port side



Transom bracket, 45° from the rear, port side



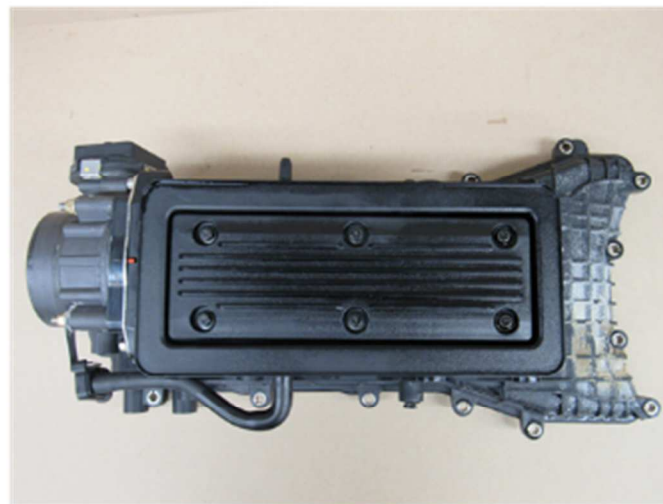
Transom bracket, 45° from the rear, stbd side



Throttle and intake manifold - top



Throttle and intake manifold - front



Throttle and intake manifold - side



Port intake runners - inside



Port intake runners - outside



Starboard intake runners - inside



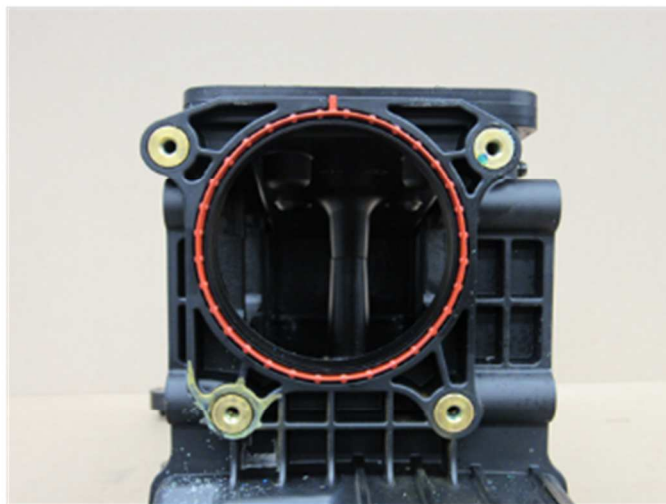
Starboard intake runners - outside



Intake manifold throttle adapter



Intake manifold without throttle adapter



Intake manifold port outlet



Throttle body – inlet side



Throttle body – outlet side



Fuel rail on engine (stbd side)



Fuel injector tip



Engine control unit (ECU) – connector side



ECU on-engine – under port intake runners



Cylinder head (port) from combustion chamber side



Cylinder head (starboard) from combustion chamber side



Combustion chamber

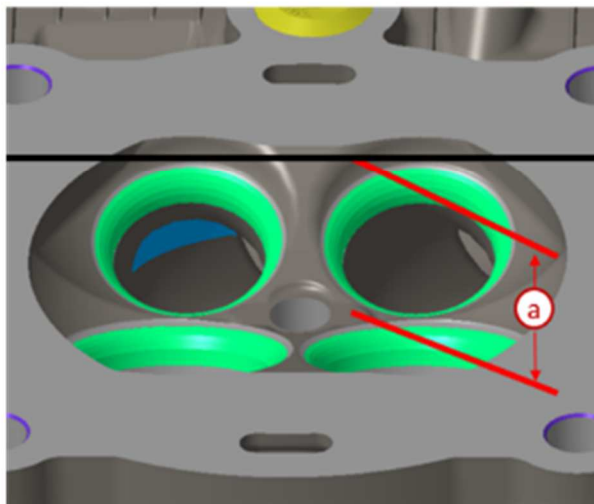


Combustion chamber without valves

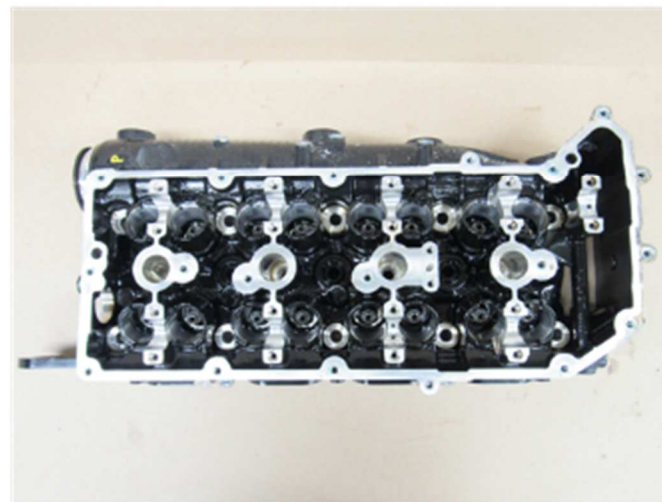


Note: clean-up around port throat is variable due to casting tolerance

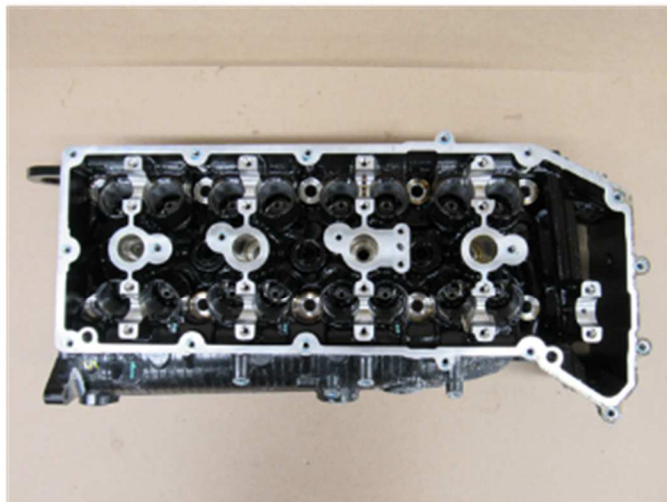
Combustion chamber height a min 14.1 mm



Cylinder head (port) from the valvetrain side



Cylinder head (starboard) from the valvetrain side



Valvetrain – close-up



Cylinder head showing intake port



Exhaust outlet – port cylinder head



Exhaust outlet – starboard cylinder head



Intake port core from manifold flange to intake valves, including valve stems; maximum volume = 152 cc



Intake (left) and exhaust (right) valves



Valve spring with keys and retainer



Intake (left) and exhaust (right) valves



Piston viewed from top



Piston and rod assembly



Piston viewed 45° from wrist pin



Piston viewed from bottom



Connecting rod



Cylinder block from port deck side



Cylinder block from starboard deck side



Crankshaft



Cylinder block from crankshaft side



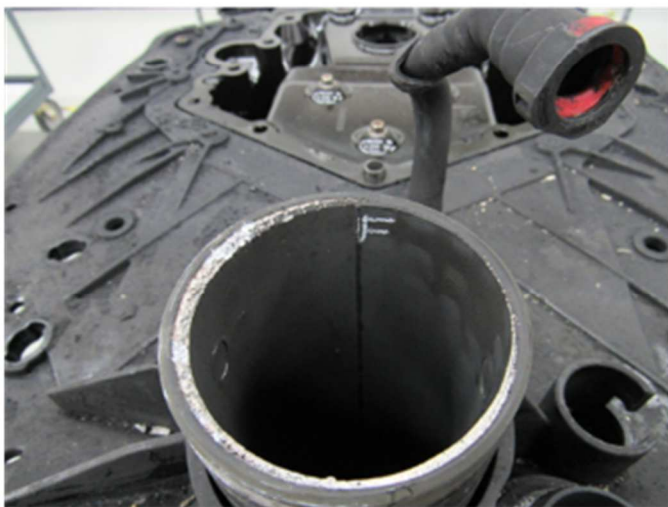
Oil cooler on-engine – under port intake runners



Exhaust manifold



Lower exhaust pipe inlet



Exhaust manifold inlet and outlet



Lower exhaust pipe



Lower exhaust pipe outlet



Gear housing profile



Driveshaft housing exhaust inlet



Gears and carrier



Gear housing exhaust passage



Oil pump without cover



Flywheel bottom (L) and top (R)



MEASUREMENTS

ENGINE FUEL

Type:	Gasoline
Minimum octane required:	91 RON

ENGINE TYPE

Number of cylinders:	8 Cylinders
Cylinder arrangement:	Vee (64°)

ENGINE BLOCK	Tolerance	Measurement	Unit
Bore	+/- 0.10	92.00	mm
Stroke	+/- 0.10	86.00	mm
Capacity per cylinder	max	573.6	cc
Total Capacity	max	4 589	cc
Cylinder block material		XK360.2-T5 Aluminium	
Cylinder liner material		Grey iron	
Distance from crankshaft centreline to cylinder block deck face.	+/- 0.10	210.0	mm
CYLINDER HEAD	Tolerance	Measurement	Unit
Cylinder head material		A356-T6 Aluminium	
Volume of combustion chamber (without volume of spark plug hole)	min	51.9	cc
Compression ratio	max	10.1 nom	
Thickness of cylinder head	+/- 0.20	96.0	mm
Inlet Port:			
Size of port at cylinder head/manifold face	max	30 x 60	mm
Internal diameter of valve seat insert	+/- 0.20	33.1	mm
Surface finish of port		Cast	
Exhaust Port:			
Size of port at cylinder head/manifold face	max	N/A	mm
Internal diameter of valve seat insert	+/- 0.20	26.1	mm
Surface finish of port		Cast	

Inlet Valves:

Diameter of stem	+/- 0.008	5.4725	mm
Diameter of head	+/- 0.1	37.00	mm
Overall length of inlet valve	+/- 0.25	88.49	mm

Exhaust Valves:

Diameter of stem	+/- 0.008	5.464	mm
Diameter of head	+/- 0.1	31.0	
Overall length of exhaust valve	+/- 0.25	87.67	mm

Valve Springs:

Diameter of wire	max	2.925	mm
Inside diameter of coil	min	17.5	mm
Free length	+/- 0.5	46.1	mm
Number of working turns	+/- 0.5	6.1	turns

CAMSHAFT/SHAFTS

Tolerance Measurement Unit

Inlet:

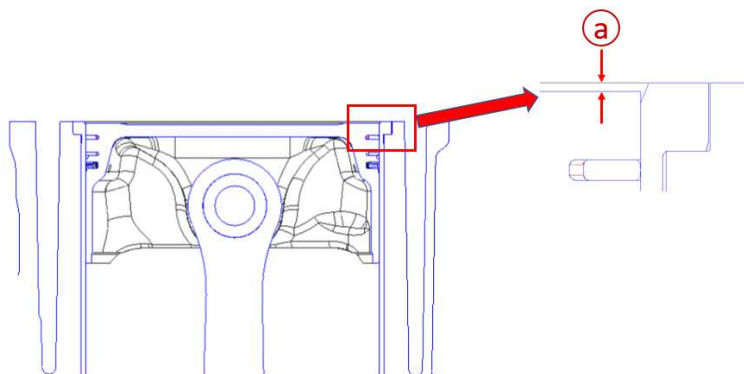
Tappet clearance for checking timing	+/- 0.050	0.175	mm
Total valve lift (at nominal lash)	+/- 0.10	8.54	mm
Total (duration) inlet opening angle (measured at flywheel in degrees at 1,0 mm valve lift at specified valve lash)	+/- 5°	200	degrees
Duration inlet opening angle 3mm under max valve lift (measured at flywheel in degrees)	+/- 2°	124	degrees
Base circle diameter of lobe	+/- 0.02	35.00	mm
Cam shaft lobe height	+/- 0.05	43.72	mm

Exhaust:

Tappet clearance for checking timing	+/- 0.050	0.350	mm
Total valve lift (at nominal lash)	+/- 0.10	8.89	mm
Total (duration) exhaust opening angle (measured at flywheel in degrees at 1,0 mm valve lift at specified valve lash)	+/- 5°	204	degrees
Duration inlet opening angle 3mm under max valve lift (measured at flywheel in degrees)	+/- 2°	128	degrees
Base circle diameter of lobe	+/- 0.02	35.00	mm
Cam shaft lobe height	+/- 0.05	44.24	mm

PISTONS

Material of piston	Aluminium		
Type and thickness of rings	Square	1.20	mm
	Taper Faced Napier	1.00	mm
	Oil Control	2.00	mm
Piston crown height from head deck at top dead center (a)	min	0.30	mm



CONNECTING ROD	Tolerance	Measurement	Unit
Length of rod from big end to small end (centre to centre)	+/- 0.05	140.5	mm

CRANKSHAFT	Measurement	Unit
Number of main bearing journals	5	
Diameter of main bearing journals	59.984-60.000	mm
Diameter of connecting rod journals	53.984-54.000	mm
Surface finish of crankshaft	Primarily machined, with some as-forged	

TYPE OF BEARINGS

Piston Pin	Floating
Connecting Rod journal	Plain
Main journal	Plain

FUEL INJECTION	Tolerance	Measurement	Unit
Make		Walbro	
Type of pump, model no.		Gerotor, FGB-29	
Fuel pressure at idle		approx 290-340	kPa
Fuel pressure no running		340-370	kPa
Total number of injectors		8	Injectors

Diameter of throttle bore max 80.0 mm

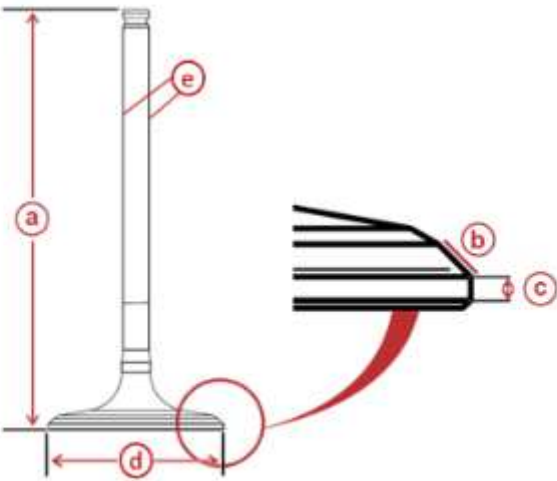
COOLING SYSTEM

Type	Raw water cooled
Method	Thermostat controlled
Pump	Rubber impeller vane pump
Number of impeller blades	6
Thermostat start opening temperature	57-61 °C
Thermostat fully opened	77 °C

VALVE INSPECTION

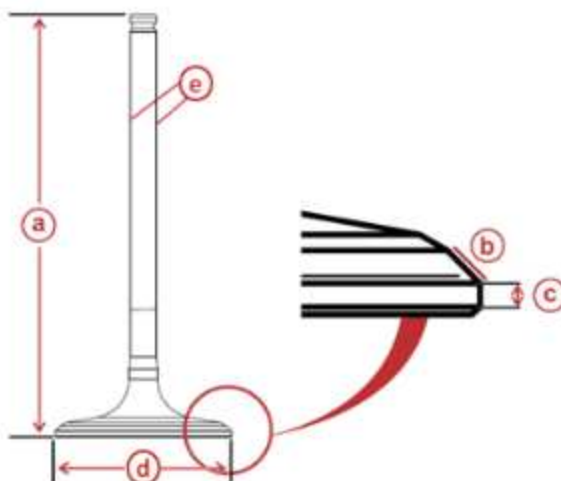
Intake valve

Intake Valve Specifications		
Intake valve	Height (a)	88.49 ± 0.25 mm
	Valve stem diameter (e)	5.4645-5.4805 mm
	Valve face angle	45°
	Outside diameter (d)	37.0 ± 0.1 mm
	Valve margin width (c)	0.875 ± 0.2 mm
	Valve stem service limit runout (measured at valve face)	0.030 mm



Exhaust valve

Exhaust Valve Specifications		
Exhaust valve	Height (a)	87.667 ± 0.25 mm
	Valve stem diameter (e)	5.456-5.472 mm
	Valve face angle	46°
	Outside diameter (d)	31.0 ± 0.1 mm
	Valve margin width (c)	1.331 ± 0.2 mm
	Valve stem service limit runout (measured at valve face)	0.030 mm



SENSOR TESTS

Cylinderblock coolant sensor

Meter Test Leads		Temperature	Reading (nominal)
Red	Black		
Pin A (black/orange)	Pin B (brown/black)	0 °C (32 °F)	32.6 kΩ
		20 °C (68 °F)	12.5 kΩ
		40 °C (104 °F)	5.3 kΩ
		65 °C (150 °F)	2.1 kΩ
		95 °C (203 °F)	786 Ω

Manifold Absolute Pressure Sensor

Manifold Absolute Pressure (MAP) Sensor Readings	
At idle (neutral)	35-48 kPa (5-7 psi)
At wide-open throttle	Within 15% of BARO

Manifold Air Temperature Sensor

Meter Test Leads		Temperature	Reading (nominal)
Red	Black		
Pin A (tan)	Pin B (black/orange)	0 °C (32 °F)	6.5 kΩ
		15 °C (59 °F)	3.2 kΩ
		25 °C (77 °F)	2.1 kΩ
		100 °C (212 °F)	150 Ω

Spark plug

Brand	NGK
Model	LKAR7C-9

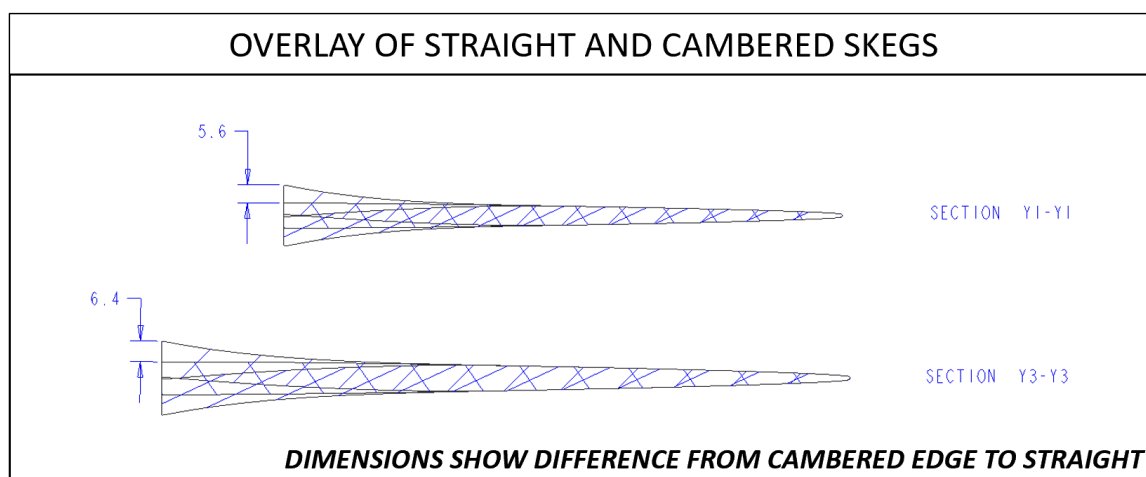
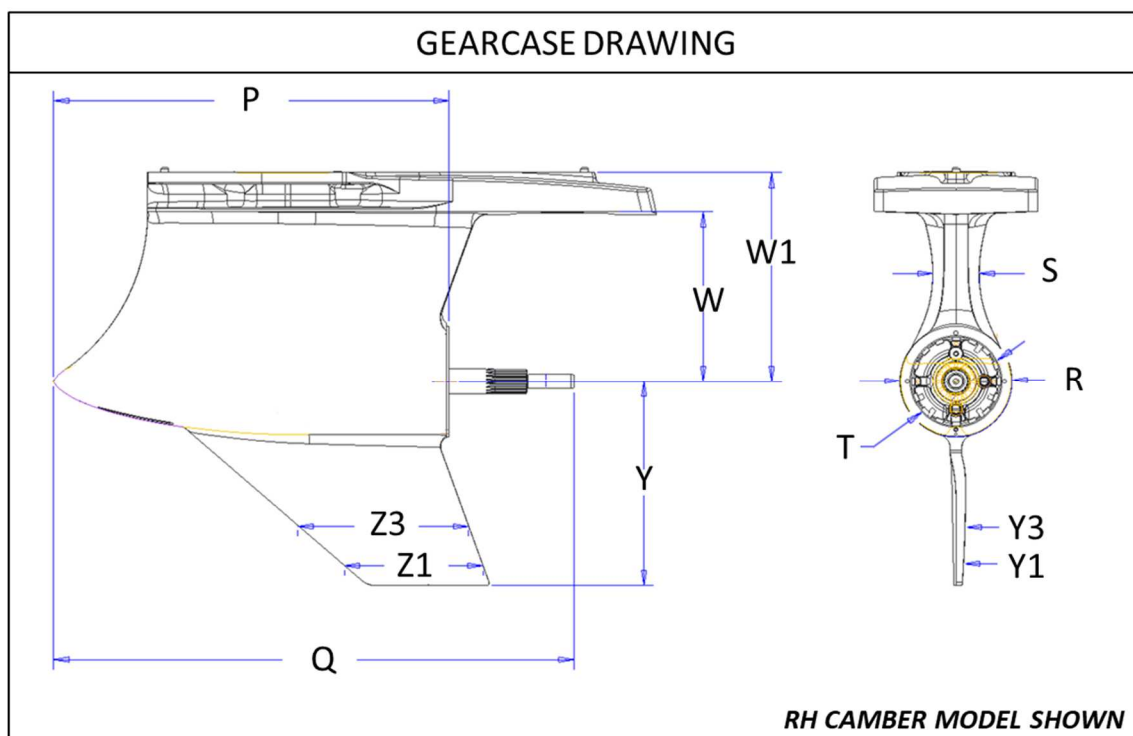
WEIGHTS	Tolerance	Measurement	Unit
Inlet valve (bare)	min	47	g
Exhaust valve (bare)	min	36	g
Valve spring	min	23.5	g
Inlet camshaft (port and stbd)	min	1 070	g
Exhaust camshaft (port)	min	1 350	g
Exhaust camshaft (stbd)	min	1 320	g
Piston (with rings)	min	291	g
Piston Pin	min	66.5	g
Connecting Rod (with bearings and bolts)	min	440	g
Crankshaft	min	15 310	g
Flywheel (bare)	min	5 780	g

UNDERWATER UNIT

Sport Master (Straight, RH, or LH cambered skeg)

	Tolerance	Measurement	Unit
Gear Ratio		1.75 (14/29)	
Gear Ratio		1.60 (15/24)	
P Longitudinal length of gearcase torpedo	+/- 5.0	492.0	mm
Q Longitudinal dimension of gearcase including propeller shaft	max	648.0	mm
R Transverse dimension of gearcase	min	140.0	mm
S Thickness of strut	min	57.0	mm
T Diameter of exhaust outlet	max	112.0	mm
Z1 Skeg chord length, 25mm above bottom	+/- 5.0	172.4	mm
Z3 Skeg chord length, 75mm above bottom	+/- 5.0	212.4	mm
W1 Distance from propeller shaft to upper flange	+/- 5.0	259.3	mm
W Distance from propeller shaft to anti-ventilation plate	+/- 5.0	211.0	mm
Y1 Thickness of skeg, 25mm above bottom*	Min	<i>Straight 7.6</i>	mm
Y1 Thickness of skeg, 25mm above bottom*	min	<i>Cambered 9.3</i>	mm
Y3 Thickness of skeg, 75mm above bottom*	min	<i>Straight 10.1</i>	mm
Y3 Thickness of skeg, 75mm above bottom*	min	<i>Cambered 11.4</i>	mm
Y Skeg depth from propeller shaft	+/- 5.0	253.7	mm

*measurement made at skeg trailing edge



FOUR STROKE OUTBOARD PETROL ENGINE

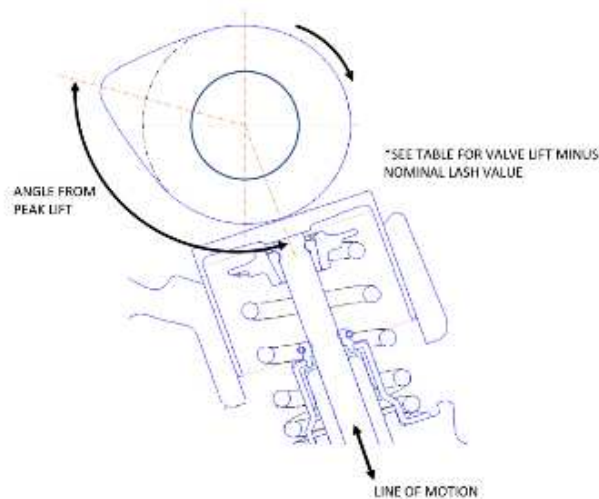
NOTES

Inspection of ECM

Model	300R (Mechanical)	300R (DTS)
ECM over speed limiter*	6550 rpm	6550 rpm
ECM software version	BRZ16_AAC002	BRZ16_AAC002
ECM calibration part number	8M0149487	8M0149481

*Note, over speed limiter indicates speed at which one bank of cylinders are cut. At 6,700 rpm all cylinders are cut. Instantaneous spikes over 6,700 rpm are possible if the prop completely exits the water (e.g. wave jump)

Attachment 1 - Camlift measurement



Valve Lift Table (in Cam angle) at Nominal Lash				
INTAKE (INT#1 Lobe Index Timing @ Max Lift: 114 degrees in Crank ATDC)			EXHAUST (EXH#1 Lobe Index Timing @ Max Lift: 110 degrees in Crank BTDC)	
Cam Angle [°]	Valve Lift [mm]		Cam Angle [°]	Valve Lift [mm]
-72	0.053		-64	0.007
-70	0.087		-62	0.041
-68	0.121		-60	0.075
-66	0.155		-58	0.121
-64	0.189		-56	0.224
-62	0.223		-54	0.431
-60	0.257		-52	0.759
-58	0.291		-50	1.184
-56	0.337		-48	1.667
-54	0.438		-46	2.170
-52	0.643		-44	2.674
-50	0.965		-42	3.176
-48	1.384		-40	3.673
-46	1.860		-38	4.160
-44	2.355		-36	4.631
-42	2.852		-34	5.082
-40	3.346		-32	5.510
-38	3.832		-30	5.913
-36	4.302		-28	6.292
-34	4.753		-26	6.646
-32	5.180		-24	6.975
-30	5.583		-22	7.278
-28	5.961		-20	7.556
-26	6.315		-18	7.808
-24	6.643		-16	8.033
-22	6.945		-14	8.233
-20	7.222		-12	8.406
-18	7.472		-10	8.553
-16	7.697		-8	8.673

-14	7.895		-6	8.766
-12	8.067		-4	8.833
-10	8.212		-2	8.873
-8	8.332		0	8.887
-6	8.424		2	8.873
-4	8.490		4	8.833
-2	8.530		6	8.766
0	8.543		8	8.673
2	8.530		10	8.553
4	8.490		12	8.406
6	8.424		14	8.233
8	8.332		16	8.033
10	8.212		18	7.808
12	8.067		20	7.556
14	7.895		22	7.278
16	7.697		24	6.975
18	7.472		26	6.646
20	7.222		28	6.292
22	6.945		30	5.913
24	6.643		32	5.510
26	6.315		34	5.082
28	5.961		36	4.631
30	5.583		38	4.160
32	5.180		40	3.673
34	4.753		42	3.176
36	4.302		44	2.674
38	3.832		46	2.170
40	3.346		48	1.667
42	2.852		50	1.184
44	2.355		52	0.759
46	1.860		54	0.431
48	1.384		56	0.224
50	0.965		58	0.121
52	0.643		60	0.075
54	0.438		62	0.041
56	0.337		64	0.007
58	0.291			
60	0.257			
62	0.223			
64	0.189			
66	0.155			
68	0.121			
70	0.087			
72	0.053			