FOUR STROKE OUTBOARD PETROL ENGINE HOMOLOGATION FILE

International Homologation File Number: 00548		
Homologation Valid from:	**2026**	**Expiry: Dec 31, 2036**
Valid for the following classes:	**Offshore 2**	
Manufacturer:	**Mercury Marine**	
Engine Model:	**Mercury Racing 500R**	
Number Manufactured:	**>600 500R engines**	
At the date:	January 1, 2026	
Certified by the National Authority of:		
At the date:		
UIM Homologation Group Inspector:	**M Lundblad**	
At the date:	2026 feb 24	
UIM Certification Approval:	**Union Internationale Motonautique**	
At the date:	2026 feb 24	
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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98000 Monaco
Tel: +377 92 05 25 22 Fax: +377 92 05 04 60
uim@uimpowerboating.com

PICTURES

Photo of the complete engine from the port side.

Photo of the complete engine from 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.

Photo of the engine without top cowl, 45° from the rear at the port side.

Photo of the engine without top cowl, 45° from the rear at the starboard side.

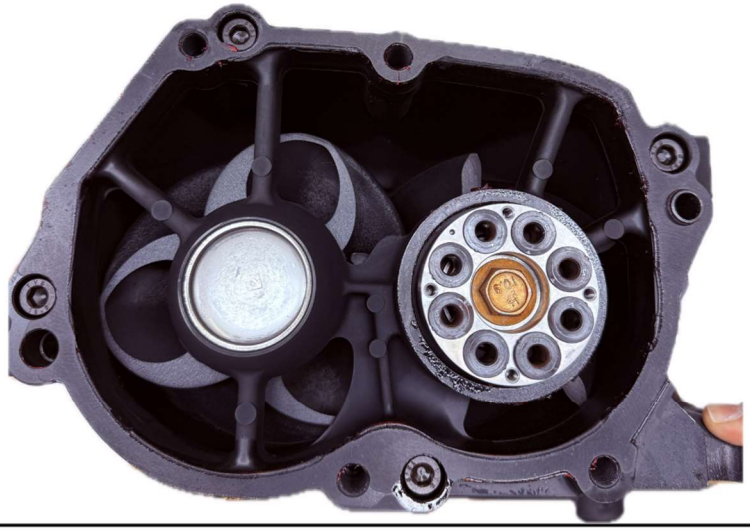
Open Exhaust - Optional

Photo without engine covers, port side 	Photo without engine covers, stbd side 
Photo without engine covers, front 	Photo without engine covers, rear 

Midsection assembly and gearcase, stbd side 	Midsection assembly and gearcase, port side 
92mm Throttle Inlet 	Supercharger Inlet 

Supercharger Nose - Inlet plate flange

Supercharger Rotor Inlet



Supercharger Discharge Port

Charge cooler, Cylinder head side 	Charge cooler, supercharger side 
Supercharger discharge, STBD Side 	Supercharger discharge, Port Side 

Fuel rail on engine (stbd side) 	Fuel injector tip 
Engine control unit (ECU) – connector side 	ECU on-engine – under STBD cover 

Cylinder head (port) from combustion chamber side

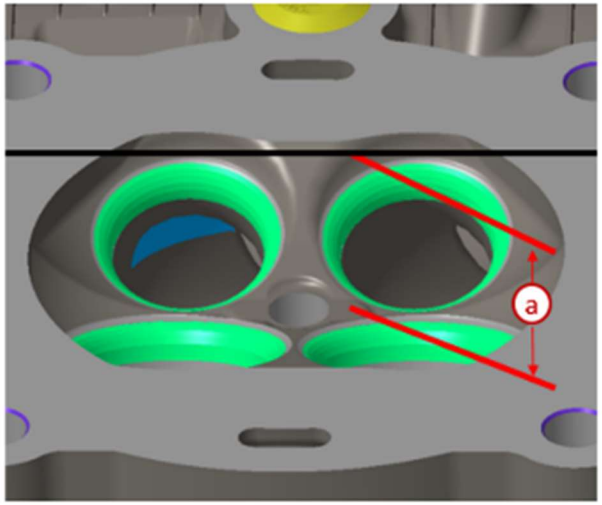
Cylinder head (starboard) from combustion chamber side

Combustion chamber

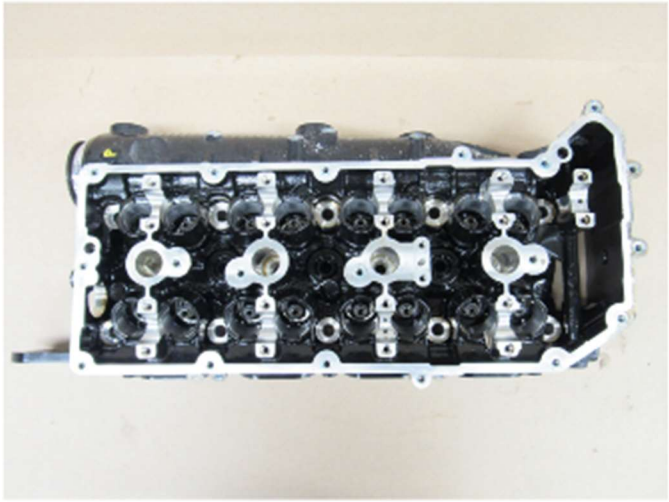
Combustion chamber without valves

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

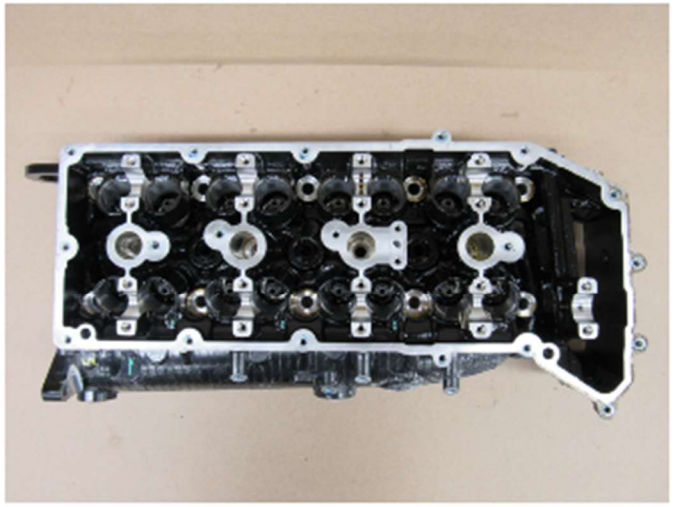
Combustion chamber height a min 14.0 mm



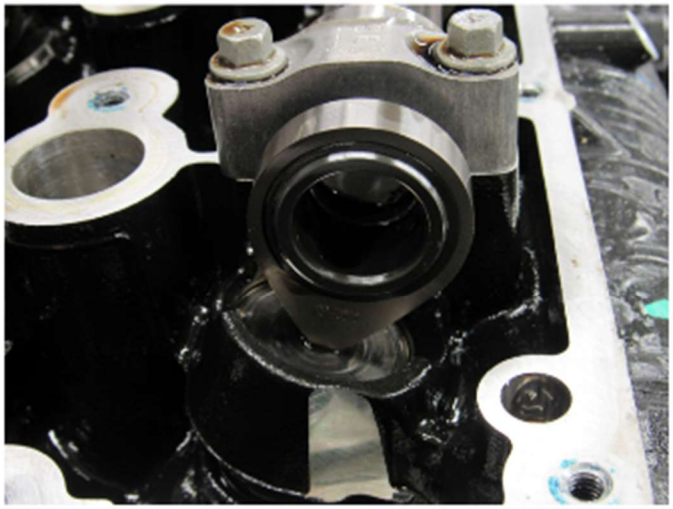
Cylinder head (port) from the valvetrain side



Cylinder head (starboard) from the valvetrain side



Valvetrain – close-up

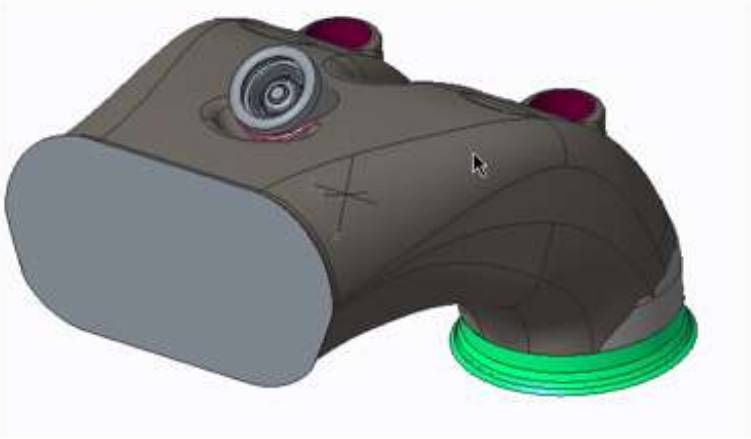


Cylinder head showing intake port

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 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 coolers on-engine – under port charge cooler and filter 	Exhaust manifold 
Lower exhaust pipe inlet 	Exhaust manifold inlet and outlet 

Supercharger Pulley

Supercharger Flywheel Pulley

Flywheel Top

Flywheel Bottom

	Supercharger Belt 
Oil pump without cover 	

MEASUREMENTS

ENGINE FUEL

Type:		**Gasoline**	
Minimum octane required:		**95**	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

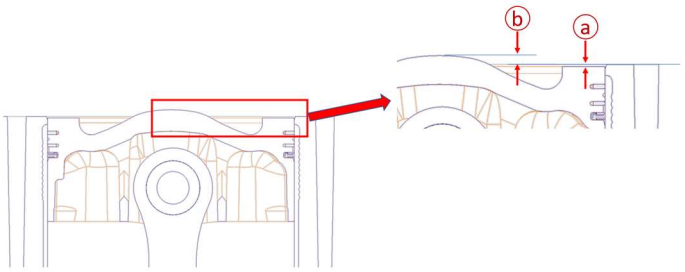
CYLINDER HEAD	Tolerance	Measurement	Unit
Cylinder head material		**A356-T6 Aluminium**	
Volume of combustion chamber (without volume of spark plug hole)	min	**51.9**	cc
Compression ratio	nom	**8.5**	
Thickness of cylinder head	+/- 0.20	**96.0**	mm
Inlet Port:			
Size of port at cylinder head/manifold 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°	**120**	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 depth *below* head deck at top dead center, edge (a)	min	**0.50**	mm
Piston crown height *above* head deck at top dead center, center (b)	max	**2.50**	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	**92.0**	mm

SUPERCHARGER

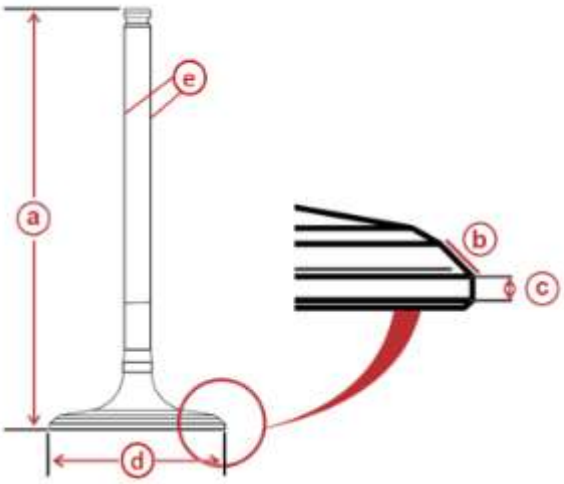
Supercharger Flywheel Pulley Circumference	**455**	mm
Supercharger Inlet Pulley Circumference	**214**	mm

COOLING SYSTEM

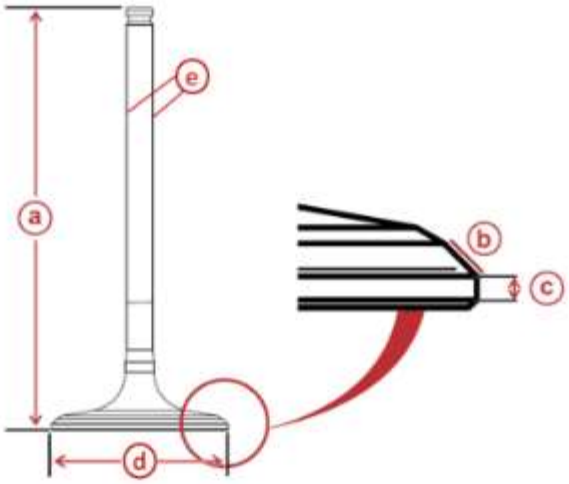
Type	**Raw water cooled**	
Method	**Thermostat controlled with pressure relief**	
Pump	**Rubber impeller vane pump**	
Number of impeller blades	**6**	
Thermostat start opening temperature	**67-71**	°C
Thermostat fully opened	**77**	°C

VALVE INSPECTION

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

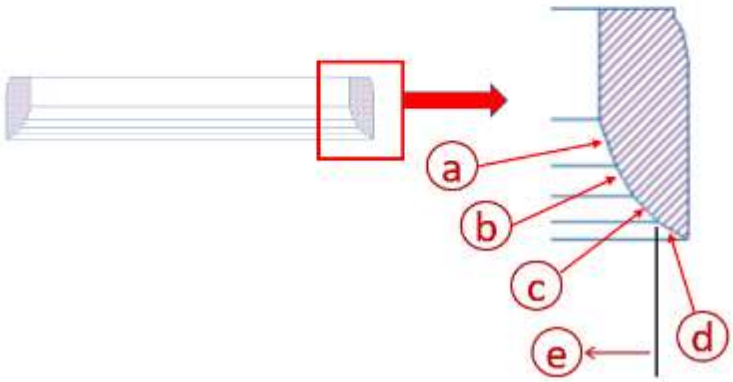


Exhaust Valve Specifications		
Exhaust valve	Height (a)	87.667 ± 0.25 mm
	Valve stem diameter (e)	5.456-5.472 mm
	Valve face angle	46°
	Outside diameter (d)	31.0 ± 0.1 mm
	Valve margin width (c)	1.331 ± 0.2 mm
	Valve stem service limit runout (measured at valve face)	0.030 mm

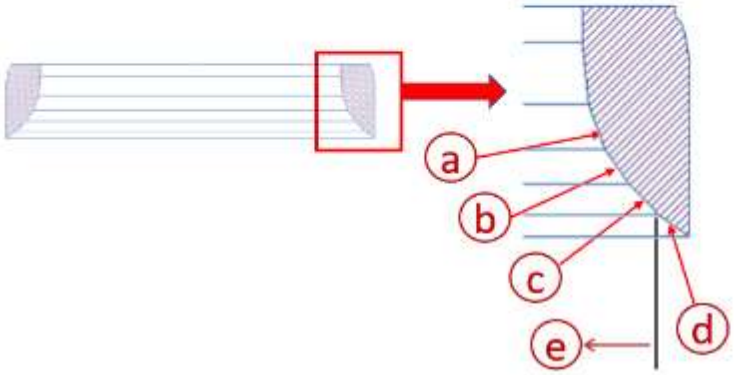


VALVE SEAT INSPECTION

Intake Valve Seat Specifications		
Valve Seat	Surface (a) angle from valve axis	20°± 1°
	Surface (b) angle from valve axis	30°± 1°
	Surface (c) angle from valve axis	44°± 0.25°
	Surface (d) angle from valve axis	60°± 1°
	Surface (b) width	1 ± 0.2 mm
	Surface (c) width	1 ± 0.1 mm
	Diameter (e)	Ø36.45 ± 0.1 mm



Exhaust Valve Seat Specifications		
Valve Seat	Surface (a) angle from valve axis	20°± 1°
	Surface (b) angle from valve axis	35°± 1°
	Surface (c) angle from valve axis	44°± 0.25°
	Surface (d) angle from valve axis	55°± 1°
	Surface (b) width	1.2 ± 0.2 mm
	Surface (c) width	1.2 ± 0.1 mm
	Diameter (e)	Ø30.4 ± 0.1 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**

ENGINE GRAPHICS

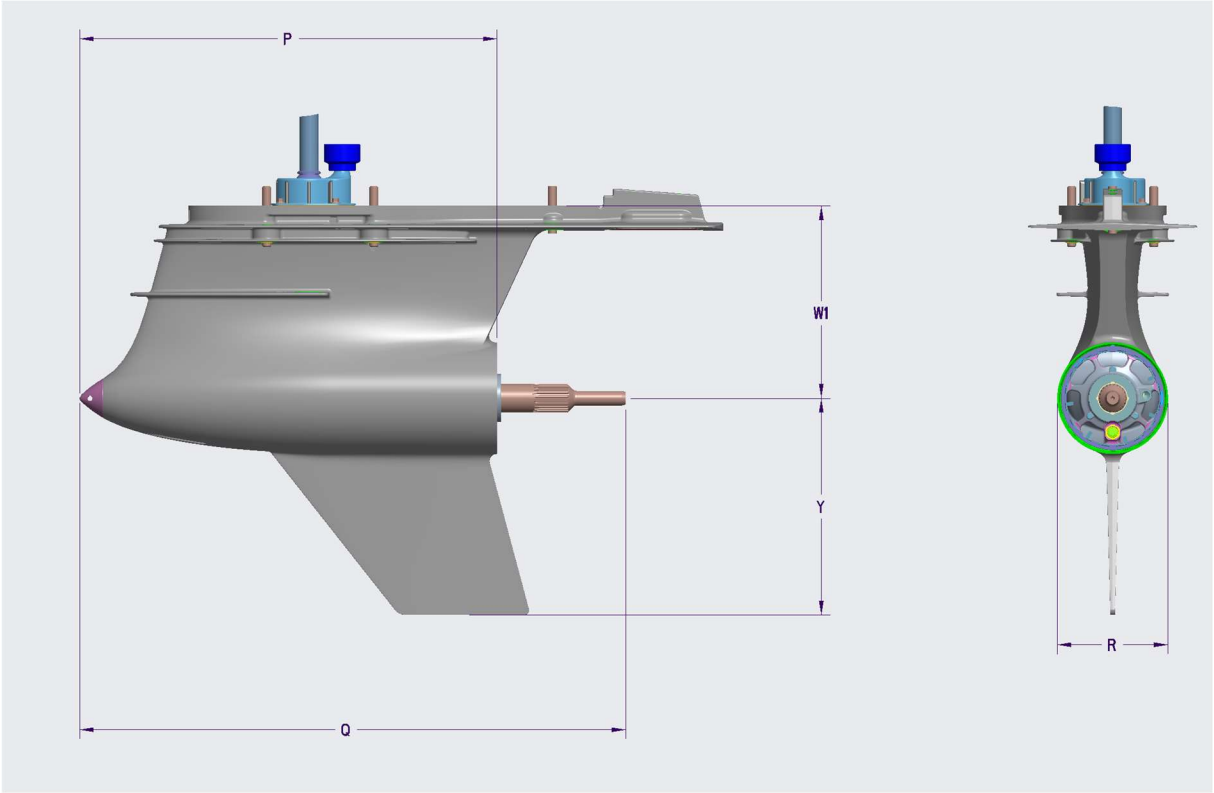
The color of graphic items (1) (2) and (3) may be modified as desired. Pattern files for items (2) and (3) are available from Mercury Racing upon request. (4) Cowl /mid-section color changes or vinyl wraps are allowed, but graphic locations, font, and size must remain as shown. Cowling may be replaced or repaired by a facsimile of identical size and dimension. Rear air inlets must remain, with identical location and cross-sectional area.

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	**305**	g
Piston Pin	min	**66.5**	g
Connecting Rod (with bearings and bolts)	min	**440**	g
Crankshaft	min	**15 310**	g
Flywheel (bare)	min	**5780**	g

UNDERWATER UNIT
R-Drive Sport

	Tolerance	Measurement	Unit
Gear Ratio		**1.60 (15/24)**	
P Longtitudinal length of gearcase torpedo (B)	max	**565**	mm
Q Longtitudinal dimension of gearcase including propeller shaft	max	**738**	mm
R Transverse dimension of gearcase	min	**149**	mm
W1 Distance from propeller shaft to upper flange	+/- 2 mm	**259**	mm
Y Skeg depth from propeller shaft*	+/- 2 mm	**292**	mm

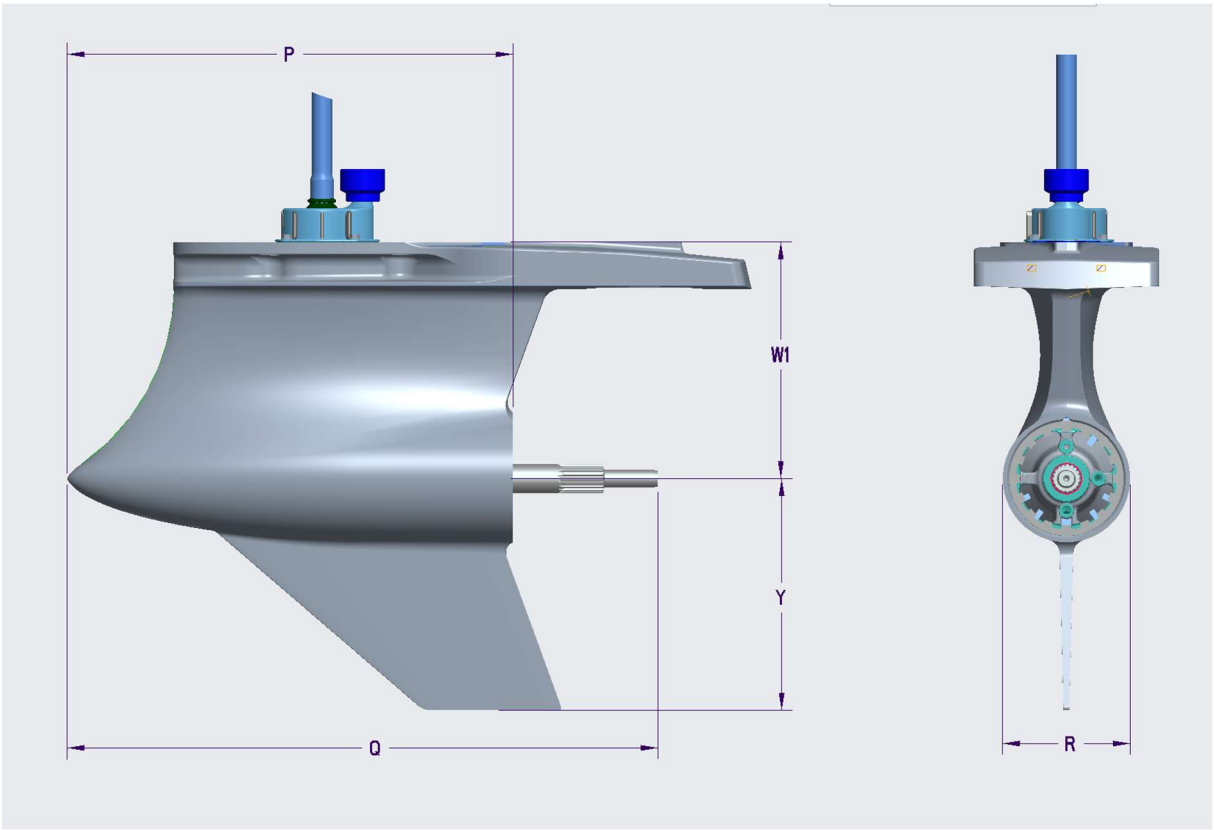
**Gearcase skeg must conform to Mercury skeg template, part number 8M0236703*



UNDERWATER UNIT
5.44 Sportmaster

	Tolerance	Measurement	Unit
Gear Ratio		**1.60 (15/24)**	
P Longtitudinal length of gearcase torpedo (B)	max	**490**	mm
Q Longtitudinal dimension of gearcase including propeller shaft	max	**648**	mm
R Transverse dimension of gearcase	min	**139**	mm
W1 Distance from propeller shaft to upper flange	+/- 2 mm	**259**	mm
Y Skeg depth from propeller shaft*	+/- 2 mm	**254**	mm

**Gearcase skeg must conform to Mercury skeg template, part number 8M0218147*



FOUR STROKE OUTBOARD
PETROL ENGINE

NOTES

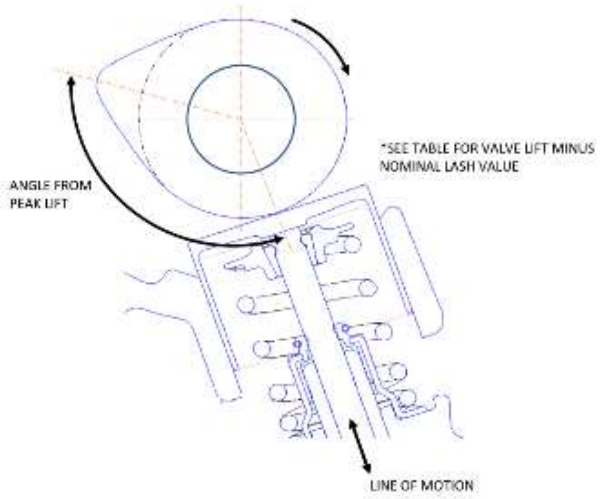
Inspection of ECM

Model	**500R**
ECM over speed limiter*	6600 rpm
ECM software version+	8M0232338

*Note, over speed limiter indicates speed at which individual cylinders are cut. At 6800 rpm all cylinders are cut. Instantaneous spikes over 7,000 rpm are possible if the prop completely exits the water (e.g. wave jump).

+The calibration part number is current as of the publication of this document. Subsequent calibration revisions may be made by Mercury with the approval of COMINTECH.

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			
-70	0.087			
-68	0.121			
-66	0.155			
-64	0.189		-64	0.007
-62	0.223		-62	0.041
-60	0.257		-60	0.075
-58	0.291		-58	0.121
-56	0.337		-56	0.224
-54	0.438		-54	0.431
-52	0.643		-52	0.759
-50	0.965		-50	1.184
-48	1.384		-48	1.667
-46	1.860		-46	2.170
-44	2.355		-44	2.674
-42	2.852		-42	3.176
-40	3.346		-40	3.673
-38	3.832		-38	4.160
-36	4.302		-36	4.631
-34	4.753		-34	5.082
-32	5.180		-32	5.510
-30	5.583		-30	5.913
-28	5.961		-28	6.292
-26	6.315		-26	6.646
-24	6.643		-24	6.975
-22	6.945		-22	7.278
-20	7.222		-20	7.556
-18	7.472		-18	7.808

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