



FOUR STROKE OUTBOARD PETROL ENGINE HOMOLOGATION FILE

International Homologation File Number: 00536A		
Homologation Valid from	2018 April 30	Expiry: 2028 Dec 31
Valid for the following classes:	CIRCUIT: GT15 OFFSHORE:	
Manufacturer:	TOHATSU CORPORATION	
Engine Model:	MFS15E EPS	
Number Manufactured:	1000+	
At the date:	20th April 2018	
Certified by the National Authority of:		
At the date:		
UIM Homologation Group Inspector	Jari Lehtonen	
At the date:	2018 April 17	
UIM Certification Approval:	Mikael Lundblad	
At the date:	2018 April 30	
Running Production Changes		
Change Detail	Throttle bore corrected	Page No. 6, 14
Date Approved for Use	2023 Feb 21	Approved by 
Change Detail		Page No.
Date Approved for Use		Approved by

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.



Photo without top cover, 45° from the front at the port side.



Photo without top cover, 45° from the front at the starboard side.

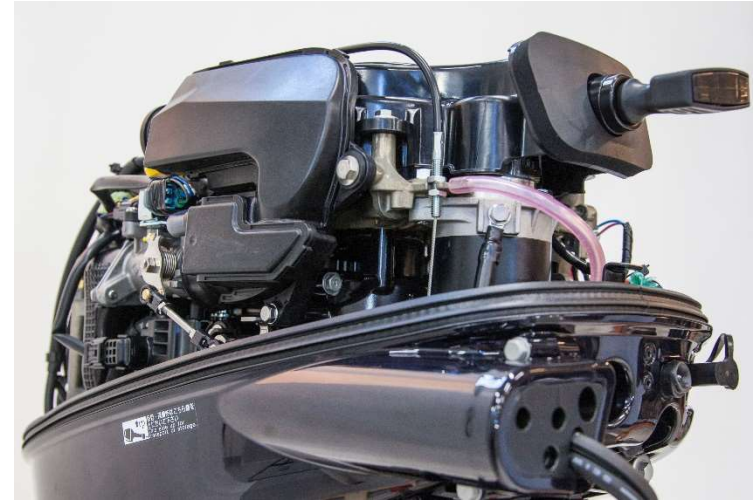


Photo without top cover, 45° from the rear at the port side



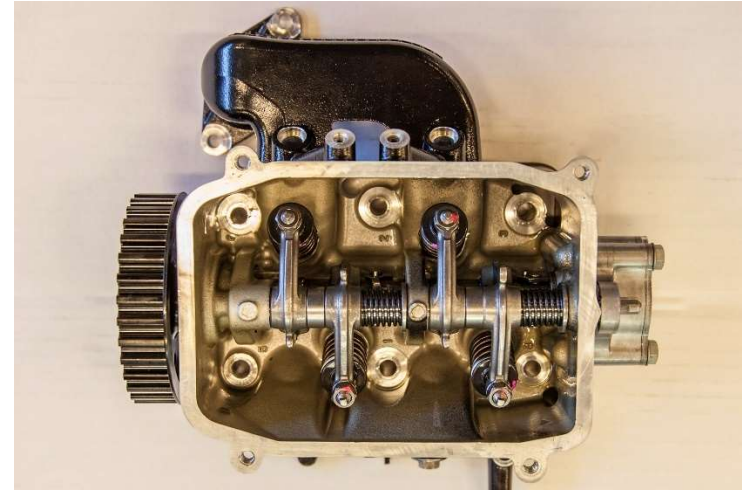
Photo without top cover, 45° from the rear at the starboard side.



Cylinder head from the combustion chamber side



Cylinder head from the valve assembly side.



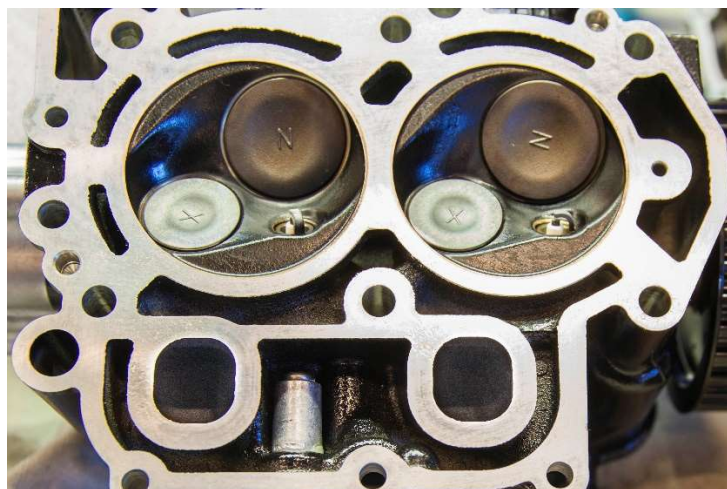
Cylinder head showing intake ports.



Cylinder head showing intake ports - detail



Cylinder head showing exhaust ports.



Cylinder head showing exhaust ports - detail



Piston viewed from the top



Piston viewed from the bottom



Piston, viewed 45° from the wrist pin.



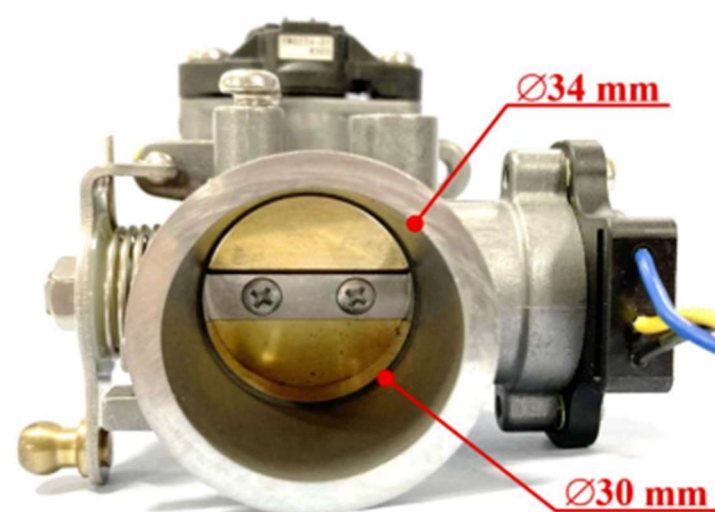
Crankshaft.



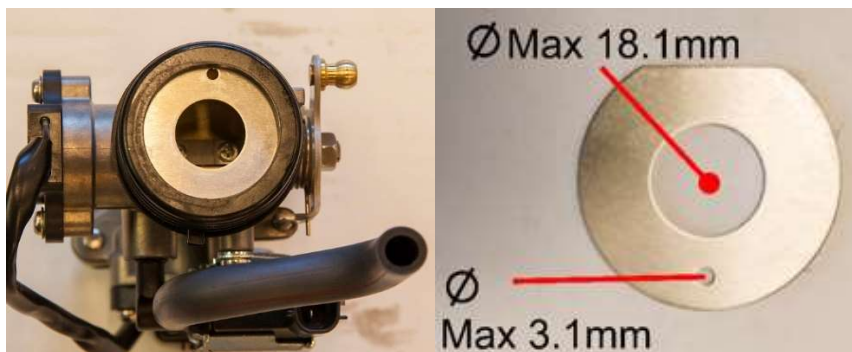
Connecting rod and crankshaft.



Throttle house



Restrictor plate air intakes



Intake silencer air intakes



Intake manifold



Intake manifold - Close up



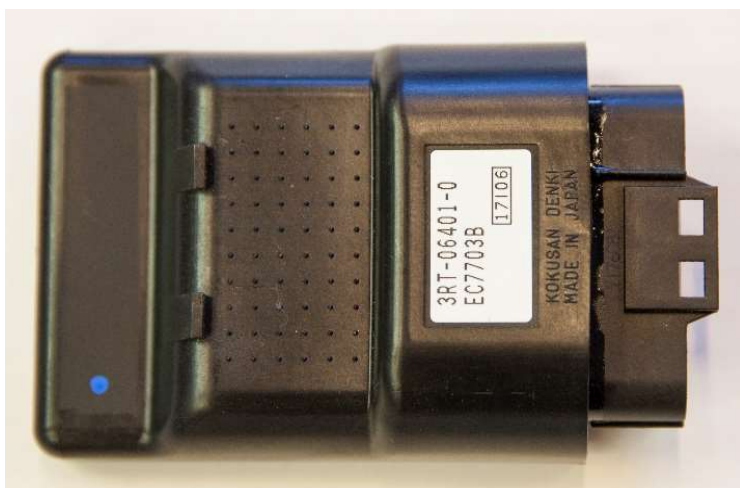
Fuel Injector Rail



Fuel Injector - Close up



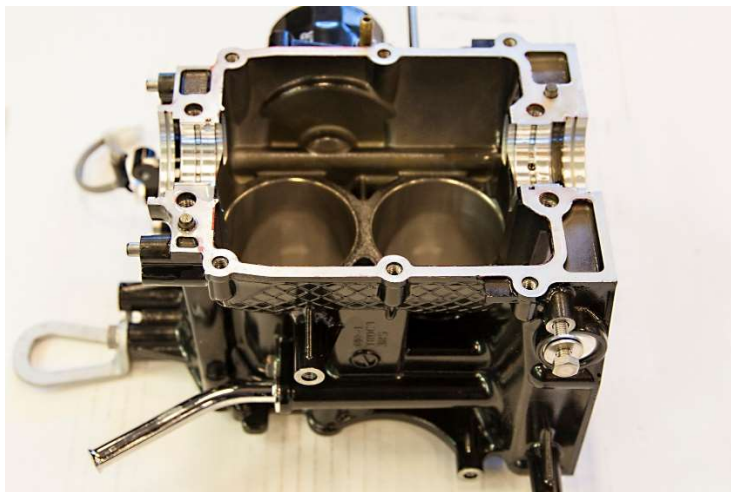
ECU box Front



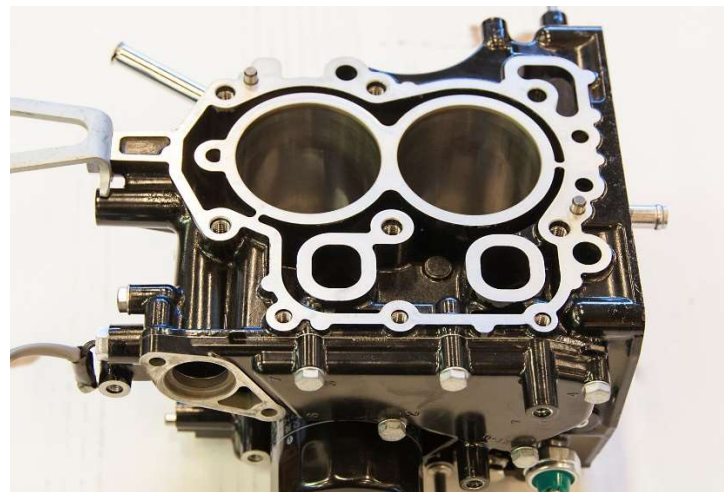
ECU box back



Cylinder block, viewed 45° from front starboard side.



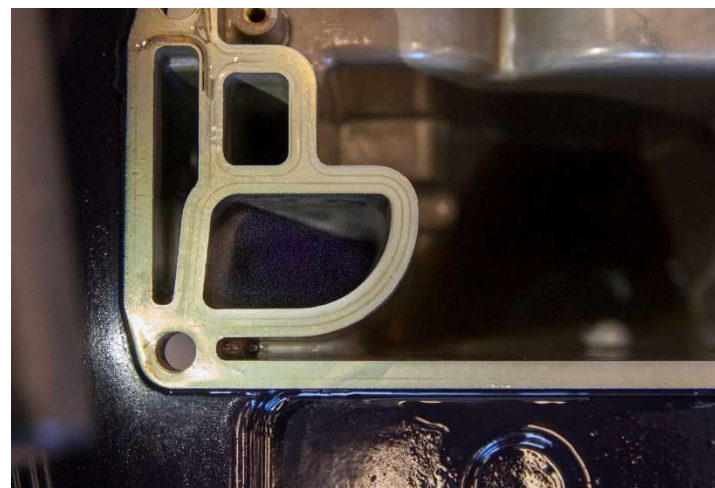
Cylinder block, viewed 45° from rear, port side



Oil pump



Internal exhaust pipe



Flywheel – viewed from top side



Flywheel – viewed from bottom side



Gear house



Gear house - Exhaust cooling



Gear House Skeg



Gear house skeg - Close up from bottom side



MEASUREMENTS

ENGINE FUEL

Type:

Minimum octane required: **91** RON

ENGINE TYPE

Number of cylinders: **2** Cylinders

Cylinder arrangement: **In line**

ENGINE BLOCK	Tolerance	Measurement	Unit
Bore	+/- 0.10	61.0	mm
Stroke	+/- 0.10	57.0	mm
Capacity per cylinder	max	166.5	cc
Total Capacity	max	333	cc
Cylinder block material		Aluminum	
Cylinder liner material		Steel	
Distance from crankshaft centreline to cylinder block deck face.	+/- 0.20	139.9	mm
CYLINDER HEAD	Tolerance	Measurement	Unit
Cylinder head material		Aluminum	
Volume of combustion chamber (without volume of spark plug hole)	+/- 0.20	16.0	cc
Compression ratio	max	10.2	
Thickness of cylinder head	+/- 0.10	100.7	mm
Depth of combustion chamber	+/- 0.20	12.4	mm
Inlet Port:			
Size of port at cylinder head/manifold face	+/- 0.50	φ 33.0	mm
Internal diameter of valve seat insert	+/- 0.20	φ 28.0	mm
Surface finish of port		Cast	
Exhaust Port:			
Size of port at cylinder head/manifold face	+/- 0.50	20x22.5	mm
Internal diameter of valve seat insert	+/- 0.20	φ 21.0	mm
Surface finish of port		Cast	

Inlet Valves:

Diameter of stem	-0.08/-0.028	5.50	mm
Diameter of head	+/- 0.1	31.8	mm
Overall length of inlet valve	+/- 0.35	74.15	mm
Valve face angle	+/- 1°	19	°

Exhaust Valves:

Diameter of stem	-0.025/-0.045	5.50	mm
Diameter of head	+/- 0.1	24.7	
Overall length of exhaust valve	+/- 0.35	75.45	mm
Valve face angle	+/- 1°	19	°

Valve Springs:

Diameter of wire	max	2.4	mm
Inside diameter of coil	+/- 0.2	16.0	mm
Free length	max	32.85	mm
Number of working turns	+/- 0.5	6.85	turns

CAMSHAFT/SHAFTS

Tolerance Measurement Unit

Inlet:

Tappet clearance for checking timing	+/- 0.02	0.15	mm
Total valve lift	+/- 0.10	6.81	mm
Total inlet opening angle (measured at flywheel in degrees at 0,1 mm lift at specified valve lash)	+/- 5°	290	degrees
Duration inlet opening angle 3mm under max lift (measured at flywheel in degrees)	+/- 2°	138	degrees
Base circle diameter of lobe	+/- 0.025	20.0	mm
Total lift of lobe	+/- 0.05	3.63	mm

Exhaust:

Tappet clearance for checking timing	+/- 0.02	0.20	mm
Total valve lift	+/- 0.10	7.15	mm
Total inlet opening angle (measured at flywheel in degrees at 0,1 mm lift at specified valve lash)	+/- 5°	336	degrees
Duration inlet opening angle 3mm under max lift (measured at flywheel in degrees)	+/- 2°	140	degrees
Base circle diameter of lobe	+/- 0.025	20.0	mm
Total lift of lobe	+/- 0.05	3.80	mm

PISTONS

Material of piston		Aluminum	
Type and thickness of rings	Square	1.00	mm
	Square	1.20	mm
	Oil scraper	2.00	mm

CONNECTING ROD

	Tolerance	Measurement	Unit
Length of rod from big end to small end (centre to centre)	+/- 0.02	88.8	mm

CRANKSHAFT

	Tolerance	Measurement	Unit
Number of main bearing journals		2	
Diameter of main bearing journals	-0.004/-0.012	34.00	mm
Diameter of connecting rod journals	-0.015/-0.028	29.00	mm
Surface finish of crankshaft		Cast	

TYPE OF BEARINGS

Piston Pin	Plain bearing
Connecting Rod journal	Plain bearing
Main journal	Plain bearing

SPARK PLUG

Brand	NGK
Model number.	DCPR6E

FUEL INJECTION

	Tolerance	Measurement	Unit
Brand		mitsubishi	
Type of pump, model no.		Electric,E00AT90172	
Total number of injectors		2	Injectors
Type of injectors		Fuel	
Diameter of throttle bore	max	ϕ 30.0	mm
Diameter of throttle inlet	max	ϕ 34.0	mm
Diameter of hole in restrictor plate	max	1x ϕ 3.1 + 1x ϕ 18.1	mm

SENSOR TESTS



Engine Temperature Resistance (Reference Value) :

Between terminal

about at 5°C : 4.24 to 4.86 kΩ

about at 25°C : 1.90 to 2.10 kΩ

about at 100°C : 0.166 to 0.204 kΩ



MAP (Intake Air Pressure) Sensor Resistance (Reference Value) :

Between Vout TEMP ④ to Vout MAP ①: No conductivity

Between Vout TEMP ④ to Vcc ③ : No conductivity



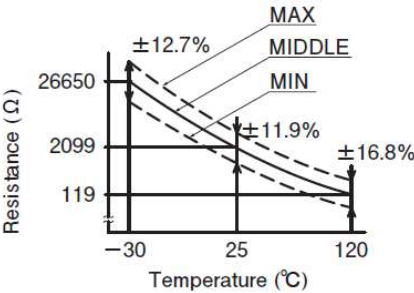
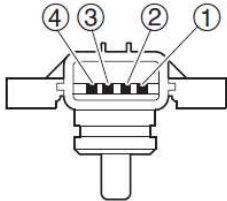
MAT (Intake Air TEMP) Sensor Resistance (Reference Value) :

Between Vout TEMP ④ to GND ② :

0.6 ± 0.6 kΩ (0°C)

0.282 to 0.388 kΩ (80°C)

* If ambient temperature is different use the illustration shown to the right.



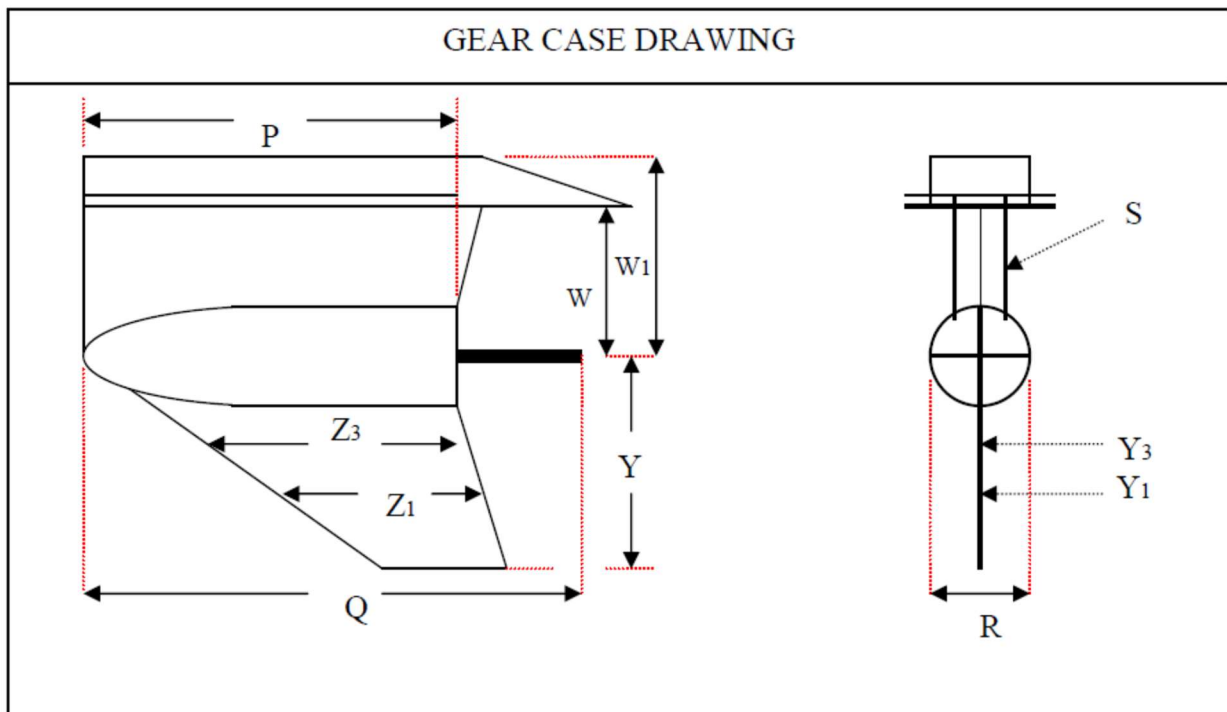
COOLING SYSTEM

Type	Water
Method	Thermostat controlled
Pump	Impeller
Number of impeller blades	8
Thermostat start opening temperature	52 °C
Thermostat fully opened	65 °C

WEIGHTS	Tolerance	Measurement	Unit
Inlet valve (bare)	min	28.7	g
Exhaust valve (bare)	min	24.6	g
Inlet rocker arm	min	48.8	g
Exhaust rocker arm	min	48.8	g
Inlet/ Exhaust camshaft	min	362.0	g
Piston (with rings)	min	113.0	g
Piston Pin	min	36.0	g
Connecting Rod (with bearings)	min	123.0	g
Crankshaft	min	3080	g
Flywheel (bare)	min	2900	g

UNDERWATER UNIT

	Tolerance	Measurement	Unit
Gear Ratio		13:28(2.15)	-
P Longitudinal length of gearcase torpedo	+/- 3.0	174.5	mm
Q Longitudinal dimension of gearcase including propeller shaft	max	287.5	mm
R Transverse dimension of gearcase	min	76.0	mm
S Thickness of strut	min	33.0	mm
Z1 Skeg chord length, 25mm above bottom	+/- 5.0	80.0	mm
Z3 Skeg chord length, 75mm above bottom	+/- 5.0	123.0	mm
W1 Distance from propeller shaft to upper flange	+/- 5.0	235.0	mm
W Distance from propeller shaft to anti-ventilation plate	+/- 5.0	137.0	mm
Y1 Thickness of skeg, 25mm above bottom	+/- 2.0	9.0	mm
Y3 Thickness of skeg, 75mm above bottom	+/- 2.0	15.0	mm
Y Skeg depth from propeller shaft	+/- 5.0	142.0	mm
Diameter Exhaust outlet at propeller resess	+/- 1.0	φ 64.5	mm



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NOTES

- 1) The diagnostics tools quickly and accurately point to problem areas in engine.

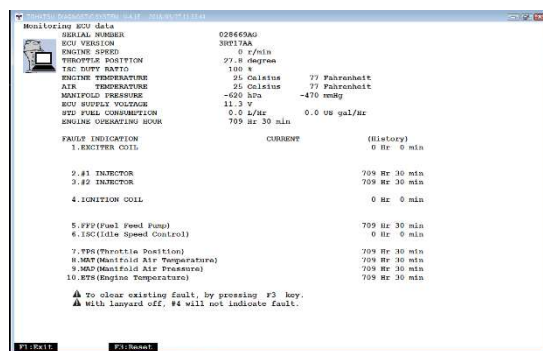
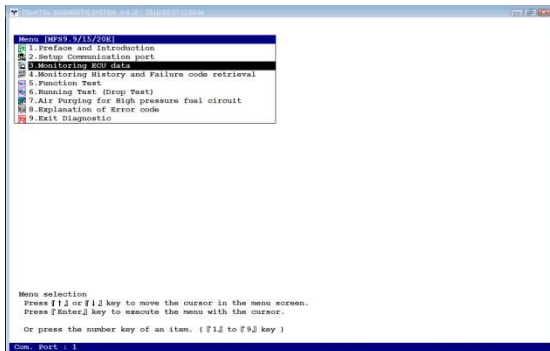
Connect the coupler of diagnostics tools to the ECU



Part number ECU



Photo of sample 3AC screen display

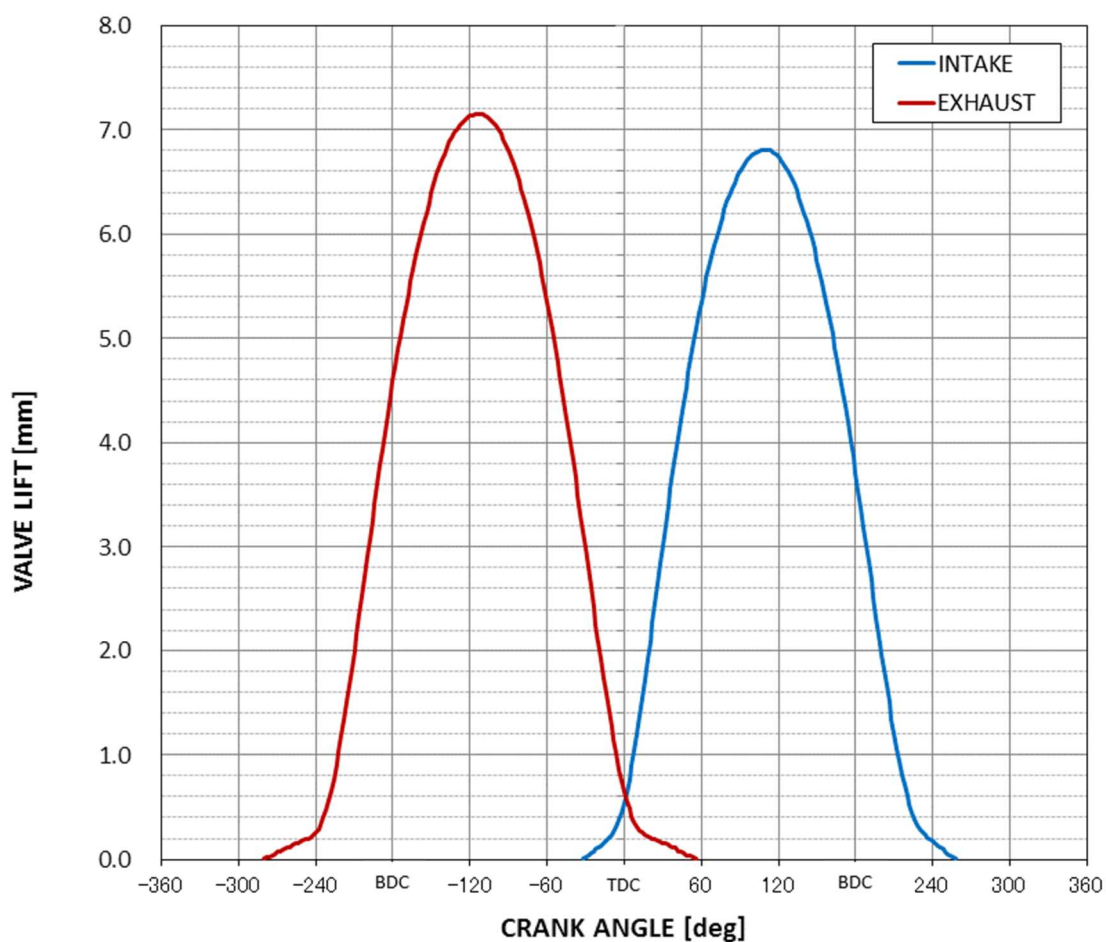


Info viewable are engine speed, running time, error codes, and engine serial number.

- 2) Photo of bracket without powertrim



Attachment 1 - Camlift Curve/measurement



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