

## 420cc Builder Modified Predator OHV engine Technical Specifications For 2014 season

BM (Builder Modified) Predator 420cc OHV engine With Electric Start – Approved  
Engine: OHV Predator 420cc engine modified only according to these BM OHV Engine  
Spec.

### **ENGINE SPEC SHEET FOR BM 420cc OHV CLASS**

**Description:** Single cylinder, 2- valve overhead valve Electric Start, 4-cycle engine. No aftermarket coatings of any type are permitted on any part of the engine (exception Blower Housing and Shrouds, (Paint).

**Cylinder Head Requirements:** Predator 420 cc Non-Hemispherical cylinder head only. Machining of gasket surface is allowed. No addition of material in ports or to cylinder head allowed. Porting and / or grinding of ports are not permitted. Grinding/machining of combustion chamber is allowed. Valves, retainers and lash cap must be stock. No aftermarket valves allowed. Valve seats may have two angles, 45° valve face and 30° top relief. Inside diameter of valve seats must be stock (Int. 1.200" max ID and Ex 1.020" max ID) (Both measured at the largest diameter of the steel seat). Valve seats must appear stock and must be in stock position and depth. All four Head Bolts/Studs are required. Head bolt washers are allowed. Head studs/nuts/washers are allowed. Head gasket/s may be after market, must be of stock configuration, and gasket thickness non-tech. Cylinder head guide plate for pushrods must remain stock. No other alterations to the head are permitted.

**Bore and Stroke:** Stock bore is 3.543" +/-0.005" (90 mm) and may not be over-bored. Stroke is 2.598" +/-0.005".(66 mm)

**Connecting Rod:** Stock or ARC 6272 Billet aluminum rod, with or without bearing inserts allowed. (Use of this rod requires clearancing balance shaft for dipper.) No titanium rods allowed. Rod length is specified as 4.410" (112mm).

**Combustion Chamber Volume:** A minimum of 48.0 cc. combustion chamber volume is allowed. CC's are measured with the engine together, at TDC, with valves closed. Inspection requires a 100 cc burette or larger, and \*ATF Transmission Fluid\*. Check head volume. NOTE: Weight of engine and placement of plug hole make it difficult to prevent trapped air. Cylinder head must be close to level as measured on top fin. Oil must come to lowest portion of spark plug hole without overflow. Rotate flywheel SLOWLY!

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**Carburetor/Intake Requirements:** Stock Huayi or RUI\*ING carburetor. Maximum bore of 0.827", Carburetor Air Filter adapter overall length is a max 1.375" length allowed of any material. Pulse-type fuel pump is mandatory. Fuel pump must be pulsed from one of the following: Black phenolic carburetor spacer, the engine block or the valve cover. Black phenolic carburetor insulator must be in stock form except for the addition of a pulse line fitting, Minimum length of phenolic insulator .551". (14.5mm) Choke assembly must be present and in working order. Jet openings, air bleeds jets, and emulsion tubes are non-tech. The use of remote jetting adjuster is allowed. Throttle shaft, washer, and butterfly must be present, butterfly screw non tech. Stock intake runner gasket configuration only. Fuel bowl may have an overflow system. .

**Piston Requirements:** Must be stock dished piston (Overall height: Minimum 2.595 (66mm) with no further modifications. Rings must appear stock and all rings must be installed. Piston may not pop out above cylinder deck. Rings may not fall through bore. Wrist pin: Minimum diameter of 0.786" (20 mm), Minimum length of 2.431" (61.6 mm) Center of wrist pin to top of piston: 1.106" +/- 0.005" (28.1mm). from top of Wrist pin bore to piston top nominal size is 0.708" (18mm)

**Valve Train:** Stock valve-train only in stock configuration including stock rocker ratio of 1.2:1 Max, stamped steel rocker arms. Exception: Any single or dual valve springs and valve spring shims are allowed must use Stock OEM valve retainers. Lifter overall length: min 1.891"; Push rod cup depth of 0.138" max. Push rod length: min length 6.443". Intake valve head Max OD 1.425" and Exhaust valve head Max OD 1.263". Valves must be one angle only, 45°. No knife edging of valves (1mm min. margin). Valves may be polished. Valve length: Intake valve 3.390" +/- 0.002", Exhaust valve 3.349" +/- 0.002"., Valve length to top of keeper slot; Intake: 3.209" +/- 0.002", Exhaust: 3.189" +/- 0.002". No additional support for rocker studs permitted. (No stud girdles). Outside face of valve head may **not** be below the combustion chamber floor. (i.e. don't sink the valves) Valve cover may be drilled for crankcase equalizer tube fitting and a fitting installed in the stock hole for oil catch can hose. Valve cover gasket is non-tech.

**Camshaft Requirements:** Stock camshaft only, ez-spin assembly must remain as stock. The duration check for Intake and exhaust lobes is listed below, as measured on top of valve retainer.

## Valve Chart

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Valve lift Intake	BTDC +/- 2 Degrees	ATDC +/- 2 Degrees		Valve lift Exhaust	ATDC +/- 2 Degrees	BTDC +/- 2 Degrees
0.050		8		0.050		270
0.100		22		0.100		190
0.150		35		0.150		173
0.200		48		0.200		158
0.250		63		0.250		127
0.300		85				
0.323 Max		114		0.271 Max		91
0.300		140				
0.250		162		0.250		60
0.200		174		0.200		23
0.150		189		0.150		14
0.100		208		0.100		3
0.050		215		0.050		20

**Crankshaft Requirements:** Stock, factory crankshaft, balance shaft, and with stock, factory timing gears in stock aligned location. No modifications to crankshaft allowed. Aftermarket steel main bearings of non-self-aligning type, with or without seal are allowed. No ceramic bearings. Crankshaft throw diameter is 1.180", 1.168" (30 mm – 29.66 mm) minimum. **Crankshaft length may be cut for clutch fitment.**

**Block Requirements:** Stock Block, as cast and produced with no alterations or modifications other than those specifically permitted. Block head mating surface may

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be machined, however, no piston pop out is allowed. Blocks may NOT be welded for repairs. No addition of material to block (i.e. welding, JB weld, etc.). All bolt bosses in block may be drilled and tapped for repairs or other uses. Additional side cover gaskets as required for crankshaft thrust are permitted. All parts associated with the governor and the low oil sensor may be removed, plugging any associated holes allowed.

**Flywheel/Ignition:** Stock, unaltered flywheel only. Weight, approximately 13#. No aftermarket flywheels allowed. Flywheel key required. All magnets including charging magnets must be in place in the factory location. Starter ring gear and starter must be in place and operable. Grinding/ machining on flywheel are not allowed. Cutting down the starter cup is allowed for clearance of an aftermarket flywheel screen. Plastic fan is not a tech item. Ignition timing is non tech. Stock ignition module only, no modifications of any type allowed. Sparkplug connector must be stock as from factory. All Electrical Components must be intact.

**Header and Muffler Requirements:** Header Pipe Length: Minimum 18"- Maximum 25". The diameter of pipe is to be 1 ¼" to 1 3/8" OD or a combination of both. Silencer must be a B91 Style, RLV 4106, 1 5/16" inlet type. Muffler MUST be clamped to the header pipe. Holes must : Screen nearest the motor, 0.128 NO Go; Second screen from inlet end, 0.128", No Go; Third Screen from inlet 0.193 NO GO; Outer Screen, Square holed pin gage, 0.203" diameter,, NO GO.

**Clutch Requirements:** 1" Bore, Shoe Type Clutch only. Clutch springs are not a tech item.

<b>Revision History</b>			
<b>Revision</b>	<b>Date</b>	<b>Detail</b>	<b>Initials</b>
00	6/4/13	Initial Release	JBR
01	6/18/13	Modified from original to clarify statements.	JTS
02	7/16/13	Corrections and modifications for 2014	JTS
03	11/6/13	Head Measurement procedure change, and Silencer measurements, per RLV.	JTS