



## **MSCS Engine Guide**

**[www.MidwestSuperCupSeries.com](http://www.MidwestSuperCupSeries.com)**

## **GENERAL ENGINE REQUIREMENTS**

MSCS requires the use of approved sealed engines. MSCS approved sealed engines have numbered seals with MSCS engraved on them. Engine can be built by any builder, but must be sealed by MSCS approved engine sealer.

Honda GX390 K1 or U1 engines (Car & Truck) and Predator 420cc # 60340 (Car & Truck) will be used in MSCS Mini Cup competition.

Engine must remain in stock location. Offsetting of engine is expressly prohibited.

No interchanging of parts from different engine models except that using U1 crankshaft and rods in a K1 motor is allowed. This includes the GX390 QAE also. The WO, WO1, Z5T00, Z5T800, Z5T900 Honda piston and rings may be used in older engines as well. When changing to the Z1C90 piston, you must also change to the new wrist pin.

**The use of a billet connecting rod is illegal.**

Engines cannot be altered from stock factory Honda / Predator specifications unless otherwise noted in this rulebook.

All parts must be factory Honda parts designed for the GX390K1 and GX390U1 will be checked against factory Honda parts unless otherwise noted in this rulebook. All official decisions are final.

Specifications for the Honda GX390K1 engines can be found on page 2-4 of the Honda Shop Manual, part number 61ZH910.

## **HONDA DETAILED ENGINE REQUIREMENTS (for car & truck)**

**\*Only truck difference highlighted in yellow**

Internal and external governor system may be removed. Governor shaft hole may be plugged or vented.

Zero piston pop-up is allowed. Bore may be clearanced, and may not exceed the maximum service limits. Bore may be oversized by 10 thousandths (.010), 20 thousandths (.020), or 30 thousandths (.030) with Honda replacement pistons only. Top piston ring may be oversized. Stock or aftermarket ring permitted. Top ring gap is a non-tech item. No gap-less rings. No tech on rings except for thickness and width.

Crankshaft may be shortened by a maximum of 1.250 inches at the clutch end. Clutch bolt hole may be re-tapped. No lightening, polishing, or balancing of the crankshaft is allowed. Crankshaft may be ground .010 and the use of a Honda .010 replacement rod is permissible.

Piston and connecting rod must remain stock standard size, no grinding, polishing or sizing modifications allowed, although any weight oil lubrication is allowed. Also, top of piston crown may be machined to ensure 0 piston pop out. Dish in top of piston must remain a minimum of .080

Rotating the piston or rod is expressly forbidden.

Replacement rod bolt is allowed, as long as the rod is not altered or modified, except for oil lubrication hole as specified.

Only the Stock piston is allowed

## **CYLINDER HEAD**

Cylinder head must remain stock.

Cylinder head may be machined to a minimum thickness of 3.730 inches for car.

Cylinder head may be machined to a minimum thickness of 3.680 inches for truck.

No porting, polishing or sizing of any part of the cylinder head is allowed.

Only stock valve grinding angles allowed. 30°first & 45°second.

All cylinder head dimensions will be taken from stock Honda parts.

Worn valve guides may be replaced with stock Honda valve guides or with a bronze guide-liner.

Only head gasket part# 12251-Z1C-801 is legal for MSCS

## **CAMSHAFT**

NOTE: Super Cup engines may compete using the profiled camshaft as described below. This is the only camshaft (other than stock) allowed. Any cam that does not fall within the specifications below will be considered illegal. Any cam found to be illegal WILL BE CONFISCATED and not returned.

Camshaft timing cannot be changed from Honda factory specifications. (See Honda Manual)

A reground Honda camshaft may be used, as long as it remains within the following profile and must be checked at the lifter against the camshaft. If a cam does not meet the profile below and MSCS officials determine that the only reason is excessive wear on a formerly legal cam, the cam will pass tech for that race only and the driver will be instructed to have a new cam installed for the next event.

### **INTAKE**

#### **LIFT DEGREES POSITION**

.050 3BTDC -----3 ATDC

.100 14-----20 ATDC

.150 30-----36 ATDC

.200 50-----56 ATDC

.250 81-----87 ATDC

.265 MAX.

.250 48----- 42 BBDC

.200 19----- 13 BBDC

.150 1----- 7 ABDC

.100 17----- 23 ABDC

.050 34----- 40 ABDC

## EXHAUST

### LIFT DEGREES POSITION

.050 37 -----31 BBDC

.100 19 -----13 BBDC

.150 2BBDC-----4 ABDC

.200 21 -----27 ABDC

.245 MAX.

.200 68 -----62 BTDC

.150 46 -----40 BTDC

.100 29 -----23 BTDC

.050 12 -----6 BTDC

## VALVE TRAIN

All valves, lifters, push rods and rocker arms must remain stock Honda GX390K1/U1 engines. Aftermarket valve springs okay if they meet the dimensions of the stock spring. One stock Honda shim allowed under both intake and exhaust springs. All dimensions will be taken from known stock Honda GX390K1/U1 engine parts. All other specifications will be from Honda GX390K1 shop manual.

A small groove may be cut in the valve stem for a safety (rubber) "O" ring to be installed. Groove must be no more than: 0.020" deep - 0.100" wide - 0.750" from end of valve stem.

Slot in rocker arm may be elongated to prevent binding.

## HONDA CARBURETOR

The following modifications are allowed to the stock Honda carb.

Choke may be removed from carburetor. Shaft holes must be plugged.

Any stock Honda jet may be used. Jet may be drilled.

Honda carburetor needle and seat must remain stock.

The Honda carburetor is the only carburetor approved by MSCS.

Carburetor must not exceed a bore of .930

### **TILLOTSON CARBURETOR**

Not approved for use at this time by MSCS

### **ENGINE/CAR ELECTRICAL SYSTEM ALTERNATOR**

Oil alert system may be removed.

Charging system may be removed.

Charging magnets may be removed.

### **FLYWHEEL**

Flywheel may be balanced. Minimum flywheel weight must be 11 lbs. 10 oz. Weight should be removed from the outer edge of the flywheel. Any flywheel that shows signs of excessive machining on the inside area will be deemed illegal. The tech official will have sole discretion and authority on this matter.

No other alterations to the flywheel allowed.

### **SPARK PLUG**

Any make or brand of spark plug may be used. Plug must remain unaltered from factory but sealing ring may be removed for head temperature sensor.

Aftermarket spark plug connectors may be used to replace stock Honda connectors.

## **IGNITION SYSTEM**

Altering the ignition timing from stock Honda GX390K1 specifications is not allowed.

No alterations to the starter coil or other electrical parts are allowed.

Spark intensifiers are prohibited.

## **STARTER**

The electric starter must be in working order. All cars must be capable of starting under their own power.

The starter cup is an extension of the recoil starter assembly and can be removed if desired. It also presents a hazard when adjusting the carburetor. The cup may be removed and replaced with the following Honda fan flange (Honda part # 19512-ZE2-000) ONLY. The screen must be replaced and firmly attached to the motor in the original location and made of ¼ inch mesh. Honda part # 19620-ZE3-810 may be used. It cannot be made of solid materials or be partially covered. A hole may be cut in the center of the mesh to allow access to the crankshaft nut.

## **ELECTRICAL SWITCH LOCATIONS**

All electrical switches must be located on the left side of the dash panel and must be labeled showing the on/off positions.

A switch must be wired so as to ground the ignition.

## **ACCESSORIES**

Lap timers and other automated electronics (oil pressure, temperature and rpm) are allowed providing they are mounted securely. Data acquisition devices are allowed as long as they do not interfere with race track operations or other competitors.

Tach/temp sensor devices may be attached to the spark plug or exhaust. A small hole can be drilled in the exhaust pipe to accommodate the sensor.

## **ENGINE COOLING SYSTEM**

Air cooling components cannot be altered from Honda GX390K1.

The stock shroud covering the head can be replaced with an aluminum shroud with maximum dimensions of 5" by 10". The replacement of this shroud is not a performance enhancement. The shroud must not extend further forward than the leading edge of the fins on the head. The intent is to equalize cooling over the surface of the aluminum head thus adding durability. No Mechanical Device/ Electrical Used.

No tampering with the fan shroud and/or grille.

## **ENGINE EXHAUST SYSTEM**

Exhaust pipe must be made by approved MSCS manufacturers. Pipe must have no interior restrictions and be a minimum of 22 inches end to end for all cars. Pipe must be 1 ¼" tubing from the flange.

Mufflers may not be used at any MSCS event.

Additional bracing and brackets to reinforce and support pipe are legal.

Exhaust pipe wrap and Ceramic coating is approved.



## **FUEL & OIL**

Unleaded gasoline available at a corner service station only. No racing fuel, aviation fuel, methanol, or additives of any type are allowed. MSCS reserves the right to use a pump around system. Any competitor who does not allow fuel to be pumped will be disqualified. Fuel may be tested by MSCS officials.

Oil is to be used to lubricate the engine only – not for combustion. Any brand of oil is allowed, provided it does not contain any prohibited additives. Prohibited additives designed to increase power include but are not limited to nitro methane, polypropylene oxide, etc. These can be dangerous and will bring a stiff penalty and/or suspension from MSCS.

## **PREDATOR 420cc # 60340 Detailed Engine Requirements**

The Predator 420cc engine (#60340) may be used in MSCS competition in either the car or the truck. To be allowed in the car the engine must remain stock. The engine must be race prepped at an approved MSCS engine builder location. Check with tech or the MSCS president to get an approved location for having your engine race prepped.

Replacement rod bolt is allowed, as long as the rod is not altered or modified, except for oil lubrication hole as specified above.

Rocker arms and retainers can be upgraded from stock Predator using stock Honda parts. Check with MSCS to get information on replacement parts.

Internal and external governor system may be removed. Governor shaft hole may be plugged or vented.

Worn valve guides may be replaced with stock Honda valve guides or with a bronze guide liner.

All valves, lifters, push rods and rocker arms must remain stock Honda. Aftermarket valve springs okay if they meet the dimensions of the stock spring. One stock Honda shim allowed under both intake and exhaust springs. All dimensions will be taken from known stock Honda engine parts.

A small groove may be cut in the valve stem for a safety (rubber) "O" ring to be installed. Groove must be no more than: 0.020" deep - 0.100" wide - 0.750" from end of valve stem.

Slot in rocker arm may be elongated to prevent binding.

Stock Honda retainers allowed

The following modifications are allowed to the stock Honda carb.

Choke may be removed from carburetor. Shaft holes must be plugged.

Any stock Honda jet may be used. Jet may be drilled.

Honda carburetor needle and seat must remain stock.

The Honda carburetor is the only carburetor approved by MSCS.

Carburetor must not exceed a bore of .930

Oil alert system may be removed.

Charging system may be removed.

Charging magnets may be removed.

Any make or brand of spark plug may be used. Plug must remain unaltered from factory but sealing ring may be removed for head temperature sensor.

Aftermarket spark plug connectors may be used to replace stock Honda connectors.

Altering the ignition timing from stock Honda GX390K1 specifications is not allowed.

No alterations to the starter coil or other electrical parts are allowed.

Spark intensifiers are prohibited.

The electric starter must be in working order. All cars must be capable of starting under their own power.

The starter cup is an extension of the recoil starter assembly and can be removed if desired. It also presents a hazard when adjusting the carburetor. The cup may be removed and replaced with the following Honda fan flange (Honda part # 19512-ZE2-000) ONLY. The screen must be replaced and firmly attached to the motor in the original location and made of ¼ inch mesh. Honda part # 19620-ZE3-810 may be used. It cannot be made of solid materials or be partially covered. A hole may be cut in the center of the mesh to allow access to the crankshaft nut.

Air cooling components cannot be altered.

The stock shroud covering the head can be replaced with an aluminum shroud with maximum dimensions of 5" by 10". The replacement of this shroud is not a performance enhancement. The shroud must not extend further forward than the leading edge of the fins on the head. The intent is to equalize

cooling over the surface of the aluminum head thus adding durability. No Mechanical Device/ Electrical Used.

No tampering with the fan shroud and/or grille.