MIDGET 4 CYLINDER

GENERAL SPECIFICATIONS										
Year	Displ.		Carburetor	HP at RPM	Torque (Ft. Lbs. at RPM)	Compr. Ratio	Bore		Stroke	
	cu. ins.	cc					in.	mm	in.	mm
1975	91.0	1493	1x1-Bbl.	.....	.....	7.5-1	2.9	73.7	3.44	87.5

ENGINE IDENTIFICATION

Engine identification and serial numbers are stamped on crankcase, located on right hand side above generator.

ENGINE REMOVAL

1) Disconnect battery, remove hood, drain cooling system and remove radiator. Disconnect heater air intake hose. Remove fan, drain engine oil, and disconnect carburetor from manifold.

2) Remove nuts and bolts securing exhaust manifold to exhaust pipe then disconnect running-on control valve vacuum pipe from intake manifold. Disconnect heater hose and heater control valve hose.

3) Disconnect water temperature capillary tube, remove rear rocker cover nut, release support bracket, then disconnect diverter valve hose from check valve. Remove nuts securing manifold and remove manifold. Disconnect electrical leads at alternator.

4) Remove distributor cap and air pump. Disconnect oil pressure gauge tube, engine ground strap, and fuel line. Remove nuts and bolts securing transmission housing and starter motor to engine. Move transmission restraint cable aside then disconnect starter.

5) Place support under transmission then secure suitable lifting device to engine lifting brackets. Remove two nuts securing right and left front engine mounts, raise engine enough to remove bolts from mounts then lift engine from vehicle.

INTAKE & EXHAUST MANIFOLD

Removal – Disconnect battery, remove air cleaner and carburetor. Remove nuts and bolts securing exhaust manifold to exhaust pipe then disconnect running-on control valve vacuum pipe from intake manifold. Disconnect and remove water temperature capillary tube, rear rocker cover nut then release support bracket. Disconnect diverter valve hose from check valve. Remove nuts securing manifold and remove manifold.

Installation – To install intake and exhaust manifold, reverse removal procedure.

CYLINDER HEAD

Removal – 1) Disconnect battery and drain cooling system. Remove air temperature control valve hot air hose, then disconnect distributor vacuum line from carburetor. Disconnect E.G.R. valve and breather pipe from rocker cover. Disconnect fuel line from carburetor.

2) Disconnect carburetor and lay to one side. Remove temperature sending unit then disconnect capillary tube from intake manifold. Disconnect thermostat housing hose then remove fan guard from radiator. Remove water pump attaching bolts from cylinder head. Disconnect diverter valve hose from check valve and unscrew four air manifold unions from cylinder head.

3) Remove rocker cover nuts, then release support bracket from rear rocker cover stud. Remove air induction manifold, check valve then remove rocker cover. Remove spark plug leads and disconnect exhaust manifold from exhaust pipe. Disconnect the running-on control valve vacuum pipe, heater control valve hose, and heater by-pass hose.

4) Disconnect heater return pipe bracket. Rocker shaft and push rods. Remove nuts and washers securing cylinder head and remove cylinder head.

Installation – To install, reverse removal procedure then tighten head nuts gradually in sequence shown in *Fig. 1*.

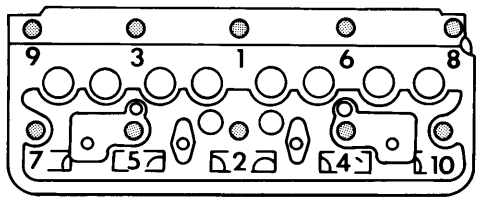

Fig. 1 Midget Cylinder Head Tightening Sequence

VALVES							
Engine & Valve	Head Diam. In. (mm)	Face Angle	Seat Angle	Seat Width In. (mm)	Stem Diameter In. (mm)	Stem Clearance In. (mm)	Valve Lift In. (mm)
1493 cc							
Int.	1.380 (34.99)	45°	45.5°	....	.3107-.3113 (7.89-7.91)	.0007-.0023 (.02-.06)	.....
Exh.	1.170 (29.71)	45°	45.5°	.....	.3100-.3105 (7.874-7.887)	.0015-.0030 (.04-.07)	.....

MIDGET 4 CYLINDER (Cont.)

VALVE ARRANGEMENT

E-I-I-E-E-I-I-E

VALVE GUIDE SERVICING

Removal & Installation – With cylinder head removed, remove valve, spring and retainer. Using suitable tool (60A) and adapter (S 60A-2A), position tool on combustion chamber face of cylinder head, pull replacement guide in driving old guide out. Insure that guide protrusion above cylinder head top face is correct.

VALVE SPRINGS			
Engine	Free Length	PRESSURE (LBS.)	
		Valve Closed	Valve Open
1493 cc	1.52 (38.6)	.....	.....

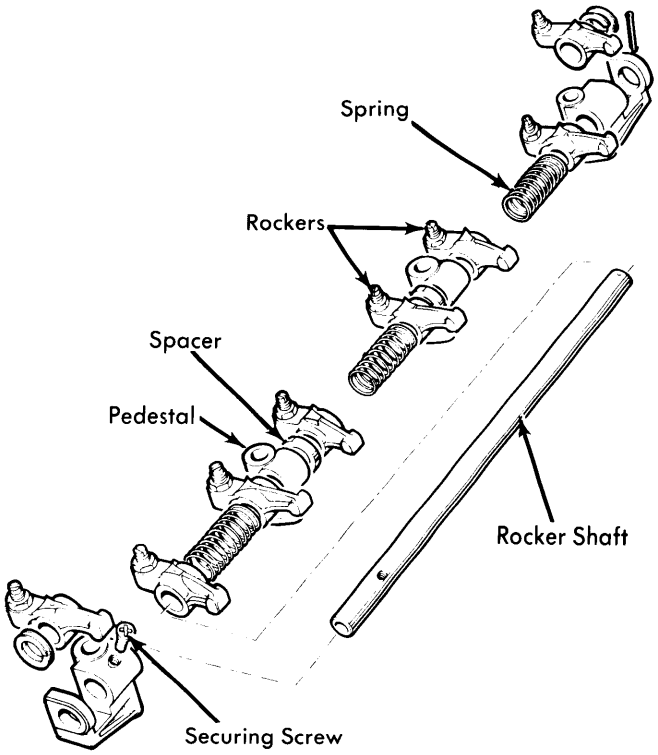

Fig. 2 Disassembled View Of Rocker Arm & Shaft

ROCKER ARM ASSEMBLY

Removal – Disconnect breather pipes from rocker cover and remove rocker cover. Remove nuts and washers securing rocker arm shaft and remove rocker arm assembly.

Disassembly – Remove cotter key from front end of rocker shaft. Slide off rockers, pedestals, springs and spacers from shaft noting the order for reassembly. Remove screw securing rear pedestal to shaft and remove pedestal and rocker arm.

Reassembly – Reverse disassembly procedure, applying Loctite to rear pedestal locating screw.

Installation – To install rocker arm assembly, reverse removal procedure. Adjust valve clearance.

VALVE CLEARANCE ADJUSTMENT

With engine cold, set valve clearance to .010" (.25 mm). To check valve clearance, turn crankshaft until valves in first column are fully open, then valves in the second column may be checked and adjusted as necessary.

Valves Open	Valves to Adjust
1	8
3	6
5	4
2	7
8	1
6	3
4	5
7	2

PISTONS, PINS, RINGS						
Engine	PISTONS	PINS		RINGS		
	Clearance	Piston Fit	Rod Fit	Rings	End Gap	Side Clearance
1493 cc	①.002-.003 (.051-.076) ②.0002-.0016 (.005-.041)	③	④	1	.012-.022 (.305-.559)	.0015-.0035 (.038-.089)
				2	.012-.022 (.305-.559)	.0015-.0035 (.038-.089)
				3	.015-.055 (.38-.1.40)	.....

① – At bottom of skirt.
② – At top of skirt.
③ – Hand push fit.
④ – Interference fit.

MIDGET 4 CYLINDER (Cont.)

OIL PAN REMOVAL

Drain engine oil, remove oil pan screws and lower oil pan.

PISTON & ROD ASSEMBLY

Removal – Remove cylinder head, drain oil and remove pan. Remove bearing caps and move connecting rods off of crankshaft. Remove piston and rod assembly from cylinder head side of block.

Installation – Lubricate pistons, cylinder bores, and crankshaft with clean oil. Fit pistons and connecting rods to their original bores. Make sure that arrow on piston is pointing towards front of engine and that ring gaps are staggered. To complete installation, reverse removal procedure.

PISTON PINS

Removal & Installation – Piston pin is hand press fit in connecting rod. To remove pin, remove circlips then press out pin. Separate piston from connecting rod. To install, reverse removal procedure and note the following: Install new bushing and ream to proper size. Ensure piston is fitted correctly on connecting rod; arrow on top of piston facing front and cylinder number stamped on connecting rod and cap facing camshaft.

CRANKSHAFT MAIN & CONNECTING ROD BEARINGS

Engine	MAIN BEARINGS				CONNECTING ROD BEARINGS		
	Journal Diam.	Clearance	Thrust Bearing	Crankshaft End Play	Journal Diam.	Clearance	Side Play
1493	2.3115-2.3120 (58.713-58.725)	.0005-.002 (.013-.050)	3	.003 (.076)	1.8750-1.8755 (47.625-47.638)	.001-.003 (.03-.08)	.006-.014 (.1524-.3556)

CRANKSHAFT & MAIN BEARING SERVICE

Removal – 1) Remove engine from vehicle, then remove clutch assembly, and remove flywheel. Remove engine rear adapter plate, water pump and thermostat housing, then remove timing chain and gears. Remove camshaft locating plate and front mounting plate.

2) Remove dipstick, oil pan, crankshaft pulley and drive key. Remove shims if fitted, and two screws securing front sealing block. Remove crankshaft rear oil seal housing. Remove connecting rod and main bearing caps and remove crankshaft.

Installation – 1) Coat pilot bushing with zinc oxide grease and install in crankshaft. Install main bearings, crankshaft, and main bearing caps. Tighten caps to specification. Check crankshaft end play; adjust with selective thrust washers.

2) Install connecting rods, bearings, and caps. Use new bolts and tighten to specification. Install front sealing block using suitable sealing compound, then drive new wedges into slots. Cut protruding edges from wedges. To complete installation, reverse removal procedure.

ENGINE FRONT COVER & OIL SEAL

Removal & Installation – 1) Remove radiator, fan, air pump, and drive belts. Raise engine if necessary, remove crankshaft pulley nut and remove pulley. Remove eight screws, one bolt, and three nuts securing front cover to block.

2) Remove front cover and gasket along with oil seal. Press seal from front cover. To install, dip new seal in engine oil and press into front cover using suitable tool. To complete installation, reverse removal procedure.

TIMING CHAIN REPLACEMENT

Removal – Remove engine front cover and oil thrower as previously described. Align timing marks on camshaft and crankshaft sprockets then remove bolts securing camshaft sprocket. Remove camshaft and crankshaft sprockets along with timing chain.

Installation – To install, reverse removal procedure and note the following: Align timing marks and correct any misalignment of timing chain by fitting selective shims behind crankshaft sprocket.

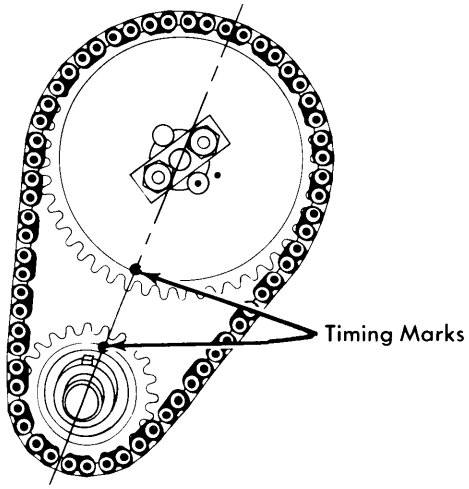

Fig. 3 Timing Chain Sprocket Alignment

MIDGET 4 CYLINDER (Cont.)

CAMSHAFT			
Engine	Journal Diam.	Clearance	Lobe Lift
1493 cc			
No. 1	1.9659-1.9664 (49.93-49.95)	.0016-.0036 (.04-.09)	.....
No. 2	1.9649-1.9654 (49.90-49.92)	.0026-.0046 (.07-.12)	.....
No. 3	1.9659-1.9664 (49.93-49.95)	.0016-.0036 (.04-.09)	.....

CAMSHAFT

Removal – 1) Remove radiator, air pump drive belt and fan belt. Remove thermostat, water pump and fan. Remove crankshaft pulley, and engine front cover. Remove timing chain and gears.

2) Remove bolt securing cam locating plate and remove plate then remove cylinder head. Remove lifters and identify for reassembly. Remove distributor drive shaft and fuel pump. Withdraw camshaft from block.

Installation – To install camshaft, reverse removal procedure and note the following: Check camshaft end play; if end play is excessive, install new locating plate.

VALVE TIMING				
	INTAKE		EXHAUST	
Engine	Open (BTDC)	Close (ALDC)	Open (BLDC)	Close (ATDC)
All Engines	18°	58°	58°	18°

VALVE TIMING

1) Adjust valve clearance of number 7 and number 8 valves to .050" (1.27 mm). Rotate crankshaft to bring number 1 piston to TDC on compression stroke. Check that number 1 and 2 valves are fully closed and number 7 and 8 valves have the same clearance.

2) After valve timing has been checked, valve clearance should be set to specification.

ENGINE OILING

Crankcase Capacity – 4.8 qts. including filter.

Oil Filter – Full flow type with disposable cartridge.

Normal Oil Pressure – 40-60 psi; at idle 20 psi.

ENGINE OILING SYSTEM

Force feed system with rotor type oiling pump. A full-flow type oil filter is used. An oil pressure relief valve is used to enable oil to by-pass filter if oil becomes blocked .

OIL PUMP

Removal – Drain crankcase oil and remove oil pan. Loosen oil strainer locknut and unscrew oil strainer from oil pump cover plate. Remove three bolts securing oil pump to crankcase and remove pump.

Installation – To install oil pump, reverse removal procedure.

Disassembly & Inspection – Remove inner rotor and shaft assembly. Remove outer rotor. Clean all components then reinstall rotors in pump body with chamfered edge of outer rotor at driving end of pump body. Place straightedge across face of pump body and check clearance between straightedge and rotors. Clearance should not exceed .0004" (0.1 mm). Check clearance between inner and outer rotors and pump body. Clearance between the inner and outer rotors, measured at the rotor lobes should not exceed .010" (.25 mm). Clearance between outer rotor and pump body should not exceed .008" (0.2 mm). If clearance is excessive at any location, pump should be replaced.

Reassembly – To reassemble, reverse disassembly procedure and ensure that outer rotor is installed in pump body with chamfered end at driving end of pump body.

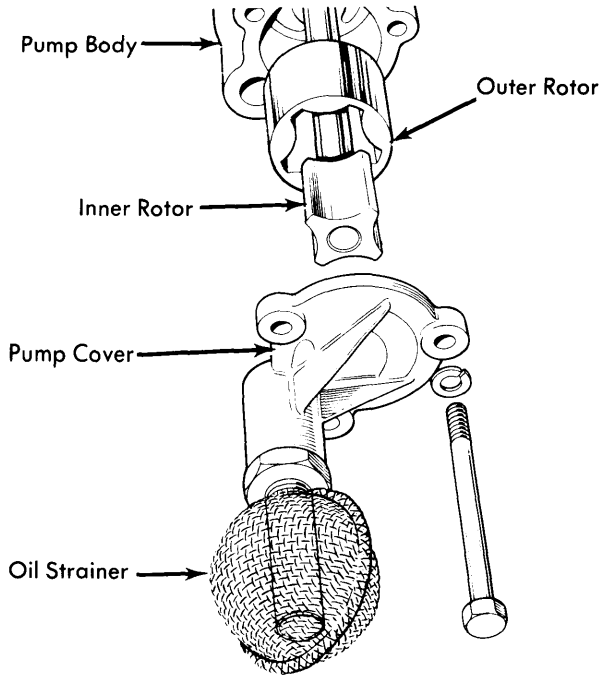

Fig. 4 Engine Oil Pump Disassembled View

MIDGET 4 CYLINDER (Cont.)

ENGINE COOLING

Cooling System Capacity – 4.5 qts.

Thermostat – Opening temperature, 190°F (88°C)

WATER PUMP

Removal – Remove radiator, loosen alternator adjusting bracket and remove fan belt. Remove nuts and bolts securing fan and remove fan from coupling assembly. Remove nuts securing water pump to thermostat housing and remove water pump, fan coupling, and tolerance ring.

Installation – To install water pump, reverse removal procedure and refill cooling system.

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (mkg)
Cylinder Head	50 (6.9)
Connecting Rod Nuts	①50 (6.9)
Rocker Shaft	32 (4.4)
Oil Pan	20 (2.8)
Engine Front Cover	
small bolt	10 (1.4)
large bolt	20 (2.8)
Water Pump	20 (2.8)
Manifolds	25 (3.5)
Crankshaft Pulley	150 (20.7)
Rocker Cover	2 (.03)
Flywheel	②40 (5.5)

① – Phosphated 46 (6.4).
② – Parkerised 45 (6.2).