

MODEL A RESTORERS
CLUB OF WA. INC.

Keeping your Model A Ford Rollin'

A Collection of hints, tips,
remedies and Trouble-shooting
ideas in the unlikely event
that your Model A Ford
“fails to proceed”.

Keeping your Model A Ford Rollin'



TUNE YOUR MODEL A FORD for MAXIMUM ECONOMY and PERFORMANCE

based on the "Tune up Course" booklet presented at Informative talk by
ALAN BERGMAN at the 13th National Model A Ford Rally, S.A. ©

Proven steps to improve economy and performance...

ECONOMY TUNE

1. Replace and/or clean and gap spark plugs.
2. Clean / replace and adjust contact points.
3. Lubricate distributor cam and wick.
4. Set ignition timing.
5. Adjust mixture and idle and test, if possible, on exhaust gas analyser.
6. Service air cleaner or replace element, if fitted.
7. Final adjustment of mixture and idle with air cleaner fitted.
8. Road test.

TUNE UP

1. Test compression.
2. Replace and/or clean and gap spark plugs.
3. Clean / replace and adjust contact points.
4. Lubricate distributor cam and wick.
5. Check / replace condenser.
6. Check distributor shafts for wear.
7. Clean and examine distributor cap and rotor for cracks and wear; and contacts for wear.
8. Clean rotor - examine trailing edge.
9. Set ignition timing.
10. Check operation of ignition advance/retard.
11. Check for full throttle and throttle return.
12. Check operation of choke.
13. Adjust mixture and idle and test.
14. Check / tighten fuel line connections.
15. Service / replace air cleaner element, if fitted.
16. Clean and seal battery terminals and earth connection.
17. Adjust mixture and idle with air cleaner, if fitted.
18. Check and adjust fan belt.
19. Road test and rectify any defects observed.

MAJOR TUNE-UP

1. Test compression.
2. Replace and/or gap and clean spark plugs.
3. Clean / replace and adjust contact points.
4. Lubricate distributor cam and wick.
5. Replace / check condenser.
6. Check distributor shafts for wear.
7. Clean and examine distributor cap and rotor for cracks and wear; and contacts for wear.
8. Secure rotor firmly on distributor shaft.
9. Set ignition timing.
10. Check/adjust advance/retard lever for full operation.
11. Check oil and water levels.
12. Check coil leads, spark plug connectors, junction box connections, etc.
13. Clean carburettor and set to specifications.
14. Check carburettor needles and seats, float level, float drop, float for puncture, gaskets; assemble and seal, tighten down bolts.
15. Tighten manifold bolts and check for leaks.
16. Crack cylinder head nuts and re-torque in correct sequence.
17. Check and adjust valve clearances as specified.
18. Adjust fan belt and tighten all engine bolts (starter, generator, mountings, etc.).
19. Check for full movement on throttle controls.
20. Check operation of choke.
21. Adjust mixture and idle and check, if possible.
22. Check/tighten fuel line connections.
23. Service/replace air cleaner filter, if fitted.
24. Clean and seal battery and earth connections.
25. Check charging rate - maximum 10amps.
26. Adjust mixture and idle with air cleaner, if fitted.
27. Road test and rectify any faults.

Check fan blades for cracks regularly.

TUNE-UP HINTS by ALAN BERGMAN © 1989

1. Set spark plug gaps to maximum setting for economy and mid-range power (say, 32 -35 thou.).
2. Set point gap to minimum setting for maximum economy and mid-range power. (Increase coil saturation time - hotter spark.) (Large dwell, eg: 15 - 18 thou for Model A Ford).
3. Remember, advancing the engine timing gives the mixture a longer period of time to burn. If you advance too far, pressure is exerted against the piston before it reached T.D.C. (Top Dead Centre) and if the timing is too slow then the piston will be past T.D.C. So, be accurate when setting timing - use a test light. Advancing the engine timing leans the mixture, retarding the ignition timing enriches the mixture, both within reason.
4. Change oil regularly when hot - remember, oil is cheaper than metal.
5. For absolute maximum economy, keep the inlet air as cold as possible.
6. Upper cylinder lubricant via carburettor once a month keeps valves in good condition - better compression.
7. For maximum economy (cruising) jet carburettor for an air / fuel ratio of 15 to 1 (1% CO) under load or 14 to 1 (1.5% CO) off load (any leaner will damage engine).
8. For maximum power (three quarter to full throttle) jet carburettor for an air fuel ratio of 12.7 to 1 (5.5% CO) under load or 12 to 1 off load (6% CO).

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ALAN BERGMAN - STEVE READ
Compiled and Produced by BEVAN SHARP

ROLLING REMEDIES

Steve Read, Western Model A News, January, 1990

Steve says:- "Remember if you fail to proceed - DON'T PANIC! Don't start pulling the car to pieces until you have gone through your trouble-shooting and diagnostic procedure. Always stick to the same procedure so you don't get confused. Remember - you bought the car, you restored it, you CAN fix it!"

Trouble-shooting procedure:

1. Check fuel flow and quality, water, etc.
2. Check spark at points. If no spark then condenser, wiring or wire under distributor plate.
3. Check spark to plugs. If no spark out of distributor, then probably coil or rotor button.
4. Check points for gap and timing.
5. Check for stripped cam gear.

FUEL - 1) Tap fully on? 2) Small filter in tank come loose, is outlet hole blocked? Check by loosening the pipe at the carburettor and see if fuel is running out, if not, hole in tank covered by rust or scale.

Remedy - remove fuel line from carburettor and blow back along line, eject any rubbish around hole. May need repeating to get you home.

3) Has small nut holding choke arm come adrift allowing choke flap to close, so causing flooding? Remedy - keep flap in open position with piece of folded cardboard or use clothes peg to hold choke open.

ELECTRICAL - Are battery terminals clean and tight?

1) Slow and loss of power resulting in a final stop and possibly overheating? Most likely points have closed or screw holding timing cam has loosened allowing timing to retard. Remedy - reset or time.

2) Motor idles reasonably but misses badly under load or on hills, etc. Remedy - Most likely coil. Replace with new one from under the seat!

3) Motor backfires under most conditions? Probably condenser. Remedy - this is the most blamed part in a Model A, and may not be the problem but change it anyway, it can't hurt anything! >

4) Engine winds over but will not start? Check for spark at points. If no spark most likely problem is wire under distributor plate. Remedy - dismantle distributor and repair. Better to have a complete, timed, spare distributor so you can drop it straight in (have rotor straight ahead as a reference point) to eliminate a range of suspects.

Loss of timing through crankshaft? If the motor turns over but the rotor does not you can reasonably assume no cam gear teeth. To check, press in timing pin - you will feel if cam is moving. Remedy - can be replaced by roadside, but best done in peace back home.

No condenser? Almost any modern condenser will do by removing the old one and fitting a condenser to the coil bracket and the wire to the distributor side of the coil. Make sure condenser is earthed. Normally condenser wire would go to positive side of coil but if your car has been converted to negative earth, make sure the wire always goes to the distributor side of the coil.

Broken rotor button? Unlikely but possible. Take rubber cap from end of coil lead and push over rotor shaft, poke small split pin through top of cap in line with key way in shaft so it just clears contacts in distributor cap. Then fit a bit of tin foil down centre of cap to conduct current from top of cap. Refit. Purely temporary!

To clear rust blocking hole in fuel tank, poke a thin piece of wire into the fuel outlet through filler hole. The wire will prevent large pieces from covering the hole but still allow fuel to pass.

Amp meter or regulator stopped resulting in flat battery? Run a wire direct from the generator terminal to the starter terminal. Beware to start motor before connecting and be sure to remove wire as soon as engine has stopped or damage to generator could occur. In an emergency the wire from stop light to switch is over 2 meters long!

Lost timing pin? Use anything that will fit. To make it easier, put paint marks on the crank pulley and motor to show position of Top Dead Centre. It only comes around every second revolution.

TROUBLE SHOOTING - Model A Ford
hints from "Tune-Up Course" by Alan Bergman ©

PROBLEM - Engine runs rough - low power, backfires.
Replace condenser in distributor. Always carry several in hot weather.

PROBLEM - The Engine will not Start.
Turn on the ignition switch and while turning the engine over with t' starter, place a screwdriver blade with a well-insulated handle, between the engine head (ground) and about 1/8 inch near each spark plug. You should see a blue spark jump to each plug as the engine rotates. (Be sure the distributor cam is turning.) You can also remove the spark plug leads from the distributor body and leave approximately 1/8 inch near the connection. You should see a blue spark jump at each gap. *Note:- You can remove the distributor cap and touch the high-tension wire to the rotor, start the engine and watch spark rotation, breaker action and any wobble in the cam while the engine is running or cranking over.*

If there is a good spark and the engine just quits, check for a gas line clog or faulty carburettor.

If there is NO spark, remove distributor body and cap and check:-

1. Breaker points open and close as engine turns over. The points should be set at .018 inch to .022 inch gap.

2. Rotor, cap and body are not cracked or show sign of high voltage breakdown (carbon line or path). Check contact plate for short ground or bad wire to points.

3. Rotate engine until the breaker points are closed, then, while the ignition is turned on, open the points with a screwdriver or wood stick. At this time the spark should jump from the high tension wire of the distributor coil to a ground point (approx 1/8 - 1/4 inch gap). If ~~this~~ does not occur, the spark coil may be faulty or the ignition switch may be bad. *Note:- If the high tension wire is not allowed to discharge to ground, the distributor coil will break down internally, eventually causing permanent damage to the coil.*

4. If you see a small spark between the points when opening them, the circuit through the ignition switch is complete and the coil is probably at fault. Also you can connect a test light across the points and it should light up when the points open.

PROBLEM - Engine out of Time.

If the engine was running OK when it quit, the distributor timing will probably be all right. But, if the timing has changed, either by removing the distributor or the distributor cam, the engine must be retimed.

Time engine as usual with spark lever up in the "retard" position, with the throttle slightly increased, transmission in neutral and emergency brake on. With timing pin reversed and seated in hole in timing gear for Top Dead Centre, distributor cam should be moved until points are just beginning to open in number one firing position. *Note:- If you connect the test lamp across breaker points or the distributor side of the coil, to ground, the lamp will light up when the points open, with the ignition switch on.* Replace and tighten timing pin. Start engine and notice how it runs at full retard and full advance positions of the spark lever. If the engine timing is too advanced the engine will start hard, like with a weak battery and it will "roll" instead of running smooth and even. If the timing is too retarded the engine will run sluggish and get hot, it may also backfire through the carburettor. You can move the distributor cam counter-clockwise to advance the timing and clockwise to retard the timing. Good timing and a smoothly-running engine can be difficult to obtain if there is excessive backlash and wear in the distributor gears and bushings. Also note that as the bushing on the points wear down and the gap becomes smaller, the engine will run retarded. This is particularly noticeable just before the points have no gap and the engine stops running!

The best tools for electrical repair are a roll of electrical tape or friction tape, spare wire, a screwdriver (medium blade, long) and a test light (6-volt lamp with two leads and two alligator clips).

TROUBLE-SHOOTING CHART

adapted from "Tune Up Course" by Alan Bergman ©

ENGINE WON'T START?

Starter does not turn engine

Battery flat, Lead loose or corroded, Faulty starter switch, Faulty starter motor.

Starter turns engine slowly

Battery partly run down, Connections dirty, Terminal/s loose, Faulty starter motor.

Starter turns engine fast

FUEL

If no fuel in carburettor:- No fuel in tank, Air lock in fuel line, Blockage in fuel line.

If fuel at carburettor:- Jets choked, Mounting loose, Water in fuel, Dirt in Carburettor.

IGNITION

If spark at plug leads:- Spark plugs oiled up, Spark plug cracked, Plug leads disconnected.

If no spark at plug leads:- Cracked rotor, Loose low tension leads, Faulty distributor cap, Dirty distributor points, Faulty condenser, Carbon brush not making contact.

If no spark at coil lead:- Burned-out coil, Loose or broken high tension leads, Faulty switch.

ENGINE MISFIRES

High tension leads shorting, Incorrect spark plug gap, Cracked spark plug porcelain, Battery connection loose, Electrical lead damp.

Water in Carburettor, Fuel line partly blocked, Jets faulty or blocked.

Sticking valve, Broken valve spring, Incorrect valve clearance.

ENGINE STARTS AND STOPS

Low tension connection loose, Faulty switch controls, Dirty points.

Fuel line blockage, Water in fuel, Dirt in carburettor, Air leaks.

ENGINE SLUGGISH

Fuel feed faulty, Ignition timing incorrect, Carburettor incorrectly adjusted, Ignition retarded.

Valve sticking, Valve burned or broken, Valve spring broken.

ENGINE DOES NOT GIVE FULL POWER

Ignition retarded, High tension lead shorting, Faulty distributor cap, Faulty spark plug.

Valve burned or seating badly, Incorrect valve clearance.

Fuel supply faulty, Jets partly blocked.

ENGINE RUNS ON WIDE THROTTLE ONLY

Slow running jet blocked, Carburettor flooding.

ENGINE KNOCKS

Fuel octane too low, Timing over advanced, Excessive carbon, Worn bearing or piston.

MODEL A TROUBLES MADE EASY

MOTOR WILL NOT SPEED UP

Choke stuck closed, Pistons binding, Not enough oil in engine, Bent or sticking valve stem, Too much play in valve opening plungers, Too much space between valve stems and push rods, Valves timed late, Throttle stuck closed, Timer stuck in retarded position, Binding contact bell crank, Dragging brakes, Driving system parts not aligned

MOTOR WILL NOT STOP

Throttle remains open, Ignition switch out of order, Incandescent carbon deposits fire charge, Overheated engine.

MOTOR SPEEDS UP SUDDENLY

Timer casing advanced, Clutch slipping, Throttle jarred open.

MOTOR RUNS IRREGULARLY OR MISFIRES

a) **Motor** - Carbon deposits, Weak or broken valve springs, Sticky valve stems, Carbon under valve heads, Worn push rods or guide, No clearance between valve stem and plungers, Air leak, Broken cylinder head gasket. b) **Fuel** - Carburettor float chamber getting dry, Water or dirt in fuel, Poor fuel adjustment. c) **Ignition** - Loose wiring or terminals anywhere, Broken spark plug insulator, Plug points sooty or oily, Wrong plug gap, Prematurely grounded primary wire, Battery running down, Adjustment of contact points, Wire broken inside insulation, Pitted or worn contact points, Weak distributor spring, Gummed lubrication on distributor cam, Defective condenser or coil

MOTOR STOPS WITHOUT WARNING

Broken primary wire, Broken timer spring (rare), Fuel valve jarred closed, Fuel pipe clogged, No fuel, Carburettor jet clogged, Water in fuel, Oil or carbon in spark plug, Short circuit by ground in wire, Air lock in fuel pipe or tank, Battery wire loose, Inlet valve stuck open, Piston seized through lack of oil, Broken camshaft or crankshaft (rare), Seized main bearing (rare), Insufficient lubrication, Flywheel wedged (rare), Sheared key in crankcase gear operating valve mechanism (rare).

MOTOR STOPS GRADUALLY

Fuel supply partly clogged, Air vent in fuel tank filler cap blocked, Float needle valve stuck, Water or dirt in carburettor jet, Mixture adjusting needle jarred loose, Loose battery terminal, Valves stuck open, Motor overheating due to defective oil or cooling, Spark advance rod broken, Throttle rod broken, Contact points sticking.

MOTOR RACES

Control rods broken, Defective induction pipe joints, Leaky carburettor flange packing, Throttle not closing, Timer stuck in advance position, Clutch slips (in high gear).

MOTOR NOISY IN ACTION

a) Mechanical knocking - Foreign matter in engine (such as a loose nut), Carbon deposits in combustion chamber, Incandescent spark plug points or carbon deposits, High piston, Loose wrist pin bearings, Loose connecting rod big end bearings, Worn main bearings, Piston worn permitting side slap, Cylinder worn out of round, Cylinder head bolts loose, Play in valve operating mechanism, Timing gears worn, Loose flywheel, Poor oil or lack of oil, Piston rings tight. Broken ball in gear set. **b) Mixture troubles** - Mixture too rich, Float chamber flooding. **c) Ignition troubles** - Spark timed too early. **d) Other causes of knocking** - Climbing steep hills in high gear, Overheating due to defective cooling. **e) Hissing and squeaking sounds** - Broken spark plug insulator, Spark plug leaks, Loose joint between motor and exhaust manifold, Loose carburettor, Valve spring chamber covers loose, Leaking cylinder head packing, Poor lubrication, Muffler leaking or ruptured, Broken piston rings (blowing sound), Tight piston rings (scraping sound). **f) Popping or blowing back in carburettor** - Incorrectly timed outlet valves, Inlet valve not seating, Defective inlet valve spring, Dirt under inlet valve seat, Not enough fuel (open needle valve), Spark too retarded, Contact points pitted, Weak battery. **g) Muffler explosions** - Mixture not exploding regularly, Exhaust valve sticking, Dirt under exhaust valve seat, Sticking points, Ruptured muffler. **h) Grinding noises** - Worn timing gears, Defective cylinder lubrication, Worn driving gears, Worn lower gears (not noticed on direct drive).

MOTOR WILL NOT START - OR STARTS HARD

a) Defects in motor - Leaky head gasket, Water or rust in cylinders, Seized or dry pistons, Piston rings gummed, Valve stuck, Pump impeller stuck, Valve gears out of time, Broken crankshaft (rare), Broken valve spring, Broken timing gear (rare). **b) Fuel system** - No fuel, No fuel in float chamber, Old or stale fuel, Clogged filter, Fuel supply pipe clogged by dirt or water, Fuel level too low, Fuel level too high (flooding), Filler cap clogged, Broken or stuck choke control, Bent or stuck float lever, Not enough fuel at jet, Cylinders flooded with fuel, Leaky float, Water in carburettor, Dirt in float chamber, Mixture too lean, Dirt in sediment bulb, Float valve stuck. **c) Ignition system** - Ignition switch off, Loose terminal on coil or switch, Ignition wire shorted, Defective spark plug (no spark), Broken spark plug insulation, Carbon deposits or oil between plug points, Spark plug points too close or too wide, Short circuited secondary coil, Stuck or defective breaker points, Short circuit in distributor, Battery weak, Poor contact points, Points dirty, Poor contact at switch, Primary wires broken or short circuited, Battery grounded by short circuited wire, Loose, broken or poor battery connection, Corroded or dirty battery terminals, Defect in coil, Broken spring in distributor, No contact at points, Point contact lever stuck, Dirt or water in distributor, Defective ignition lock.

MOTOR LOSES POWER

a) Causes of poor performance - Loose spark plugs, Defective cylinder head gasket, Cracked piston or cylinder (rare), Leaking valve (regrind), Warped valve heads, Piston ring joints in line, Head casing loose on cylinder, Worn piston rings. **b) Other causes of lost power** - Exhaust or inlet valve lift insufficient, Choked muffler, Carbon deposits, Tight bearings, Cylinder dry or overheated, Oil too light, Oil carbonises at too low temperature, Overheating though driving with retarded spark, Overheating due to racing motor in low gear, Overheating due to too rich mixture, Oil feed interrupted, Fan belt loose or broken, No water in radiator, Water pump defective.

Note: All causes of irregular motor action also cause lost power.

IF THE STARTER WILL NOT TURN

a) See that the starter pedal is not sticking and goes all the way down. Disconnect battery if pedal sticks, b) Note whether starter engages. If starter spins, "nurse" the pedal until gear engages. Make sure spring is not broken or pinion stuck on shaft. c) See that main leads to battery are firmly connected at battery and switch. d) Battery may be discharged.

If starter turns motor but motor will not fire - a) Do not continue to "churn" motor, but check:- Ignition switch is on, Throttle lever is open about one and a half inches, Air choke lever is closed (in cool weather), There is fuel in carburettor, Fuel stop cock is open, Check items under "**Motor will not Start**". b) With a very cold motor it may take time to get an ignitable mixture into the cylinders, close choke valve to draw fuel to prime carburettor. c) In moderate weather churning with choke closed will flood cylinders - to clear, open wide air choke and throttle levers.

ALL LIGHTS GO OUT - IGNITION FAILS - STARTER DEAD

a) Loose connection at battery terminal, starter motor or switch, point where battery is grounded to vehicle frame or fuse blown (if fitted).

ALL LIGHTS GO OUT - IGNITION FAILS - STARTER OK

A short or open circuit in wire between starting switch and fuse block or fuse blown (if fitted). If fuse burned - carefully check for grounds in wiring in switch, lamps, distributor, etc, tighten terminals.

ALL LIGHTS OUT - IGNITION AND STARTER OK

Open circuits between lighting switch and lamps, Loose connection at switch or lamp, or burned-out bulbs.

IGNITION FAILS - LIGHTS AND STARTER OK

Loose connections at ignition switch, coil or distributor. Poor grounding of the switch (one wire system) or open circuits between ignition switch and distributor.

GENERATOR TEST

A simple test to determine if the generator is properly operating, if the ammeter pointer shows no indication is, first, switch all lights on with engine idling; second, start engine and run reasonably fast. If lights brighten after starting engine it proves that the generator is delivering current properly. The test must necessarily be conducted in the dark (or a closed garage). The ammeter should indicate if it is working.

ONE LIGHT GOES DIM

Defective bulb or connection. If OK examine for short circuits.

ONE LIGHT FLICKERS

Loose or frayed connection at lamp or switch. Intermittent ground or short circuit in wiring. Bulb loose.

TAIL LIGHT GOES OUT

Bulb OK? Broken wire? Connections tight? Body of lamp making good electrical contact with frame of car.

COWL LIGHT GOES OUT

Same as preceding.

STOP LIGHT DOES NOT WORK

As tail light. Also check stop light switch.

HEAD LIGHTS GO OUT

Check head light circuit and bulbs. Blown fuse (if fitted).

ONE HEAD LIGHT GOES OUT

Open circuit between junction and lamp, bad connection at lamp, burned-out bulb, frame and lamp not grounded.

FUSES BLOWN OUT

This indicates a short circuit. Test that all is in order, starting with stop light and switch.

<u>TROUBLE</u>	<u>SYMPTOM</u>	<u>POSSIBLE CAUSE</u>	<u>CURE</u>
Engine won't turn over	Lights go dim Lights remain on	Run-down battery Loose terminals Corroded terminals Defective starter	Push start Tighten clamps Scrape lugs clean Push start
Engine turns over but won't start or cuts out while driving	No spark at plugs	Wet ignition Grounded or burned H.T. Corroded rotor Points dirty or burned Points out of adjustment Condenser shorted Broken/shorted wire/terminal Defective ignition switch.	Wipe dry or spray Find short and repair Scrape contacts clean File, clean, and wipe Reset gap Replace (radio OK?) Repair or replace By-pass with jumper wire
	Engine flooded	Fuel boiling in carb due to heat. Choke sticking	Clear by cranking, pedal floored, or push-start. Free butterfly and clear.
	No fuel at carburettor	Dirt or water in carburettor Clogged vent in fuel tank Clogged fuel filter Clogged fuel line Kinked fuel line Loose fuel line fittings Vapour lock Main jet dirty Water in system or tank	Cup hand on carb, crank Loosen cap Clean out sediment Blow out to clear Squeeze kink to remove Tighten Allow engine to cool Apply wet cloth Remove cover and clean Drain off or clean out
No Clutch	Pedal goes to floor	Broken linkage	Put in 2nd gear, drive off on starter till engine fires
No accelerator	Pedal goes to floor	Broken linkage	Repair or set idle screw full in.
Exhaust falls off	Scraping on ground	Rotten or damage by impact	Tie up with wire or remove

1. Is there fuel?
2. Is there spark (HT).
3. Is there fuel in carburettor?
4. Is there a point gap?
5. Is the key on?
6. Is there water and oil?
7. Are there any loose wires?

from "Tune Up Course" by Alan Bergman ©

Keeping your Model A Ford Rollin'

CLEARANCES AND LIMITS IN ASSEMBLY OF MODEL A ENGINES

Taken from Ford Service Bulletin of June, 1931

Size of parts

Diameter of pistons - 3.8745

Diameter of cylinder bore - 3.876

Diameter of crankshaft main bearings - 1.624

Diameter of crankshaft pin bearings - 1.499

Diameter of camshaft bearings - 1.560

Shims .002 thick are placed between all main and connecting rod bearings after burnishing. This is for oil clearance.

Clearances

Piston clearance in cylinders - .002 maximum

Piston ring gap - Lower ring - .008 to .010

Piston ring gap - Centre ring - .010 to .012

Piston ring gap - Upper ring - .012 to .015

Ring-groove clearance - .001

Piston rings are fitted in connecting rod bushings - .0003 maximum

Pin assembled in piston - .0002 to .0005 shrink fit

Pistons assembled with split side of skirt towards left side of engine

Connecting rod side play at lower end of rod - .008 to .012

Clearance between piston bosses at upper end - .040 to .053

Connecting rod fitted to crankshaft - .001 clearance

Connecting rods are installed with oil dips towards camshaft

Crankshaft end play - .002 to .004

Main bearing clearance - .001

Camshaft bearing clearance - .003 maximum

Camshaft end play taken up by tension of spring in front cover - tension of spring approximately 35 lbs

Clearance between valves and push rods - .010 to .013

Exhaust valves fitted in valve guides - .002 clearance

Intake valves fitted in valve guides - .001 to .0015

Valve lift - .287

Push rod clearance - .0015

Time gear backlash - .004

End play of water pump shaft - .006 to .010

Flywheel eccentricity and wobble (indicator reading) after mounting flywheel on C/S - not more than .005

Breaker point gap - .018 to .022

Spark plug gap - .035

Free movement or end play in clutch pedal - 1" minimum