

MAXFORD USA CRRC GASOLINE ENGINE

SERVICE TIPS & CHECKLIST

I. DEFINITIONS & RECOMMENDATIONS

- A. **Carburetor:** If you use gasoline with alcohol, you might need to replace the diaphragm after about 80 hours of operation. If the engine will not be used for more a month or more, drain the fuel tank and remove any fuel from inside the carburetor by running the engine at idle until it runs out of fuel. Keeping gasoline inside the carburetor over an extended period of time will damage the diaphragm and clog passages inside the carburetor.
- B. **Fuel:** We recommend you use an in-line fuel filter intended for use with gasoline engines. Metal filters intended for glow engines are too coarse and will not screen out fine particles. Also filter your fuel before putting it into the airplane's fuel tank. The break-in fuel mix ratio should be approx. 24:1.
1. **Lean:** The term 'lean' means that there is less fuel being delivered to the engine from the carburetor for a given throttle setting. The engine will run faster, smoother and hotter as the mixture is leaned, provided that it is not leaned too much. **Too Lean:** Hard to start; will not decelerate, hangs at higher revs for a while; dies when quickly given full throttle; a too-lean setting may contribute to a dead-stick landing when the throttle is opened after a long downline
 2. **Rich:** The term 'rich' means that there is more fuel being delivered to the engine from the carburetor for a given throttle setting. The engine will run slower, cooler and less smoothly and will probably foul the spark plug if it is too rich. **Too Rich:** Runs rough and shakes badly, burbles at midrange RPMs and smoothes out at full throttle; engine will transition slowly and may die after idling for a long period. Running rich may also be caused by low-voltage from the ignition battery; make sure the ignition battery is fully charged and has adequate capacity.
- C. **Spark Plug:** To avoid improper operation or possible engine damage, use only the spark plug recommended for this engine with a gap in the range of 0.4 to 0.6 mm (0.016 to 0.024 inch).
- D. **Idle adjustment:** The idle screw sets the throttle arm's lowest position. If the engine runs well, but the RPMs are not as low as you want, adjust the idle screw. A broken-in engine should give reasonable low RPMs with some idle adjustment. Adjustment of Low- and High-speed needles is not necessary in most cases and not recommended for beginner to intermediate gas-engine pilots.
- E. **Low-speed needle adjustment:** This adjusts the gasoline-to-air mixture for low RPMs. The needle closest to the engine is the "low-speed" needle. The factory setting is 1.5 turns. If the engine runs unevenly at low RPM, you might adjust the low-speed needle screw, but first read item I - G, below.
- F. **High-speed adjustment:** The high-speed RPM and transition performance are adjusted with the high-speed needle valve. The needle farthest from the engine is the "high-speed" needle. The optimum setting of the high-speed needle may vary slightly according to air temperature and elevation. The typical factory setting is 1.5 turns. If the RPM steadily drops at full throttle or fades on long vertical maneuvers, the engine may be lean and might benefit from adjustment of the high-speed screw, but first read item I - G, below.
- G. **The Low- and High-speed needle valves** were initially set at the factory; they were then readjusted as necessary when we QC-tested the engine at Maxford USA. If you are not a fully experienced gas pilot, even though you may have run glow engines for years, we highly recommend you simply keep the default set up. Only if you consider yourself an experienced gas pilot and are willing to be fully responsible for the result (which may void your warranty), you can try readjusting the Low- and High-speed needles yourself, but first read section III.
- H. **Before you call for service,** study the troubleshooting section in the following pages. If any of the described problems apply, investigate whether a suggested solution solves the problem. Your new Maxford USA Certified CRRC engine comes with a one(1) year Maxford USA Limited Warranty; we also service out-of-warranty CRRC engines. Nevertheless, any time you can resolve an issue by yourself, you will save yourself time, effort and expense. Please be patient: calm yourself and take a break; fully read this document, then re-read it, and you may be surprised to find you can solve most problems by yourself.

II. TROUBLESHOOTING

1. The most common issue is: "I cannot start it" or "It does not run consistently." In that case...
 - 1.1. Make certain all three(3) pins of the sensor cable are connected to the CDI with proper black-to-black, etc. polarity; also be sure all three(3) of the male pins are properly mated with all three(3) female sockets within the connector. Double-check all connections for the CDI's power from your ignition switch and battery.
 - 1.2. Activate the choke, switch ON the ignition, then flip the prop until you hear the engine 'pop.' For your safety, we recommend you use an electric starter. It is normally necessary to choke the engine only for the first start during each day of flying. Once you hear the 'pop,' open the choke and try to start the engine; if you do not get a 'pop' or if fuel runs out the carburetor's velocity tube, the engine might be flooded.
 - 1.3. If the engine is flooded, remove and dry the plug and clear the cylinder of excess fuel.
 - 1.4. If the spark plug becomes fouled, replace the spark plug. See item III - 8.
 - 1.5. Check the idle screw or your throttle servo's position at low-throttle and see if the idle RPM is set too low.
 - 1.6. Check your fuel system: Carefully check the tank's filter, clunk, vent and fuel lines for any blockages, kinks or holes. Make sure the fuel-tank's clunk moves freely and remains positioned to draw fuel.
 - 1.7. Use only fuel that is correctly mixed (24:1 for break-in) and free of moisture (an issue in especially-humid climates and where gasoline contains alcohol).
 - 1.8. If the engine will not start after you have made any adjustments to the Low- or High-speed needle valve, return the needle valve(s) to the factory-default settings of 1.5 turns open.
 - 1.9. Ensure the carburetor's mounting bolts are not loose. Be careful: Over-tightening these bolts can damage the carburetor's spacer.
 - 1.10. Check the voltage of your battery and substitute if possible. The voltage should be 4.8 to 6.0 V.
 - 1.11. If you have a switch or voltage regulator in your installation, remove or bypass them to see if that makes any difference.
 - 1.12. Check the current-draw, not just the voltage from your battery, with the ignition system connected and switched ON. If the current measures much less than 80 mA (0.08 A) or if there is no current flowing at all, you may have a weak, defective or discharged ignition battery, a bad connection, a defective switch, or, at worst, a bad capacitive discharge ignition (CDI) module. A damaged or poorly connected switch or a switch that cannot reliably supply the current required by your ignition system may result in no or improper operation of the ignition system. Use a freshly charged 4-cell NiCd or NiMH battery able to provide at least 4.8 V while it is continuously providing a current of at least 500 mA (0.5 A). A simple check of your ignition-battery's ability to maintain its rated voltage while providing the required current is to temporarily connect a 10 ohm resistor across your battery; then, if your battery's voltage measures less than 4.8 volts with this 10 ohm load, remove the load and replace your battery. The actual current draw of a good CDI with the engine running at 5,000 to 6,000 RPM is approximately 400 mA (0.4 A).
 - 1.13. Check and ensure your spark plug is firmly seated in the cylinder head.
 - 1.14. Check that the spark-plug cap is fully seated onto the spark plug and the metal ring on the spark-plug cap is holding the cap to the base of the spark plug. A spark-plug cap that is not properly connected may spark internally, damaging the spark-plug lead and causing radio frequency interference (RFI) that can cause radio problems.
 - 1.15. You may "test for spark" with the spark plug removed from the cylinder by operating the ignition (moving the magnet under the sensor) with the spark plug properly installed in the high-voltage cap. Make sure the spark plug is pressed fully down inside the cap; a poor connection may damage the high-voltage cap. However, having spark doesn't always mean the plug is good; try switching the plug to see if that makes a difference.

NO GOOD
Arcing will occur inside the cap!

GOOD
The high-voltage lead is securely attached to the tip of the plug and the cap is securely attached to the base of the plug.



- 1.16. A spark-plug lead that is damaged may cause weak or no spark and RFI.
- 1.17. A damaged sensor cable, with its solid-state Hall Effect device and attached cable and connector, or capacitive discharge ignition (CDI) module may be damaged. You might try substituting a known good sensor cable or CDI if available.

Problems:

Solutions:

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| 2. The idle is not steady. | 2.1 The low-speed needle may be too rich. 'Close' clockwise 1/8-turn and try again, but before you decide to attempt any such adjustment, first read section III . Your engine may simply require more 'break-in' time. |
| 3. The engine does not idle reliably, but dies. | 3.1. It may be possible to adjust the idle to 1,500 RPM or less; however, setting the idle to approx. 1,800 to 2,000 RPM will help ensure a more reliable idle and smoother throttle transition. Note: The size and type of your propeller also affects the idle – a larger and heavier prop generally provides a more reliable idle. |
| 4. The engine hesitates when rapidly accelerated; the RPM increases while idling or the engine stops when the throttle is moved from high to low. | 4.1. The low-speed needle may be too lean. 'Open' counterclockwise 1/8-turn and try again, but read section III before you attempt any such adjustment. |
| 5. The engine "stutters" or "coughs" in the midrange or when the throttle is advanced. | 5.1 The low-speed needle may be set too rich. The High-speed needle may also be set too rich. Read section III before you decide to readjust. |
| 6. The engine dies or sags during transition. | 6.1. The Low-speed needle is probably set too lean. Both the Low- and High-speed needle valves can have an effect on the mid-RPM range. Before you decide to readjust, read section III . |
| 7. Engine stops at full throttle, engine hesitates when accelerated rapidly, or cannot reach 6,000 RPM at full throttle with a recommended prop. | 7.1. High-speed needle valve may be set too lean. 'Open' 1/8-turn and try again. Before you decide to readjust, read section III . |
| 8. Engine can no longer reach its full, normal RPM, or the spark plug consistently acquires carbon build-ups. | 8.1. High-speed needle valve may be set too rich. 'Close' 1/8-turn and try again. Before you decide to readjust, read section III . |

III. If you are an experienced gas-engine pilot or are willing to learn, you may use the following additional tips and suggestions. If you are not, contact us and let our professional staff take care of your engine's needs – see section IV for details.

1. Use only a high quality, heavy-duty switch: Maxford USA's 'Heavy Duty DSC Switch with Charge Jack/Futaba connectors.' Small-sized Receiver Switches are not recommended.
2. When connecting the sensor's cable and the battery's cable to the ignition module, make sure that the polarity of the wires is correctly maintained, black-to-black, etc.
3. A damaged spark-plug high-voltage wire is not replaceable and requires the ignition module to be replaced! You may use rubber grommets or plastic "spiral wrap" insulation from an automotive or electronic supply store to protect them from rubbing against fiberglass or sharp edges of wood or metal. Damage to the braided shielding around the high-voltage lead can cause radio interference.
4. We recommend that you use a 4-cell NiCd or NiMH ignition battery; never use a battery with a voltage rating higher than 6 Volts. The output of an unregulated 2S LiPo battery without a voltage regulator will damage the capacitive discharge ignition module (CDI) and void the warranty.

5. We recommend that your ignition battery have a capacity of at least 1,500 mAh. With this size battery the ignition battery will typically last longer than the average receiver battery. If your voltmeter ever registers 4.8 V or less with no load on the battery, do NOT fly until you charge or replace the battery.
6. Keep all ignition components and wiring separated as much as possible from your radio's receiver, receiver battery, servos, and their wiring and switches.
7. Ignition timing is set at the factory and should never require adjustment.
8. You may use a recommended NGK spark plug as a replacement spark plug - see the [Maxford USA Website](#) for details concerning your particular engine. Some other replacement plugs might not properly fit the spark-plug cap, causing poor performance, generating radio-frequency interference and possibly damaging the high-voltage cap.
9. Do not use any silicon components in your fuel system. Gasoline deteriorates silicon and the broken-down bits may get carried into and clog the carburetor.
10. We recommend you use a filter between your tank and carburetor and immediately replace any fuel system parts (fuel lines, filters, tank, etc.) that become damaged, degraded or worn.
11. During break-in we recommend you use a petroleum-based oil such as Lawn Boy Ashless or Pennzoil Air-Cooled 2-stroke oil at a 24:1 ratio with the highest available octane gasoline for the first 2 to 4 gallons. Using a test bench to break in your engine is the best choice; however, it is all right to break it in on an airplane, but do not fly at full throttle and be conservative when by setting a reliable RPM for the idle.
12. The High-speed needle can be set just slightly rich during break-in. However, a too-rich setting may cause problems with excess residue and carbon build-up inside your engine.
13. After break-in, operating the engine overly rich limits power and contributes to performance and reliability issues such as poor transition, excess carbon build-up, fouled spark plugs, excessive exhaust residue, sticking rings, and overall rough running.
14. The engine may be flooded if fuel drips from the carburetor. If this is the case you can remove and dry the spark plug, reinstall or replace the spark plug, then try starting again without using the choke.
15. After the engine "pops" and the choke is opened, position the throttle control to 'idle' or slightly higher. to start the engine.
16. For advanced gas-engine pilots only: Rough running may indicate the engine is too rich; you may slightly adjust the Low-speed needle to optimize for a smooth idle and reliable transition to high throttle. Make sure both needles are correctly adjusted as explained in the Owner's Manual. Due to changes in air pressure and air flow in the cowl when the plane is flying, the needles may benefit from being fine-tuned to optimize in-flight performance. If you decide to adjust the Low- and/or High-speed needle valves to accommodate differences in air density and airflow inside the cowl or when you move the engine from one plane to another, such adjustments may take repeated cycles of ground adjustments followed by flight tests.

IV. Engine Service Policy:

Your new Maxford USA Certified CRRC engine comes with a one year limited warranty. Most in-warranty services are performed at Maxford USA's office in Paramount, California. We also service CRRC engines that are out of warranty. If your CRRC engine has not been certified by Maxford USA, you need to follow the manufacturer's warranty policy or we will treat your engine as out-of-warranty.

The Maxford USA Limited Warranty service covers all reasonable parts and labor costs for repair. The customer is responsible for the cost of shipping and insurance to us. Maxford USA is responsible for shipping the engine back to you. You must contact us to get a return-merchandise authorization number (RMA#) before you send us your engine for our evaluation. The RMA# must be shown on the shipping box. Any engine sent without an RMA# will be refused and returned to you at your cost.

The Maxford USA Limited Warranty for CRRC engines extends only to the original consumer purchaser and does not cover: Damage caused by crash, abuse, misuse, alteration, or accident; improper handling, operation, maintenance, modifications, fuel or any damage caused by customer's effort at disassembly or the customer's installation and use of any parts or accessories (spark plug, prop, etc.); any modification to or disassembly of the engine or its ignition system or any use of the engine for a purpose for which it is not specifically intended will automatically void the warranty; if the engine is involved in any accident or if you attempt to disassemble and/or repair the engine yourself, the warranty will also be considered void.

Out of warranty service: The customer is responsible for the shipping and insurance costs to us and back to you. The cost for the engine's incoming and initial inspection will be \$40. Inspection may take 2 to 5 days, then we will provide you, the owner of the engine, with a report of our findings and a price quote for repair. You may then decide if you want us to proceed with the repair. When completed, the repair invoice will be charged for parts and labor. The repair will have a 30-day warranty. However, if you decide to decline our estimated cost for the repair, your engine will be shipped back to you at your cost.

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REMINDER:

AN IMPORTANT NOTICE TO OUR GAS ENGINE CUSTOMERS ...

THIS PRODUCT IS NOT A TOY!

Because of its performance capabilities, this product, if not operated carefully and correctly, could cause injury to you or spectators and damage to property. Maxford USA performs a quality-control inspection on all new Maxford USA Certified CRRC engines that we sell; we also quality-control check every engine serviced by us. Nevertheless, the capabilities of your finished model airplane depend on how you assemble it and your safety depends on how you use, maintain and fly it. Any running or testing of this engine and any operation of a model airplane with this engine is done entirely at your own risk.

In purchasing your Maxford USA Certified CRRC engine or authorizing Maxford USA to service your CRRC engine, you, the buyer or user of this product, exempt, waive, and relieve Maxford USA from all current or future liability for any personal injury, property damage, or wrongful death, and if you, the buyer or user of this product, are involved in any claim or suit, you will not sue Maxford USA or any of its representatives.

