Thank you for purchasing this Team Associated engine. This manual contains the instructions needed to operate and maintain your new engine. Please read this manual completely to obtain maximum performance and reliability from your new Team Associated engine. Pay special attention to the break-in instructions outlined in this manual. The engine must be broken in to achieve maximum performance. Follow the directions in this manual exactly.

**Required Equipment**

- Glow plug starter
- Model car fuel
- Fuel bottle
- Small Phillips head and flat head screwdriver
- Spare glow plugs
- Foam prefilter oil treatment
- 5/16 nut driver or a glow plug wrench

Model Car Fuel
The proper fuel is very important for long engine life. Improper fuel can cause hard starting, poor performance, and excessive wear of the components of the engine.

- 1. The fuel must contain both castor and synthetic oils.
- 2. You should try to keep the nitro (nitromethane) content between 10% to 20%.
- IMPORTANT: DO NOT use any type of airplane fuels. Airplane fuels may not have the necessary oil types and ratios needed for R/C cars.

Fuel Bottle
For conveniently filling the tank, use a smaller bottle with a dispensing tube and cap to prevent the fuel from evaporating or getting contaminated.

Glow Plug
We recommend using the #MC59 McCoy or the #0099 O’Donnell glow plugs.

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**How to set the carburetor and start the engine**

**BEFORE STARTING THE ENGINE**

The first start-up of your engine is the most critical moment of the engine’s life, dictating how it will perform from this time forward.

**Step 1 Oiling the filter.**

The air filter is essential for keeping dirt out of the engine. The air filter must be oiled before running the engine. We recommend using Associated #7110 foam pre-filter treatment. Dip the treatment all around the filter, put the filter in a plastic bag and knead it until the filter is saturated, but not soaked. Never run your vehicle without the air filter.

**Step 2 Setting the high-speed mixture.**

The high-speed mixture screw controls how much fuel enters the engine during mid- to high-speed operation. Screw the high-speed mixture screw clockwise, until it bottoms out. DO NOT over tighten. Now turn the mixture screw counter-clockwise 2 3/4 turns.

**Step 3 Setting the low speed.**

The low speed mixture screw controls how much fuel enters the engine at idle. Screw the low speed mixture screw counter-clockwise 1 1/4 turns.

**Step 4 Setting the idle speed.**

The idle screw is used to control the idle speed. Turn the idle screw clockwise to increase idle speed, and counterclockwise to decrease idle speed. A good idle speed is when the engine runs smoothly and consistently, with no hesitation or surging.

**Step 5 Setting fuel in the fuel tank.**

Squeeze the fuel bottle, put the bottle’s tube into your fuel container, and draw out some fuel. Lift the lid on the fuel tank, and slowly squeeze the fuel bottle until the tank is full. Be careful here. If you overflow the tank it might get on your radio gear or on your brakes and may cause an unsafe driving situation. Always keep your fuel bottle closed when not in use.

**HOW TO START THE ENGINE**

**Step 1 To STOP the engine, pinch and hold the carburetor's fuel line while running at idle speed. DO NOT shut off the engine by placing your finger over the exhaust pipe. Another way is to push a piece of wood (or plastic handle of a tool) firmly against the flywheel underneath the vehicle.**

**Step 2 Turn on your radio system and attach a glow starter to the glow plug.**

**Step 3 Start the engine with your put putter (4.60) or ProStart Starting Pistol (RC8 RTR).**

For pull start engines, note the following tips: Never put the rope out to its full length; doing so can cause damage and the rope may not retract. Quick, short pulls of the pull start rope are the best technique to use with a pull starter. DO NOT extend the rope more than 12” (305 mm).

Do not abruptly release the handle. Allow the cord to unwind smoothly while still holding the handle. Pull the operating handle straight out when starting the engine, so that the cord does not rub against the vehicle’s body or engine. This will help prevent the cord from being damaged or engine head. To avoid spilling fuel over the starter unit and its cord, some fuels have a damaging effect on these parts.

If the pull starter is very hard to pull (it will not extend out of the pull starter assembly), the engine may be fuel-locked. Excessive fuel between the head and the piston will not let the piston move through its proper range of motion. To fix, loosen the glow plug one turn and try to start the engine. If the engine starts, tighten the glow plug with the glow plug starter while the engine is running.

For ProStart engines, slide the starter shaft through the back of your RC8 and into the hex starter on the back of the engine. Pull the trigger on the ProStart Starting Pistol to start the engine.

If the engine still will not start, there could be a problem with the glow plug, glow starter or the engine could be flooded. Refer to the trouble-shooting guide later in this manual.
3 Breaking in your engine for the first time

Read this before you drive
The key to breaking in your engine is patience. During the break-in period, your engine may appear to malfunction such as stalling, inconsistent performance, and fouling out glow plugs. Don't give up. These are just a few things you may go through during the break-in period. Just keep it running, apply the throttle on and off as smoothly as you can. Suddenly bursts or quick releases of the throttle can stall your engine. Soon after break in you will also feel the new engine running a little rough.

During break in, use the fuel with the same percentage of nitro which you plan to run every day. The performance level of your engine will be limited by the 'rich' fuel mixture which you will use during the break-in process. Once the engine is fully broken in the mixture can be 'leaned out', and speed and acceleration will increase. Because of the rich fuel mixture and the wearing of the new parts, deposits will form on the glow plug causing it to fail. Expect to replace the glow plug during the break-in period, and definitely when the engine is fully broken in and the fuel mixture is leaned out.

Understanding the engine terms 'rich' and 'lean'
Your carburetor has screws that regulate how much air and fuel enter the engine together, the air/fuel mixture. A rich/fuel mixture that is too 'rich' means there is too much fuel, and a mixture that is too 'lean' means that there is not enough fuel for the given amount of air.

- When the mixture is too rich, performance will be sluggish (one symptom of this is excessive amount of smoke from the exhaust). There is also a potential to foul the glow plugs when the mixture is too rich.
- When the mixture is too lean, there is not enough fuel to cool or lubricate the internal engine components, and damage to the engine and/or glow plug is almost certain.

The high-speed mixture screw clockwise to lean the mixture. This decreases fuel flow for given amount of air. Turn counter-clockwise to richen the mixture and increase the amount of fuel to be mixed with the air.

Caution: If, while you are driving, the engine stalls because of an overheating condition, severe damage may have already occurred. Overheating is caused by the following conditions:
- Fuel mixture is set too lean.
- Air leaks around carb.
- No air filter.
- Loss of muffler pressure (the tips fall off).
- Excessive nitro content in the fuel.
- Incorrect oil content in the fuel.
- Poor quality of fuel.
- Contaminated fuel.
- Excessive loads on the engine (bound up drive train)

Your engine will be short-lived if any of the above conditions are allowed to exist for any length of time.

- During tanks one to four watch closely for any signs of overheating. These will include: Steam or smoke coming from the engine surfaces
- Cleaning out and then logging during high-speed acceleration, as if it is running out of fuel.
- Popping or clattering sound when slowing down.
- Idle speed will surge or possibly diminish to the point of stalling.

To Test For Overheating:
It's important to check the head temperature during the operation of the engine. The best method for checking the head temperature is to use a head temperature gauge. There are several head temperature gauges available, and the temperature readings between these different brands of gauges vary. Due to this variance, the temperature readings will range between approximately 220 degrees and 260 degrees. If you don't have access to a head temperature gauge, you can use water to check the head temperature. Place a drop of water on top of the cylinder head. If it sizzles away immediately, shut down your engine. It takes approximately 3-5 seconds for the water drop to boil away, then the engine is running within a normal temperature range.

The First Two Tanks of Fuel
Step 1
The high-speed and low-speed mixture screws should already be set as they were described to you earlier in this manual. Part 2, Step 3, "Setting the high-speed mixture", and Part 2, Step 4, "Setting the low-speed".

However, for break in procedures, the engine should run richer than these settings.

Turn the high-speed mixture screw counter-clockwise 1/4 turn from the position you set it to run it richer. (SET GT truck engines come preset for standard setting.)

Step 2
Start your engine. Once the engine is started, ease in and out of the throttle slowly to warm the engine. If the engine keeps stalling when accelerating, then richen the high-speed mixture screw 1/8 of a turn counter-clockwise.

The idle speed should be set as fast as possible without causing the vehicle to move. If necessary, adjust the idle screw as described to you earlier in Part 2, Step 5, "Setting the idle speed".

Step 3
The standard setting of the high-speed mixture screw will vary slightly with each engine. To know if your engine is set correctly you will find the following performance characteristics (on a warmed up engine):
- The engine will accelerate sluggishness from a standing start and may even try to quit if the throttle is applied too quickly.
- Blue-white smoke will be coming from the exhaust.
- When the car is accelerating at full throttle, the engine will never "Clean Out". When an engine cleans out, the speed and the rpm's will increase suddenly and dramatically, as if the engine has switched to second gear. Also, the amount of smoke that comes from the exhaust will decrease.
- Cleaning Out is a desirable characteristic once the engine is fully broken in.

As the engine reaches normal operating temperature, it will speed up and performance will increase. This occurs because the fuel mixture becomes leaner with the increased temperature. You will need to enrich the fuel mixture about 1/16 of a turn or more so that the engine continues to run as described above.

Step 4
When the flat tank is almost gone, bring the car in and shut off the engine. Allow the engine to cool for 10 to 15 minutes before starting the engine up again.
- Add more fuel. Start it back up and run the second tank of fuel. Again allow the engine to cool before starting it up again.

Tanks Three – Four
Step 5
Turn the high-speed mixture screw clockwise (leaner) 1/8 of a turn and run it through the third tank of fuel. Repeat this step for the fourth tank of fuel. This completes the engine break-in procedure. Now go on to Part 4, Tuning.

4 Tuning your engine’s performance

TUNING THE ENGINE FOR MAX POWER:

Sometime between the fourth and the sixth tank of fuel, the inner engine parts should be settled and broken in. You can then begin adjusting the fuel mixture to maximize performance for your driving needs.

As you continue to lean the fuel mixture, the engine will run faster up to a point. When the engine is set too lean, it will seem to run strong at first, but will bog, hesitate, or stall when running at high speed. The engine will also rapidly overheat when the setting is too lean.

This is because fuel includes lubrication, and that lubrication is inadequate when the setting is too lean.

CHECK THE ENGINE TEMPERATURE AS YOU LEAN THE MIXTURE, DO NOT LET THE ENGINE OVERHEAT. You should always see smoke coming from the exhaust.

At the optimum setting, the engine will clean out, have a strong-sounding, high-pitched white at full speed; and there will be a thin trail of white smoke coming from the exhaust. It is always better to set the engine a little rich rather than too lean. Find an area with a long straight-away so you can allow the engine to run at full speeds. Run your car two or three full throttle and note its performance. Turn the high-speed mixture screw clockwise 1/8 of a turn and retest your car, again noting the vehicle's performance. Continue to lean the mixture and retest the vehicle until the highest speed is achieved. At that point, turn the high-speed screw counterclockwise 1/4 of a turn and operate the car at medium speeds for 1 to 2 minutes to allow the engine to cool. Then, continue testing.

TUNING FOR LOW-SPEED PERFORMANCE

The low-speed mixture affects how the engine will perform in the low to mid range rpms. Tuning the low-speed needle clockwise will lean the mixture. As with the high-speed mixture, leaning the low-speed mixture increases performance. Again, if the mixture here is set too lean, the engine may be starved for lubrication in the low and mid-rpm ranges, thus causing overheating and excessive engine wear.

Perform the following test to determine if the low speed mixture is set correctly.

With the engine warm and running, allow it to idle for approximately 15 seconds. Now quickly apply throttle and note the performance.

If the engine bogs, accelerates erratically, and a large puff of blue smoke emitted, then the low speed mixture is too lean. Turn the low-speed screw clockwise 1/8 of a turn. Adjust the mixture screws in 1/8 of a turn increments, wait 15 seconds, and retest after each change. Adjust for the best acceleration without the car stalling.
5 Care and maintenance

CARE AND MAINTENANCE
When you are finished racing for the day, drain the fuel tank. Afterwards, energize the glow plug with your glow plug starter and try to restart the engine in order to burn off any fuel that may remain inside the engine. Repeat this procedure until the engine fails to fire. Try to eject residue while the engine is still warm.

Finally, inject some corrosion inhibiting oil, and rotate the engine to distribute the oil to all the working parts. Do not, however, inject the oil into the carburetor, for it may cause the O-rings inside to deteriorate.
When cleaning the exterior of the engine, use Nil-o-Clean. Do not use gasoline or any solvents that might damage the silicone fuel tubing.

Cleaning the air filter
When the air filter starts to get dirty, do the following steps.
Step 1
Clean the dish soap & water. When it looks cleaner, dry the filter with a towel and let the filter dry completely before oiling.
Step 2
Apply Associated's #7710 Foam Pre-Filter Treatment to help keep the dirt out. Dab a small amount of treatment all around the filter, put the filter in a plastic sandwich bag, and leave it until the filter is saturated, but not soaked.

6 Troubleshooting your engine

Glow Plug Problems
The glow plug in your engine is an inexpensive consumable item which must be replaced periodically to maintain peak performance and starting ease. Most often, any starting problems or erratic performance can be traced back to the glow plug. The glow plug should also be checked if the engines acceleration and top speed performance suddenly becomes flat.
The only sure way to test for a faulty glow plug is simply install a new one to see if the problem goes away. Remove the plug from the cylinder head with a 5/16" nut driver. Make sure there is no dirt or debris on top of the head which could fall into the engine. Do not lose the copper gasket which seals the glow plug. Touch the glow plug to the contacts of the glow plug starter. All of the coils should glow white. Sometimes the first few coils will not glow while the rest are bright, most likely indicating a bad plug. If the glow is dim orange, then the glow starter battery should be replaced or recharged.

Fuel Mixture
The fuel mixture is the largest variable you have to control while operating your engine. Fuel brand, ambient temperature, and humidity all effect how your mixture should be set. If the engine runs great one day but runs rich or lean the next day, it is probably the result of a change in the air quality and temperature. This should be expected and adjusted for.

Cooling Problems
Engine overheating is most often caused by running the engine too lean or because the cooling air for the cylinder head is blocked. If the mixture is too lean, simply allow the engine to cool, richen the mixture and try it again. Bodies must have holes cut in them to allow for cooling air to circulate over the surface of the cylinder head. On most bodies, it is a good idea to cut part of the windshield out and part of the back window to allow for additional cooling.

Floodig
You may accidentally flood the engine at some time sometimes caused by squeezing the primer bulb to many times. Symptoms of a flooded engine include difficulty starting and muffled sounds coming from the exhaust. Remove the glow plug with a 5/16" nut driver and then remove the air filter. Turn the engine upside down to drain any excess fuel out of the combustion chamber and carburetor. Turn the vehicle back over and install the glow plug. The engine should start and run normally.

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<th>Troubleshooting Chart</th>
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<td>Engine stalls while driving around turns</td>
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