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

**Glow Plug Starter**
The glow plug starter is a battery powered device used to heat up the glow plug so the motor will start up. Once the motor starts, the glow plug starter will be removed.

## 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 foam filter must be oiled before running the engine. We recommend using Associated #7710 foam pre-filter treatment. Dab 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 1/4 turn.

**Step 3 Setting the low speed.**
This screw meters the fuel at low speeds. The low-speed mixture screw is located in the end of the carburetor, inside the throttle arm. This screw controls how much fuel enters the engine at idle and low throttle. This adjustment will smooth the idle and improve the acceleration to mid speed. Make this adjustment with the throttle closed, after setting the idle. Turn the screw clockwise gently until it bottoms out. Do NOT over tighten. Now turn the low-speed mixture screw counter-clockwise 6 1/2 turns.

**Step 4 Setting the idle speed.**
The idle screw regulates the throttle opening to control the idle speed. The throttle opening at idle should be set as shown in the picture below. Turn the screw until the throttle opening inside the throttle valve is 0.020” (.5mm). The idle speed may need to be re-adjusted after the engine is warm.

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.

There are many racing fuels available, however they must meet some requirements:
- The fuel must contain both castor and synthetic oils.
- You should try to keep the nitro (nitromethane) content between 20% to 30%.

IMPORTANT: DO NOT use any type of airplane fuels. Airplane fuels may not have the necessary of 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 ODOPF O'Donnell glow plugs.

**Step 5 Putting fuel in the fuel tank.**
Squeeze the fuel bottle, put the bottle's tube into your fuel container, and draw out some fuel. Lift up 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 you may create 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 pull starter (4.60) or ProStart Starting Pistol (RC8 RTR).

For ProStart engines, slide the starter shaft through the back of your MG78.0 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.
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 be malfunctioning with problems 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, sudden bursts or quick releases of the throttle can stall your engine. Soon after break-in your patience will pay off with a well running engine.

During break-in, use the fuel with the same percentage of nitro which you plan to run every day. The performance level of the engine will be limited by the "rich" fuel mixture which you will use all 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 to form the fuel mixture. A rich 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 plug in the engine, and the nitro will be "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.

Turn 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 too lean.
- Air leak around carbs.
- No air filter.
- Loss of muffler pressure (line falls 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 lagging during high-speed acceleration, as if it is running out of fuel.
  - Popping or crackling 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 richer. (RTR 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 standards for the high-speed mixture setting 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 sluggishly 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 rmp's will increase suddenly and dramatically, as if the engine has a switch 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 is becoming leaner with the increased temperature. You will need to richen 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 first tank is almost gone, bring the car in and shut off the engine. Allow the engine to cool for 8 to 10 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:

Sometimes the fourth and fifth tank of fuel, the inner engine parts should be settled and broken in. You can then begin adjusting the fuel mixture to maximum performance for your driving needs. As you continue to lean the fuel mixture, the engine will run faster 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 O F TEN 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 whine 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 richer, rather than too lean.

Find an area with a long straight-away so you can allow the engine to run at full speed. Run your car two or three at full throttle and note its performance. Turn the high-speed mixture screw clockwise 1/8 of a turn and test your car, again noting the vehicle's performance. Continue to lean the mixture until the vehicle until the highest speed is achieved. At that point, turn the mixture screw counter-clockwise 1/16 of a turn. This is the optimum setting that the engine should be set to run at.

If the engine stalls on acceleration, begins to bog or slow down at full throttle, or if there is a reduction in exhaust smoke, then the engine is running too lean. Immediately turn the high-speed mixture screw counter-clockwise 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-rpms 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 emits, then the low speed mixture is too rich. Turn the low-speed screw clockwise 1/8 of a turn. If the engine speeds up for a moment then bogs, hesitates, or stalls, then the low speed mixture is too lean. Turn the screw counter-clockwise 1/8 of a turn. Adjust the mixture screws in 1/16 of a turn increments, wait 15 seconds, and test 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 compression 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.

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 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.

Glow Plug Problems
The glow plug in your engine is an expensive 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 engine's 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 the head that 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.

Flooding
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 muffling 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.

6 Troubleshooting your engine

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, then adjust 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.

Troubleshooting Chart

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<th>Problem</th>
<th>Solution</th>
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<td></td>
<td>Engine is overheated</td>
<td>Allow engine to cool, richen fuel mixture, check air flow</td>
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<td>Carburetor dirty or blocked</td>
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<td></td>
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<tr>
<td></td>
<td>Engine over geared for application</td>
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<td>Find the bound item and repair</td>
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<td>Low-speed mixture too lean</td>
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<td></td>
<td>Idle speed set too low</td>
<td>Increase idle speed</td>
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