

Starting & Tuning the New TRX2.5 Engine

*By Steve Slayden**



Now that the amazing new T-Maxx 2.5 truck has been released and is in the hands of many excited and enthusiastic owners, I thought it was time to give some important tips on starting, breaking-in and tuning this hot little monster for maximum performance. This piece will be useful for anyone who has just purchased a new T-Maxx 2.5 and also those of you who are looking into getting one of your own. Some of the tips may even be helpful to some of you T-Maxx veterans out there as well, so grab your gear and let's get started.

Tools and Accessories:

As with all Traxxas RTR vehicles the T-Maxx comes pre-assembled with radio gear already installed. The instruction packet included in the box contains some important tools and accessories that can be used to perform minor maintenance tasks and repairs. Basic hand tools such as screwdrivers, pliers,

wire cutters, etc. will be necessary to perform major disassembly of the truck. There will also be some accessory items needed to keep your truck up and running. I'll run down a list of important and handy items that will make working on and tuning your new Maxx a much more pleasurable experience. Some of the tools listed below are not absolutely necessary but will make tuning quicker and easier. I've listed only the tools that would be useful for this particular segment. There are other items that will be handy for future articles on tuning and maintaining the truck.

Tools



1. Small flat tip model engine-tuning screwdriver
2. #1 Phillips screwdriver
3. Medium size wire cutters
4. Medium size needle nose pliers

Accessories



1. Spare glow plugs (#3231)
2. CA glue (for tires)
3. Fuel 10%- 20% (Traxxas Top fuel recommended)
4. Fuel bottle

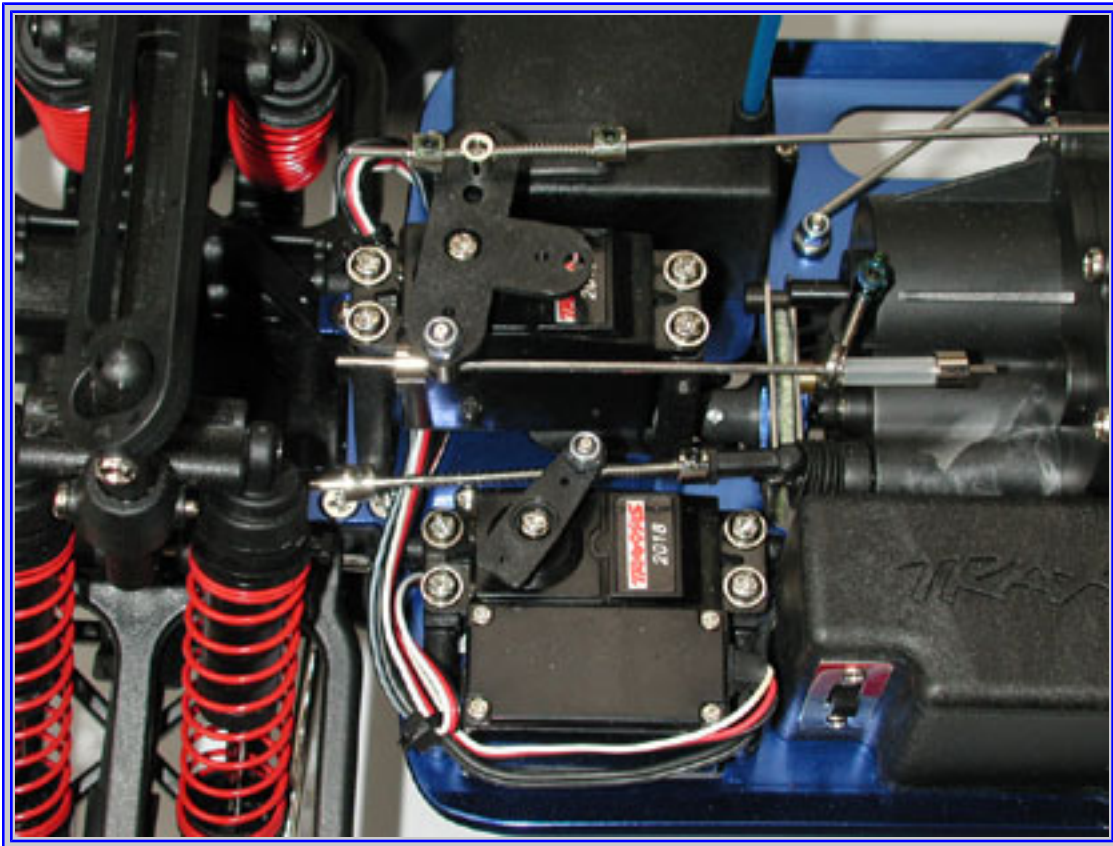
Chassis / Radio System Pre-Check:

After pulling your T-Maxx out of the box and reading through the instructions it's a good thing to run a quick check over the chassis and radio gear to make sure that everything is functional and in order. You all do read the instructions don't you? You know the book with all of the pretty pictures and diagrams in it? I thoroughly recommend reading it carefully.

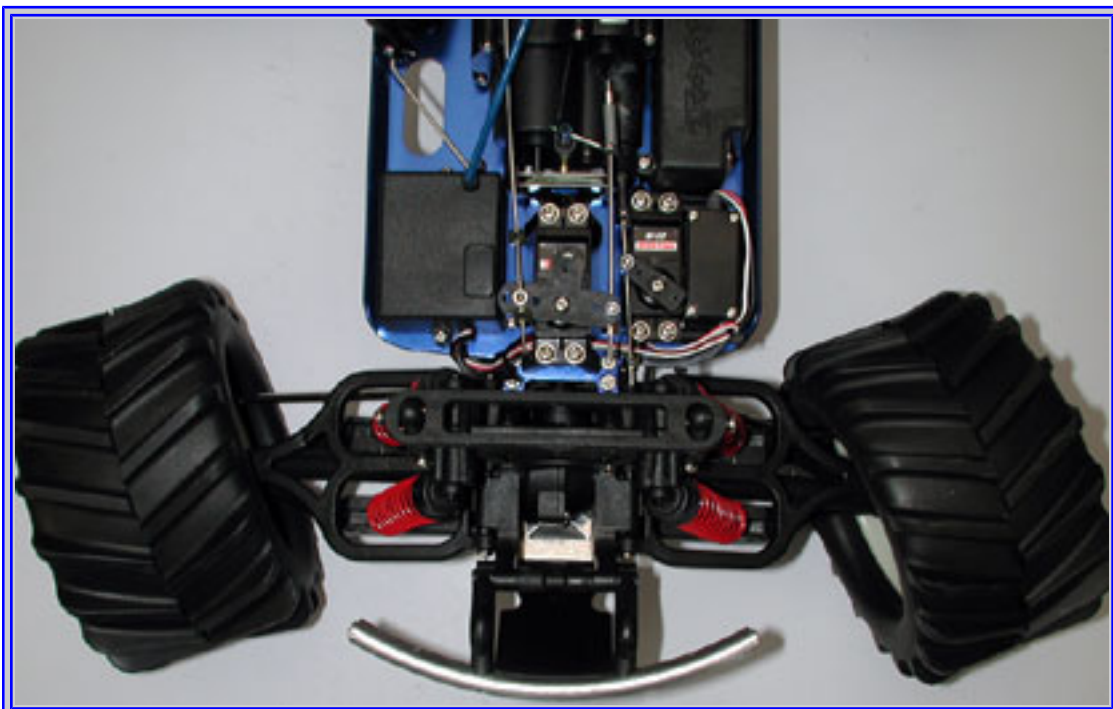


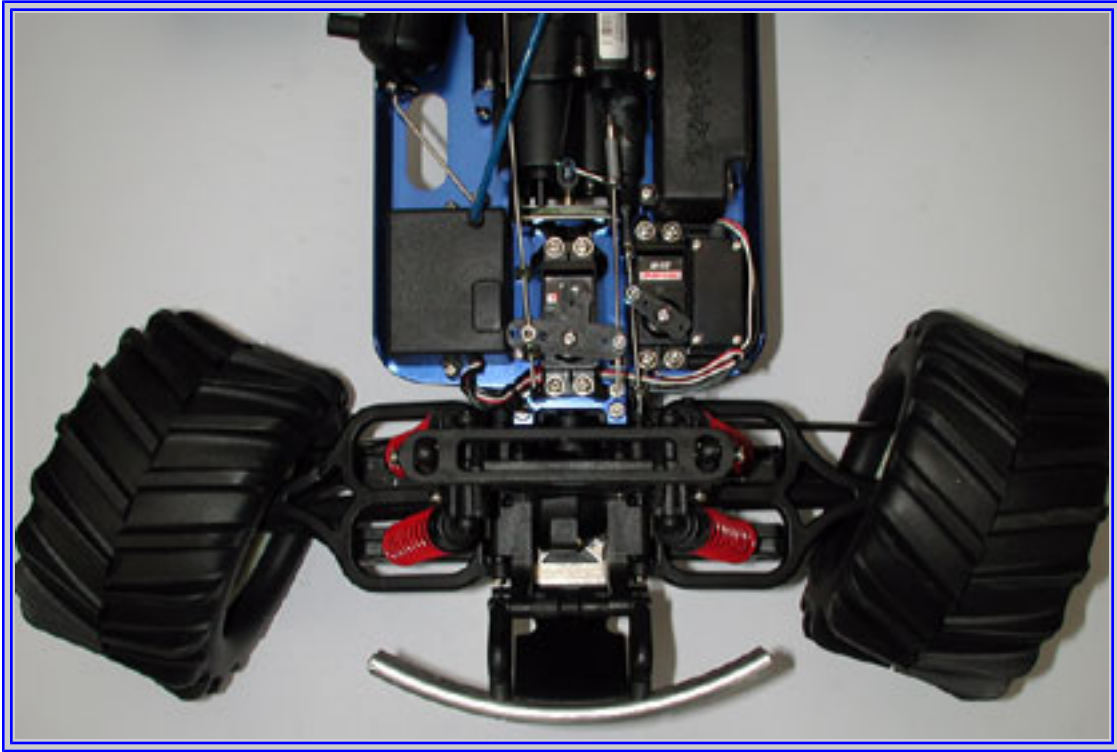
It's packed with some very important and interesting stuff. The T-Maxx instruction manual is the best manual that I have personally ever read in an RC vehicle kit. If you follow the directions that are written in its pages, it might just be the difference between having countless hours of fun with your new monster truck or pulling your hair out one strand at a time. Nobody really likes the latter, no matter what they tell you, so let's read the manual.

After gluing the tires and installing the radio system batteries, the next step is to perform a radio systems check. Checking the radio system is the first thing that I'll cover and is probably the most important. A malfunctioning radio system can potentially cause more damage than any other component on the vehicle due to a runaway crash. It is very important to perform a radio system check every time that you plan on running the truck. Make sure that all three servos have full range of motion and are not glitching or binding in any manner.

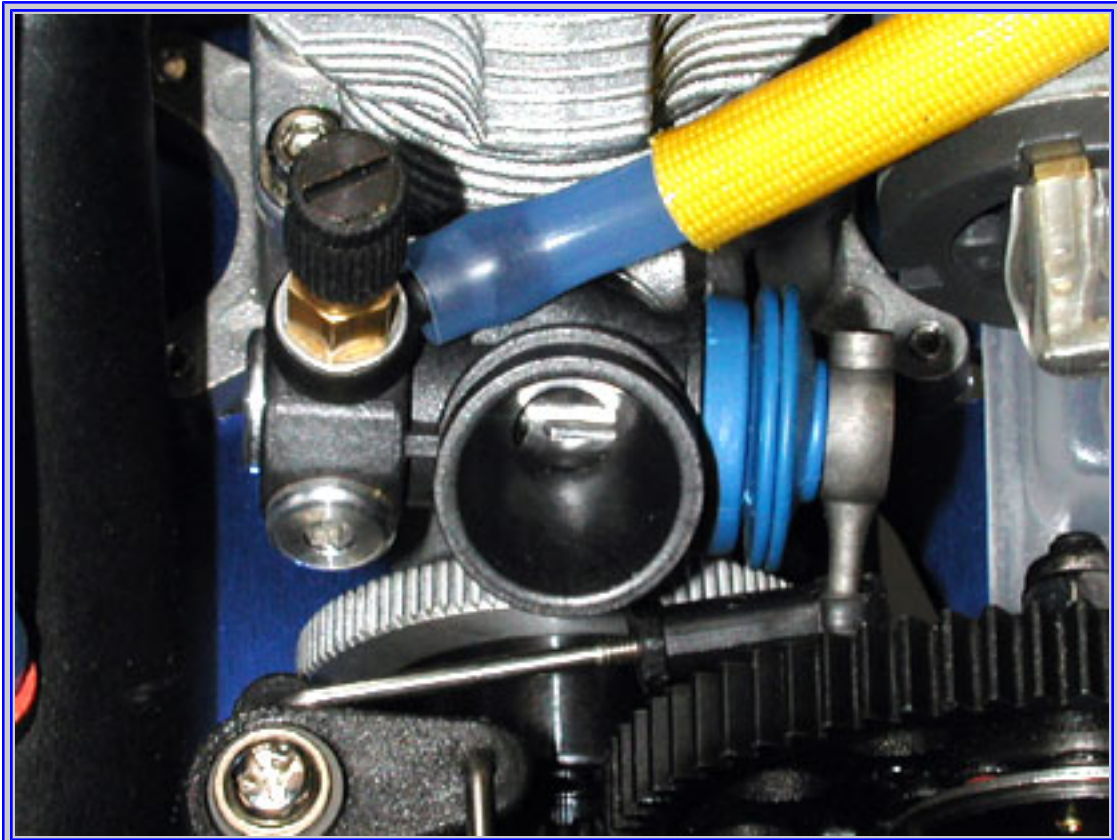


Note that the front of the truck should be lifted up to get full steering range due to the zero-scrub steering design. This design utilizes the centrifugal force of the wheels to help steer the truck. When the truck is rolling the steering has no problem going from lock to lock.





Next, make sure that the slide valve in the carburetor is returning all the way back to the preset idle position and that it is operating smoothly.

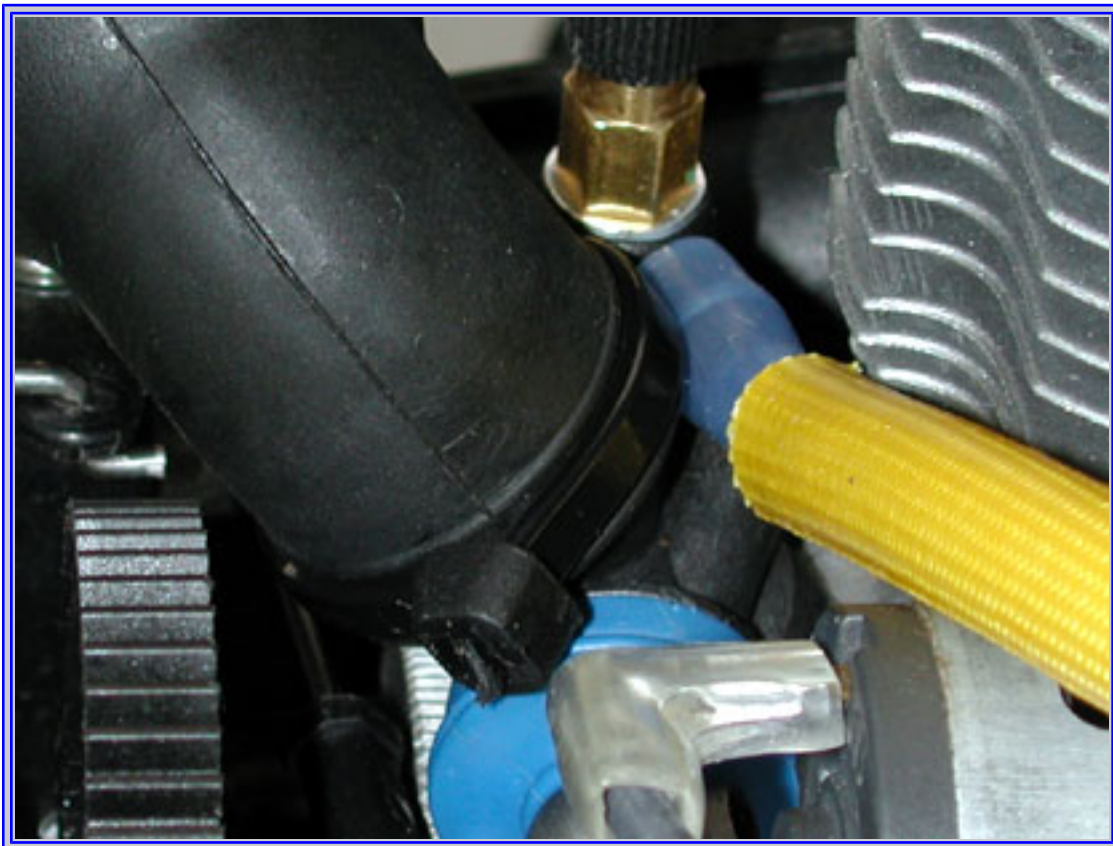


After checking the servo functions, perform a range check with a friend. Make sure that there are new batteries in the radio system and that the antenna mast is fully extended. Turn both the truck and the transmitter switches on. Now, have a friend walk away with either the truck or the transmitter to the farthest distance that you plan on operating the truck and operate all radio functions. All three channels should work fine. If there is a range problem or the system is glitching do not proceed to operate the truck until the problem is diagnosed and corrected.

There are many things that can cause radio interference outdoors like power lines, large outdoor antennas and CB radios. If you are trying to run indoors things such as metal beams, fluorescent lamps and computer monitors can cause interference. Before you think that the radio system is faulty, try another location and see if the problem clears up.

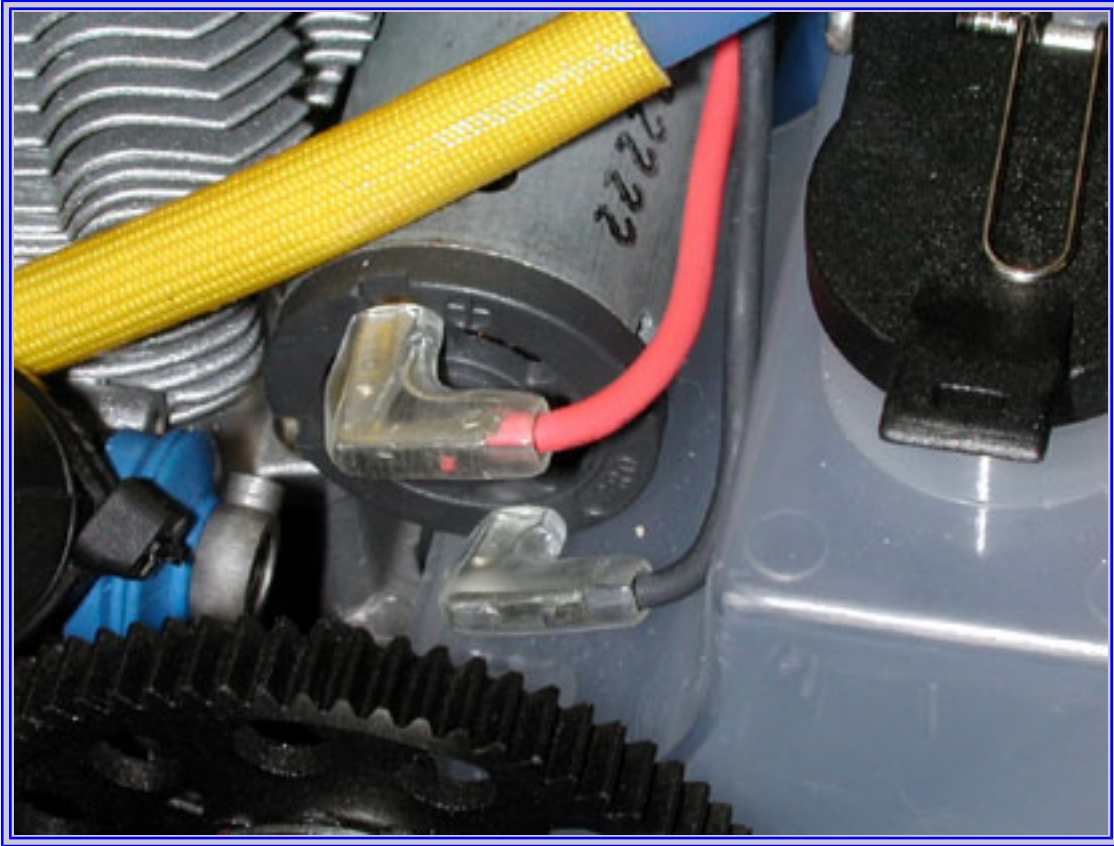
After checking the radio system functions there are a few things to check over before firing up the engine for break-in. Here's a quick checklist:

- Make sure that there is a zip-tie around the base of the airfilter. This will keep the airfilter secured to the carburetor. It is very important that the airfilter stays on the carburetor anytime that the engine is running. Running the engine without an airfilter can and will cause severe damage to the piston and sleeve ruining the performance of the engine.

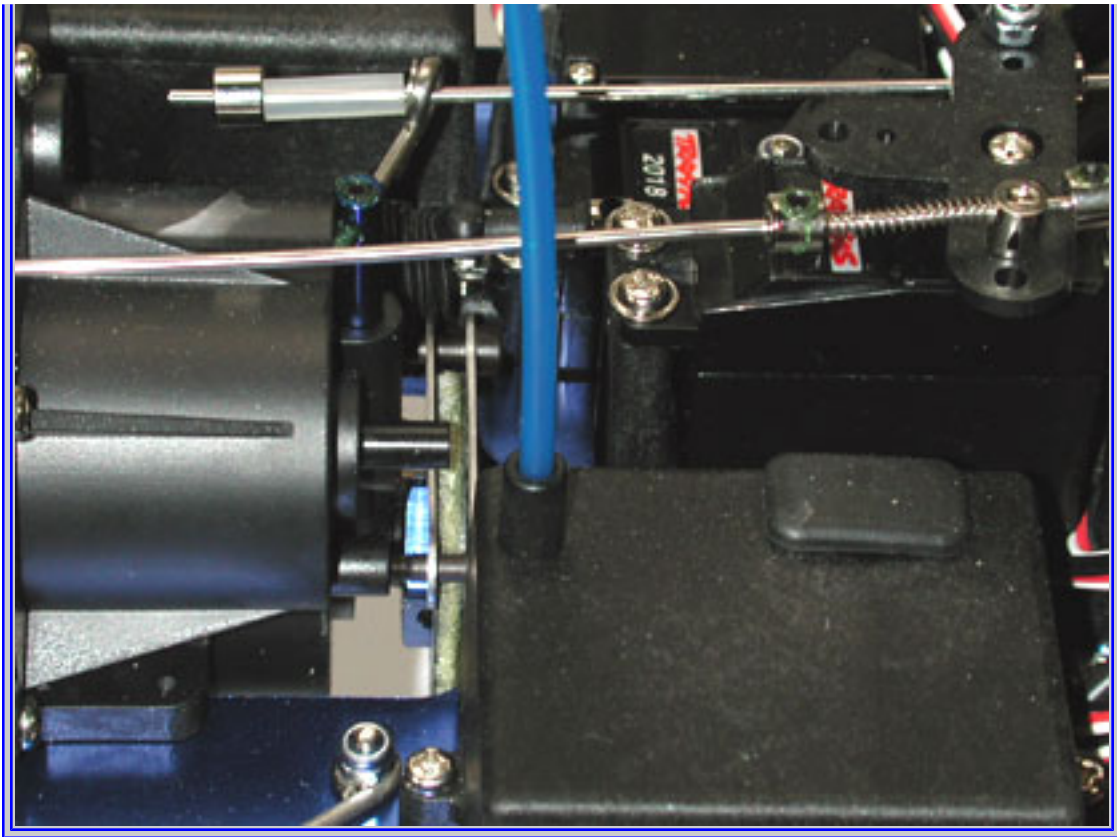


- Check the connections on the EZ-Start. Make sure that the positive and negative wires are

connected to the proper terminals and are secured to the electric EZ-Start motor. Also check the connection between the blue glow plug wire and the glow plug. The wire should be snug on the glow plug and then inserted inside the protective slot of the head protector. ez connection



- Make sure that you use the antenna tube and install it in the molded post on the receiver cover. Do not leave the antenna wire coiled up under the body or wrapped around the body mount. This will shorten the range of the radio system tremendously, which can lead to a runaway.

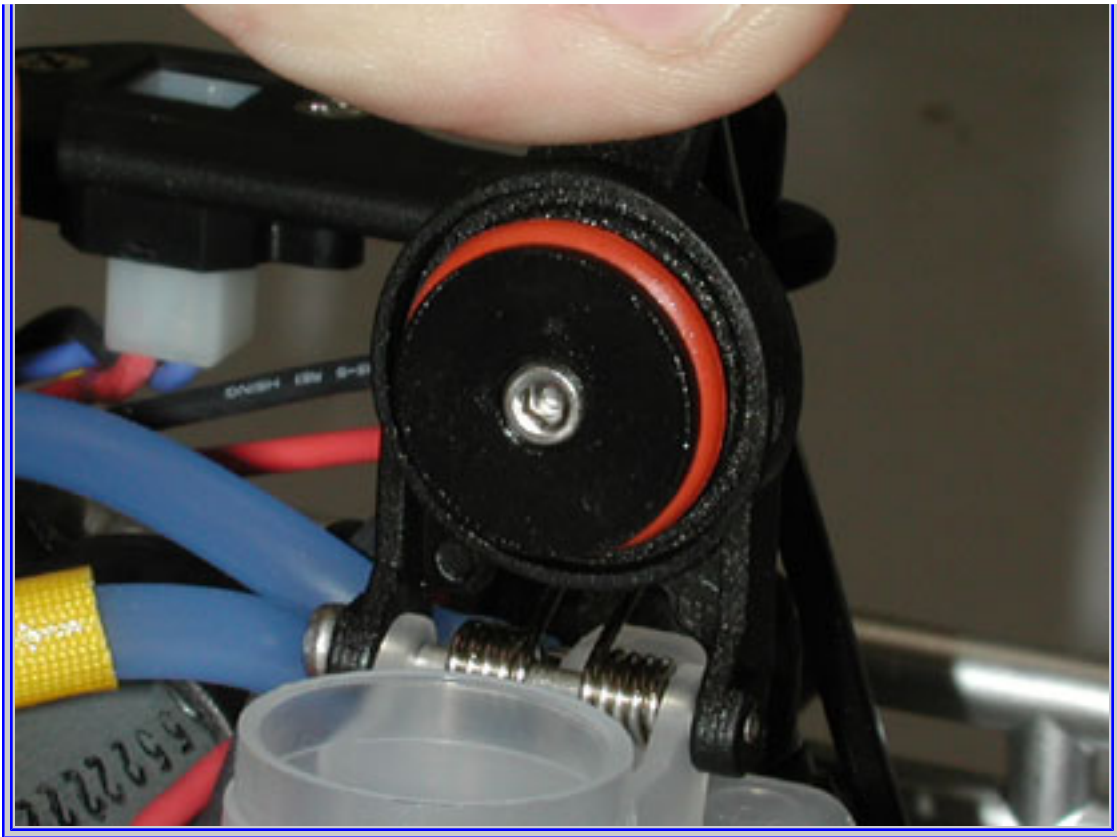


- Here's a handy tip, slide a zip-tie through the slot at the end of the fuel tank lid so that the long end of the zip-tie is pointing upward. This will act as a handle so that re-fueling the truck with the body on is much easier.



- The last thing that we'll check before heading out to break-in the engine is the seal between the fuel cap and the tank. This is adjustable with a 2.5 hex wrench. Your lid may not need adjustment, but it's a good thing to check anyway. The orange o-ring that seals the tank should fit snugly into the filler neck of the tank.

It should also fit all the way down into the filler neck. If the cap closes very easily without any tension between the o-ring and the filler neck, then the o-ring is set too loose. Turn the adjustment screw clockwise to tighten. This will spread out the o-ring providing a tighter fit. The opposite is needed if the cap will not retract all the way back into the filler neck.

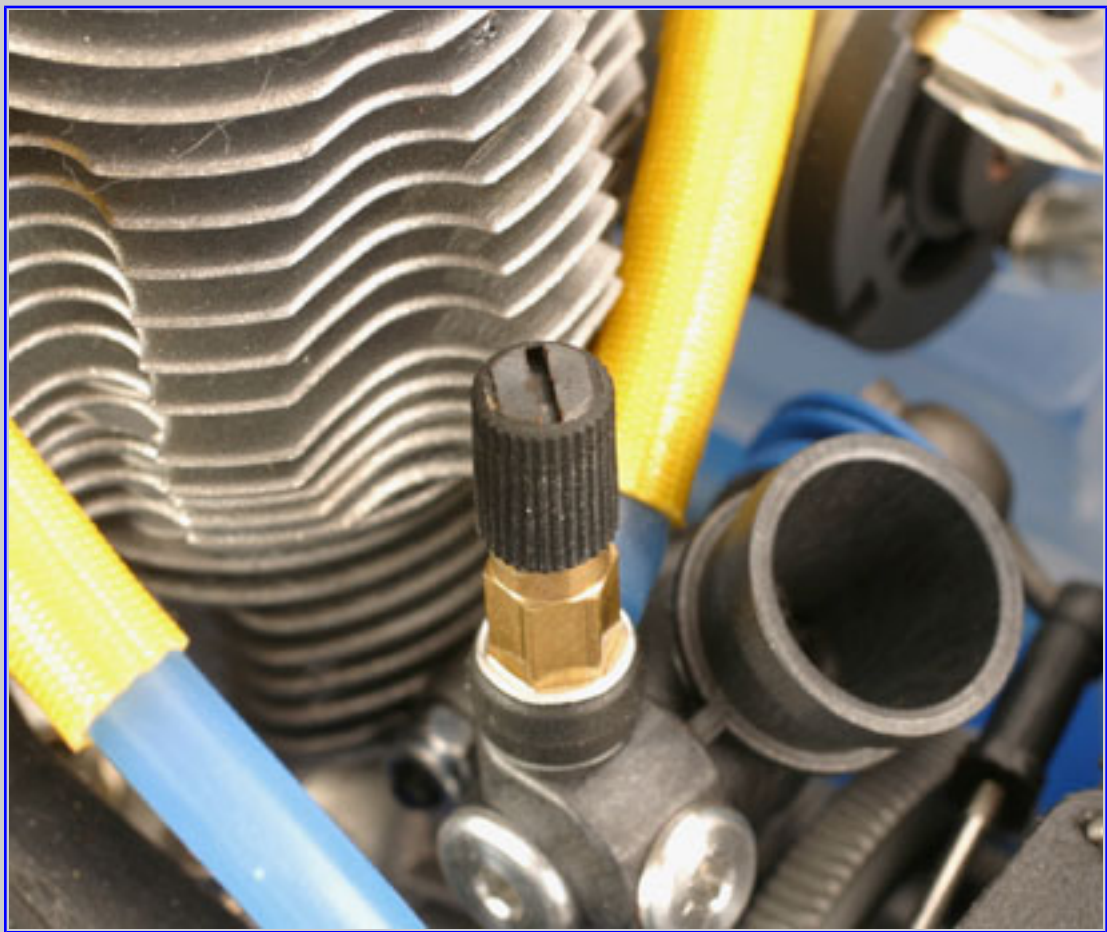


Break-in Tips and Settings:

Now that you have checked over your T-Maxx and everything is ready to go it's time to break-in the engine. I'll go over a few common problems that may occur and how to fix them, and possibly avoid them in the future.

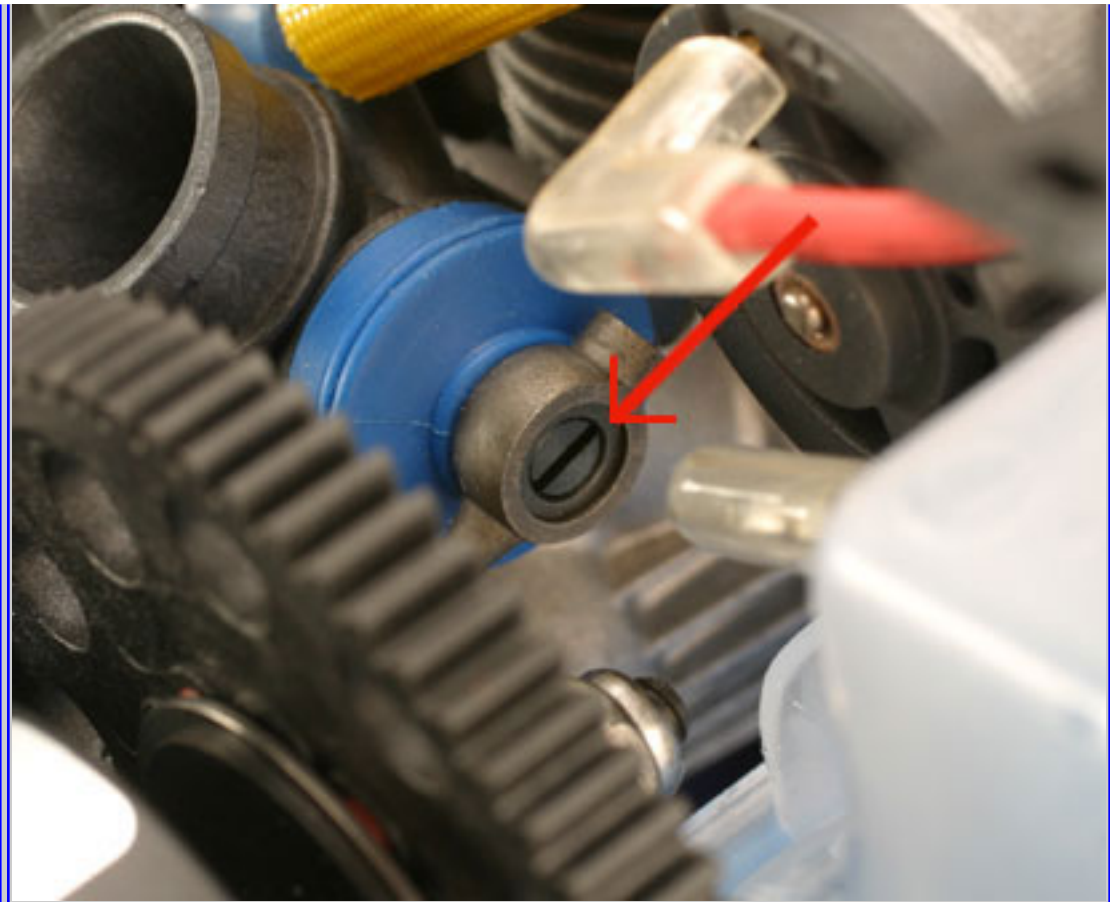
Factory break-in (default) carburetor settings:

Hi-speed needle



A good starting point for the TRX2.5 hi-speed needle is 4 turns out from closed. This is preset at the factory, and is a good default setting in case you lose track of the engine's current mixture setting.

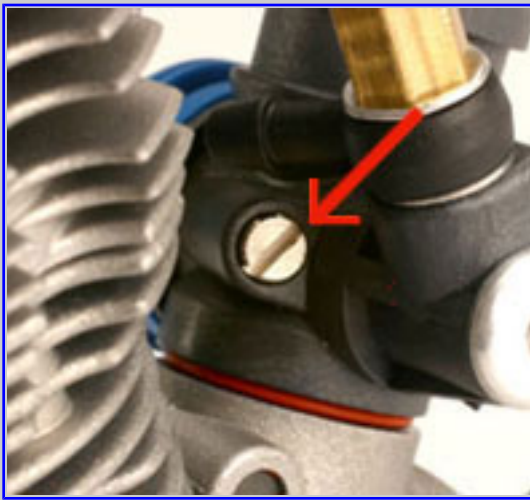
Low-speed needle



Notice the thin darker gray area between the low speed needle and the throttle arm. This is actually the other end of the slide valve from inside the carburetor. The low-speed needle is threaded into the slide valve and is set flush (even) with the edge of the slide valve. Note: This is a good base setting. Adjustments may need to be made to the low-speed needle for best performance in your running conditions.

Idle stop screw

Idle gap



Note that the idle stop screw is only used to set the limit at which the slide valve will close inside of the carburetor.



This is a good starting point for the slide valve to stop at idle (0.7mm-1.0mm).

The carburetor is preset at the factory for break-in. The base setting should be good enough to start and run the engine through the break-in process, however if you are having trouble getting the engine started or keeping it running then you may be in a weather condition that requires an adjustment to the mixture needle. It is a good idea to bring the little tuning card that was attached to the fuel tank with you.

Tuning

Idle Stop Screw

- 1. Turn the idle stop screw clockwise to richen the mixture.
- 2. Turn the idle stop screw counter-clockwise to leanen the mixture.
- 3. Turn the idle stop screw clockwise to richen the mixture.
- 4. Turn the idle stop screw counter-clockwise to leanen the mixture.
- 5. Turn the idle stop screw clockwise to richen the mixture.
- 6. Turn the idle stop screw counter-clockwise to leanen the mixture.
- 7. Turn the idle stop screw clockwise to richen the mixture.
- 8. Turn the idle stop screw counter-clockwise to leanen the mixture.

Starting Your Model

1. Turn on the radio system & range test.
2. Engine must be at room temperature.
3. Connect T2 Start and press button. Watch for fuel reaching through the fuel line up to carburetor.
4. If fuel isn't visible within 5 seconds, prime by reinserting reed valve for 1 or 2 seconds, but wait fuel reaches the carburetor.
5. Engine should start and idle.
6. Proceed with break-in.

STOP!

The TRX 2.5 engine must be broken in over 5 tanks of fuel before tuning for performance. The carburetor has been preset by the factory to settings of the factory. These adjustments may be required to compensate for temperature and altitude. Engine should always show light sign of blue smoke from the exhaust. If there's no smoke or the engine stalls, richen the idle stop screw 1/4 turn & proceed with break in. Richen the fuel line to shut off the engine.

Fuel!

Use Fresh Top Fuel for best performance and engine life. The TRX 2.5 is optimized for 13-20% Nitro fuel. If you break-in your engine on 20% fuel then use 20% fuel all of the time.

Break-in Procedures

Task 1	Throttle: 1/4	Time: 2 seconds	Cool: 10 min.	Body: Off	Apply throttle gradually
Task 2	Throttle: 1/2	Time: 2 seconds	Cool: 15 min.	Body: On	Apply throttle gradually
Task 3	Throttle: 1/2	Time: 3 seconds	Cool: None	Body: On	Reduce idle speed if necessary
Task 4	Throttle: Full	Time: 3 seconds	Cool: None	Body: On	Don't allow shifts to high gear if 2-rod equipped
Task 5	Throttle: Full	Time: 5 seconds	Cool: None	Body: On	Accelerate over 3 second count, hold for 2 sec.

Card supplied as a tuning aid. Read and follow all instructions in the Owner's Manual.

This is a very informative card and will be extremely valuable, especially to those of you that are new to nitro RC. You can tear the card at the perforation and place it in your wallet or pit box. I wish that I had one of these when I got into nitro many years ago. It would've saved me from many hours of frustration.

Starting the Engine - After filling the tank with fuel, install a freshly charged battery into the EZ-Start 2 control box. Turn the transmitter and the truck on. Plug the EZ-Start controller into the receptacle located in the middle of the rear body mount. Note that the controller will only key into the receptacle one way. Do not immediately prime the engine. [Priming the engine is only necessary if the fuel is not making its way to the carburetor.](#) Press the red button on the controller. This will spin the engine over while heating the glow plug at the same time. Note that both LED lights on the EZ-Start controller should be lit green. If either light is not lit then there is a problem with that function.

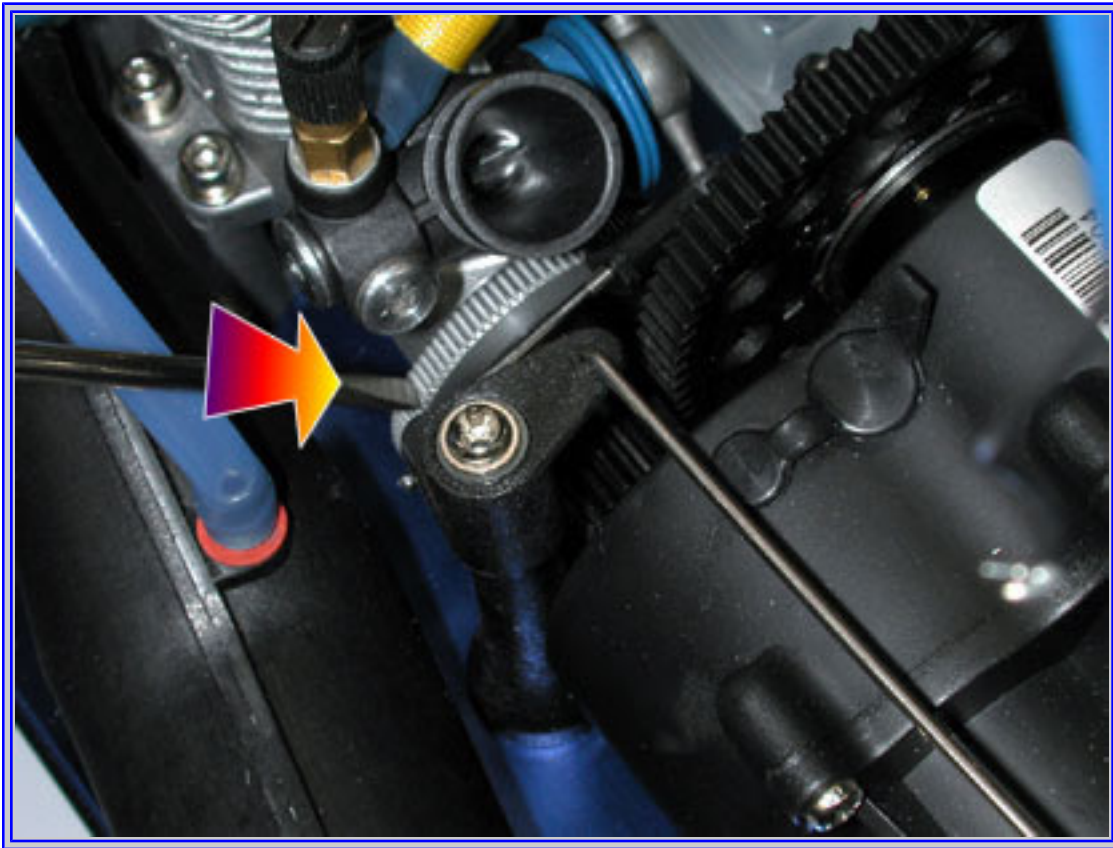
The EZ-Start should turn the engine over at a sufficient enough rate to draw the fuel into the carburetor within a reasonable amount of time. Look at the fuel line and watch the fuel make its way up to the carburetor. To help speed up the fuel to the carburetor you can prime the engine by placing your finger over the outlet of the exhaust pipe for just a brief second or two. You can see the fuel work its way to the carburetor very rapidly. Caution: Priming the engine for too long will then flood the engine causing it to hydro-lock. Fortunately, the EZ-Start 2 system was designed with thermal protection and overload cutoff circuitry. This feature will keep the EZ-Start motor from over heating.

There are two ways to lock an engine during start-up:

- 1) Engine flooded - Too much unburned fuel in the engine crankcase will cause the engine to hydro- lock. A rich hi-speed needle setting or priming the engine for too long during start-up usually causes this. Also, a fouled glow plug can cause the engine to flood by not heating up to burn the fuel. Keep your eye on the glow plug LED on the controller. This light will tell you if the plug is not heating up. Read on for clearing a flooded engine.

- 2) Piston stuck at TDC (Top Dead Center) - A new engine will typically have a tight fit between the piston and the top of the sleeve. This is a tapered fit. The fit should not be too tight to start the engine, however a weak starter battery or one that has not been charged fully may not deliver enough power to crank the engine over at the appropriate RPM to keep the piston from sticking.

Make sure that you are using a good quality battery pack that is fully charged. This is especially important with a new engine that needs to be broken-in. If the engine is stuck at TDC, then use a flat blade screwdriver to rotate the flywheel over. Place the blade into one of the grooves of the flywheel and push down turning the flywheel counter-clockwise when viewed from the front.



You should see the flywheel turn and you should feel the piston become unstuck from the sleeve. Before trying to restart the engine replace the starter battery with a freshly charged pack or a freshly charged battery pack of better quality.

If the button is pressed too long after the engine stops turning over, the controller will stop sending power to the electric motor. When this happens the motor LED on the controller will not light. This means that the thermal cutoff circuitry was tripped inside of the controller. Allow the EZ-Start controller to cool for 5 to 10 minutes before trying to start the engine again. If the engine sticks at TDC, use the procedure above to free it. If the engine floods, then follow the steps below to clear it.

Clearing a Flooded Engine - Clearing a flooded engine is an easy process.

- 1) Disconnect the blue glow plug wire from the glow plug and take the glow plug out of the engine with the two-way glow plug wrench included in the instruction bag. Disconnect the fuel tubing from the carburetor and plug the fuel tubing with a clean 3mm machine screw. This will keep fuel from running out of the fuel tank and making a mess. If the fuel tubing is not disconnected, then more fuel can make its way into the engine defeating the whole purpose of this procedure.
- 2) Plug in the EZ-Start 2 controller, tip the truck over on its side and press the red controller button for about 8 to 10 seconds. This should turn the engine over at a very

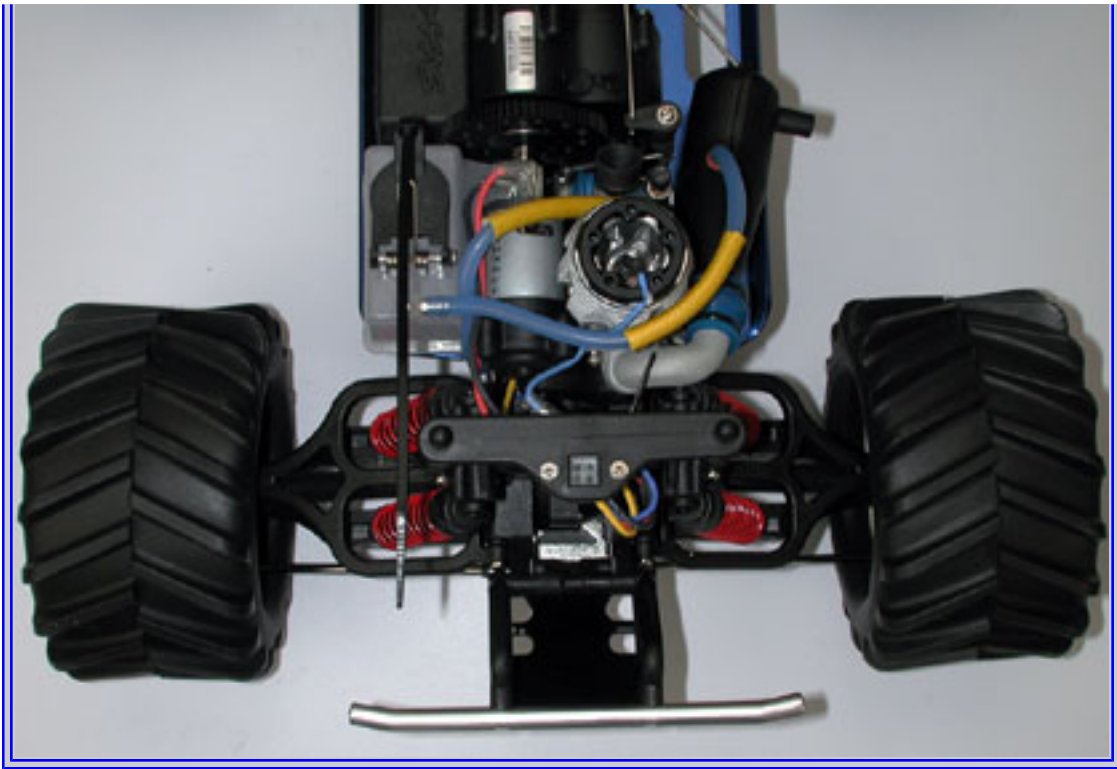
rapid rate spitting out all of the excess raw fuel from the crankcase and combustion chamber of the engine. If there is still fuel coming out of the engine after a 10 second burst then release the button for a few seconds and repeat another 8 to 10 second burst. Repeat this process until all fuel has exited the crankcase.

3) Wipe up the raw fuel from the cooling head with a paper towel and reinstall the glow plug back into the head. Make sure that the little copper glow plug gasket is located correctly onto the glow plug before installation. There is a tapered edge between the threads of the plug and the hex body of the plug. This should match up with the tapered (concave) side of the gasket.

4) Reconnect the blue glow plug wire and place back into the protective slot in the head protector. To get the blue wire back onto the plug securely, it helps to use a pair of needle nose pliers to press the connector down over the plug. Take out the screw that was used to plug the fuel line and reconnect the fuel line to the carburetor. Your engine is now ready to start. Do not try to prime an engine that was just cleared out. There should be plenty of fuel residue inside the engine to start-up. The engine should fire up immediately.

Once the engine is started it will act a little sluggish and boggy at first. Go ahead and drive the truck slowly back and forth to make sure that the truck is tracking straight and that the engine is idling down when you let off of the throttle. If everything is in order then carry on with the break-in procedures.

If the truck is not tracking straight and the steering trim on the transmitter is not correcting the matter, then try adding a little bit of toe-in to the front and/or the rear of the truck. Making the turnbuckle links a little longer will increase toe-in.



This will give the truck more stability. If the engine seems very sluggish and wants to stall when you let off of the trigger, then the engine is probably set a little too rich. Try leaning out on the hi-speed needle 1/16 of a turn until it stays running. Keep in mind that the engine will provide strong performance even at a rich break-in setting, so don't get carried away.

Follow the break-in procedure as outlined by the manual and you will be rewarded with a faster and longer lasting engine to show for it. If the engine is idling at a high RPM or is accelerating extremely fast, then the mixture is too lean for your driving conditions. Richen the hi-speed needle 1/8 turn until it idles down immediately and is spitting a little bit of raw fuel out of the exhaust pipe.

Download movie "Break-in"



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After completing a few tanks of break-in you may encounter a situation where the engine will have a hard time starting or will want to die shortly after it is started. This is typically caused by a fouled glow plug and is common while breaking in a new engine. There are tiny particles that pass through the combustion chamber during the break-in process that come from all of the new components wearing in together for the first time. These particles can foul the glow plug.

Replacing the glow plug with a new one will bring the engine back to life. I get a lot of questions about which plug to use in the new engine. I recommend using the #3231 heavy duty Traxxas plug

exclusively with the new TRX2.5 engine. The #3231 plug has a thicker element that will stand up to the extremities of the new engine. The #3230 plug should be reserved for situation where a hotter plug is needed, such as running in cold weather conditions.

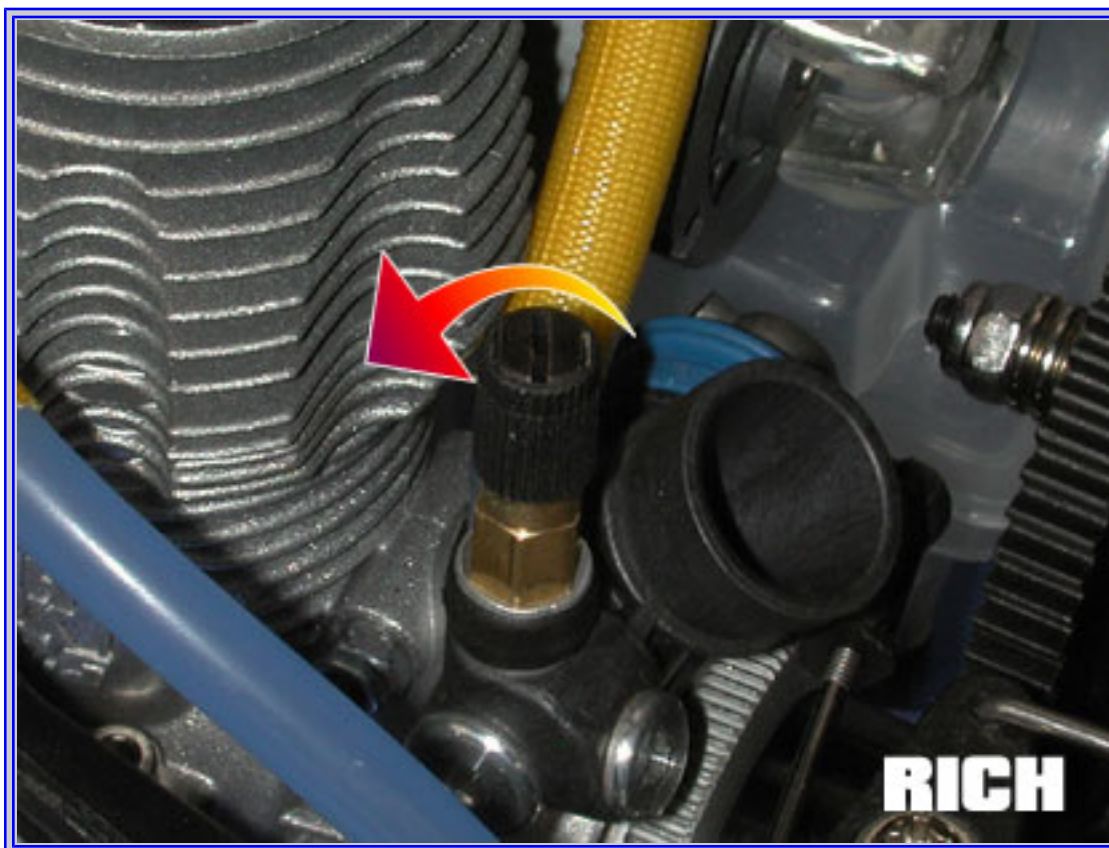
Be sure to complete the break-in process before tuning the engine in for performance. Once the fifth tank is completed, bring the truck in, and shut the engine off to allow the engine to cool. Give the truck a quick check over. If the engine ran fine through the full five tanks of break-in, then I like to go ahead and change out the glow plug with a new one at this point. Give the truck a good look over for loose screws and make sure that everything is still in order as mentioned in the above checklist.

Tuning the TRX2.5 in for Performance:

Now the fun begins! I covered a few things in my review of the new T-Maxx 2.5 on tuning the engine. In this article I'll go a little further in depth towards getting maximum performance out of the new TRX2.5 engine and what to do if things start to go south.

Hi-speed needle adjustment - After running the truck through the five tanks of break-in it is time to tune the engine for performance. The engine produces a lot of power even at a break-in setting, but that's just the beginning. Start the truck up and make a few passes back and forth gradually giving the truck more throttle. Once you've made four or five passes back and forth, the engine should be up to a good tuning temperature, (I'll speak more on engine temperature later in this segment). Lean the hi-speed needle by turning the needle clockwise 1/16 of a turn and make a few more passes.





This should increase the power output of the engine. The engine should accelerate very quickly and rev up to a high RPM without cutting out or running erratically.

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When you let off of the throttle, the engine should slow down to a reasonable idle without jerking the transmission into gear. Also, the engine's RPM should not jump up and down when sitting at idle. The engine should idle smoothly without engaging the transmission and without dying.

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If you feel that the engine has not yet reached its best performance, continue to lean the hi-speed needle

1/16 of a turn at a time and make a few more passes. You must make a few high-speed passes after each needle adjustment to determine what the engine is going to do. As you lean out the mixture setting, the engine may want to idle at a higher RPM. If this happens decrease the engine's idle by turning the idle stop screw counter-clockwise until the idle comes down to a reasonable level as described above.

Remember that you should always see a puff of smoke from the exhaust pipe under acceleration. As the truck builds speed the trail of smoke will become less noticeable, but should always be there. If the smoke is gone, then that means that there is an inadequate amount of lubrication going through the engine and this can cause permanent damage to the piston and sleeve. If this happens, richen the hi-speed needle ¼ turn until you see smoke during your high-speed passes and the engine should get back to running and idling reliably.

If you have found yourself turning the hi-speed needle every which way and have lost track of the setting and you are having no luck with getting proper performance, take a deep breath and relax. Shut off the engine and think of a happy place. Don't feel bad. Believe me, we've all done it at one time or another. Turn the hi-speed needle all the way in just until it stops.

Back the needle out four complete turns. This is a good starting point for break-in, which will put you back to where it was when you pulled it out of the box. The base setting for the low-speed needle is when the adjustment head of the needle is set flush with the metal housing that surrounds it. Always start rich and tune for performance.

Low-speed needle adjustment - Once maximum performance is attained out of the hi-speed needle adjustment, it is time to adjust the low-speed needle.



It is important to adjust the hi-speed needle first, before adjusting the low-speed needle. With the hi-speed mixture set correctly, and the engine producing good power and speed, bring the truck in and listen to the engine idle down. If the engine is "hanging up" or taking a while to idle down to a reasonable RPM, then the low-speed needle could be too lean.

Remember to try and get the idle down by adjusting the idle stop screw counter-clockwise first. If the low-speed needle is too lean, then the idle adjustment will not have much of an effect on the idle. Turn the low-speed needle adjustment counter-clockwise a little at a time until the engine RPM is comes down to a reasonable level.

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The idle of the engine is affected by both of the needle adjustments and the idle stop screw. The low-speed needle has a greater effect on the idle speed than the hi-speed needle. One of the more common problems that I see with tuning engines is that some people will try and compensate for a low idle caused by rich low-speed mixture setting by cranking up the idle stop screw.

Try to keep the idle gap as small as possible. The gap is usually happy around the 0.7mm to 1.0mm mark. If you find yourself having to go beyond the 1.0mm mark then there is a good chance that the

low-speed mixture is a little on the rich side. If you are turning the idle stop screw out so much that the RPM is no longer being affected but is still too high, then the low-speed needle is too lean.

Keep in mind that the above conditions and adjustments are usually found in an extreme situation when the truck wants to kick into gear or the engine is hanging up badly. Once you have corrected these problems or if they just simply do not apply, then it's time to move on to fine tuning the low-speed needle with the low-speed mixture test.

Before you proceed any further, think about what your truck is doing. If you are already getting excellent power and punch out of your TRX2.5 and the idle is smooth and consistent, then you need not adjust anything. Go have fun. Try not to make a huge deal out of getting that "perfect" setting. The TRX2.5 produces so much power that it is not as critical to get that "perfect" mixture to have a lot of fun with this truck.

Low-speed test - Once the engine is up to a good running temperature, make a few high-speed passes back and forth and bring the truck in. As soon as the engine idles down pinch the fuel line between the EZ-Start motor and the carburetor with a pair of needle nose pliers. This will keep you from burning your fingers on the cooling head. The engine should idle up for 3 to 5 seconds then try to stall. Let go of the fuel line just before the engine stalls. If your engine falls within the 3 to 5 second range then it should be good to go.

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If the engine immediately stalls, then the low-speed mixture is too lean.

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Richen the low-speed needle counter-clockwise 1/8 turn and retest after making a few more hi-speed passes. If the engine idles up for more than 5 seconds then lean the low-speed needle clockwise 1/16 turn and retest.

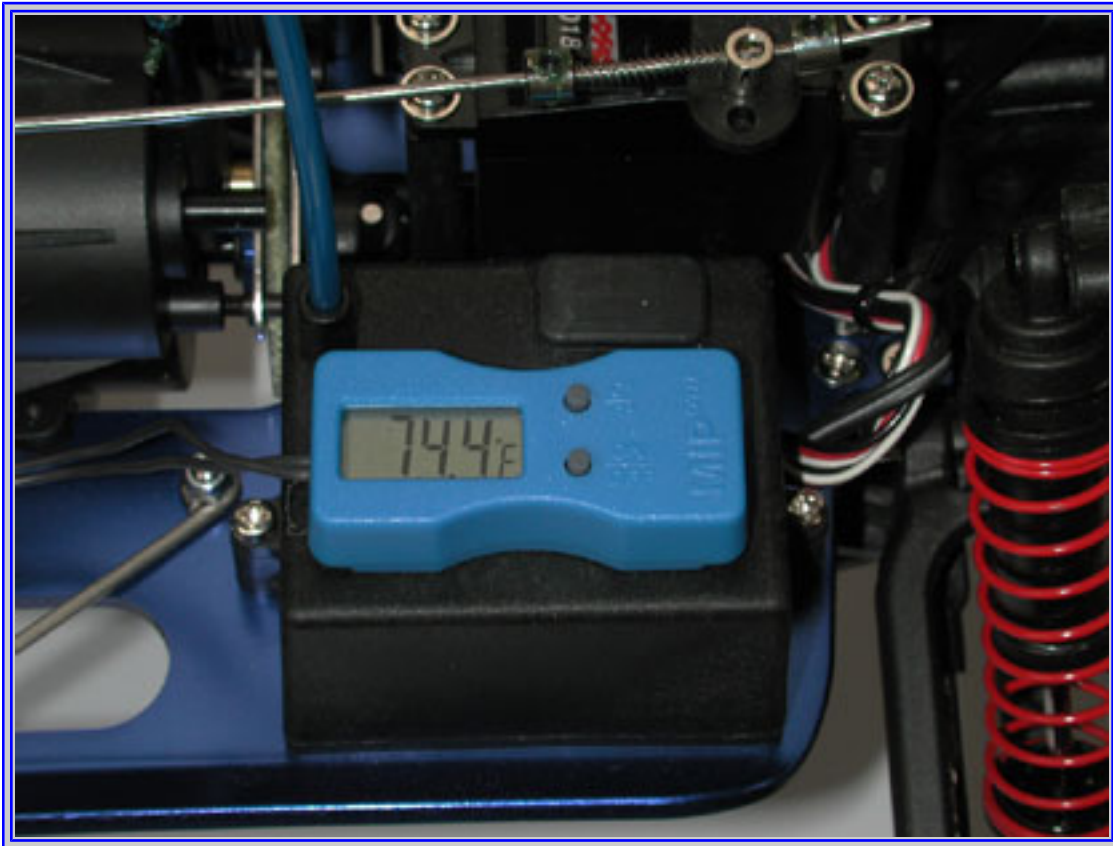
Download movie "Rich Low Speed"



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Tuning the Engine in by Temperature:



Tuning the engine by temperature is another way to adjust the carburetor to maximize performance. This is something that should only be used as a guideline. There really isn't a perfect set temperature for every engine. Weather conditions, fuel, ventilation and many other variations around the engine will change the "happy" temperature for each engine. I try to discourage nitro owners from falling into that trap.

The best way to tune the engine is to watch and listen to what the engine is doing. When the engine is running strong and reliably with plenty of smoke coming out of the pipe, then check the temperature at that point. This should be a guide to where the temperature needs to be for that particular driving condition. Maximum temp for any condition should not exceed 270 F.

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The temperature can provide good feedback to make sure that you are going in the right direction. If the temperature goes up but performance doesn't increase, then the engine may be too lean. One way to bring engine temperatures down is to cut a hole in the windshield directly in front of the engine for

extra airflow around the cooling fins. The hole should be around 2" to 2.5" in diameter. This is definitely recommended for anyone running his or her truck in a hot climate.

Stay Tuned.....

If you follow these simple yet effective steps for tuning your new TRX2.5, I can assure you that you will have many, many hours of high performance fun with your new T-Maxx 2.5. The power of this revolutionary new small block engine is incredible. With the right tuning skills the TRX2.5 can offer unbeatable performance and reliability whether you are out at the local track or in your own back yard. Next time we will talk about maintenance, cleaning and storage. Down the road we'll be looking into racing set-ups for the T-Maxx. See ya!