

Traxxas Responds to the TRX 2.5 Forum

Hello everyone. We have been watching the TRX 2.5 forum and are growing concerned that some people seem to be having troubles with their engines. The TRX 2.5 has overall proven to be a very reliable and powerful engine, and there are tens of thousands of these engines currently in service. We're pleased to report that the TRX 2.5 just won Car Action Magazine's 2003 Reader's Choice Award for Best Engine. Nevertheless, it sounds like there's a number of people here on this forum who are experiencing significant troubles with their TRX 2.5. After studying the posts, we believe that many of the problems can be traced back to simple tuning issues. However, there are a few others we see that are not so easily explained, and the problems could possibly be resulting from defective engine components.... particularly in those weird cases where there is problematic overheating and rapid engine wear. We are committed to find out exactly what is going on here and will be working hard to resolve any engine issues. Don't get frustrated. Let us help you get your engine performing as it should.

Before we can adequately troubleshoot and diagnose an engine problem, we have to start at square one and make sure that people have got the basics down. That's the first step our customer support representatives take, to establish a baseline to work from and rule out common tuning mistakes (there are many!). Thus, the biggest part of this post covers basic tuning and troubleshooting for the TRX 2.5. Beyond that, there appears to be four general areas of concern we have identified on the forum that will be specifically addressed here: tuning, overheating, carburetors, and engine life (including piston/sleeve fit). This post will attempt to cover these topics one at a time. If you've got the bases covered and are still experiencing problems, then you could have a defective engine. This post will show you some things to look for. If it is defective, please work with us to verify it and get it repaired as soon as possible! It's a long post but please take the time to read it thoroughly. Even if you're an old pro at this, there could be some important little overlooked detail in here that will make all the difference with your engine.

Tuning:

We have been reading some pretty broad variations in the way people are attempting to tune their engines. Some of it makes sense and some does not. Let's start from the beginning. The factory settings for your carburetor when it was brand new were measured and set on a flow bench to flow a measured amount of fuel and air. This setting is a baseline break-in setting that's sure to get the engine starting and running in a broad range of temperature, humidity, and altitude conditions. **Once running, the customer needs to observe how the engine is responding and depending on what they observe make minor adjustments for their location.** For example, if you live in a location with high altitude and thinner air, the factory setting may be slightly rich. In this instance the engine may be extremely sluggish and stall while accelerating. The customer will need to lean the high-speed mixture slightly and proceed with break in. The chart below is included in the instruction manual to provide a guideline for making minor fuel mixture adjustments to compensate for various changes in atmospheric conditions.

If the...	is...	then the air density is...	adjust (correct) the fuel mixture to be...
Humidity	Lower	Slightly more dense	Slightly richer
	Higher	Slightly less dense	Slightly leaner
Pressure (barometer)	Lower	Less dense	Leaner
	Higher	More dense	Richer
Temperature	Lower	More dense	Richer
	Higher	Less dense	Leaner
Altitude	Lower	More dense	Richer
	Higher	Less dense	Leaner
Nitro %	Lower		Leaner
	Higher		Richer

During break in, the engine should be set slightly to moderately rich. You can identify a rich running condition by observing the following:

Sluggish acceleration with blue smoke coming from the exhaust.

The model may not shift into second gear (if equipped)

There is some unburned fuel spraying from the exhaust tip

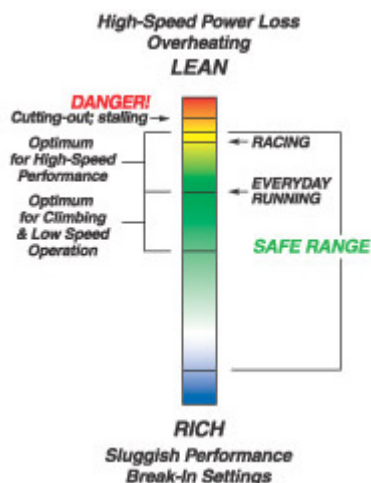
Leaning the high-speed fuel mixture increases performance

If the fuel mixture settings get too far away from the factory settings, then return to a baseline setting of 4 turns out on the high speed needle and set the low speed needle flush with the machined edge inside the end of the throttle arm (see this link http://www.traxxas.com/support/pub/...actory_settings). If you have to set the fuel mixtures to extremes above and below these baseline settings then it's time to call Traxxas and diagnose some other problem with the engine. Generally speaking, anything below 3 turns and above 5 1/2 turns on the high-speed needle should definitely be suspect. **It's important to emphasize that the user needs to carefully observe how the engine is actually running and make adjustment decisions based on that.** Don't rely on posts that read something like this: "I set

my HSN to XX turns out and now it runs great...."

Once past the break in procedure, the fuel mixture can be leaned to improve engine performance. Before you begin tuning, the engine should be warmed up to its normal operating temperature and running slightly rich. All final tuning adjustments must be made to the engine at its normal operating temperature. Gradually lean the high-speed needle (clockwise) in 1/16 turn increments. Make several high-speed passes with the model after each adjustment to clear out the engine and note any change in performance. Continue to lean the high-speed needle in 1/16 turn increments until the engine power and performance is no longer improving. **Watch carefully!!** Never run the engine too lean (not enough fuel flow). **Never lean the engine until it begins to cut-out or stall. Leaning the engine beyond the safe allowable limits will result in poor performance and almost certain engine damage (such as rapid piston/sleeve wear). This is very, very important!** Indications of an overly lean mixture include: Cutting out or sudden loss of power during acceleration. Overheating (temperature beyond 270° F at the glow plug) Fluctuating idle (caused by overheating) Little or no blue smoke coming from the exhaust.

If any of these conditions are present, stop immediately and richen the high-speed mixture ¼ turn. The engine will probably be slightly rich at that setting and you can then retune for performance. Always tune for performance by starting rich and moving leaner toward the ideal setting. Never try to tune from the lean side. There should always be a light stream of blue smoke coming from the exhaust.



With the high-speed needle set, the model may still be sluggish on the bottom end. Lean the low-speed needle 1/16 turn and retest. Continue to lean the low-speed needle in 1/16 turn increments until the engine is snappy, responsive, and has a good idle quality. If you lean the low-speed needle too far, the engine will stutter and possibly stall out when you accelerate (DANGER!). Try this test. With the engine running, pinch the fuel line going to the carburetor. The engine should continue to run for a second, speed up, and then die. If it dies immediately, the low speed mixture is too lean, and must be richened. Once the low speed mixture is set, you can fine-tune the high-speed needle even further to achieve the desired performance. Just don't run the engine too lean on the high-speed side. If you get it too lean the engine will overheat, be difficult to start, and will not run smoothly at top speed. Also, a lean condition will cause the internal engine components to wear out very quickly. You should always be able to see a nice trail of blue smoke from the exhaust while you are accelerating. If you don't, then your engine is running lean.

Engine Temperature

We have read many posts regarding engine overheating. The TRX 2.5 engine in **good tune** will run 140 to 160 degrees over the ambient temperature. If it is 30 degrees outside, the engine may run at 170 to 190 degrees. If it is 90 degrees outside, the engine may run as hot as 230 to 250 degrees. TRX 2.5 temperature should not exceed about 270 degrees or something is wrong. Engine overheating is caused by one or a combination of the following factors; improper tuning, insufficient air flow, or a worn piston and sleeve. Improper tuning is the number one cause for engine overheating. If you are tuning for temperature and think your engine should run 250 degrees when its 40 degrees outside, then you're headed for trouble! Do not tune for temperature. Observe how the engine is running. Is it making good power? Is there a nice trail of blue smoke? Is it responsive on the bottom end of the RPM scale? Temperature is only a relative tuning tool. Use a temp gauge to make sure you aren't exceeding maximum temperature. You can also use a temp gauge to help you set your high-speed needle. If you are

leaning your high-speed needle and the temperature is going up but the performance isn't improving then your mixture is getting too lean. Do not be determined to run the engine at some temperature you heard or read it should run at, while ignoring the outside air temperature and other conditions. You simply will not have good results! Pay attention to how the engine runs first, then check it with your temp gauge to make sure your temps are in a good range.

Insufficient airflow around the cooling head will cause the engine to overheat in some circumstances. If it's 30 degrees outside, the cooling head will have more than enough capacity to keep a well-tuned engine cool. If it 105 degrees outside, then it may be necessary to increase the airflow across the cooling head to keep even a well-tuned engine from exceeding its maximum temperature over time. Try cutting a hole in the windshield of the model to increase airflow to the cooling head. It gets very hot and humid here in Texas. Even on a typical 100-degree summer day, the TRX 2.5 has enough cooling capacity to run well and stay under 270 degrees. Keep in mind on those super hot days, to protect the engine you may need to run the high-speed fuel mixture slightly richer than you normally would. You will sacrifice a tiny bit of performance (probably not even enough to notice) but it's worth it to protect your engine investment.

Larger Cooling Heads

There are some misconceptions about cooling heads. First, do not install a larger cooling head to solve an overheating problem caused by improper tuning! You might reduce engine temperature slightly by adding cooling capacity, but your engine could still be self-destructing from improper tuning. Many of the machined aluminum cooling heads on the market may appear visibly larger but in fact cool less efficiently than the stock head that was engineered for your TRX 2.5. There is much more science to head design than simply cutting fancy slots in a piece of round aluminum. For example, the stock TRX 2.5 head has fins that are tapered (thick in the middle, thin at the edges) to quickly and efficiently draw the heat away from the engine.

Worn Piston/Sleeve

Overheating can be caused by a worn piston and sleeve. We suspect this may be the cause of frustration for some of you who run the fuel mixture richer and richer trying unsuccessfully to get the temps down. In the process, the rich fuel mixtures compound the overheating problem with hard starting, stalling, and poor performance. Piston and Sleeve wear is affected by many factors from initial factory assembly to customer tuning and maintenance. For more information about this, please refer to the discussion further down in this post regarding engine life.

Other Factors That Affect Engine Tuning:

As discussed, understanding engine tuning plays a huge role in having success with your engine. So what other factors affect engine tuning?

The Weather:

The current weather outside your front door is perhaps the single largest variable that can influence your engine's tuning needs. Temperature, humidity, barometric pressure, and air density all influence the engine's fuel mixture requirements. For the best running performance your TRX 2.5 requires a specific ratio of fuel molecules and air molecules in the combustion chamber, no matter what the outside conditions are. The carburetor's job is to meter just enough fuel into the available air to maintain the necessary fuel to air ratio. The needles on the carburetor control how much fuel is being metered into the air stream passing through the carburetor. If you have cool, dense air, then more fuel (a richer mixture) will be required to maintain the correct ratio. If the air is thin, hot, and less dense, then less fuel is needed to maintain the same ratio of fuel and air. This is sort of a quick overview to help you understand why carburetor adjustments are there in the first place and why it is necessary to set them just right. Several pages of in-depth full-color instruction regarding this are in your operating instructions for your model. If you really want to tune your engine well, take some time to read and understand the principles that are there. The link to the T-Maxx manual is provided for your assistance.

<http://www.traxxas.com/products/nit...ting-manual.pdf>

Seasonal Changes:

Your engine could require tuning adjustments, or possibly even a new piston and sleeve depending on when it was broken in. For example, if you broke in and tuned your engine in the dead of winter when it was 20 degrees outside, its operating temperature range may not have exceeded 190 degrees (By the way, the Operating Instructions advise against this....you're about to read why.). Now it's spring and 90 degrees outside, you fire up your engine and it runs fast at first but soon starts to overheat, stall, and become hard to restart. Tuning seems impossible. You re-set the needles but it doesn't help. What's wrong? Now that it's 90 degrees outside, the engine is running in a completely different heat range (230 to 260 degrees). The sleeve is expanding with the increased temperature, loosening the piston and sleeve

fit. The engine essentially acts like it has a worn out piston and sleeve, even though it may only have half a gallon of fuel run through it from the previous winter. Unfortunately, the cure is to replace the piston and sleeve. You can keep the old piston and sleeve and use it for cold winter running.

Air Leaks:

Intermittent air leaks can cause inconsistent tuning. The TRX 2.5 uses reliable O-rings to seal at all gasket surfaces. It is one of the best-sealed engines available. Air leaks can arise however if the engine is disassembled and new gaskets are not used when it is reassembled. For example, on older TRX 2.5 engines, if the carburetor is ever removed the bottom o-ring that seals it **must** be replaced. Later TRX 2.5 engines have the lower o-ring installed in crankcase, preventing damage if the carb is removed. When the carb is reinstalled light pressure should be applied to compress the upper o-ring while tightening the pinch nut. If the high-speed needle valve (and fuel inlet) is removed (such as for repositioning the fuel inlet), the two crush washers **must** be replaced. The needle only needs to be tightened snugly against the crush washers. Overtightening will cause air leaks and excessive overtightening can actually cause leaking hairline cracks in the carburetor body. Damaged fuel tubing can cause air leaks and inconsistent tuning issues, particularly in the pressure line that travels from the tuned pipe to the fuel tank. A cracked or damaged fuel tank or a fuel tank cap that is not closed can cause inconsistency with tuning. An exhaust leak is another source of problems. Make sure your header and coupler are secured tightly. One of the most common causes of air leaks is serious crash damage. You might think you drove away from that full-speed crash or 30-foot jump unscathed and cheering, however hidden damage could have occurred from the force of the impact. Air filters can come off, carburetors get knocked loose or crack, fuel tanks can crack, exhaust parts can come loose, and so on. The problem may not reveal itself until much later when the original crash that caused the initial damage has been forgotten. If you've been abusing your model, be sure to inspect it carefully after stunts and crashes. This kind of damage is tough to see. Of course models like the T-Maxx are much more likely to be subject to this kind of abuse.

Engine Life:

One of the most challenging issues for any engine manufacturer to address is engine life. The big question is always how long will it last before I have to change a piston and sleeve or connecting rod. Some people run gallons and gallons of fuel between rebuilds while others are replacing their piston and sleeve after only half a gallon. So what gives? Internal engine component wear is most affected by two very important issues: tuning and maintenance. Maintenance refers to keeping the air filter clean and secure on the carburetor so that dirt doesn't have an opportunity to enter the engine. All it takes is for the smallest particle to work its way into the engine and scratch the wall of the sleeve. That scratch effectively ruins the seal between the piston and sleeve, which in turn wreaks havoc on engine tuning. It is very important to maintain your air filter and keep dirt out of the engine. Tuning directly affects engine life because the fuel mixture carries the oil that lubricates the engine. If the engine is run too lean, there is not enough oil present to build the lubricating film that prevents the metal parts from grinding together and wearing against each other. An engine that is improperly tuned can be hard to start, requiring excessive cranking. This can also decrease engine life.

How do I know if my engine is worn out (worn piston and sleeve)?

The symptoms of a worn piston and sleeve are overheating, stalling after running for a minute or two, and difficult starting. The usual complaint sounds something like this: the engine has to cool for 5-10 minutes before it will restart, then it runs super fast for a few passes, and then stalls out, repeating the cycle. At this point the only cure is to replace the piston and sleeve.

"Why does my engine act like the piston and sleeve are worn out? I think I did everything right." We've seen some intelligent posts from some customers who believe they are doing everything "by-the-book" and still experienced inconsistent tuning and questionably short engine life. In this case, there could be a problem with the fit of the internal engine components. For example, the pistons and sleeves are hand-fitted, speced, and tested by people just like any of us, and people can occasionally make mistakes. In this case we would like the opportunity to examine the engine to see if a defective component was at fault. If it was then we will be happy to take care of the problem and get you back on the road. Obviously, if the engine has been poorly maintained, is full of sand, and/or burned beyond recognition, we can't replace parts for free. But if the engine has been properly broken in, run, and maintained and yet for some reason still shows excessive signs of internal wear or possibly a defective component is revealed then the Traxxas support you counted on when you purchased the engine will kick in and get you fixed up. Our support staff comes to work each morning to do just this very thing (with all our products, not just engines).

Sticking Carburetors:

We've read a few posts that express concern over sticking carburetors. The TRX 2.5 is equipped with a high performance composite slide carburetor. The slide carburetor provides better throttle response and

less restrictive airflow than traditional barrel type carburetors. It is molded of composite instead of machined from aluminum. The composite material does not transfer heat like a metal body and molding allows shaping the inlet track and fuel metering area in beneficial ways that would not be possible with old-tech machined carburetors. One of the prices you pay for an ultimate performance carburetor is that it is less tolerant to dirt. That's why the TRX 2.5 has such a superior air filter design. All it takes is a little carelessness with your air filter maintenance or running the engine even briefly without a filter to get some dirt in the carb. The carb tolerances are very tight to eliminate air leaks so even a tiny speck of dirt can cause friction in the slide mechanism. If you have a sticking carburetor, it must be disassembled and thoroughly cleaned. Use lint-free rags and compressed air to prevent introducing even more particles into the carburetor. Make sure the rubber boot on the throttle arm is correctly installed and doesn't have any cracks or tears. Also, if the carb has been removed, be sure that it is properly aligned with the throttle linkage to prevent binding. If none of these fixes work for you, then please contact us for further assistance.

Using up Glow Plugs:

We've seen a few other posts where people claim that their engine is consuming many glow plugs. This has three possible causes. First, using a glow plug in the wrong heat range (too hot for example) could lead to failure. To rule out this possibility, use a Traxxas heavy-duty 3231 glow plug. It really is the RIGHT glow plug for the TRX 2.5. Second, lean fuel mixtures can cause glow plugs to fail. If you're running your engine too lean, too hot, or running the engine out of fuel at high speed (lean condition), then you can expect to replace some glow plugs. Finally, glow plugs fail when there is trash in the engine. Particles ingested into the engine reach the combustion chamber and attach to the glow plug element, causing failure. This can be a serious matter because it could indicate some type of internal engine failure that's producing metal shavings. If you can confidently rule out the first two causes and are consistently eating glow plugs (usually accompanied by other difficult tuning issues), then the engine should be torn down and examined by you (if you are knowledgeable) or by our service team. It's best to call us for assistance if you are experiencing these problems.

Engine Modifications:

We see lots of people in these forums making significant modifications to their engines. The TRX 2.5 doesn't need any modification to be incredibly fast. We understand that it's in the blood and some of you can't help but start customizing and adding to your model. Certainly that's part of the fun of the hobby! We do however recommend caution because some modifications can dramatically alter the tuning and driveability of your engine. For example, installing a tuned pipe that wasn't specifically designed for the TRX 2.5 can produce disappointing results. Aftermarket air filters may not filter particles as well as the stock filter. Aftermarket pistons and sleeves are made by taking measurements from a production engine...not nearly as precise as working from the original Traxxas engineering drawings and tolerance specifications. You may get unexpected results. If you are having issues with your engine, reinstall the stock parts and take it back to square one. This will give you a baseline to determine if there is fault with the engine or if the aftermarket part is the troublemaker.

We hope that this information will be helpful in resolving the engine troubles that some of you are experiencing. We want to encourage you to use the Traxxas support system that came with your engine purchase. Help us to help you have a good experience with your Traxxas product by getting in touch with us and expressing your concerns or needs. We also welcome your comments and questions in this forum.

Traxxas Support