



**PERFORMANCE ENGINES
OWNERS MANUAL**

INTRODUCTION

Congratulations on your purchase of a Dynamite® racing engine. Precisely manufactured and assembled, your Dynamite engine will provide you with trouble-free performance if you carefully read and follow these instructions.

USING THE PROPER EQUIPMENT

FUEL

Using the proper fuel is critical in order to achieve maximum engine performance, reliability, and longevity. You must use fuel that is specifically designed for model car/truck/buggy applications. Never use any type of model airplane glow fuel! Use of model airplane fuel can damage your engine and immediately void any warranty.

For general use we recommend using Dynamite Blue Thunder™ Race Formula fuel with 20% nitro. This fuel provides the best combination of power, fuel economy and engine life. Dynamite Blue Thunder fuels are vigorously tested, researched and formulated to deliver excellent power as well as engine protection.

Dynamite Blue Thunder is the only fuel which is 100% certified for use in Dynamite engines.

CARE AND HANDLING OF FUEL

- Follow all directions and warnings on the fuel bottle.
- It is very important to keep fuel containers capped tightly at all times. Some components in the fuel can evaporate very quickly or absorb moisture upsetting the performance qualities of the fuel.
- Never store unused fuel in the fuel dispensing bottle. Immediately return fresh unused fuel back into your quart or gallon fuel bottle.
- Never mix old fuel with fresh new fuel. Never mix different fuel brands together.
- Always store the fuel in a cool dry location, off of concrete floors and away from any source of heat, ignition, flame or combustion.

Warning! Model engine fuel is poisonous to humans and animals.

Drinking model fuels can cause blindness and death. Handle with utmost care and respect. Keep model fuels out of reach of children. Never leave your fuel where a child could have access to it.

GLOW PLUGS

A glow plug has been included and is ideal for breaking in your new engine. In fact, during the break-in procedure, it is not uncommon to go through one or two glow plugs, as microscopic bits of metal (from the cylinder/piston wearing in) bond themselves to the plug element causing glow plug failure. We recommend Dynamite glow plugs as the absolute best glow plugs for this engine. Dynamite glow plugs have been designed to deliver an ideal balance of performance and longevity.

We recommend the DYN2500 glow plug for engines up to .15 cu in and the DYN2495 for engines that are .20 cu in and larger. It is a good idea to keep at least a couple of extra glow plugs in your pit box at all times.

AIR FILTERS

All model car engines must use a properly oiled air filter to keep dirt out of the engine. Any dirt that enters the carburetor can immediately destroy your engine. We recommend DYN2612 as an excellent choice for a quality air cleaner for .12 and .15 engines and DYN2614 for .21 and larger engines. Clean and re-oil the air filter after each hour of running to prevent sucking dirt into the engine. If you intend to run your vehicle in extremely dusty conditions the air filter should be serviced after each 1/2 hour.

STARTER BOX AND GLOW IGNITER

Dynamite engines are equipped with either a pull start/spin start system or may require the use of a starter box.

For spin start engines we recommend the DYN5645 Spin Start Hand Held Starter. While we recommend using a spin starter or a starter box for the initial starts, starting the pull start/spin start equipped engine can be accomplished using the pull starter only as well.

For the starter box version, we recommend using the DYN5610 Ready-Start Universal starter box in order to handle the high compression of the Dynamite engine. You will also need a glow plug igniter (glow driver) to light the glow plug. Use a high-quality rechargeable glow igniter such as the Dynamite metered glow driver (DYN1925). Make sure it is fully charged per the instructions.

ENGINE BREAK-IN

Dynamite racing engines are manufactured to exacting tolerances and require a special break-in procedure in order to accomplish the final precise fitting of the internal engine components. It is very important that you follow the break-in procedure as closely as possible in order to achieve the best performance and longest life from your Dynamite engine. Engine break-in will take between one and two hours.

Dynamite engines are manufactured with an ABC piston/sleeve construction. ABC stands for aluminum piston, and a brass sleeve that is chrome plated. This type of engine design relies on a very precise running fit between the piston and sleeve for proper cylinder sealing and is vital to achieving reliable long lasting engine performance.

People have differing opinions on what is the proper procedure to break in a model engine. Old style break-in procedures, such as idling the engine at low operating temperatures on the bench for several tanks of fuel or simply running the engine with a very rich fuel mixture for the first 4 tanks of fuel, will not achieve the best results. Only use the Dynamite break-in procedure. Other break-in procedures could result in a weak, damaged, or otherwise poorly performing engine.

The procedure outlined here was extensively tested and proven to yield better performing engines than other "common" break-in methods.

Allow yourself plenty of time in order to properly break-in your engine. The engine break-in period will take a minimum of 5 tanks of fuel. Do not use the break-in time to impress your friends with your new engine. Patiently wait until the engine is fully broken in before attempting continued high-speed running.

During break-in, your engine may appear to be malfunctioning with symptoms like stalling, unpredictable performance, and fouled glow plugs. These are simply the normal "break-in pains" engines sometimes go through. They will disappear once your engine is fully broken in.

BREAK-IN PROCEDURES AND TIPS

Break-in will be accomplished by accelerating, slowing, and accelerating again at different rates for the first 5 tanks of fuel. Once the engine begins to break in, the length and amount of the acceleration will progressively increase. Continued high-speed running is not acceptable during the first 5 tanks of fuel.

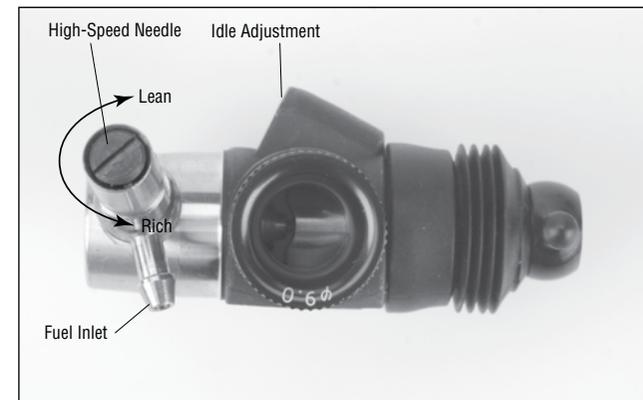
Perform the initial break-in on a large, flat, paved surface. Smoothly apply all accelerating and decelerating action. Avoid rapid acceleration and decelerating as this could cause the engine to stall.

- Special break-in fuels are not recommended. Break-in should be performed using the same fuel you plan to use daily.
- Avoid breaking in the engine in extremely hot or cold conditions.
- Avoid allowing the fuel tank to run completely empty. Low fuel levels cause the mixture to run too lean possibly resulting in a burned glow plug or higher than recommended engine temperature.
- Do not break in the engine by simply idling it on a stand. This will not achieve the best results.
- A glow plug has been included and is ideal for breaking in your new engine. During the break-in procedure it is not uncommon to go through one or two plugs as microscopic bits of metal (from the piston/sleeve wearing in) bond themselves to the plug element causing glow plug failure. Keep extra glow plugs handy.
- Change or clean your air filter after the break-in procedure is complete.
- Follow the instructions exactly for each of the first 5 tanks of fuel.
- Never run your engine indoors. The exhaust fumes are very harmful so always run your model outdoors, in a well-ventilated area.

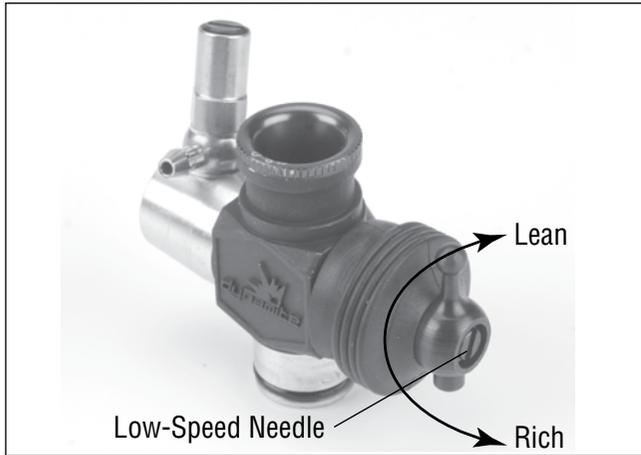
CARBURETOR ADJUSTMENTS

Your Dynamite engine comes equipped with one of a number of available carburetors. Engines such as the .12, .15, and .18 are equipped with either a 2-needle rotary or 2-needle slide valve carburetor. Engines .21 and larger are equipped with either a 2-needle or 3-needle slide valve carburetor. Below are illustrations of each. Please take a moment to review the pictures below in order to familiarize yourself with the various functions that apply to the particular carburetor that was supplied with your engine.

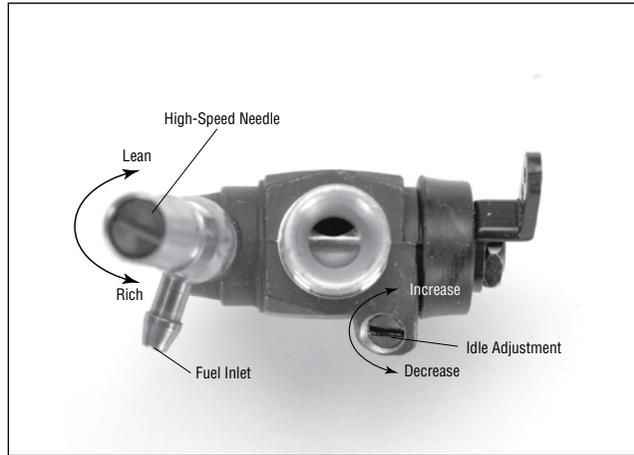
Note: The carburetor's initial startup fuel mixture settings have been preset at the factory. Do not change the settings.



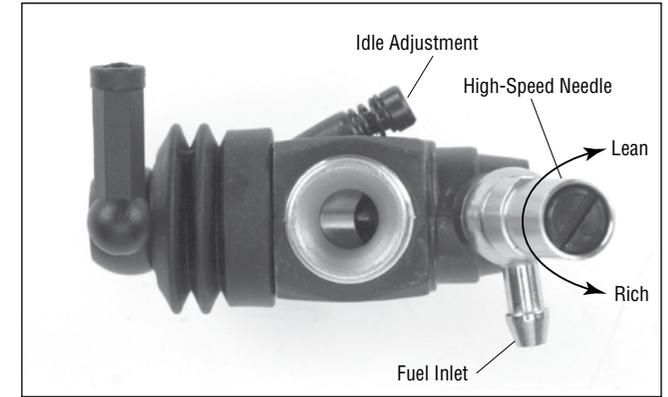
.21 and larger 2- and 3-needle slide valve carburetor



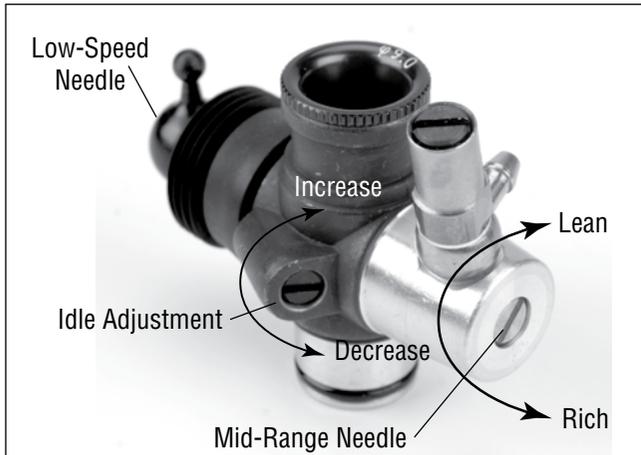
.21 and larger 2- and 3-needle slide valve carburetor



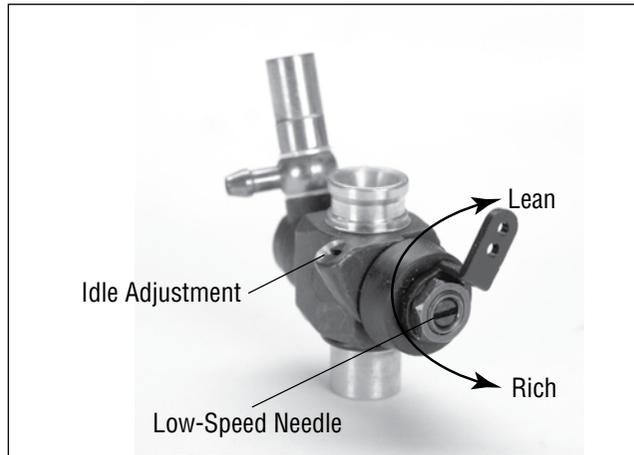
.12, .15 and .18 2-needle rotary carburetor



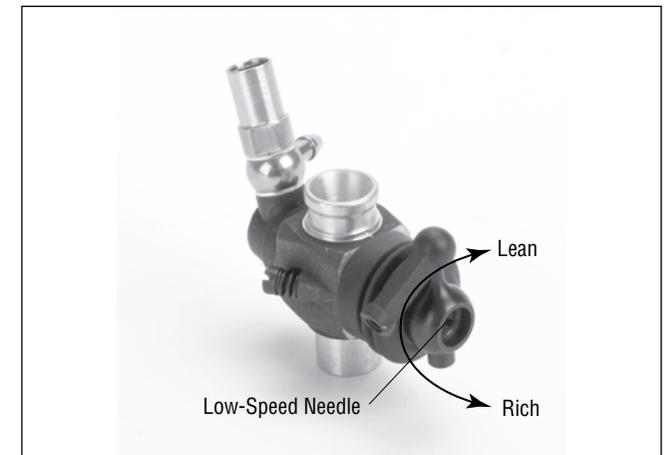
.12, .15 and .18 2-needle slide valve carburetor



.21 and larger 3-needle slide valve carburetor



.12, .15 and .18 2-needle rotary carburetor



.12, .15 and .18 2-needle slide valve carburetor

Engines .21 or larger may also be equipped with a slide valve carburetor that includes three inserts of various diameters. These are sometimes referred to as "restrictors" or "venturies". These carburetor inserts are used to alter the power curve of the engine along with fuel economy. The three diameters have the following effects.

Small: Develops smooth linear power and is easier to control than a larger insert. Best suited for medium to low traction conditions on small to average size tracks. Also offers the best fuel mileage.

Medium: Increased power for high traction, medium to large size tracks with a slight decrease in fuel mileage over the small insert.

Large: Offers the most explosive power and acceleration with high-fuel consumption. Used for large and fast high-traction tracks.

STARTING YOUR DYNAMITE ENGINE FOR THE FIRST TIME

The first start of your engine is the most critical time of the engine's life, dictating how well it will perform and maximizing its life expectancy.

Before you start your Dynamite engine for the first time, make sure you have read all instructions and precautions in this manual. Pay close attention to the tank-by-tank break-in instructions in the next section, and make sure you have read and understood them before you run your engine.

It is recommended but not totally necessary to use a heat gun to heat the engine to 160–180 degrees before you start the break-in process. Your engine must be at room temperature (70°F or 21° C) or above the first time you start it. If it's cooler than room temperature outside, remove all fuel and keep your vehicle indoors until you're ready to start it and then take it outside. If it's colder than 45 degrees, special considerations should be made.

We do not recommend running Dynamite engines at temperatures below 35 degrees. See the cold weather break-in tips section for more information.

FACTORY NEEDLE SETTINGS

Your carburetor is preset at the factory to give the correct air-to-fuel ratio and idle speed for break-in. Do not adjust the carburetor unless you observe a poor running condition that requires correction.

NON-PULL START AND PULL/SPIN START ENGINES:

For the non-pull start version engine, we recommend using the DYN5610 Ready-Start Universal starter box in order to handle the high compression of the Dynamite engine. For spin start engines we recommend the DYN5645 Spin Start Hand Held Starter.

You may need to “blip” the throttle on the transmitter (applying throttle on/off) while trying to start the engine, as new engines are more difficult to start due to the tight piston/cylinder fit.

1. Install the engine into your vehicle.
2. Turn on the radio system.
3. Make sure the throttle trigger on the transmitter is in the idle (neutral) position and the carburetor is in the idle position also.
4. Connect the glow igniter to the engine.
5. A. For non-pull start version engines, place the vehicle on a starter box and engage the starter.
B. For spin start version engines, slide your hand under the strap of the starter so that your index finger is on the switch at the bottom. Place the machined end of the starter shaft into the matching hex socket in the backplate of the engine. Holding the starter securely, press on the switch button and the engine should turn over and start up.
6. Watch for fuel moving through the fuel line up to the carburetor. Pay close attention as the fuel moves very fast. If the fuel doesn't move through the line within 5 seconds, prime the engine by briefly (one or two seconds) covering the exhaust outlet with your finger until the fuel is just visible moving through the carburetor fuel line. Watch carefully!

If the engine is primed too long, it will flood with fuel and stop turning.

Should the engine become difficult for your starter box or hand held starter to turn over, the engine may be flooded (hydro-locked). The presence of excess fuel between the cylinder head and piston will not allow the piston to travel through its full range of compression, effectively “hydro-locking” the engine.

Should this occur, remove the glow igniter from the plug. Using a glow plug wrench (DYN2510), remove the glow plug and turn the model upside down and rotate the flywheel to clear out the excess fuel, reinstall the glow plug and start again.

Note: Your Dynamite engine doesn't usually require priming. If you do need to prime your engine, watch the fuel line carefully to avoid flooding your engine.

Another common occurrence with new engines is for the piston to become stuck at the top of its travel in the sleeve. This occurrence is completely different from hydro-locking and is caused by the tight fit of the piston and sleeve when the engine is new. In order to relieve the stuck piston use a flat blade screwdriver through the flywheel's access hole in the chassis in order to pry the flywheel through its rotation.

This sticking issue should be completely eliminated by the break-in procedure.

7. Once fuel reaches the carburetor, the engine should quickly start and idle.
8. Disconnect the glow igniter from the model.
9. Proceed with the engine break-in.
10. Do not rev your engine with no load (wheels off the ground).

PULL START ENGINES:

1. Install the engine into your vehicle.
2. Turn on the radio system.
3. Make sure the throttle trigger on the transmitter is in the idle (neutral) position and the carburetor is in the idle position also.
4. Connect the glow igniter to the engine.
5. Use short quick pulls to start the engine.

When using a recoil starter, never pull the rope out its full length. Doing so may cause damage and recoil starter failure. Quick, short pulls of the recoil starter are the best technique to use. Never extend the starter rope more than 12 inches. Should the pull starter be extremely difficult to pull (will not extend out of the assembly), the engine may be flooded (hydro-locked). Excess fuel between the cylinder head and piston will not allow the piston to travel through its full range of compression, effectively "locking up" the engine. Should this occur, remove the glow igniter from the plug. Use a glow plug wrench (DYN2510) to remove the glow plug and turn the model upside down. Give the recoil starter a few short pulls to clear out the fuel, reinstall the glow plug and start again.

Another common occurrence with new engines is for the piston to become stuck at the top of its travel in the sleeve. This occurrence is completely different from hydro-locking and is caused by the tight fit of the piston and sleeve when the engine is new. In order to relieve the stuck piston use a flat blade screwdriver through the flywheel's access hole in order to pry the flywheel through its rotation.

This sticking issue should be completely eliminated by the break-in procedure.

If available, we recommend using a spin starter or starter box for the initial starts, even with a pull start equipped engine.

You may need to "blip" the throttle on the transmitter (applying throttle on/off) while trying to start the engine, as new engines are more difficult to start due to the tight piston/cylinder fit.

TANK-BY-TANK BREAK-IN PROCEDURE:

TANK #1

1. Once the engine starts the exhaust should emit lots of blue/white smoke, indicating that the engine is rich (a good thing during break-in). During the first tank of fuel, you may wish to set a higher than normal idle speed and/or leave the glow igniter attached in order to keep the engine from stalling.
2. Drive your vehicle on a large, flat, paved surface. Over a 2-second time span, gently pull the throttle trigger to 1/4 throttle and back again to idle. Accelerate and decelerate as smoothly as you can.
3. While accelerating, look for thick blue/white smoke from the exhaust. If there is no smoke, richen the high-speed fuel mixture 2 hours by turning the needle counterclockwise. Imagine the slot in the needle is like the hour hand on a clock. Adjust it as though you were moving the hour hand from one hour to the previous one.
4. Regularly check the fuel level while running. When the fuel tank is nearly empty, shut off the engine by touching the flywheel with a tool handle or small block of wood. Do this when the engine is at idle speed only.
5. Rotate the flywheel so that the piston is at bottom dead center (BDC). BDC can be found by rolling the engine over by the flywheel with your finger into the area of rotation that is "free" and without any drag. Let the engine cool for 15 minutes.

TANK #2

1. Drive your vehicle on a large, flat, paved surface. Over a 2-second time span gently pull the throttle trigger to 1/2 throttle and back again to idle. Accelerate and decelerate as smoothly as you can.

2. Regularly check the fuel level while running. When the fuel tank is nearly empty, shut off the engine by touching the flywheel with a tool handle or small block of wood. Do this when the engine is at idle speed only.
3. Rotate the flywheel so that the piston is at bottom dead center (BDC). Let the engine cool for 15 minutes.

TANK #3

1. Drive your vehicle on a large, flat, paved surface. Over a 3-second time span gently pull the throttle trigger to 1/2 throttle and back again to idle. Accelerate and decelerate as smoothly as you can.
2. As the engine breaks in, the idle speed may increase and cause your vehicle to try to creep forward when stopped. If this begins to occur, reduce the idle speed by turning the idle adjustment on the carburetor counterclockwise.
3. Regularly check the fuel level while running. When the fuel tank is nearly empty, shut off the engine by touching the flywheel with a tool handle or small block of wood. Do this when the engine is at idle speed only.
4. Rotate the flywheel so that the piston is at bottom dead center (BDC). Let the engine cool for 15 minutes.

TANK #4

1. Drive your vehicle on a large, flat, paved surface. Over a 3-second time span gently pull the throttle trigger to 3/4 throttle and back again to idle. Accelerate and decelerate as smoothly as you can.
2. Regularly check the fuel level while running. When the fuel tank is nearly empty, shut off the engine by touching the flywheel with a tool handle or small block of wood. Do this when the engine is at idle speed only.
3. Rotate the flywheel so that the piston is at bottom dead center (BDC). Let the engine cool for 15 minutes.

TANK #5

1. Drive your vehicle on a large, flat, paved surface. Over a 3-second time span gently pull the throttle trigger to full throttle and back again to idle. Accelerate and decelerate as smoothly as you can.
2. Regularly check the fuel level while running. When the fuel tank is nearly empty, shut off the engine by touching the flywheel with a tool handle or small block of wood. From the fifth tank on, you will not need to let the engine cool between tanks. However when shutting down the engine at any time, rotate the flywheel so that the piston is at bottom dead center (BDC).

TANK #6

1. Clean and reoil your air filter before you proceed. During the sixth tank of fuel, you can run your vehicle on smooth flat surfaces and off-road dirt as well. The engine can now begin to be tuned for general performance use.

COLD WEATHER BREAK-IN TIPS

During the break-in process, the piston and sleeve wear into each other to form a precise fit. The engine needs to heat up to a temperature of around 200 to 215 degrees to relieve most of the mechanical stresses that the piston/sleeve/rod must endure during initial break-in. A precise fit between these components is critical for proper compression, and optimum performance. If the engine runs too cold during break-in, the piston and sleeve will not expand to their appropriate sizes for break-in, and this can lead to premature wear of these components.

- In cold weather conditions it is recommended to use a heat gun to heat the engine to 160-180 degrees before you start each tank of the break-in process.

- Once the engine is running, it is important to keep the temperature of the engine up around 200 to 215 degrees during break-in. In weather below 45 degrees, the engine will tend to run at lower than recommended temperatures of between 140 to 175 degrees (at proper break-in mixture settings). Do not lean the fuel mixture to increase engine temperature as this will decrease the available lubrication and cause your piston/sleeve to wear prematurely.
- If needed wrap the cooling head with aluminum foil, paper towel, clean rag, or sock in order to block some of the cooling airflow and help keep the engine running around the recommended 200 to 215 break-in temp.

The engine can actually run too hot if too much of the cooling airflow is blocked. Make sure that you monitor the engine's temp closely for the first couple of tanks until you get the correct amount of cover for the cooling head which will depend on your current weather conditions.

Adjust the cover up or down in order to expose more or fewer cooling fins to regulate engine operating temperature.

- If you do not have a temperature probe, a drop of water on the cooling head (down around the glow plug area) should slowly sizzle for about 5 to 10 seconds at around 200 to 210 degrees. If the water sizzles for only a couple of seconds, the engine is likely over 220 degrees, and needs to be cooled down. If water takes a long time or does not evaporate at all, it means that the engine is running too cool.
- It is not recommended that you operate your engine when ambient temperatures are below 35 degrees Fahrenheit. If you attempt to run your vehicle below 35 degrees, your engine may become very difficult to start and tune. At temperatures below freezing, nitro fuel can begin to gel causing tuning and erratic running issues along with being harmful to the engine.

TUNING YOUR DYNAMITE RACING ENGINE

A nitro engine's performance depends on the fuel mixture. Turning the mixture needles clockwise will lean the fuel mixture and turning the mixture needles counterclockwise will richen it. Leaning the fuel mixture will increase engine power up to the point that the engine begins to starve for fuel and begins to overheat. An engine should never be run too lean; doing so severely shortens the life of the engine. When an engine is too lean, it will run very strong immediately after being started but will soon begin to sag and hesitate or stall when accelerating. The best way to tune an engine is by using an infrared temperature gauge, but you can use water to check the head temperature also.

TUNING THE HIGH-SPEED NEEDLE

To obtain the correct high-speed needle setting, start the engine and drive your vehicle around for a minute or two. Make several high-speed passes at full throttle in order to clear out the engine. Place a drop of water on the cylinder head. If the water sizzles away (evaporates immediately), the needle setting is too lean. A correct needle setting will result in the water evaporating after 3-5 seconds. If the water does not evaporate, chances are good that the needle setting is too rich. Lean the needle 1 hour (imagine the slot in the needle is the hour hand on a clock and adjust it as though you were moving the hour hand from one hour to the next or previous one) and run the engine again, adjusting the needle setting to get the desired evaporation time.

Check the temperature each time you change the needle mixture. Do not let the engine overheat, as this will damage the engine.

TUNING THE LOW-SPEED NEEDLE

The low-speed needle (also referred to as the idle mixture or idle needle) should be set after you're satisfied with the high-speed needle setting. After achieving the proper operating temperature, make a couple of high-speed passes and then reduce the engine throttle to the idle position. Pinch the fuel line with your fingers close to the carb fuel inlet nipple. If the engine dies immediately, the low-speed needle is set too lean. If the rpm's increase dramatically, the setting is too rich. The ideal setting results in the rpm's increasing just a slight amount after pinching the fuel line.

MID-RANGE NEEDLE ADJUSTMENT

The mid-range adjustment screw adjusts the air/fuel mixture at half throttle and can dramatically affect mid-range throttle response. The factory setting will provide a slightly rich mid-range. For a crisper leaner mid-range, desirable on high traction tracks where maximum acceleration is needed, turn the mid-range screw out (counterclockwise) 1 full turn. To soften the mid-range response (richer), turn the mid-range screw clockwise 1 full turn for a softer feel during acceleration, best suited for low traction conditions.

Note: The mid-range adjustment screw and low-speed needle work in unison. Any time the mid-range adjustment screw is adjusted it will be necessary to readjust the low-speed needle. When turning the mid-range screw in (clockwise), the low-speed needle will need to be backed out (counterclockwise). When the mid-range screw is backed out (counterclockwise), the low-speed needle will need to be adjusted inward (clockwise).

IDLE SPEED ADJUSTMENT

The last setting to be made is the idle speed. Remember, this adjustment should be made while the engine is running at normal operating temperature.

1. Make sure the throttle trim is set so that the carburetor is fully closed against the idle speed screw when the trigger is in the neutral position. The best way to assure that this setting is correct is by applying the brakes after several high-speed runs. After the vehicle has stopped, release the trigger to the neutral position, the engine should not pick up rpm's. When the brakes are reapplied the rpm's should not drop. When the throttle trim is set correctly you should have to apply a slight amount of forward throttle before the rpm's begin to rise from idle. This will ensure that the throttle slide is resting against the idle adjustment screw.
2. Turn the idle speed screw counterclockwise to reduce the idle speed, or clockwise to increase it. When there is a need to increase the idle speed, slightly open the throttle position while doing so in order to keep the idle screw from damaging the carburetor slide. Ideally, the engine should idle just fast enough to be reliable. Avoid an idle that is set too high, as it will cause the clutch mechanism to overheat and fail.

FINE-TUNING THE CARBURETOR

Daily changes in temperature and barometric pressure may require you to adjust your carburetors needles. Also if you run your vehicle at a new location at a different altitude, some carburetor adjustment may be needed.

When the weather is colder and the air density is higher, you may need to richen the fuel mixture.

Conversely when the weather is warmer and the air density is lower, you may need to lean the fuel mixture. Remember to make small adjustments of 1 hour at a time. Imagine the slot in the needle is like the hour hand on a clock. Adjust it as though you were moving the hour hand from one hour to the next or previous one.

FUEL MIXTURE ADJUSTMENT CHART

The following chart provides general guidelines on how weather conditions and altitude affect air density when they move higher or lower than your baseline setting.

IF	IS	Creates an air density that is	Required Tuning Adjustment
Temperature	Higher	Less Dense	Leaner
	Lower	More Dense	Richer
Humidity	Higher	Less Dense	Leaner
	Lower	More Dense	Richer
Pressure	Higher	More Dense	Richer
	Lower	Less Dense	Leaner
Altitude	Higher	Less Dense	Leaner
	Lower	More Dense	Richer
Nitro %	Higher	N/A	Richer
	Lower	N/A	Leaner

TUNING ENGINES BY TEMPERATURE

Do not rely on a temp gauge alone to tune your engine as there is NO optimal temperature that will deliver the best tune on any given day. Factors such as track conditions, driving style, atmospheric conditions, and gauge accuracy will affect operating temperatures

Tune the engine by paying very close attention to how it responds to changes in fuel mixture (more smoke/less smoke, fast/sluggish, reliable/stalling, smooth sound/ muffled sound, etc). Remember to make small adjustments of 1 hour at a time. Imagine the slot in the needle is like the hour hand on a clock. Adjust it as though you were moving the hour hand from one hour to the next or previous one. Once the engine is tuned for acceptable performance, then observe the temperature.

A temperature gauge should only be used as a tuning aid by giving you a relative indication of how your adjustments are affecting the engine and to help prevent you from reaching higher than recommended engine operating temperatures. As you lean the fuel mixture, the engine performance will increase along with the temperature. If you continue to lean the fuel mixture and the temperature increases but the engine performance does not change, then you have exceeded the maximum safe lean setting. In general, try to keep your engine from exceeding 270°F when measured at the glow plug. Most properly and fully broken in engines operate well at temperatures of 200 to 265°F depending on track conditions, driving style, atmospheric conditions, and gauge accuracy.

FACTORY NEEDLE SETTINGS

If at any point you find yourself “lost” as far as tuning goes, going back to the factory carburetor settings should allow you to get right back on track.

Following is a listing of available carburetors and their factory preset needle settings.

.21 AND LARGER 2-NEEDLE SLIDE VALVE CARBURETOR:

High-Speed Needle: 3½ turns out (counterclockwise) from closed.

Low-Speed Needle: 2 turns out (counterclockwise) from closed.

.21 AND LARGER 3-NEEDLE SLIDE VALVE CARBURETOR:

High-Speed Needle: 3½ turns out (counterclockwise) from closed.

Low-Speed Needle: 2 turns out (counterclockwise) from closed.

Mid-Range Needle: Screw should be just slightly in from flush with the face of the carburetor.

.12, .15, .18 2-NEEDLE SLIDE VALVE CARBURETOR:

High-Speed Needle: 2 turns out (counterclockwise) from closed.

Low-Speed Needle: 2 turns out (counterclockwise) from closed.

.12, .15, .18 2-NEEDLE ROTARY CARBURETOR:

High-Speed Needle: 2 turns out (counterclockwise) from closed.

Low-Speed Needle: 2 turns out (counterclockwise) from closed.

When checking the adjustment of the low-speed needle, it is crucial that the throttle slide is closed completely when turning the needle and that you do not over-tighten the needle. Use a Dynamite 3-IN-1 engine-tuning screwdriver (DYN3048) to make this job easier. When you feel resistance in the needle, immediately stop turning and begin turning the needles counterclockwise, counting the number of turns from “closed”.

TROUBLESHOOTING GUIDE

Problem	Possible Cause/Solution
Engine won't start:	<ul style="list-style-type: none"> · Clogged fuel line · Bad or improper glow plug · Glow igniter not charged
Engine starts, and then dies:	<ul style="list-style-type: none"> · Engine flooded · Pressure line blocked or disconnected · Bad or improper glow plug
Engine starts and runs for 1/2 tank and then quits	<ul style="list-style-type: none"> · High-speed needle too lean · Hole or tear in fuel line · Defective fuel tank · Bad or improper glow plug · Idle speed set too low · Overheated engine (too lean) · Improper needle settings

PROTECTING YOUR INVESTMENT

AFTER-RUN MAINTENANCE

After-run maintenance must be performed in order to keep your engine in proper operating condition.

After each day of running, it's critical to use a high-quality after-run oil to protect the internals of the engine and help prevent corrosion. The methanol used in the fuel attracts moisture that can cause corrosion (particularly in the ball bearings).

Follow these steps after running your engine:

1. Empty all fuel from the tank.
2. Start and run the engine until completely out of fuel.
3. Carefully remove the air filter. Avoid allowing any dirt or debris to enter the carburetor. Add 5 to 6 drops of a quality after-run oil into the carburetor. Turn the engine over a few times to distribute the oil throughout the engine.
4. Clean and inspect the engine, air cleaner and fuel system.

Never run your engine without a properly cleaned and oiled air filter. If you happen to lose an air filter while running your vehicle stop immediately! Clean, reoil and reinstall the air filter before continuing.

A throttle return mechanism is recommended. This can be as simple as a rubber band on the throttle linkage. This will prevent high-rpm engine runaways in the case of radio or receiver pack malfunction. The Dynamite throttle return spring kit (DYN6640) is highly recommended for .21 and larger engines.

A few minutes spent before and after each time you run your model will allow you to enjoy it for a long time to come.

WARRANTY PERIOD

Exclusive Warranty- Horizon Hobby, Inc., (Horizon) warrants that the Products purchased (the "Product") will be free from defects in materials and workmanship at the date of purchase by the Purchaser.

LIMITED WARRANTY

(a) This warranty is limited to the original Purchaser ("Purchaser") and is not transferable. REPAIR OR REPLACEMENT AS PROVIDED UNDER THIS WARRANTY IS THE EXCLUSIVE REMEDY OF THE PURCHASER. This warranty covers only those Products purchased from an authorized Horizon dealer. Third party transactions are not covered by this warranty. Proof of purchase is required for warranty claims. Further, Horizon reserves the right to change or modify this warranty without notice and disclaims all other warranties, express or implied.

(b) Limitations- HORIZON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, ABOUT NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF THE PRODUCT. THE PURCHASER ACKNOWLEDGES THAT THEY ALONE HAVE DETERMINED THAT THE PRODUCT WILL SUITABLY MEET THE REQUIREMENTS OF THE PURCHASER'S INTENDED USE.

(c) Purchaser Remedy- Horizon's sole obligation hereunder shall be that Horizon will, at its option, (i) repair or (ii) replace, any Product determined by Horizon to be defective. In the event of a defect, these are the Purchaser's exclusive remedies. Horizon reserves the right to inspect any and all equipment involved in a warranty claim. Repair or replacement decisions are at the sole discretion of Horizon. This warranty does not cover cosmetic damage or damage due to acts of God, accident, misuse, abuse, negligence, commercial use, or modification of or to any part of the Product. This warranty does not cover damage due to improper installation, operation, maintenance, or attempted repair by anyone other than Horizon.

Return of any goods by Purchaser must be approved in writing by Horizon before shipment.

DAMAGE LIMITS

HORIZON SHALL NOT BE LIABLE FOR SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR PRODUCTION OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCT, WHETHER SUCH CLAIM IS BASED IN CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY. Further, in no event shall the liability of Horizon exceed the individual price of the Product on which liability is asserted. As Horizon has no control over use, setup, final assembly, modification or misuse, no liability shall be assumed nor accepted for any resulting damage or injury. By the act of use, setup or assembly, the user accepts all resulting liability.

If you as the Purchaser or user are not prepared to accept the liability associated with the use of this Product, you are advised to return this Product immediately in new and unused condition to the place of purchase.

Law: These Terms are governed by Illinois law (without regard to conflict of law principals).

SAFETY PRECAUTIONS

This is a sophisticated hobby Product and not a toy. It must be operated with caution and common sense and requires some basic mechanical ability. Failure to operate this Product in a safe and responsible manner could result in injury or damage to the Product or other property. This Product is not intended for use by children without direct adult supervision. The Product manual contains instructions for safety, operation and maintenance. It is essential to read and follow all the instructions and warnings in the manual, prior to assembly, setup or use, in order to operate correctly and avoid damage or injury.

QUESTIONS, ASSISTANCE, AND REPAIRS

Your local hobby store and/or place of purchase cannot provide warranty support or repair. Once assembly, setup or use of the Product has been started, you must contact Horizon directly. This will enable Horizon to better answer your questions and service you in the event that you may need any assistance. For questions or assistance, please direct your email to productsupport@horizonhobby.com, or call 877.504.0233 toll free to speak to a service technician.

INSPECTION OR REPAIRS

If this Product needs to be inspected or repaired, please call for a Return Merchandise Authorization (RMA). Pack the Product securely using a shipping carton. Please note that original boxes may be included, but are not designed to withstand the rigors of shipping without additional protection. Ship via a carrier that provides tracking and insurance for lost or damaged parcels, as Horizon is not responsible for merchandise until it arrives and is accepted at our facility. A Service Repair Request is available at www.horizonhobby.com on the "Support" tab. If you do not have internet access, please include a letter with your complete name, street address, email address and phone number where you can be reached during business days, your RMA number, a list of the included items, method of payment for any non-warranty expenses and a brief summary of the problem. Your original sales receipt must also be included for warranty consideration. Be sure your name, address, and RMA number are clearly written on the outside of the shipping carton.

WARRANTY INSPECTION AND REPAIRS

To receive warranty service, you must include your original sales receipt verifying the proof-of-purchase date. Provided warranty conditions have been met, your Product will be repaired or replaced free of charge. Repair or replacement decisions are at the sole discretion of Horizon Hobby.

NON-WARRANTY REPAIRS

Should your repair not be covered by warranty the repair will be completed and payment will be required without notification or estimate of the expense unless the expense exceeds 50% of the retail purchase cost. By submitting the item for repair you are agreeing to payment of the repair without notification. Repair estimates are available upon request. You must include this request with your repair. Non-warranty repair estimates will be billed a minimum of 1/2 hour of labor. In addition you will be billed for return freight. Please advise us of your preferred method of payment. Horizon accepts money orders and cashiers checks, as well as Visa, MasterCard, American Express, and Discover cards. If you choose to pay by credit card, please include your credit card number and expiration date. Any repair left unpaid or unclaimed after 90 days will be considered abandoned and will be disposed of accordingly. Please note: non-warranty repair is only available on electronics and model engines.

UNITED STATES

Electronics and engines requiring inspection or repair should be shipped to the following address:

Horizon Service Center
4105 Fieldstone Road
Champaign, Illinois 61822

All other Products requiring warranty inspection or repair should be shipped to the following address:

Horizon Product Support
4105 Fieldstone Road
Champaign, Illinois 61822

Please call 877-504-0233 or e-mail us at productsupport@horizonhobby.com with any questions or concerns regarding this product or warranty.

UNITED KINGDOM

Electronics and engines requiring inspection or repair should be shipped to the following address:

Horizon Hobby UK
Units 1-4 Ployters Rd
Staple Tye
Harlow, Essex
CM18 7NS
United Kingdom

Please call +44 (0) 1279 641 097 or e-mail us at sales@horizonhobby.co.uk with any questions or concerns regarding this product or warranty.

GERMANY

Electronics and engines requiring inspection or repair should be shipped to the following address:

Horizon Technischer Service
Hamburger Strasse 10
25335 Elmshorn
Germany

Please call +49 4121 46199 66 or e-mail us at service@horizonhobby.de with any questions or concerns regarding this product or warranty.

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