

MT83

ENGINE

INSTRUCTION & SAFETY MANUAL



XRAY[®]

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Congratulations on your purchase of the high-performance NT18 0.8cc nitro-powered engine.

Developed for highest performance and excellent reliability, this engine represents the perfect combination of manufacturing quality and race-winning experience.

The XRAY NT18 0.8cc engine has the following features:

- uses standard model car fuel
- standard glowplug design
- durable construction
- adjustable, dual-needle, slide carburetor (aluminum)
- large, blue-anodized billet aluminum heatsink cooling head

Internal combustion (or "nitro-powered") engines require some basic knowledge and understanding, as well as important safety considerations.

SAFETY FIRST

!! READ & UNDERSTAND BEFORE OPERATING THE ENGINE !!

This engine is NOT A TOY, it is a precision-manufactured machine. This machine can injure to you or other nearby, and can also damage property. It is very important to pay attention as indicated in this manual. Improper use of the machine can be very dangerous.

You alone are responsible for operating your engine safely; act with discretion and pay special attention at all times.

- Carefully read and fully understand all of the safety instructions and engine operation instructions before you operate your engine.
- Keep these manuals in a place so you know where they are at all times.
- Follow the instructions carefully.

The information in this manual will help to prevent injuries to users and other as well as protecting objects from damage.

GRAPHIC INDICATIONS

The following words and graphic indications are used throughout this manuals.
Be sure you fully understand these meanings before reading the text.

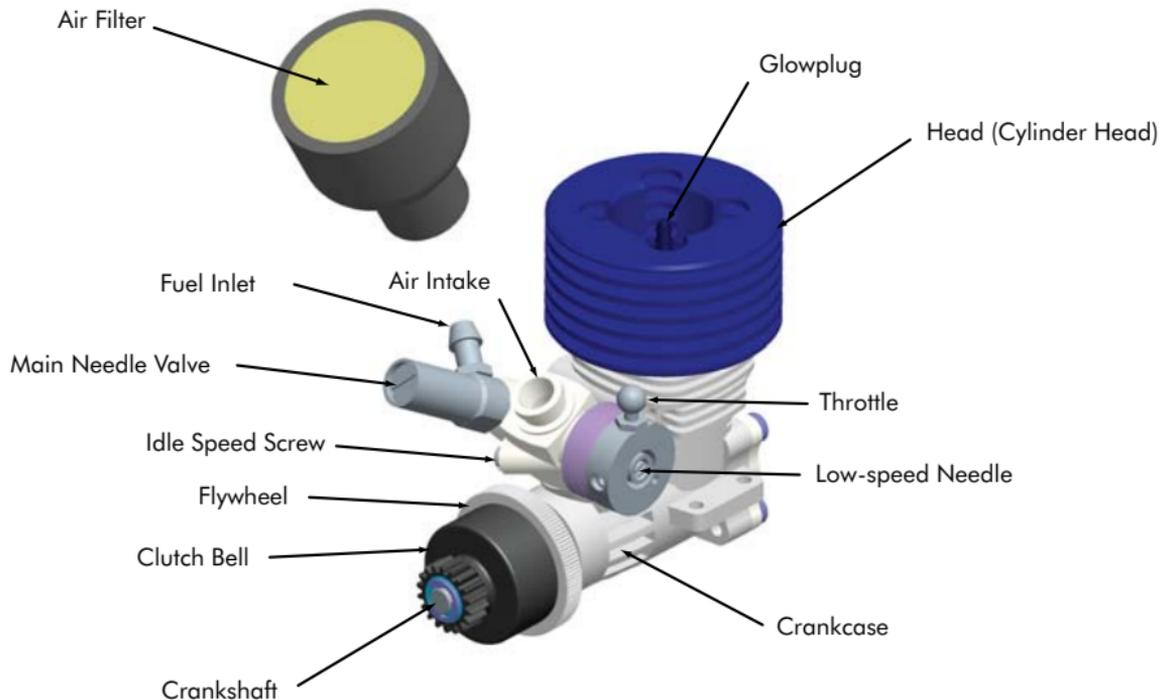
 DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
 WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
 CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderated injury, or damage of objects nearby.

Example of graphic indications:

	Warning or caution	The illustration indicates the contents of the warning or cautions. This graphic means be careful of high temperatures.
 DO NOT TOUCH	Actions are prohibited	The actions prohibited are indicated in or near the illustration. This graphic means do not touch.
 COMPULSORY	Compels or instructs certain actions	You must follow the instruction carefully. This graphic means "compulsory."

PARTS AND EQUIPMENT

This section illustrates the parts of the NT18 engine, and also describes fuel, glowplug, and air filter that you will use in the operation of this nitro-powered engine.





Fuel

For break-in and general running, use high-quality, market-available model car fuel containing 20% lubricant and 15~30% nitromethane by volume ratio.

Although you can obtain more power by increasing the nitromethane content, it will shorten engine life.



Glowplug

The type and quality of glowplug used for your engine has a substantial impact on overall performance and reliability. We strongly recommend glowplugs by XRAY. Glowplugs are consumables and the life of plug depends on several factors and manners of use.



Air Filter

Do not run engine without an air filter!

The air filter protects the engine from the intake of dust and other contaminants. A properly maintained air filter is essential to the life and performance of the engine. Use proper air filter oil with your air filter. The oil softens the foam element and traps dirt more easily. We strongly recommend that you clean and re-oil the air filter after every 1 hour of runtime (even if the filter looks clean) to maintain proper engine performance and avoid engine damage. To clean the air filter parts (including the foam filter element), wash the parts in hot soapy water, and rinse thoroughly with clean water. Dry the parts with a clean towel or compressed air (use safety eyewear). Oil the foam element with proper air filter oil.



Exhaust System

We recommending using only the XRAY-supplied exhaust system for best performance.

STARTING & SUPPORT EQUIPMENT



Starter Box

You must start the engine by first spinning the clutch flywheel. We strongly recommend using the #104300 HUDY Micro Start-Box, which is specifically designed for starting the NT18 engine.



Glowplug Starter

A glowplug starter is required to ignite the glowplug for starting. We recommend using a high-quality, battery-operated glowplug starter from a reputable manufacturer.



Glowplug Wrench

A glowplug wrench is required for removing/installing the engine glowplug. We recommend using a high-quality glowplug wrench such as the #107581 HUDY Wrench-Glowplug.



Screwdriver

A small flat-blade screwdriver is required for adjusting the carburetor. We recommend using high-quality tools such as those offered by HUDY.

INSTALLATION

 DANGER	 PROHIBITION	If you break in your engine by using a propeller, never use a propeller that has any cracks, scratches, or even the slightest signs of breakage.
 WARNING	 COMPULSORY	This model engine is designed exclusively for installation into model cars. Never use it for any other purpose. It may cause personal injury or mechanical failure.
	 COMPULSORY	Fix the engine firmly to the model, using tough bolts/nuts or screws with locking components/features that will prevent them from loosening. Do not clamp the engine in a vise. To test the engine, use a durable engine test stand available from hobby sources such as model shops. If not affixed properly, the engine may jump off the stand during operation and cause personal injury or mechanical failure.
	 COMPULSORY	In order to avoid ear damage, use an effective silencer (muffler) for sound reduction.
 CAUTION	 COMPULSORY	Exhaust gas emits annoying noise to surrounding people. Pay attention to location and time of use.

Before mounting the engine into the chassis, check that the bottom surfaces of the engine mounts blocks are flat. This is important to avoid any distortion of the crankcase, and to optimize heat dissipation through the chassis.

Hint: To flatten the bottom part of the mounted engine mounts, attach the engine mounts to the engine, then rub the bottom of the mounts on a piece of sandpaper until there is full-surface contact.

Mount the engine on the chassis and align the clutch pinion(s) with the gear(s). Adjust the gear mesh.

Hint: Use a piece of paper between the pinion and the gear, tighten the engine mounting screws and remove the paper. This should give you approximately 0.1mm of play in the gear mesh.

After connecting the fuel and pressure lines and hooking up the throttle linkage to the carburetor, check that the carburetor opens and closes smoothly without binding. If there is any restriction of movement, adjust the throttle linkage or the position of the carburetor on the engine.

If your transmitter has throttle servo trim adjustment (a.k.a. "end point adjustment"), adjust the range of motion of the throttle linkage for full throttle and full brake.

STARTING THE ENGINE

This section describes proper starting techniques and some troubleshooting information.

Safety Information

! WARNING	 PROHIBITION	Keep loose objects such as shirt sleeves, neckties, and scarves away from the spinning tires, flywheel, and gears. Be careful not to drop utensils such as screwdrivers and pencils into the spinning tires, flywheel, and gears. If these objects contact moving engine or transmission parts, it may cause mechanical breakage and personal injury.
	 PROHIBITION	When you operate an engine, keep children and others away from you and the engine. Anyone who is not operating the engine must be at least 6 meters away from the engine. If the engine comes off, it may cause injury.
	 PROHIBITION	Never operate the engine in an enclosed area such as a basement or a garage. Model engines, like automobiles, emit poisonous exhaust fumes during operation. Only operate the engines outdoors where there is good ventilation.
	 DO NOT TOUCH	Make certain the glowplug clip is not in the way of the spinning tires, flywheel and gears. Damage may be caused if it contacts the spinning tires, flywheel or gears.
! CAUTION	 COMPULSORY	Check the throttle linkage connections before starting and running the model car. If any connections fail, it may cause personal injury.
	 COMPULSORY	We strongly recommend wearing safety eyeglasses or safety shields when you operate an engine.
	 FLAMMABLE	Model engine fuel is highly flammable and must be handled with the extreme caution. Keep objects that create fire risks (such as cigarettes) away from the engine and fuel supply system. No-one should be smoking nearby the engine or fuel.

Starting Procedure

Fill up the fuel tank and "dry-start" the engine for 2-3 seconds without applying the glowplug starter, and with the carburetor in "idle" position; this primes the fuel lines and allows the fuel to reach the engine. Then apply the glowplug starter and start the engine. The engine should fire up immediately.

If the engine does not fire up immediately, check the fuel line to see if fuel is reaching the carburetor. If fuel is not reaching the carburetor, remove the glowplug starter, cover the exhaust tailpipe and "dry-start" the engine for 2 seconds. This will build up extra pressure in the pipe and in the pressure line to the fuel tank, causing the fuel to be pushed to the carburetor.

Apply the glowplug starter, and start the engine.

Once the engine has started, apply a little throttle and allow the engine to warm up to operating temperature. This is an important routine that you should always follow. The internal parts need to receive lubrication and reach operating temperature before the engine can have a load applied to it.

If your transmitter has throttle servo trim adjustment (a.k.a. "end point adjustment"), adjust the range of motion of the throttle linkage for full throttle and full brake.



Flooding & Hydraulic Lockup

Excess fuel in the cylinder may cause the engine to flood (by extinguishing the glowplug), or it may cause a hydraulic lockup (when excess fuel fills the cylinder above the piston, preventing the piston from moving upward). If this happens, **DO NOT** try to start the engine, or severe engine damage may result.

1. Remove the glowplug, open the throttle fully, cover the glowplug hole with a cloth, then turn over the engine. The excess fuel will be ejected through the glowplug hole.
2. Check the operation of glowplug with the glowplug starter before screwing the glowplug back in again.
Restart the engine.



OPERATING THE ENGINE

This section contains important engine safety operation information.

Safety Information – ENGINE OPERATION & RELATED MATTERS

WARNING	 FLAMMABLE	Fuel is highly flammable. Always store fuel in a safe place away from any danger of sparks, excessive heat, or anything which could ignite the fuel. Mishandling fuel and fuel containers may cause fires.
	 COMPULSORY	Fuel for model engines contains highly-volatile and poisonous ingredients such as methanol. Store the fuel where children cannot reach it. If someone's skin or face has been splashed with fuel, first wash it away with soap and water, then immediately consult a physician. If you swallow fuel, it is imperative to seek immediate medical treatment. Failure to undergo such treatment may endanger your life.
	 PROHIBITION	When possible, do not operate the engine-equipped model alone. Airplanes, helicopters, boats, or automobiles powered by model engines may harm other persons or objects if you v control. Remember that operating any model with your engine requires skill and continuous safety precautions. When you operate a model, you should ask for the assistance of an experienced person who can accompany you, recognize emergency situations nearby, and has enough experience in avoiding possible dangers.
CAUTION	 DO NOT TOUCH	Never touch any part of the engine while it is running, or immediately after the engine has stopped. Some portions of model engines become considerably hot during operation and remain so for a long time after shutdown. If you touch those components, you may get burned.
	 PROHIBITION	Keep your face, hands, and body away from the spinning tires, flywheel and gears to prevent injury. If the tires, flywheel or gears break, flying pieces may result in personal injury.
	 PROHIBITION	When checking the electric conduction to the plug, use a tool or clamp to handle. Never touch the plug or cable directly by hand. In this event, keep your face away from the heated portion. Seething fuel may spout out and cause a skin burn.
	 PROHIBITION	After the engine has stopped, it may restart if turned over even without plug heating. Be cautious to avoid such situations may cause personal injury or equipment failure.
	 COMPULSORY	When you handle your model car with the engine running, be especially careful about keeping it away from you and others.
	 COMPULSORY	To stop the engine, reduce the engine RPM to idle and pinch the fuel line to stop fuel flowing to the engine. Pay close attention not to touch rotating parts; carelessness around rotating parts may cause personal injury.

ENGINE BREAK-IN

Each engine is shipped from the factory with all carburetor settings set to a standard position.

A nitro-powered engine requires careful break-in the first time the engine is used to allow the internal parts to achieve proper operating clearances. This is especially true of the piston/cylinder, crankshaft, and conrod. Pay close attention during the initial break-in period; this process is very important to achieve the best engine performance, reliability, and lifespan.

The proper way to break in this nitro engine is to "heat cycle" the engine with short periods of running followed by cooling down periods. Heat cycling allows the engine to heat up to its optimum operating temperature, allowing the components to "wear in" to each other properly. During the running time, the engines should be run only SLIGHTLY rich at the top end; overly rich mixtures and cold temperature break-in will lead to premature wear and failure of the piston & sleeve and other engine components.

First, install the engine in the car, then break in the engine by performing the following steps:

1. Keep the carburetor factory settings; do not adjust.
2. Fill the fuel tank and "dry-start" the engine for 2-3 seconds without applying the glowplug starter, and with the carburetor in the "idle" position. This primes the fuel lines and allows the fuel to reach the engine.
3. Apply the glowplug starter and start the engine with a starter. We strongly recommend using the #104300 HUDY Micro Start-Box.
4. Allow the engine to idle for a short time so the engine warms up.
5. Run the engine for 5~8 minutes, varying the throttle setting, without exceeding 1/2 throttle.
The engine should run cleanly, and only SLIGHTLY rich at the top (noted by a very slight "burbling"). If the engine runs very crisply with high temperature and hard acceleration, it is probably running too lean; turn the main needle CCW slightly to richen the mixture very slightly at the top.
6. Stop the engine and allow it to cool down completely. Make sure the piston does not get stuck at top of the cylinder (TDC); rotate the flywheel to move the piston to the bottom of the cylinder (BDC).
7. Run the engine for several more heat cycles:
 - 5~8 minutes up to 2/3 throttle, then complete cool-down.
 - 5~8 minutes up to 3/4 throttle, then complete cool-down. (During the running, start to lean the main needle so it runs only very slightly rich – less than before – on top.)
 - Run through a full tank of fuel up to full throttle, adjusting the main needle so the engine runs cleanly at high RPM.

Do not run the engine at high RPM without load; that is, don't pick the car off the ground and run the engine hard. The engine will overheat without the airflow over its cooling head, damaging the engine components.

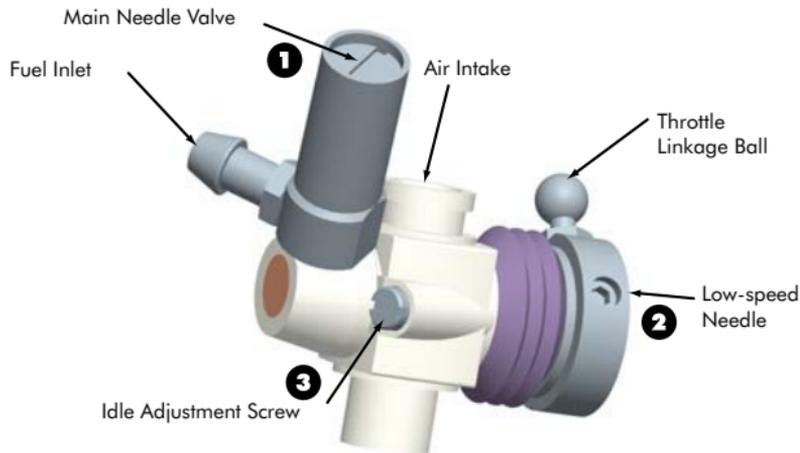
CARBURETOR ADJUSTMENT – OVERVIEW

The "Golden Rule of Carburetor Adjustment" is to make only small adjustments at one time, maximum 1/8 turn (45°), especially when fine tuning. The engine is very responsive to small changes in mixture settings.

The carburetor on the NT18 engine is preset at the factory, meaning that the original settings are close to where they should be for normal operation.

The engine carburetor has 3 adjustments:

- 1 Main needle valve
- 2 Low-speed needle
- 3 Idle adjustment screw



The carburetor has three settings that may be adjusted. Note that the initial position of each setting has been adjusted by the air gauge before shipping from our factory.

1. Main Needle Valve

The main needle valve controls the overall fuel flow to the carburetor, though its effects are particularly noticeable between $\frac{1}{4}$ and full throttle.

In the situation where this setting has not been adjusted, or if you get lost with your setup, put the main needle valve to the factory setting:

- Turn the needle CW until it barely stops (do not tighten it further or you will damage the carburetor).
- Turn the needle CCW by 3-4 turns from the fully-closed position.

2. Low-speed Needle

The low-end needle controls the amount of fuel at idle and low RPM (up to approximately $\frac{1}{4}$ throttle).

3. Idle Adjustment Screw

The idle screw controls the idle RPM when the carburetor is fully closed. We strongly recommend that the initial, factory-default setting be used for normal operation.



Main Needle Adjustment

When the main needle is properly adjusted, the engine immediately responds to the throttle operation with clean, hard acceleration without hesitation.

To check if the engine is running at a proper setting, pinch the fuel line to the carburetor and observe the results:

- At a proper setting, the engine RPM increases instantly then the engine dies out.
- If engine dies out immediately without increasing RPM, the main needle setting is too lean.

Low-End Needle Adjustment

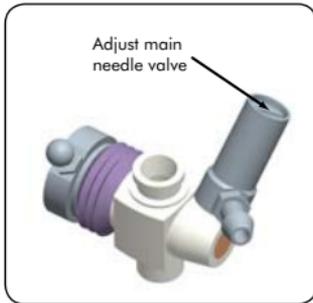
The most difficult thing to adjust is the low-speed adjustment. Keep the following principles in mind when doing this:

- Use the idle adjustment screw to adjust the idle RPM immediately after closing the carburetor.
- Use the low-speed needle to adjust the fuel mixture 2-5 seconds after closing the carburetor.
- Use only a $\frac{1}{2}$ turn each way.

The low-end needle of each individual engine is precisely adjusted at the factory. The low-end needle adjusts the performance of the engine between idle up to approximately $\frac{1}{4}$ throttle. Above $\frac{1}{4}$ throttle the main needle has the most effect on engine performance.

CARBURETOR ADJUSTMENT – BEFORE PUTTING THE CAR ON THE TRACK

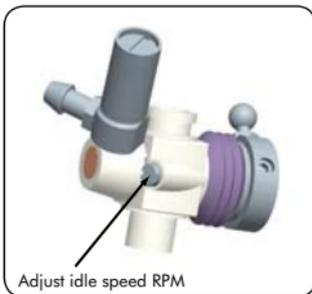
After the engine is running and has come up to operating temperature (within 15-20 seconds) proceed as follows:



Stage 1: Setting the Main Needle Slightly Rich

Take the car off the ground, and open the throttle fully. The engine should run cleanly until it reaches 80% of top RPM, after which it should start to run slightly rich (4-stroking):

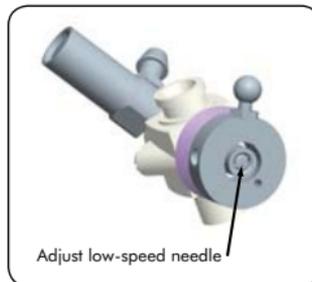
- If the engine runs cleanly all the way up to top RPM, richen the main needle (counter-clockwise) until it starts to 4-stroke at approximately 80% of its top RPM
- If the engine runs too rich (4-stroking all the way) lean the main needle (clockwise) until it only starts to 4-stroke at approximately 80% of its top RPM



Stage 2: Setting the Idle Speed

Take the car off the ground, and open the throttle fully for 2-3 seconds. Close the carburetor and check the idle speed that occurs immediately after.

- If the engine stops almost immediately, turn the idle adjustment screw clockwise to increase the idle RPM.
- If the idle RPM is too high, turn the idle adjustment screw counter-clockwise to reduce the idle RPM.



Stage 3: Setting the Low-speed Needle

Open the carburetor for 2-3 seconds and let the engine clean out. Close the carburetor and let the engine idle.

- If the engine idles for 2-5 seconds and then the idle RPM decreases, the engine is running too rich during idle. Lean the low speed needle (clockwise) to remedy this condition. Repeat this step until the engine idles reliably at a constant RPM for at least 20-30 seconds after the carburetor has been opened for 2-3 seconds.
- If the engine idles for 2-5 seconds and then the idle RPM increases, the engine is running too lean during idle. Richen the low speed needle (counter-clockwise) to remedy this situation.
- If the engine will not idle at all, rich the low speed needle (counter-clockwise), or turn the idle adjustment screw clockwise to increase the idle RPM.

NOTE: Because adjusting the low speed needle affects the idle RPM, use the idle adjustment screw to get the engine to idle at the right RPM.

Once you are satisfied that you have achieved reliable carburetor settings, you are ready to put your car on the track.

CARBURETOR ADJUSTMENT – AT THE TRACK

You can only fine-tune the main needle setting at the track. Initially, the main needle should still be set a little rich. Fill the fuel tank, run the car up to maximum speed for a few laps, and check if it reaches top RPM without running rich towards the end (4-stroking). Lean the main needle by small increments (1/12 of a turn, like 1 hour on a clock) and run the car again. Repeat these small adjustments until the engine accelerates well and reaches maximum speed without running rich. It is advised to then richen the main needle 1/8 of a turn (counter-clockwise).

Running the engine too lean will cause the engine to overheat, resulting in excessive engine wear and possibly breakdown. A fast, simple way to check the engine temperature is to apply a few drops of water to the cylinder head. The drops should evaporate only after 3-5 seconds. If they evaporate immediately the engine is too hot; richen the main needle 1/8 of a turn (counter-clockwise). Check engine temperature regularly and often.

The idle RPM and low-speed needle settings may require a little fine tuning after the main needle has been set properly. Once properly adjusted, the engine should produce a strong, high-pitched sound at maximum speed, and a thin trail of smoke should be visible from the exhaust tailpipe.

For more information about setting the idle and low-speed needle settings, see section Carburetor Adjustment – Before Putting the Car on the Track.

NOTE: The carburetor settings may change with changes in weather conditions, fuel, glowplug, or exhaust system. After changing any of these, always richen the main needle (counter-clockwise) 1/4 to 1/2-turn and then re-adjust the main needle again on the track.

FINE-TUNING THE CARBURETOR

After your engine has been properly broken in and tuned at the track, be aware that changes in weather (temperature, humidity, barometric pressure), altitude, and fuel nitro content will affect the performance of the engine. See the table below for guidelines on how to adjust your engine's carburetor settings to compensate for these various changes.

When...	does this...	change main needle setting...
Temperature	decreases	richer
	increases	leaner
Humidity	decreases	slightly richer
	increases	slightly leaner
Barometric pressure	decreases	leaner
	increases	richer
Altitude	lower	richer
	higher	leaner
Fuel nitro content (%)	lower	leaner
	higher	richer

ENGINE TROUBLESHOOTING

Engine spins but will not start:

- Make sure your glowplug starter is fully charged and is properly connected to the glowplug. If the starter is fully charged, replace the glowplug.
- Verify that fuel is getting to the carburetor. Remove the fuel line from the carburetor and see if there is fuel in it.
- Check your carb settings. It may be necessary to adjust the carb settings if the weather has significantly changed since the last time you ran the engine.

- The engine's compression may be low due to wear. This will make the engine difficult to start when it is warm, and may tend to stall when running and when the throttle is closed suddenly.

Engine will not spin (starter box will not turn the engine):

- The engine may be flooded and hydraulically locked. Refer to section "Flooding & Hydraulic Lockup".
- Check for binding at the engine flywheel. If you are not able to turn the engine by hand, the engine could be flooded, there could be binding in the clutch system, the piston may be stuck at the top of the cylinder (TDC), or there could be internal engine damage. (Note: During engine break-in, it is normal for the engine to be extremely tight and hard to turn when the piston reaches the top of the cylinder.)

Engine is very sluggish, hard to start, and will not idle during initial break in:

- The factory default break-in settings (on the carburetor) may be too rich for your location, weather conditions, or fuel brand. Extremes in temperature, humidity, barometric pressure, and altitude cannot always be accounted for by the factory default settings. These symptoms may occur when air density is very low (such as in high mountains or extremely cold temperatures). Under these conditions, lean the main needle valve slightly (1/8 turn CW), and check if there is any improvement in starting and idling. Only lean the main needle until the engine runs and idles reliably, then continue the break-in process.
- Different fuel brands/types – in combination with extreme weather conditions – can also make the factory default break-in settings too rich and cause these symptoms. Try leaning the fuel mixture slightly (1/8 turn CW), and check if there is any improvement in starting and idling.

Engine performance is sluggish:

- Engine performance depends on the carb settings and how they compensate for the weather & atmospheric conditions. Before suspecting other issues, richen the main needle by at least 1/4 turn CCW, then retune the engine.
- Try installing a new glowplug.
- If carb settings are proper, ensure the fuel is fresh. Old fuel, or fuel that has been left uncapped for a long period, may cause sluggish performance.
- Verify that there is no drivetrain binding.

Piston Stuck at top of cylinder – Top Dead Center (TDC):

A brand new engine that has not had a lot of break-in will typically have a very tight fit between the piston and the top of the cylinder (known as "pinch"), since the cylinder has a tapered fit. The fit should not be so tight that then engine cannot be started. If the piston gets stuck at TDC, use a pair of pliers to grasp the flywheel from the bottom of the engine. Rotate the flywheel CCW (viewed from the front of the engine) until the flywheel turns; you should feel the piston become unstuck from the top of the cylinder.

ENGINE CARE

Cleanliness

Always keep the outside of your engine clean.

Fuel

Use clean, fresh fuel and keep your fuel can, pump, and fuel system free from dirt.

Model fuel contains alcohol, which is hydrophilic (it attracts moisture from the atmosphere). If the fuel container is kept open it will absorb water from the air, contaminating the fuel and possibly causing corrosion of the internal engine parts.

After-run Oil

After each running session, run the engine until all fuel is used up, and then disconnect the fuel line from the carburetor. Put 4-5 drops of after-run oil (Marvel Mystery Oil, Prather, Pacer, etc.) into the carburetor and turn the engine by hand several times to coat the internal engine parts with oil. This will protect the engine bearings and internal parts from corrosion.

The use of after-run oil is also important during periods of prolonged storage (such as winter):

- Remove the engine from the model.
- Liberally apply oil into the carburetor and glowplug hole.
- Wrap your engine in a soft cloth and store it in a sealed plastic bag.

Engine Disassembly

Do not dismantle your engine unnecessarily as this may upset precision fits such as piston/cylinder and crank pin/connecting rod assembly.

If it is necessary to clean your engine completely (such as after a crash), remove only the following:

- Carburetor (do not disassemble)
- Exhaust pipe
- Crankcase backplate
- Cylinder head

Flush the entire engine with fresh fuel and reassemble. Apply after-run oil to the engine and store it or re-install the engine in the model.

Do not disassemble your engine further than described above, or your warranty may be voided!

WARRANTY

Our warranty covers only workmanship and manufacturing defects of the original, unmodified, and unused engine and parts, for a period 1 year from the original date of purchase. Neither the engine nor any of its individual parts and components are covered by warranty after the engine has been started or used. Claims for damage caused by customer disassembly, use of improper or substandard fuel, use of improper accessories (such as muffler, glowplug, etc.), crashes, abuse, improper operation, improper mounting, improper adjustment, or lack of or improper maintenance will not be covered by this warranty. Any use of the product for other than its specific intended use will automatically void this warranty. Use only authentic XRAY spare parts, use of any other products will void this warranty. Claims must be accompanied by a dated proof of purchase (registered receipt, credit card invoice, etc.).

Things to Know About your Engine

High-performance competition engines can sometimes fail; no guarantee for these types of failures exist, and we are not responsible for the use and treatment of an engine. These engines can make extremely high RPMs and build up incredible loads inside. It is extremely important that you check frequently for excess play in any components (especially the conrod/big-end) and also engine compression. Most failures occur because of low-quality fuel or mixtures, bad carburetor settings, bad functioning of the air filter, or excessive wear of moving parts. Please take note that it is suggested not to modify any parts of the engine.

If you want to repair the engine yourself, take care of the following:

- Clean the outside of the engine thoroughly before you open it, work on a clean spot, use proper tools. Any dust or dirt that enters the engine will make considerable damage.
- All moving parts inside the engine are subject to wear. If a piston/liner has worn out, or if the big-end/conrod connection has worn, you must replace these parts. If the engine has broken you must check that all other moving parts are still in good shape. If you only change one part and other parts are not in good shape, it is highly likely that your engine will suffer another failure shortly thereafter.
- If you want to replace the conrod, be sure the big-end of your crankshaft is still round and at a good size, if not replace the crankshaft. If you do not replace the crankshaft and re-use the engine, a failure may occur such as conrod or piston breakage.
- If you replace the piston and liner, be sure to check the big-end on the crankshaft.
- These high-technology engines need to be treated with precision. If you are not sure how to modify or repair your engine, ask your local dealer to do it for you or return the engine to us.

SERVICING THE ENGINE

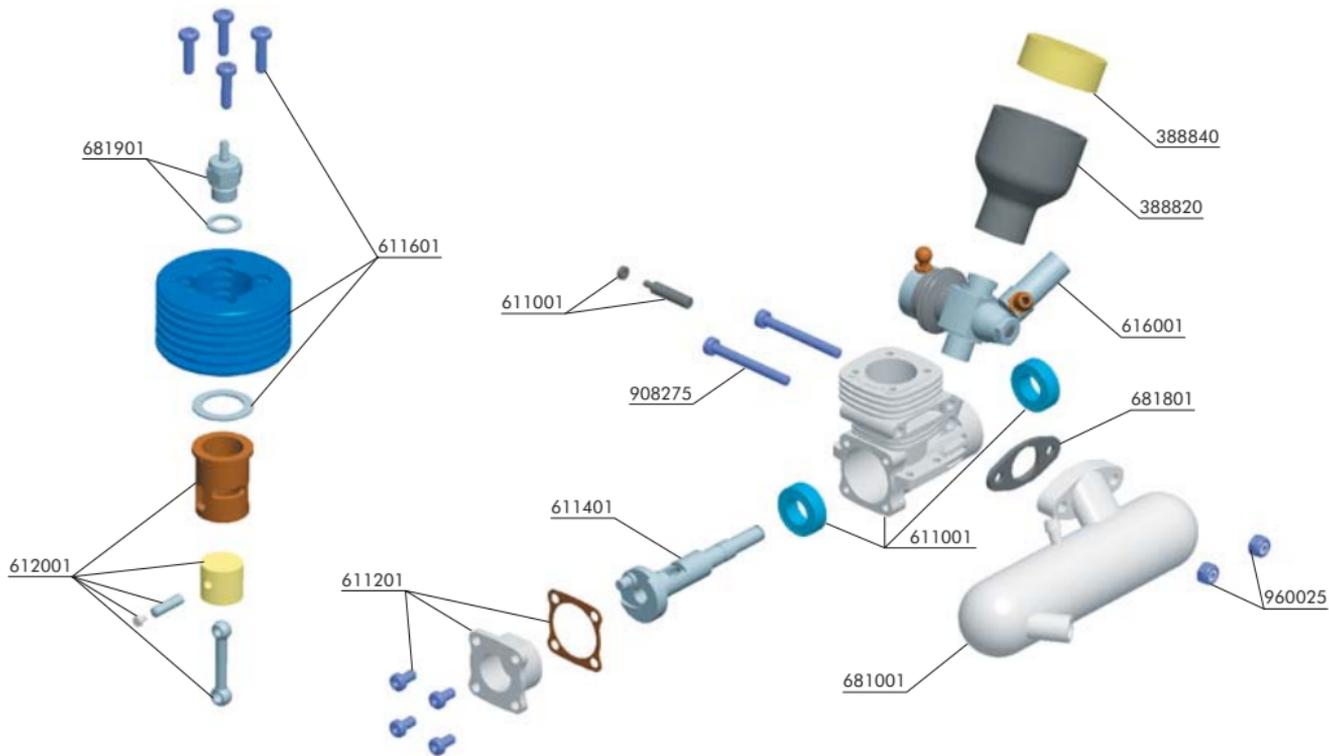
Should your engine require service, please follow the following guidelines. Do not return the engine to the place of purchase, as they are not authorized or equipped to perform service.

1. Remove the engine from the model. We cannot accept equipment for service other than the engine.
2. Along with your engine and proof of purchase, enclose a complete written explanation of the problem(s) with as much detail as possible.
3. Be sure to include your complete and proper name, address, and daytime telephone number(s).

The charges for repairs will be billed to you C.O.D. Please mention if you wish to have an estimation of repair charges prior to us beginning service. (This may cause a slight delay in your repair.) Contact your national distributor who will advise you how to proceed.

388820	AIR FILTER BODY
388840	AIR FILTER FOAM
610001	XRAY NT18 0.8cc ENGINE
611001	CRANKCASE WITH BEARINGS + CARBURETOR RETAINER
611201	REAR COVER & GASKET
611401	CRANKSHAFT
611601	BLUE HEATSINK HEAD - CNC MACHINED + HEAD SHIM
612001	PISTON & SLEEVE SET & CONNECTING ROD SET
616001	CARBURETOR
681001	XRAY NT18 MUFFLER
681801	MUFFLER GASKET
681901	GLOWPLUG
908275	HEX SCREW SOCKET HEAD CAP M2.5x25 (10)
960025	NUT M2.5 (10)

NT18 ENGINE PARTS





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