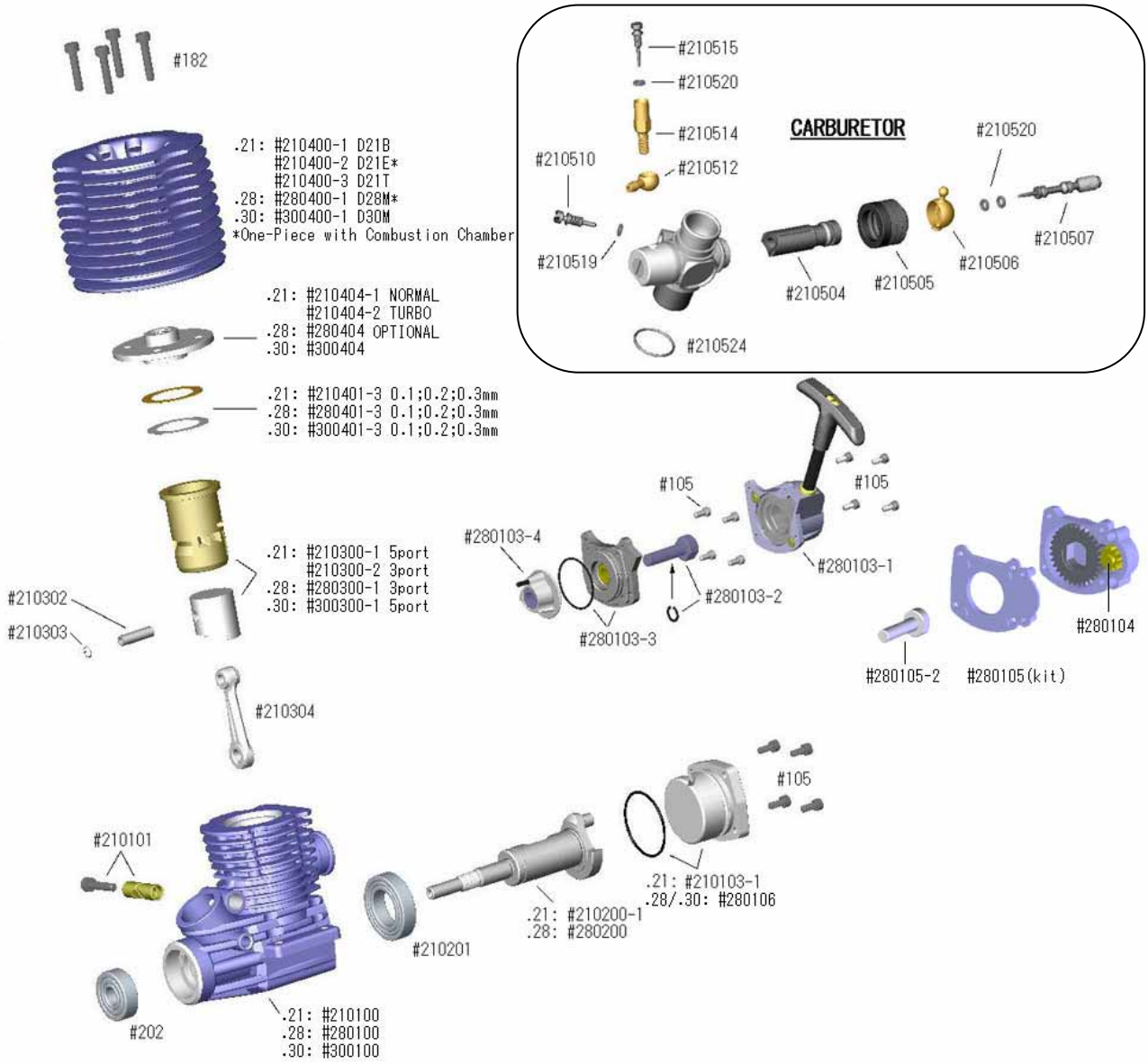
# STS High-Performance Racing Engine .21-.30 Series




## D21B Specification

| S/N: | #2101 | #2103 | #2105 ; #2106* ; #2107** | #2801* ; #2804** ; #2805 | #3001* ; #3002** ; #3003 |
|---|---|---|---|---|---|
| Engine: | D21B | D21T | D21E | D28M | D30M |
| Cylinder Contents: | 3.49 cc | | | 4.66 cc | 5.07 cc |
| Bore: | 16.22 mm | | | 18.80 mm | 19.60 mm |
| Stroke: | 16.80 mm | | | | |
| Carburetor: | 2 Needles Slide Max ∅9mm ( ∅7mm and ∅8mm Venturi Optional ) | | | | |
| Piston/Sleeve: | ABC Type | | | | |
| Ports: | 5 Port | | 3 Port | 3 Port | 5 Port |
| Crankshaft: | 14mm SG | | | | |
| Glow-plug: | Normal | Turbo | Normal | | |
| Net Weight: | 372g | | 372g-412g | | |

* : Pull-Start Backplate ; ** : Shaft-Start Backplate

# *Instruction Manual*

STS engine is designed and manufactured for high level of competition performance. To get the best performance and reliability out of this engine, **you must read these instructions carefully.** Please treat your STS engine with careto ensure the engine carries long lasting high- performance working time. Several essential factors must be considered to achieve the optimal performance of this engine:

**FUEL:** This engine should **ONLY** be used with fuel particular blended for R/C model car. Never run this motor with gasoline! The choice of fuel is very important, it should contain a minimum of 10% castor and/or synthetic oil by volume. Regarding the percentage of nitro: more nitro content (higher %) will provide more explosive power from your engine, but it will also shorten the engine's life. For average use, we recommend 15~25% nitro fuels.

**GLOW-PLUG:** Check your glow-plug regularly. When the glow-wire becomes dull or mat and the engine stalls without reason, change the glow plug. A new glow-plug will keep the engine idle stable and optimize its performance. An old glow-plug is prone to glow-wire broken, melted or missing. If you keep on using an old grow-plug, you may damage your engine. Please avoid this situation and check the plug regularly.

**AIR-FILTER:** NEVER run without an air-filter, you will ruin your engine. A good air-filter is very important to extend the life of your engine. When you use a foam air-filter, don't forget to impregnate the foam with air-filter oil before use. You must change your air-filter regularly. Washed and re-used foam filters may shorten an engine's life due to the deterioration of the foam element after extensive use and washing.

**TUNED PIPE:** NEVER run without a pipe, it will cause the engine to over-heat and will damage your engine. A correctly installed tuned pipe will let the 2-stroke engine run at peak performance. We recommend that you choose STS tuned pipes since the STS tuned pipes are developed with our engines.

**NEEDLE TUNING:** There are 4 needles on the slide carburetor can be adjusted. When you are adjusting any one of the needles, each adjustment should be of the same magnitude and always kept to minimum (use small increments). Check the engine temperature regularly and keep it under 120 °C (248 F).

**Idle/Air -Screw (No.210510)**

Adjusts the airflow when the throttle valve is at idle position. Less airflow will make the less rpm. Tune the idle/air-screw to adjust the idle speed. Screw in (clockwise) for a faster idle. Screw out for a slower idle.

**High Speed Needle (No.210515)**

Adjusts the main flow rate of the fuel (when the throttle is open significantly). Less fuel (leaner) will make higher rpm but will also generate a higher temperature. Tune the main needle to adjust the engine rpm at high-speed and open-throttle. Be careful of the engine operating temperature and check it regularly when adjusting this needle. Lean setting = clockwise turn, more rpm (power) at full throttle, more heat. Rich setting = counter-clockwise turn, less full throttle rpm, less heat, more lubrication. No smoke from the exhaust and high temperatures are indicators that the setting is too lean and possibly harmful.

**Low Speed Needle (No.210507)**

Adjust the low-speed fuel flow rate. In general, less low-speed fuel flow provides your car with more power when you first hit the throttle. Tune this needle to adjust the low-range reaction.

**OPERATING TEMPERATURE:** Be careful with the engine operating temperature. You have to measure the engine temp. regularly. Over-heat the engine will cause permanent damage to the internal parts of the engine. If you can't measure temp. make sure smoke is always being generated out the tuned pipe. Engine operating temperature is depended on air temperature. There is the suggestion of Engine operating temperature;

| Air temp. | -5 °C | 5-15 °C | 15-25 °C | 25-35 °C | 35 °C - |
|---|---|---|---|---|---|
| Engine temp. | 60 °C | 80 °C | 100 °C | 120 °C | 140 °C |

※All the suggested temp. of this manual is based on 25 °C out door temperature.

**BREAK-IN PROCEDURE**

∗**1.** Install a new conical type glow-plug (Hotter rated plugs will be better for the rich settings used during break-in) ∗**2.** Use high castor (12% or above) and low nitro rated glow fuel, 5%~15% nitro is best. ∗**3. First tank of fuel:** Start your engine, idle for 2 minutes with rich air/fuel mixture setting (some raw fuel is spitting from the exhaust) then stop and let it cool down. When your engine is stopped, make sure the piston is NOT at Top Dead Center (TDC) by rotating the flywheel. Let it cool down and repeat the "start-idle cycle" 6 to 8 times. If idle rpm is too high, adjust the Idle/air-screw. Make sure the temperature is under 80 °C (176 F). ∗**4. Next several tanks of fuel:** run the car on the track at low speed (50% to 80% throttle). Avoid using a constant throttle position; keep blipping the throttle to vary the rpm, slow-fast-slow-fast etc. Check the temperature regularly and keep it between 80 °C (176 F) and 100°C (212 F), if you can not measure temps make sure the engine is running at heavy smoke from the tuned pipe. ∗**5.** When your engine is still being run-in, higher running temperature is expected. As time goes on, running temperature will be lowered. At this point you may lean the engine by turning the main needle clockwise incrementally and keep the engine running temperature at or below 100°C (212 F). After about 1~2 liter fuel through it, take out the glow plug and turn the flywheel by hand, let the piston pass the top dead center in the sleeve. When you don't have any significant friction or just a little snug, you can start leaning the main needle incrementally in small steps, and keep it around 100~120 °C (212~248 F).

**AFTER RUN:** It is recommended the use of rcengine after run oil to keep internal moving parts of the engine lubricated. After-run oil helps for an easy start next time, protects your ball bearings and extends your engines life. After run oil can be applied via the throttle body or glow-plug hole. Ensure the areas are absolutely clean before you remove engine components, enter of debris into the engine is harmful.

**MAINTENANCE:** You must treat your engine with care. This high performance STS Racing engine may work up close to 40,000 rpm. Any failure at such a high rpm can cause damage and exemplifies why you need to regularly maintain your STS racing engine. Please understand that all moving parts inside the engine are subject to wear, and that if a piston/liner has worn out then likely the end/con-rod has also worn. When these parts are eventually in need of replacement, they are readily available and easy to install. If an engine has been broken, check to see if all of the other moving parts are still in good shape. If you only replace one part and leave other worn parts in place, it is possible that you will soon have another failure.

**These are some other important considerations:**

***** Clean the outside of the engine before you open it. Any dust or dirt that enters the engine will cause considerable damage. ***** Check the end of the con-rod frequently. If you want to replace the con-rod, be sure the big end of the crankshaft pin is not worn out, if not, replace the crankshaft as well. ***** If the engine does not sound normal and runs loudly, it may be caused by worn bearings. Replacing the bearings requires the use of a special-tool; ask for service from your local hobby shop. ***** When you start the process of installing/building your STS engine, each part should be thoroughly clean prior to installation. Be careful that each part is in its correct orientation, especially the piston/sleeve/con-rod. The skirted side of the piston should be facing to the front (carburetor side). The exhaust port (maxi-port) of the sleeve should be facing to the rear. The lubricative ditch of con-rod should be facing to the front of the engine (carburetor side). ***** Before you install the head button, do not forget to install the proper number of head shims. We suggest that you use at least 0.3 mm head shims. You may need to adjust the thickness of head shim for best performance. These are our guidelines.(Turbo not included)

| FUEL | Total thickness of head shim |
|---|---|
| - Under 20% Nitro | 0.3 mm |
| - 25% Nitro | 0.4 mm (±0.1 mm) |
| - 30% Nitro | 0.5 mm (±0.1 mm) |

Use a high quality hex wrench to install the screws. When you start to feel resistance, stop turning the screw. Repeat this for each screw. Use the "Star" technique to finish tightening the screws of the cooling head. Do not over-tighten the screws.