INK: STEVE POND & C. DAVID GIERKE
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O.S. .18 TZ

A WEAPON OF MASS COMBUSTION!

HISTORICALLY, O.S. has been conservative on the power front for the sake of easy tuning, longevity and consistency. Recently, however, O.S. engineers seem to have become more comfortable pushing the horsepower limits because now they can do so without compromising the principles that have brought them this far.

The .18 TZ is the latest in the horsepower wars. The first big small-block from O.S. was the .18 CV-R followed by the .18 TM (made especially for the Traxxas T-Maxx and Revo trucks), and now, the 5-port turbo .18 TZ engine takes its rightful spot at the top of the O.S. .18 engine lineup. The CV-R beat all the other engines in the ".18 Engine Shootout" in the December issue of *RC Car Action*, but that engine has a lower power rating than the TZ. With a 5-port sleeve and a turbo head and crank, this new TZ is a virtual lock to be the top dog.

A new 3-needle carb with a 6.5mm bore is included. The diameter of the intake fits a normal big-block air filter, and that opens up lots of replacement filter options.

■ **CARBURETOR.** A new aluminum-body 11K slide carb comes fitted to the pilot-shaft version of the TZ, and it features three mixture adjustments and a 16mm air horn. The 11K accepts standard big-block filters and has proven to be as easy to adjust and as stable as any other O.S. carb. A new 11L rotary carb is included with versions of the TZ that have a threaded crank.

CARBURETOR FEATURES

- A 6.5mm venturi allows more air and fuel to enter the engine for more power
- Phenolic gasket/insulator keeps heat away from the carb
- 3-needle carb for precise fuel metering
- 16mm intake diameter fits large-diameter (big-block) air filters

■ **ENGINE BLOCK.** The TZ engine block has cooling fins everywhere—extra fins on the bottom of the block, around the bottom of the cylinder, in the induction-port area and around the base of the carb; the carb even has cooling fins near the main needle. Cooling is obviously a high priority.

ENGINE BLOCK FEATURES

- High-performance rear exhaust port
- Universal small-block flange fits almost any exhaust header
- Lots of cooling fins help reduce engine heat
- Exactly the same external dimesions as O.S. .12 CV-R engine block, so it fits anywhere a small-block can be installed

The heat-sink fins are the TZ's trademark features (even the backplate has cooling fins). A standard rear-exhaust flange means that any typical rear-exhaust system can be used with this engine—no special exhaust needed.

TEARDOWN

MANUFACTURER: O.S. Engines
DISTRIBUTOR: Great Planes Model Distributors
PRICE: $199

BORE: 16.0mm
STROKE: 15.0mm
DISPLACEMENT: 3.02cc (0.184ci)

CARB: aluminum 3-needle slide carb with 6.5mm venturi
SLEEVE MATERIAL: chrome-plated brass
INTAKE PORTS: 5
CRANK BEARINGS (F/R): 7x19/12x21mm
CYLINDER HEAD DESCRIPTION: two-piece aluminum turbo head

MAX. POWER OUTPUT: 2.28bhp
PEAK TORQUE: 83.1 oz.-in. @ 25,850rpm
RPM @ PEAK HORSEPOWER: 30,500
MAX. RPM: 42,500rpm

PORT DURATION

SCHNUERLE: 114 deg.
BOOST: 108 deg.
EXHAUST: 158 deg.
INDUCTION: 205 deg.
INDUCTION PORT OPENS: 35 deg. ABDC
CLOSES: 60 degrees ATDC
HEAD CLEARANCE: 0.025 in. (0.64mm)

COMMENTS

There doesn't seem to be a limit to the surprises that keep coming from O.S. Engines. It has a well-earned reputation for producing high-quality, easy-to-run engines that are extremely reliable. This has often come at the expense of peak horsepower, but it was a trade O.S. was willing to make for many years—that is, until recently. Over the last few years, its new top-of-the-line engines have been producing absolutely blistering horsepower. The various versions of the .12 TR, .21 VZ-B, all the .18 engines and everything else that has come out of its factory recently have been at the top of the horsepower charts in their respective categories. All of this, however, has not been at the expense of the principles that have guided O.S. for so many years. The new generation of O.S. engines are not only exceptionally strong, but they also maintain virtually all of the legendary standards of ease of tuning and high quality that have defined O.S. engines for decades.

We've often spoke of "near big-block power" from other powerful small-block engines, but that was in reference to the meekest big-block pitted against the most powerful small-block. Even then, it required "fuzzy math" to make the case for the comparison. The new TZ makes so much power that it directly challenges prominent big-blocks in peak horsepower. The TZ tops the peak horsepower of the previous-generation O.S. .21 RZ-V01B.

At 2.28bhp at 30,500rpm, the TZ is the first small-block engine to break through the 2hp barrier; it shattered it. Its peak torque also measures the strongest for a small-block engine—81.3 oz.-in. @ 25,850rpm. It's not peaky either; it produces more than 80 oz.-in. of torque as it spans a nearly 10,000rpm range. There just isn't any pronounced weak spot in this engine's overall performance.

A pilot-shaft turbo crank is included. The inlet area around the port features intricate machining to allow air and fuel to flow more efficiently.

■ **CRANKSHAFT.** Presently, the TZ is available with a pilot-shaft, standard threaded, or a short threaded crank. It features a unique turbo port that's similar to those found in EFRA-legal engines: the turbo port isn't allowed to touch the center port. Race legality isn't much of an issue, however, because of the TZ's displacement. At 12mm, the crank diameter is pretty beefy, and the 7.5mm center port is large enough to accommodate the air/fuel flow of the big-bore carb.

CRANKSHAFT FEATURES

- A 7.5mm center port allows more air/fuel flow
- Available SG-type integrated crankshaft reduces vibrations
- 4.5mm rod journal is strong enough to handle very high rpm operation
- Unique turbo port improves breathing through center port

■ **CYLINDER HEAD.** A two-piece head designed to use a turbo glow plug is included with the TZ. The heat sink has unusual machining that is mostly for looks, but looks count, and this engine has the double threat—good looks *and* performance. Functional mill work on the head allows easier access to the engine-mounting screws. The head can be installed in any orientation.

CYLINDER-HEAD FEATURES

- Head can be rotated for better cooling for in-line and transverse-mounted engines
- Two-piece head is more versatile
- Machined for a turbo glow plug to enhance performance
- Anodizing is removed where the insert contacts the heat sink for better cooling

■ **SLEEVE.** The 5-port chrome-plated brass sleeve is the TZ's trademark feature. This is the only O.S. .18 engine that has 5 ports, and it's a contributing factor to its massive horsepower output. The sleeve has 2 ports on each side of the cylinder and a boost port in front. Each is well contoured to direct the air/fuel mixture flow to the right places.

SLEEVE FEATURES

- Has 5 ports for better air/fuel mixture control and more horsepower
- Precision, high-quality machine work
- Conservative port timing makes engine very manageable
- Large exhaust port has long duration and a large opening, so burned fuel is released quickly

■ **PISTON & CONROD.** The things that make O.S. pistons and conrods a cut above average engines aren't always visible. You can't see the quality of the material or precision of the machining, but these have been hallmarks of O.S. engines for years.

Cutouts on four sides of the head allow better tool access to the engine-mounting screws, and consequently eliminate any concerns about the position of the head when it's installed.

PISTON & CONROD FEATURES

- Skirted piston improves flow to the boost port
- Oil groove in piston to retain lubrication
- Machined, knife-edge conrod is strong and reduces turbulence in the crankcase
- Oil groove and a hole in the lower end of the conrod provide extra lubrication to the lower rod bushing.

A beefy, machined-aluminum conrod connects the piston to the crank. The piston includes an oil groove for lubrication and a modified piston skirt for better air/fuel flow through the boost port.

DYNO TESTING

The .18 TZ was tested with 20-percent-nitro fuel that contains 12-percent lubricant. A standard Novarossi 90-degree header and a 51602 pipe is the exhaust system we use for testing small-block engines. The argument could be made that because this engine has 50 percent more displacement, it would run better with a bigger tuned pipe, but for the sake of

PERFORMANCE TEST

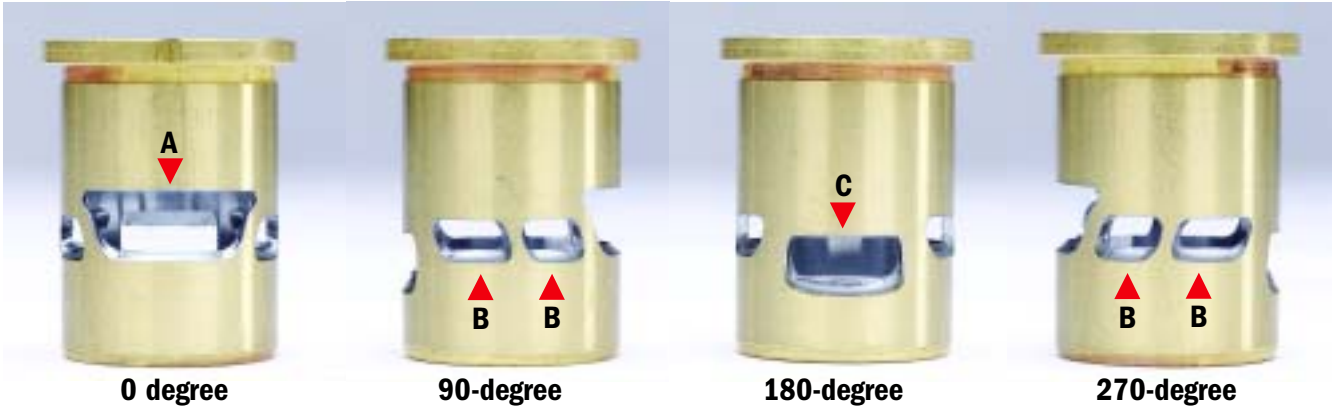
The TZ can be dropped into any car that accommodates a standard small-block engine with a pilot-shaft crank. The challenge isn't fitting it into a vehicle; it's finding a vehicle that can handle the power. We would have put it a monster truck, but we didn't get a pull-start version, so we needed a vehicle that would allow us to bump-start the engine. A 2WD stadium truck was almost out of the question because the front end would spend more time in the air than on the ground, or the tires would be smoking endlessly. We considered installing the TZ in an 1/8-scale buggy just to see how well it would run. You may scoff at the notion of having a small-block engine in a big off-road buggy, but we've seen big-block engines with less horsepower run very competitively. Common sense got the better of us, and we chose the new Kyosho V-One-RRR touring car. Having just tested the car with a .12 engine, it provided a fresh perspective on what exactly doubling your horsepower does for performance.

Old-school engine guys might recall how the really powerful engines used to have touchy needles, but the TZ sets new standards for tuning ease in ultra-powerful mills. The TZ starts easily; though it took a few tweaks to tune it for the weather, it wasn't overly sensitive, and we didn't have to chase the settings at all.

Once the needle settings were in range, we took the RRR outside to thrash on it and to see how nearly 2.3hp would change the driving characteristics of a car (and its driver) that is used to dealing with about 1.5hp. The power of this engine is so over-the-top it's hard to describe. Bottom-end response is brutally snappy and is aided by the RRR's gearing that's configured for blasting around a track as quickly as possible. Quick lap times require real throttle management; clack that trigger to against the pistol grip, and you'll launch the car into a 4-wheel drift on even the highest traction surfaces. Top speed with the TZ is similar to those of best engines because, when geared for the track, the engine runs out of rpm well before it runs out of horsepower. We already know the TZ revs up to 42,500rpm under load, so in addition to acceleration that's as quick as tire traction allows, you see a speed increase. That says nothing of the legs this engine will have after an extreme gearing change. With the right gearing, the engine's massive horsepower could push a car to more than 80mph.

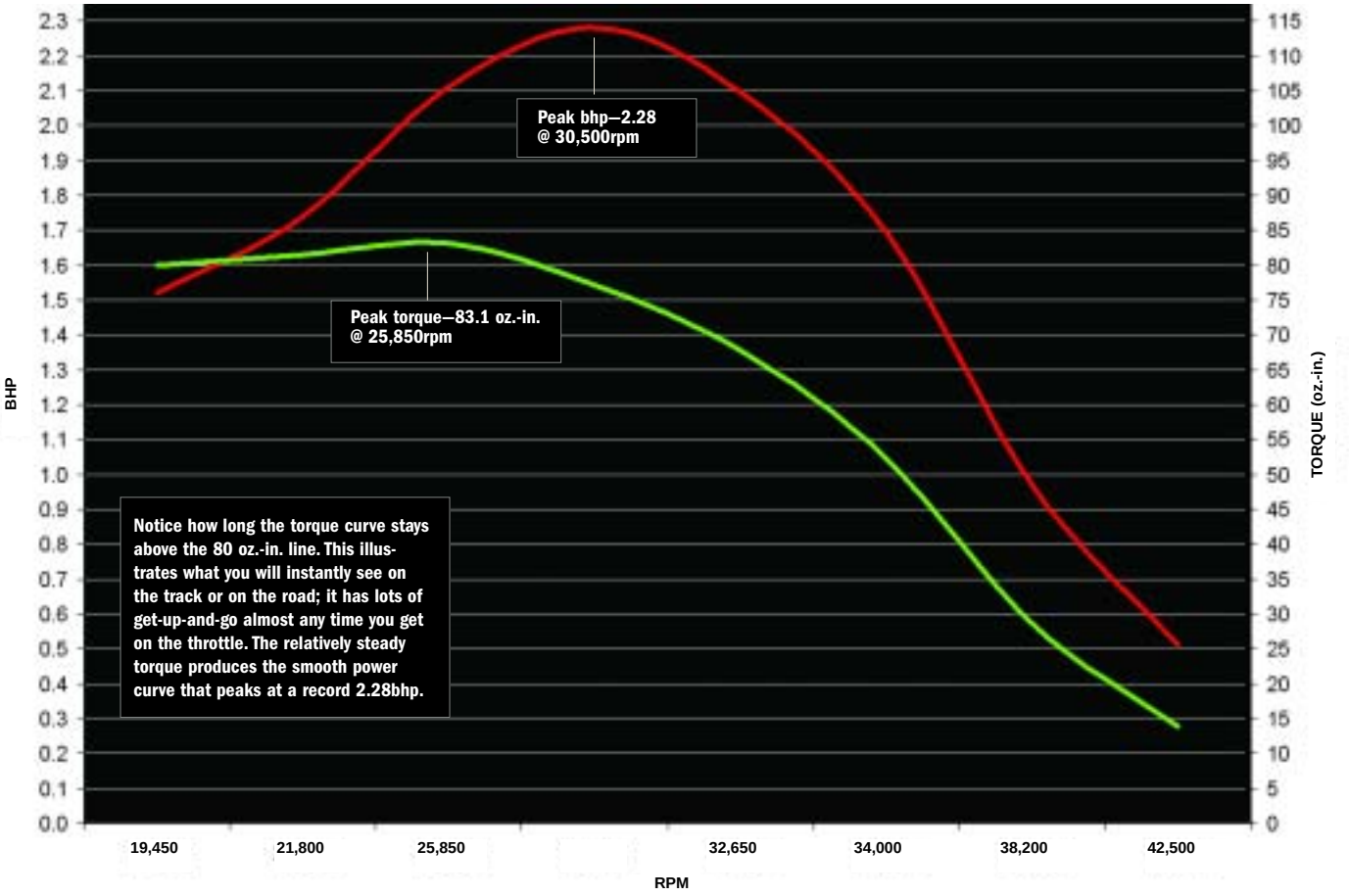
The TZ's running temps are very moderate. It isn't uncommon for more powerful engines to run a little hotter, but the TZ doesn't seem to be affected. It temped steadily in the low 200-degree range even under prolonged race-type and some downright abusive conditions.

PORT CONFIGURATION



The exhaust port (A) is widest at the top to allow more exhaust gases to escape quickly. The port in the sleeve very closely matches the shape and position of the exhaust port in the engine block, and that allows exhaust to flow much more smoothly. The Schnuerle ports (B) are two separate ports on each side of the cylinder, and there's a vane cast into the transfer passage in the block that matches the ports. A single boost port (C) features moderate port timing.

DYNO-TEST RESULTS



comparison, we chose to stay with the Novarossi pipe. The TZ didn't like running with heavy loads at under 18,000rpm. Although it may sound like a high rpm range, keep in mind that these engines idle at 6,000 to 7,000 rpm, and 18,000 is just getting on the throttle. Above 18,000, however, the torque is astronomical and climbs quickly to more than 80 oz.-in. and stays there until just a little beyond 29,000rpm. This is the first small-block to produce anywhere near 80 oz.-in. of torque—and it peaked at 83.1 oz.-in. at 25,850rpm. There's still more than 50 oz.-in. of torque at 34,000rpm, which is outside the range of useful rpm for most engines and a speed at which a mortal mill would be making less than half the torque. Horsepower is an inevitable consequence of high torque and rpm, and the TZ clicks off an amazing peak of 2.28 ponies at 30,500rpm with 76 oz.-in. of torque on tap.

FINAL ANALYSIS

You might have surmised by now that we're real fans of this new O.S. engine and the positive changes overall in the newer O.S engines. Truth is, we're fans of any product that delivers great value to the customer, and to that end, O.S. owns it in the engine market. No, their engines aren't the cheapest, but they certainly aren't the most expensive. What makes these engines great is that O.S. has unmatched quality, precision machine work, choice materials, engines that are always easy to tune, reliability and carbs that are legendary for their precision and their ability to hold a needle setting. It's all part of a commitment to delivering the best possible package to the consumer.

As for the .18 TZ, we're still a little stunned by its power output. We could come up with a hundred ways to describe it, but it's something you really can't appreciate until you've seen and felt it for yourself. It produces great torque and a lot of rpm. The O.S. .18 TZ is undoubtedly the small-block horsepower king, but one question remains: what do you do with all that power? It's really big-block power, and that isn't wishful thinking or conjecture; it's bona fide big-block power in a small-block engine. The .18 TZ is a competition small-block; its block, crank and other features allow it to fit anywhere a normal small-block does. The engine's displacement excludes it from sanctioned competition, but according to O.S., this engine was made to be the ultimate outlaw small-block—legal or not. ◆

SOURCES

O.S. ENGINES distributed by Great Planes Model Distributors
(800) 682-8948; osengines.com.