S2000 D'GARAGE

From Street Car to Track Star

Text and Photos by Robert Choo

IF YOU START WITH JUNK, YOU END UP WITH JUNK. YOU CAN SPEND TENS OF THOUSANDS OF DOLLARS upgrading the "wrong" car and the result is likely to be a faster piece of junk. The key to building a rewarding project car is to start with a good, solid foundation. As professional and grassroots teams have proven, Honda's S2000 is one such capable foundation. With the growing popularity of time attack racing and DSPORT Magazine's involvement with the Redline Time Attack series, it was only fitting that this D'GARAGE project be geared toward road racing.

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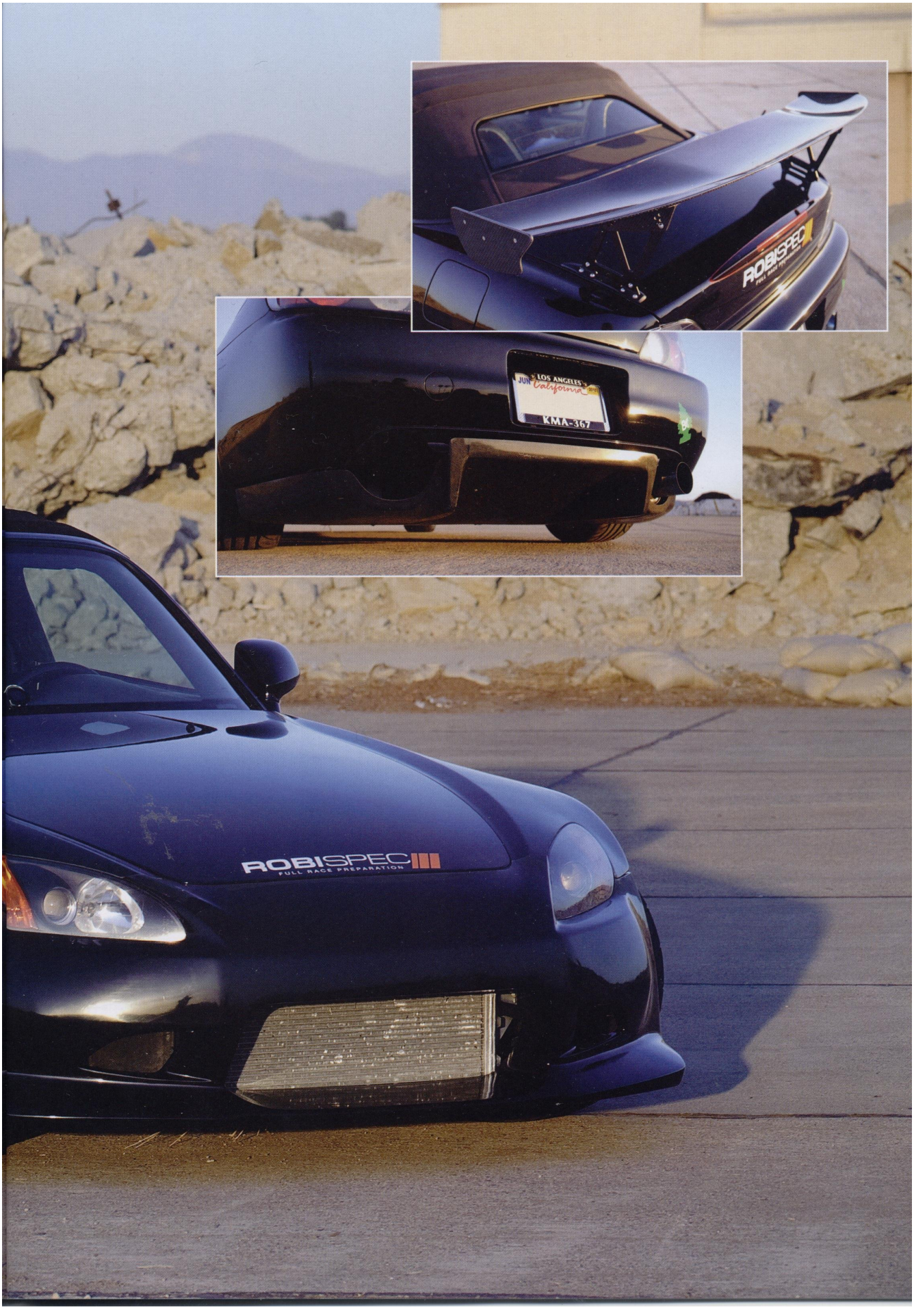
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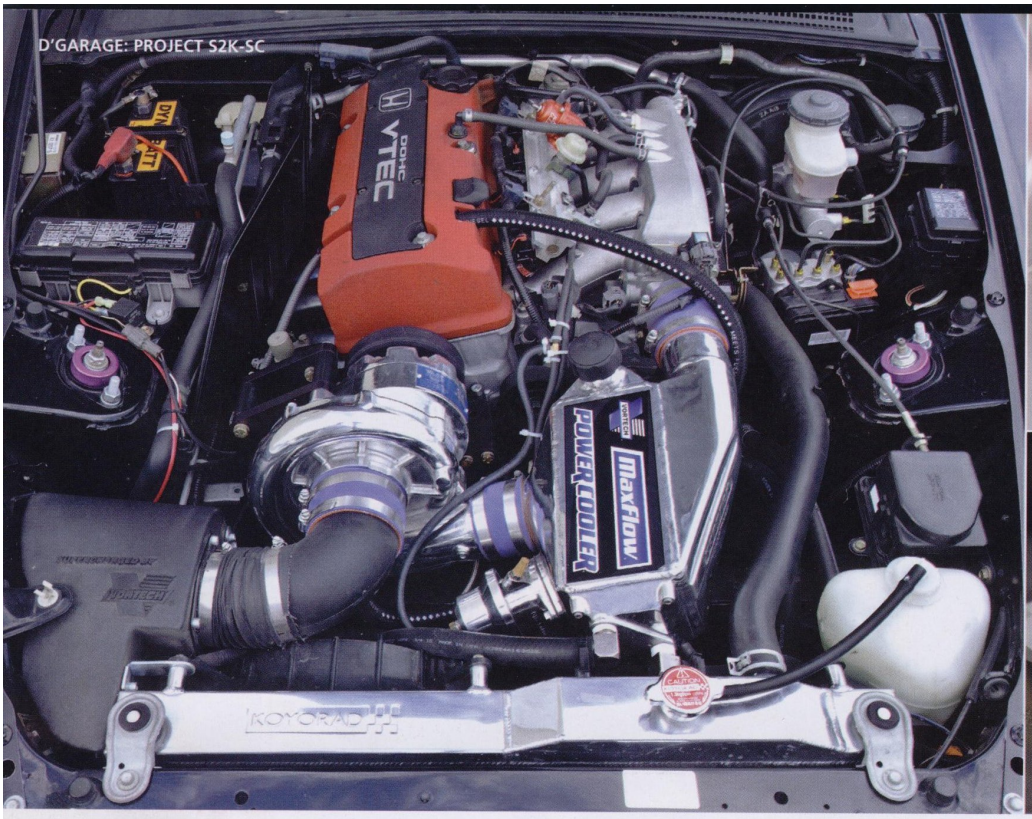

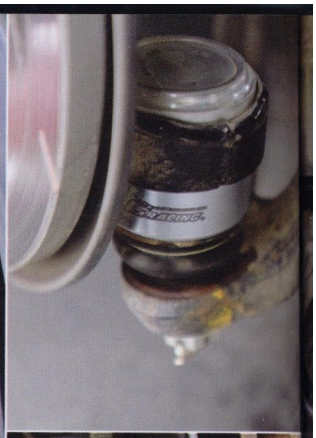

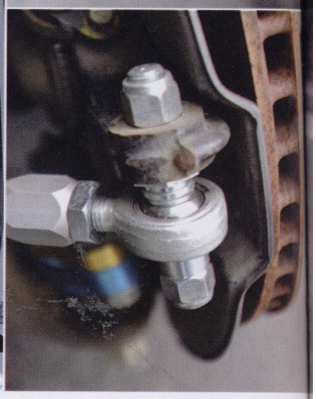

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2000 Reasons for the S2K

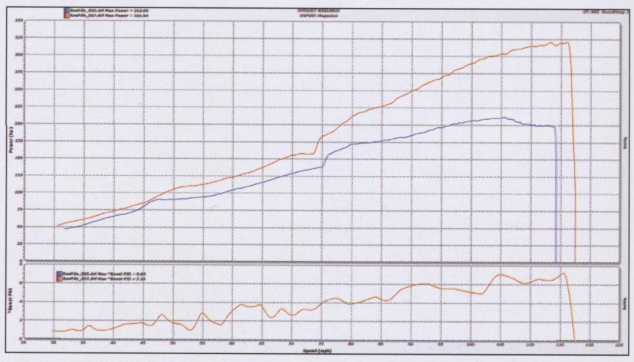
There are a number of solid platforms to select for a road racing project car. The 350Z, 240SX, RX7, WRX, S2000 and even the Miata are just a few of the capable platforms available. In our effort to narrow the field, we had to decide what features were important to us. For this project, a platform with an easy to service/upgrade engine was a must. The 350Z's V6 engine shoehorned into a tight engine compartment ruled it out. The WRX's boxer engine which requires removal from the vehicle for camshaft upgrades knocked it out of the running while the finicky, delicate and hot-tempered rotary engine in the RX7 took it out of the contention. That left the 240SX, S2000 and Miata as viable candidates. With both Feature Editor Richard Fong (S15) and Project Coordinator Jeren Walker (240SX) building their Nissans, we needed some variety. Both the Miata and S2000 feature an extremely well-balanced chassis (50:50 weight distribution), double-wishbone suspensions and great aftermarket support. Ultimately, the S2000 was chosen over the Miata for its more potent powerplant and better aftermarket support.

Born to Race

The S2000 definitely has a split-personality. On the street, it's a mediocre performer. The S2000 feels gutless below the VTEC kick (6,000RPM) and the engine needs to be whipped to redline in every gear for decent acceleration. At the track, the S2000 gets angry, turns green and shreds its clothes. The result for our S2000 was a lap time of 1:34 at the Streets of Willow on 280-treadwear Goodyear tires (OE tires were 140-treadwear Bridgestones).

Plan of Attack

After taking the S2000 to Streets of Willow for baseline testing, it became obvious that there were several areas that could be improved. In stock form, the rear suspension produces a nasty toe-out condition when the shock is compressed, causing dangerous snap oversteer. The S2000 also exhibits some body roll under hard cornering. To correct these issues, we enlisted the help of KW Suspension and J's Racing. KW Suspension offers both the Variant 3 and Clubsport coilovers for the S2000. Taking in to account the high number of track events planned for the Honda, the Clubsport was chosen over the Variant 3. The Clubsport incorporates slightly stiffer springs, (570 lbf/in Clubsport vs 516 lbf/in Variant 3), fine-tuned shock dampening and pillow-ball top hats. The Clubsports feature 14-level adjustable compression dampening and infinitely-adjustable rebound dampening. The infinite combination of rebound and compression dampening offers limitless fine-tuning options for all types of road courses. The stainless-steel body casing also improves shock durability and prevents rust. Adjustable ride height permits lowering of the vehicle's center of gravity. However this also increases the vehicle roll center height. Fortunately, the roll center height can be corrected with roll center adjusters from various aftermarket manufacturers.



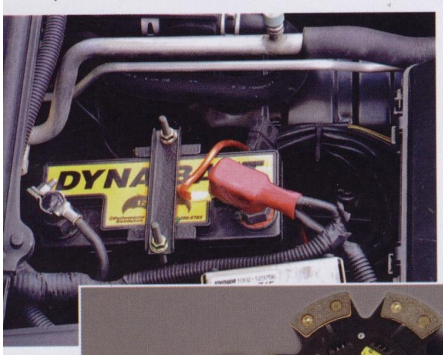
The power output of the S2000 jumped from 212.1 horsepower to 321.5 horsepower with the Vortech supercharger kit. At 9,000 RPM, the supercharger system increased the power output by 120 horsepower. The Vortech kit currently generates 14.9 horsepower per pound of boost. Smaller pulleys are on the way from Vortech to further increase the boost pressure for even more power.

The J's Racing suspension pieces combined with KW Suspension Clubsport coilovers provide the perfect balance between everyday street comfort and scorching lap times at the track.

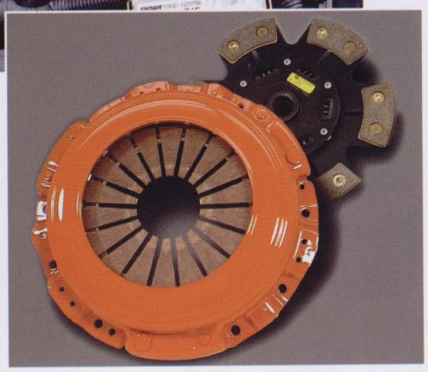
We fitted J's Racing 20mm roll center adjusters (RCJ-S1-20) to the rear S2000 hubs. The longer roll center joint effectively lowers the rear roll center helping reduce excessive body roll. A pair of J's Racing SPL Pillow Rear Control Arms (CAM-S1) alleviate some of the dangerous snap condition. The new arms are constructed from billet-machined aluminum and feature high-quality Aurora rod ends. On the front of the vehicle, the roll center was also corrected using J's Racing Camber Joints (2- to 5-degree) with Roll Center Adjuster Plates (CAJ-S1-L1). The steering angle is also affected from the lowered ride height, which was corrected using J's Racing Pillow Tie Rod End Set (PTE-S1). A set of J's Racing Steering Rigid Collar (SRC-S1) prevent the rack from moving during hard cornering.

Maximum Grip

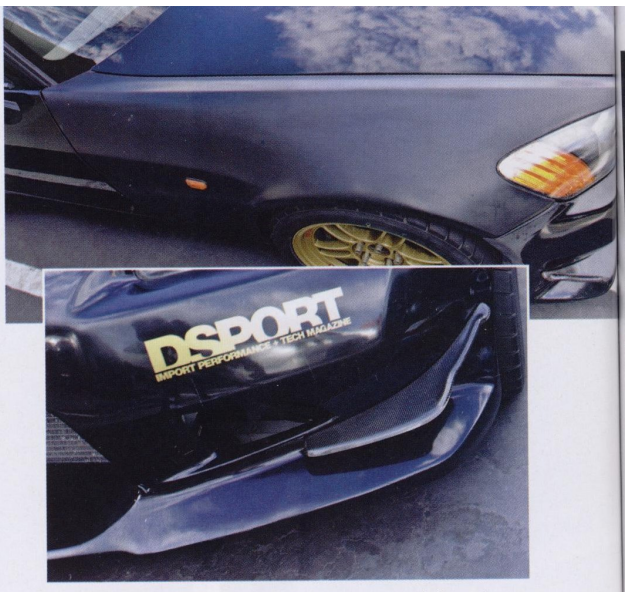
Tires are arguably the single most important component on a track car. We decided upon Hankook Ventus R-S2 tires, a very capable tire at a very affordable price. Four of the 245/40R17 R-S2s were mounted on lightweight Enkei RPF1 (17x9-inch +45) wheels. The RPF1 wheels feature Enkei's Most Advanced Technology (M.A.T) process which is said to produce a strong, lightweight wheel. According to Enkei, the M.A.T process produces wheels with similar metal flow characteristics to a forged wheel without the forged-wheel pricing. To date, the Hankook R-S2 tires have performed well under extreme race conditions. There was a slight bit of greasing when outside temperatures rose above 90-degrees (track temperatures were triple digits). Hankook's new R-S3s are designed to handle the higher track temps.



The Dyna-Batt dry-cell battery weighs only 13.5 lbs and is secured in place by a Spoon Sports battery tie down kit.



A custom Centerforce DFX was installed in place of the slipping factory clutch. The overall driveability of the DFX six-puck clutch is very good as clutch pedal effort is just slightly higher than stock.



C-West +10mm wider front fenders were needed to clear the 245/40R17 Hankook Ventus R-S2 tires. A C-West N1 Front Bumper II fitted with carbon-fiber canards increase downforce over the front tires for better grip.

THE REAR SUSPENSION PRODUCES A NASTY TOE-OUT CONDITION WHEN THE SHOCK IS COMPRESSED CAUSING DANGEROUS SNAP OVERSTEER.

Balancing Act

With the right suspension and rolling stock in place, it was time to get the suspension in tune. Robert Fuller of Robispec in Apple Valley, CA corner balanced and aligned the S2000 for maximium grip. After some tweaking of the spring perches, Fuller was able to get the S2000 to a nearly 50-percent cross weight. After the corner balance was set, Fuller moved on to adjusting the alignment of the vehicle. Fuller started with setting the camber of the vehicle. The rear was set to 3.0-degrees of negative camber while the front was set to 2.8-degrees. Fuller then adjusted the rear toe of the vehicle followed by the front toe, setting both to zero.

Supporting Cast

With the footwork ready to rock, it was time to address the aerodynamics of the S2000. On the track, downforce plays a crucial roll in vehicle grip. Higher downforce results in higher grip. Unfortunately, there is a limit. Too much downforce and the vehicle will be slowed down while too little downforce can result in a loss of grip and off-track excursions. On the S2000, a large J's Racing Version 3D GT-Wing now sits above the trunk lid. Underneath the rear bumper is a J's Racing carbon-fiber rear diffuser. These two components provide the downforce to keep the rear planted to the road. Up front, a C-West N1 front bumper with carbon-fiber canards provides the downforce over the front wheels while a set of C-West +10mm front fenders provide the necessary clearance for the 245/40R17 tires. The fit and finish of the C-West components was great, requiring minimal trimming for a perfect fit.

Power to Weight

There are two ways to make a car go fast. Make the car extremely light or make more power. Since the S2000 was still going to be used as a daily driver, removing the A/C, bumper supports, radio and interior amenities was not an option. With these restrictions, we wouldn't be able to shed much weight. Instead, we would focus on making more power.

Boost is Better

Without boost, generating extra power from the F20C engine is extremely difficult. The only way to make a significant amount of power from the highly-tuned engine is through forced-induction. After much research, we selected the Vortech Supercharger system. The Vortech system produces a very linear powerband similar to a normally-aspirated engine. This linear powerband allows the S2000 to still behave like a normally-aspirated vehicle (with the sensation of a larger, more powerful engine). This characteristic can prove to be easier to drive than a turbocharger system that generates substantial boost at lower RPMs. The bolt-on Vortech supercharger kit features an air-to-water intercooler with a front-mount heat exchanger to reduce intake charge temperatures. The system produces eight psi of boost pressure. Smaller supercharger pulleys for higher boost pressure levels are also available. The Vortech kit is 50-state legal and offers a three-year supercharger limited warranty and three-year/36,000-mile powertrain limited warranty when installed by a Vortech Top-Tier installer.

The Fruits of Labor

While we haven't made the trek back to the Streets of Willow to see how much quicker the S2000 can lap the course, we have dyno'ed the vehicle and participated in two Redline Time Attack events. The supercharger increased power from 212 to 321 horsepower at the wheels; a smog-legal gain of 51.4% in power. At its second Redline Time Attack event, the S2000 managed a third place finish in the RWD Street class. Before the next RTA event, an upgraded oil cooler, front splitter, wider tires, chassis stiffening and weight reduction are in the works. We may even fine tune the engine a bit. With some more enhancements, there is nothing stopping us from sitting on top of the podium.

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