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COVER PHOTOGRAPH BY LES BIDRAWN



STREET

Nov./Dec. 1997
VOLUME 2, ISSUE 6

Power



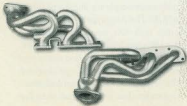
SLOTTED ROTORS

Power Performance Group's new line of slotted rotors was developed to beat the challenges of high-performance driving and severe duty brake demands. As brake pad temperature increases, bonding agents begin to evaporate and a gas is formed that actually inhibits brake efficiency. Power Slot's CNC-machined rotors are specifically designed to run cooler, promote dramatically improved wet and dry brake performance, and are a safer alternative to a process where crack-prone holes are cross-drilled through the cast iron rotors. This technology preserves outer edge rotor strength, while aggressively forcing brake dust, out-gassing and heat to vent. Bright, anti-corrosion plating, done to military specifications, adds a high-tech appearance that enhances the visual impact of custom wheel installations over long periods of time.

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Owners of naturally aspirated 300ZX's no longer need to wait for serious performance with the introduction of Steve Millen Sportsparts' headers for the non-turbo 300ZX. The tuned headers are a bolt-in replacement for the stock units, and have been tested at Stillen's Dynojet to produce a 16-hp gain at the wheels over the stock system. For more information, contact Steve Millen Sportsparts, Inc., Dept. SP, 3176 Airway Ave., Costa Mesa, CA 92626 or call (714) 540-9154. Check out their web site at www.stillen.com.



RK SPORT ROLL BAR

RK Sport's new Light Roll Bar is a non-functional roll bar with an 18-inch LED 3rd brake light. Exclusive through RK Sport, the Light Roll Bar is available in black, charcoal, and beige. The Light Roll Bar comes with all mounting hardware and installation is straightforward and easy.

For more information, contact RK Sport, Dept. SP, 214 Via El Centro, Oceanside, CA 92054 or call (760) 433-1663.



PROJECT 300ZX TWIN TURBO

*The First Step In Upgrading
This Affordable Exotic Car*



All of us at one time or another have lusted over the thought of owning a Lamborghini, Ferrari, or Porsche. Some of the more ambitious drool over unobtainable cars like the McLaren F1 or the Jaguar XRJ 220. Unfortunately, even the least expensive vehicles of this elite group are priced way beyond the means of even a well-paid professional.

And their high prices don't insure perfect. Since exotics and semi-exotics are almost always low-production, hand-crafted vehicles, they don't benefit from the modern techniques of high-quality mass production. Thus many exotics have a kit-car-like level of fit and finish, pipey engines, rough ride, wind noise, squeaks, rattles and other things that most people don't like in everyday drivers. Like racers, most exotics are designed for superb cornering, acceleration and braking. Things like creature comforts, replacement parts, serviceability and long term reliability don't weigh heavily in the final mix. Exotics are like a fine wine, something to be savored on special days, not guzzled for daily consumption.

However, there is an alternative for those who crave the all-out extreme performance of an exotic, but are not multimillionaires. We will be taking one of the best affordable sports cars on the market and showing you how to get exotic performance from this affordable daily driver.

The core of this project is a 1992

Nissan 300ZX Twin Turbo. The Nissan is an excellent candidate to build up to maximum performance levels while staying on a relatively tight budget. The 300ZX is the car that spurred the much maligned, often ignored Japanese supercar class of the early 90's which includes the late great Mazda RX-7, and the still available Mitsubishi 3000GT VR-4, Toyota Supra Turbo and Acura NSX. These vehicles all offered sparkling performance with typical Japanese reliability, quality and refinement, and with the exception of the NSX, all were reasonably affordable. When the rising yen pushed prices from \$35,000 to almost \$50,000, suddenly no one was willing to buy them. Label-conscious yuppies would still spend \$80,000 for something with Porsche on the hood, would turn up their noses at the thought of spending that money on a Nissan, Mazda or Toyota, which frankly were better buys.

On the used market, a good solid example of the 300ZX Twin Turbo can be found on the used car market for as little as \$12,000, a reasonable price for many budgets. Even though the Z was penned in the late 80s, the lines of the body are classic, clean and contemporary. The 300ZX has a strong, bullet-proof drivetrain featuring a nearly indestructible transmission with a super-strong viscous coupling limited-slip differential. These bits need little upgrading to handle mega horsepower. The engine's bottom end is also super strong in stock form and can take big gains in power

with little modification. The 300ZX possesses an exceptionally strong, rigid body with a sophisticated multilink suspension system and four-wheel steering, delivering world-class handling with a fairly smooth ride. The four-wheel vented disc brakes are controlled by a state-of-the-art four-channel ABS system. The interior of the Z has a thoroughly modern look, still fresh even after all this time with comfy, supportive seats, plenty of plushness and high-quality materials. On the road, the stock Z is tight, quite and comfortable. Although it was not the quickest, the most nimble or the shortest stopping car in its class, the Z probably had the best combination of luxury and creature comforts to high performance of any car built then or since. The Z also features Nissan's well-known build quality, reliability and extensive dealer network for reasonably priced parts. Can any exotic make that claim?

With a solid, world-class platform to work from, a budget supercar can be had for a reasonable price. To prove the durability of the Z's basic components, the winning Dal-tech Z IMSA supercar and later SCCA Escort World Challenge racers used near stock drivetrains, suspension systems, unibodies and engine bottom ends for all-out road race competition. These cars were claimed to put out nearly 600 hp and were fairly reliable once the early season engine oiling problems were sorted out. They were virtually unbeatable or until the politics of racing legislated them out of existence).

In the first stage of our build up we will bring the Z's brakes and suspension up to supercar levels to prepare it for a brace of engine mods to be handled in future issues of Street Power.

SUSPENSION

The Z-car has a nearly perfect suspension system as standard equipment. It is smooth riding for a sports car while offering outstanding grip and stability at the limit. With bolt-ons, the suspension can be brought up to supercar standards while still offering a reasonable level of comfort.

About the only minor faults that the Z-car's suspension has is some low speed understeer, excessive body roll when sticky tires are installed, and hard-to-control wheelspin from a drag-type start due to the anti-squat geometry in the rear suspension. To tackle these minor faults we selectively added some high quality bolt on components from Stillen and Ground Control, Inc. To be able to tune the suspension to our individual preferences we decided to make our project Z's suspension fully adjustable.

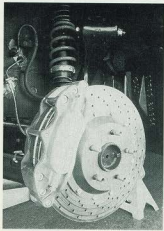
The first item we looked at was the shock-spring combination. We wanted to maintain the stock cockpit-adjustable shock feature, which works quite well.

Since no aftermarket shocks have this feature, we decided to test the stock shock's suitability for ultra high-performance cornering. The stock Z shocks are extremely stiff on the sport setting of the switch on the center console. Since we could not imagine wanting stiffer shock than this on the street, we sent the shocks to Ground Control Inc. for testing on their Roehrig shock dynamometer to confirm our judgment. The shock dyno measures the amount of damping resistance in pounds that a shock has relative to shaft velocity as expressed in inches per second. On the shock dyno, the shocks had a smooth, spike free damping curve with the proper ratio of compression to rebound damping. Jay Morris of Ground Control agreed that the stock shocks should work well for our high-performance application. He told us that the Nissan shocks had more damping on the stiff setting than any stock shock absorbers that he had ever tested. When going to stiffer springs and a lower ride height like we plan to on project Z, most stock shocks typically have too little rebound damping to control the greater bounce of stiffer springs. Jay felt that the stock shocks should be easily able to control the added rebound of the springs we wanted to run.

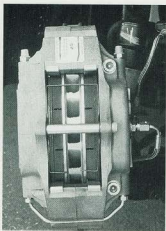
The crew at Ground Control modified the Nissan struts by adding their adjustable ride height, dual-rate coil-over conversion kit. This kit is currently the most sophisticated one available on the market. It features Eibach springs specially wound to Ground Control's specs.

All Eibach springs are made of high-quality chrome-silicon spring steel, which features much better fatigue resistance than conventional spring steel. The base chrome silicon stock is cold wound by a computer-controlled spring forming machine. This insures accurate forming and a consistent spring rate from set to set. After winding, the coils are heat-treated to restore their temper and pre-set to reduce settling after installation. Finally the springs are shot-peened to stress relieve them and for improved fatigue life.

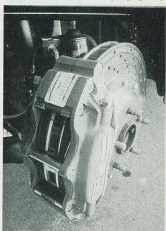
The Eibach race springs use a low-rate tender spring featuring trapezoidal cross-section wire, which helps keep a consistent rate throughout the entire stroke while avoiding premature coil bind. Trapezoidal wire is also much lighter than conventional wire. These characteristics make trapezoidal wire a good choice for the soft tender spring. A conventional, round wire, high-rate primary spring handles the main springing duty



The front brake and suspension assembly installed on the car. The brake is significantly larger than stock (13 inches versus 11 inches).

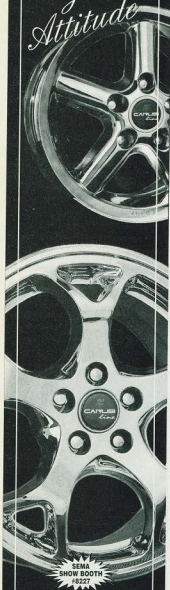


Note the overall width of the disk in relation to the sides. The steel disk material allows for such construction.



The KVR caliper is a truly beefy unit, much larger than the stock one. Aftermarket wheels are a must for this installation.

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as round wire handles high loads better.

Basically, the light tender spring absorbs the small but high frequency ripple bumps which can cause wheel hop during cornering, hard acceleration and braking while the heavy main spring comes into to play when a big bump is hit, resisting bottoming. The light tender spring makes the car more forgiving at the limit and helps it find traction on irregular surfaces. Under hard cornering or braking, the tender spring compresses allowing the heavy main spring to come into play, limiting body roll or dive and keeping the car off its bump stops. Ground Control's dual spring set up lets you have the advantages of both soft and hard springs when you need them.

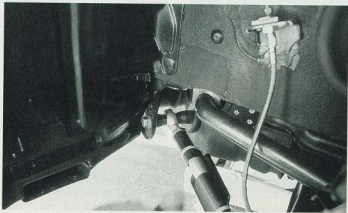
To limit body roll we chose a spring set with a main spring about 40-percent stiffer than stock. With the dual rate spring set we don't feel that the ride will deteriorate much from stock.

The Ground Control crew installed their adjustable collar system to our shocks. These parts are machined from lightweight 7075 T-6 aluminum, anodized red for cosmetic reasons and to prevent galling. The adjustable collars permit easy and rapid adjustment of ride height to suit your personal preference or driving conditions. Adjustable collars also allow for the setting of corner weights which can be tuned to optimize the chassis for a particular type of

corner during racing or for consistent understeer/oversteer balance in right or left hand turns. Ground Control also modified the stock bump stops to increase wheel travel, important for a lowered car. We set the springs for approximately 1 inch lower than stock as the Z is already pretty low. It is important not to set the ride height too low—even though it looks cool—to avoid bottoming the suspension during spirited cornering. When a car bottoms, in a turn, the spring rate for that corner of the car will instantly become infinity. This causes massive slip angles at the corner where the car is bottomed. If the front bottoms the result will be massive understeer. If the rear bottoms, wild oversteer will result.

The Ground Control springs gave a fairly smooth ride when traveling down the freeway and other easy driving venues but were firm under cornering and braking, greatly reducing dive and lean. The soft rear tender spring allowed the rear end to hunt instead of skate for traction, mellowing the tremendous wheelspin project Z had on launch and accelerating away from curves. The impact is a car that is responsive and easier to drive at the limit but still has a good ride. The cool low ride height looks nice also.

We feel that the additional price of the Ground Control race set up over con-



The Stilen tension/compression rod allows for caster adjustments on the Z, something impossible on the stock vehicle. By eliminating a major source of suspension deflection, the Stilen rods also eliminate the twitchy feeling the Z can exhibit at the limit.

RACE PROVEN PERFORMANCE

ventional springs will be well worth it because of their unique ability to give both a smooth ride and yaw free cornering, braking and acceleration.

Adjustable Stillen units replaced the stock anti-sway bars. The Stillen bars are 28mm and 21mm respectively compared to 27mm and 19mm for the stock units. Don't let the closeness in diameter fool you, as the Stillen bars are made of solid bar stock versus the hollow OEM units, making the Stillen bars much stiffer torsionally. The Stillen bars are two-way adjustable in the front and three-way adjustable in the rear in keeping with our theme of adjustability. The Stillen bars are formed from high quality 4140 stress-proof steel, an extremely tough and resilient material. For looks and to resist rust, the bars have a black powdercoat finish. They also feature anti-squeak silicon-impregnated Polyurethane bushings with aircraft-like heim joints and polyurethane bushed end links. Overall, the Stillen bars are of very high quality with original equipment fit.

The stock rear suspension of the 300ZX is fully adjustable for camber and toe, however Nissan chose to not have the front suspension adjustable for anything but toe. Precise alignment is critical for the handling of any car, so making the front suspension adjustable for camber and caster was deemed mandatory. To make the camber fully adjustable, Stillen came to our rescue with their extremely trick adjustable upper link. The Stillen upper link is a two piece unit clamped together with allen bolts. A miniature rack and pinion like device with a lock nut on the side of the link allows for precise adjustment. The soft stock rubber bushings are replaced with Stillen's signature Silicon impregnated polyurethane to cut deflection to a minimum. The stock upper link is known to sometimes squeak, and there is no provision for lubrication. The Stillen link is fitted with grease fittings to make lubrication of the pivots a snap. All of the metal parts are gold cad plated to resist rust.

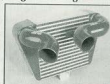
To make the caster adjustable on the front of project Z we replaced the stan-



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ard Nissan tension/compression rod with another super-trick Stilen item. The Stilen T/C rod uses aircraft style spherical bearings to replace the extremely soft stock liquid-filled T/C rod bushings. The stock bushings are designed to soak up vibrations and can have almost an inch of fore-aft deflection. This is good for a smooth ride but can cause toe change under braking and cornering loads. With the moderate forces generated by the stock wheel tire combination, bushing deflection is not so much of a problem. However, with the extreme loads that can be placed on these parts by the big and sticky meats that we plan to run on project Z, the added grip can cause enough deflection to significantly compromise handling. This toe change can make the car feel vague or twitchy at the limit. The Stilen T/C rods are machined from 4130 chrome-moly bar stock with the caster adjuster collars cut from 7075 T-6 billet aircraft aluminum.

With the Stilen upper link and T/C rod there is almost no squishy rubber in any of the major load bearing pivots in the front suspension. We are expecting razor sharp handling.

BRAKE SYSTEM

Perhaps the only part of the 300ZX that needs significant rework to handle the demands of our proposed budget supercar build-up is the brake system. Even though the 300ZX features big four-wheel ventilated disk brakes—which are superb for spirited street driving—as

stock equipment, they are strained to haul the 3600-pound Z-car down repeatedly from triple digit speeds. Under racing and time trial competition, the stock brakes are only good for a few laps before they fade away. To stop project Z, we will put together a brake system very similar to the one put together for the first generation IMSA pro car.

We called upon the experts at KVR, SMC Products and Cooltech Inc. to construct the ultimate brake upgrade for project Z. Terry Gosse at KVR, Steve Christensen at SMC and Jeff Hayes at Cooltech were instrumental in getting the brake system together.

KVR supplied us with trick AP Racing calipers. AP Racing calipers are well known to racecar constructors and have been used in Indy, F1, IMSA GTP, NASCAR and many other forms of racing. These calipers feature four pistons in the front and two in the rear. The piston areas of the AP calipers is close to that of the stock calipers, very important in maintaining correct front to rear balance. The front calipers have differentially sized pistons to prevent taper wear of the pads. The front calipers also feature a bridge bolt for stiffening. An important feature of AP racing calipers is an internal dust seal. Most racing calipers do not have dust seals so their life on the street is limited to about one year between rebuilds. Racecars have their brakes inspected and rebuilt frequently but this could be a hassle on a street car. The aluminum castings of the AP caliper bodies

are massive with many clamp bolts for extreme stiffness, important for maintaining a rock hard pedal.

KVR also supplied us with two piece Coleman rotors and custom machined 7075 T-6 aircraft aluminum rotor hats. To save weight and allow more mounting flexibility, racing brake rotors have an alloy mounting hat. The hat serves as an adapter between the car's hub and the racing rotor. This gets rid of several pounds worth of heavy ferrous metal per corner of the car and helps keep brake generated heat out of the wheel bearings.

Unlike conventional cast iron rotors, Coleman rotors are forged from steel. Steel has a higher level of strength than cast iron allowing thinner cross sectioned rotors with bigger internal vents. The resulting rotor is both lighter and cooler running than the stock iron units. Even though our front rotor is a massive 13 inches versus the stock 11 it is still 3 pounds lighter, including the alloy mounting hat. It is important to reduce the weight of the braking system if possible because it is critical unsprung weight that is being removed. Unsprung weight affects handling; the more unsprung weight, the worse the suspension can cope with small bumps. Brake weight is also rotating weight. One pound on the wheels is equivalent to at least four pounds on the chassis. This can have a big effect on acceleration cornering and braking. Steel's coefficient of friction also stays more constant across a wider band of temperature. This helps the brakes be



The Stilen adjustable front A-arm assembly allows for camber changes on the Z-car. This allows better alignment when larger wheels and tires are put on the car, as well as more precise handling.



The rear brakes are also from KVR, with SMC stainless steel lines. The Ground Control strut is visible behind the new rear disk.

more consistent over a wider operating range of temperatures. KVR cross-drilled the front rotors to help evacuate superheated boundary layer gasses. When you brake really hard, the frictional heat created by the pad rubbing on the rotor is extreme. This extreme heat actually causes the pad material to vaporize. Cross drilling gives the thin layer of vaporized brake pad material a place to escape, preventing the brake pads from slipping on a layer of superheated gas. Cross drilling also increases ventilation and internal cooling by giving the air circulating through the rotor's internal vents additional cooling paths.

The 300ZX has its parking brake drum cast as an integral part of the rear disk. This has made doing a streetable brake upgrade for the rear of the Z a chore that no aftermarket tuner has wanted to tackle. On the IMSA pro-cars the rear parking brake was simply eliminated when the brakes were modified. Since project Z is street driven, having no parking brake is simply not acceptable. We felt to maintain proper brake proportioning, it was essential to upgrade the rear brakes of project Z as well as the front. KVR stepped up and machined a super trick iron lined, aluminum brake hat for a 12.5-inch vented and cross-drilled Coleman racing rotor. This is up from the 11.6-inch stock rotor and should go a long way to maintaining correct brake bias.

KVR also supplied us with a set of Hawk HPS carbon brake pads. These

pads are designed for heavy-duty street or light competition use. Since the brake system is sized on the large side they should be more than acceptable for anything we can throw at project Z. The HPS pads are a soft, quiet, easy on the rotor pad made of a ferro-carbon material. Carbon has a consistent coefficient of friction throughout a wide temperature range unlike traditional fully metallic brake pads, which do not work well unless they are fully warmed up. Later as it becomes available, we will be switching to KVR's latest super upgrade for the front brakes, a 6-piston caliper with huge 14-inch front rotors! KVR has big brake applications for just about all late-model cars so if you own something other than a Z and still want to stop fast, many times in a row, give them a call.

To mount the calipers on project Z, we called upon the machining skills of Cooltech Inc. Cooltech is known for their pioneering use of metal matrix composites in brake rotors. Developed for the canceled NASP (National Aerospace Suborbital Plane) program, metal matrix composites or MMC's are a supermaterial making the jump from aerospace-only applications into consumer goods. The MMC's used by Cooltech are an exotic blend of metallic ceramics and aluminum. The result is rotors that weigh LESS than aluminum but are as strong as traditional iron or steel. MMC's can dissipate up to 5 times the heat of cast iron, making them ideal for brake rotor usage. Jeff Hayes of

Continued on page 76



The thicker rear anti-roll bar also boasts three different levels of adjustability for more precise roll control.

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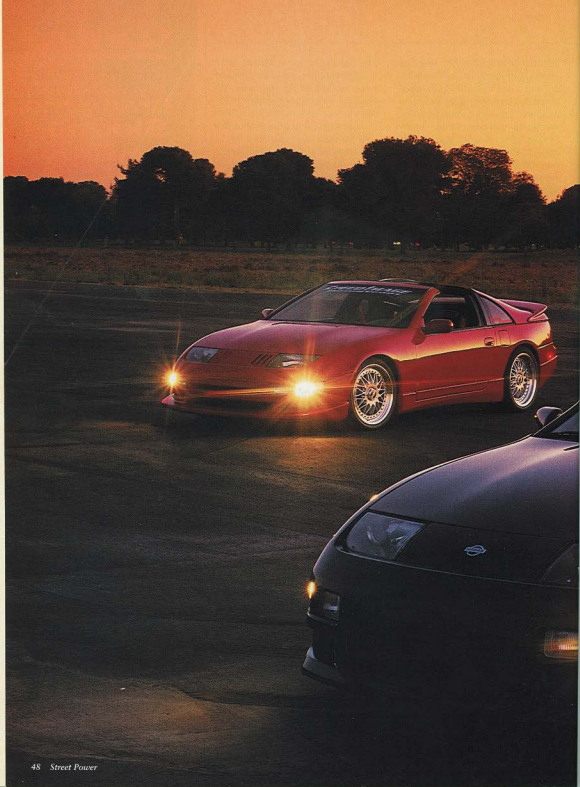
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the **BEAST** *Within*

Unlocking The Monster Under The Z-Car's Hood

by Keith Buglewicz

PHOTOGRAPHY: LES BORAAN

The late 20th century may just go down in automotive history as a golden age. Never before has there been the variety of high-performance cars at the wide range of prices on the new and used car markets. If one has only a moderate amount of money to spend on a new or used car—say, \$20,000—there are plenty of excellent choices.

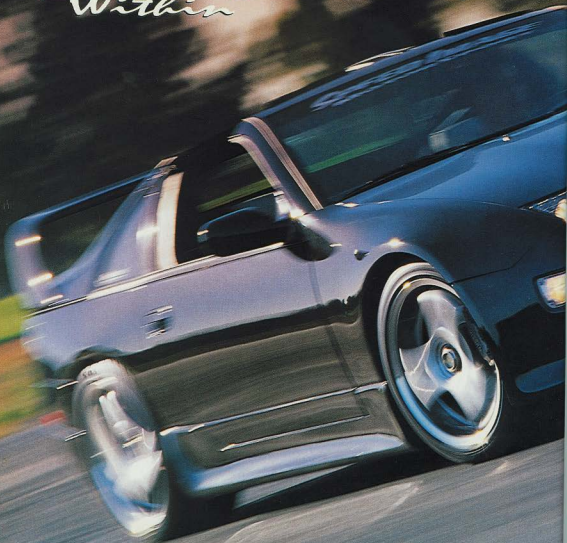




the
BEAST
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One of these is the final version of Nissan's 300ZX Twin Turbo. Although many mourned its passing (with good reason; it was one hell of a car), the Z has become inexpensive enough on the used market to warrant a close look for those considering newer—but more pedestrian—machinery. Who would have thought that a car with the Z's capabilities—0-60 in five seconds flat, a 150 mph top speed, handling abilities that could make anyone look like a pro—and reliability could be bought for under \$20,000 just a few years ago?

Of course, the stock Z is only a starting point for many people. Hidden inside the 300-hp stock twin-turbocharged V6 is a 500+ hp monster waiting to get out. Unlocking the unseen



power and releasing the beast within the Z is a favorite pastime for many, like Linh Thai Bui and Edward Bergenholtz of Speed Image Motorsport in Santa Ana, California. Both cars were built by Speed Image in Santa Ana, California. Famous for their drag-racing Civics and CRX's, Speed Image is more than capable of tackling the challenge of Nissan's now-affordable supercar.

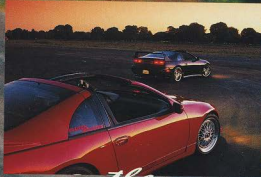
HAPPY ACCIDENT

Linh Thai Bui purchased his black '91 300ZX Twin Turbo from a friend...a notorious street racer. The car had been modified only with a GReddy manual boost controller. Linh proceeded to add the GReddy front bumper, Aramaki side skirts and

Stillen rear valance. The entire car was then slathered in a sinister, deep black paint job. Combined with the wide-mouthed GReddy front bumper and 18-inch three-spoke Super Advan wheels, the car looks ready to swallow up lesser machines instead of merely passing them.

However, Linh had only completed his cosmetic upgrades before disaster struck. On his way to lunch one day, he noticed his engine began making ugly noises. A complete diagnosis followed and came up with bad news: A connecting rod had broken. Perhaps the previous owner misused the manual boost controller, or maybe it was just a rare funky part that somehow made it through Nissan's rigorous quality control efforts. Either





the **BEAST** Within

way, the engine was dead until the rod was replaced.

Normally, a car owner would be justifiably upset at discovering his car had just barfed a rod. As it turns out, Linh wasn't as upset as he normally would have been. An engine rebuild—complete with performance internals—had been planned all along. The busted rod simply accelerated the process.

As manager and half owner of Speed Image, Linh had access to an entire arsenal of performance tricks. Although some have criticized Nissan's continued use of an iron block on the VG30DE V6, it offers enthusiasts an advantage. Aluminum blocks may have better heat transfer and are obviously lighter, but iron blocks can be bored out, which is precisely the course of action Linh took. A 4mm overbore was performed, and the block was MagnaFluxed to check for cracks or other flaws the broken rod may have caused. With the kind of power Linh was planning, the last thing he needed was a block that wasn't up to snuff. JE overbore pistons filled the bigger holes, and raised compression to 8.6:1. Crower rods connected to a blueprinted, balanced and micro-polished stock crank, and the entire bottom end was blueprinted and balanced during the assembly.

The heads were both polished and ported at Speed Image, complete with a three-angle valve job. The intake manifold was given the Extrude Hone treatment, and match-ported to the heads. Bigger JG throttle bodies replaced the stock units, and HKS cam sprockets allow fine-tuning of the cam timing.

Of course, the turbos were upgraded as well by Dynamic Autosport in Irvine, California. Dynamic's technicians ported the compressor housing and installed Super 600 compressor wheels. The stock T28 exhaust housing was ported, and larger turbo wheels were fitted inside.

A Blitz twin-solenoid boost controller regulates boost, while twin HKS sequential blow-off valves bleed off boost during upshifts. Air is inhaled through HKS performance

Continued on page 92



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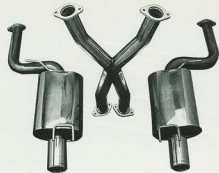
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results in enough additional fuel per injector squirt to compensate for the engine's increased breathing, or volumetric efficiency.

According to Bell (author of the new book "Maximum Boost" from Robert Bentley Publishers), all forced-induction systems with at least 4 psi boost should have intercooling to return charge air temperature to within (ideally) 20 degrees of ambient in order to control combustion temperatures and knock. This is particularly important on such high-compression engines as the M3, with its 10.5:1 squeeze.

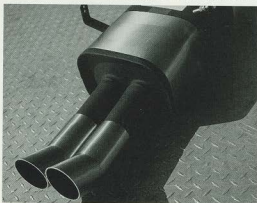
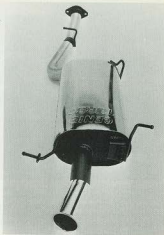
The BEGI M3 system uses a custom intercooler mounted in front of the radiator and A/C condenser. It requires removal of the front pusher radiator fan, and, for some climates, possibly an upgrade to the rear sucker fan. However, the stock rear fan has been entirely sufficient in 95-plus degree South Texas summer weather in San Antonio. The intercooler is 18 inches long, 6 inches high and 3 inches thick, with an internal flow area of 24.5 sq. in. It was designed to handle 400 hp worth of heat and boost. With thermal efficiency in the 80-percent range, on a 90-degree day the intercooler will return compressed air from the Autorotor to within 14 degrees of ambient. Pressure loss is less than 1 psi through the intercooler.

Bell Engineering realized immediately that the stock intake manifold would have to go, for several reasons. First, the stock manifold with 12-inch long runners simply did not leave any space for the Autorotor. The right custom intake manifold could also make mounting the Autorotor much simpler. And a new manifold design would clearly provide the freedom to redesign inlet runners for high efficiency, high flow at high rpm, relying on the blower to provide the excellent low end, which requires long runners on a naturally aspirated car.



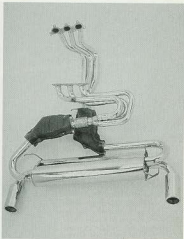
If you are looking for Nissan performance gear, Stilen should be at the top of the list. This stainless steel exhaust system is for the awesome 300ZX. Quality construction includes beilarc welding and ceramic blanket packing material tuned for an ideal exhaust note.

Mazda's third-generation RX-7 has been referred to as one of the purest sports cars ever made. With a Genie exhaust system, it is refined further. Made of T304 stainless steel, this cat-back system has a polished muffler and 80mm round polished stainless steel tip.



AC Schnitzer engineers exhaust systems exclusively for BMWs. Their systems are constructed of stainless steel, and for the E-36 chassis M3, aggressive DTM-style tips are available. AC Schnitzer products are distributed exclusively in North America through CEC.

Honda and Acura owners know DC Sports for their high-quality exhaust systems, for vehicles ranging from humble Civics to the outrageous NSX. They claim their NSX header and cat-back system gives the NSX anywhere from 26 to 30 additional horsepower.



Few cars have generated the excitement in the aftermarket that the new C5 Corvette has. Available through BC'B fabrication, this stainless-steel exhaust system is a direct factory replacement, OBD1 compatible and 50-state legal. And, the chrome tips are a great addition to the looks of the new 'Vette.



Applied Technologies Research offers a wide variety of exhaust systems for many different vehicles. This system is designed specifically for the '95-'97 Mitsubishi Eclipse/Eagle Talon twins. Built of T304 stainless steel, it is 50-state legal and includes stainless mounting hardware. →

Continued from page 47

Cooltech let us lift some rotors to our amazement. A 14-inch massive rotor that weighs in at 21 pounds in iron weighs a feathery 8 pounds when it is made of MMC! The only obvious disadvantages that we can see with MMC's is that they are twice as expensive as conventional rotors and need a special type of brake pad. They are still many times cheaper than the carbon-carbon rotors used in F1! Considering the fact that MMC rotors have the ability to eliminate 13 pounds of rotational and unsprung weight from each corner of the car, the price is well worth it, even cheap. At a later date we will experiment with these MMC rotors to test their mettle. Cooltech is mostly known for their brake upgrade kit for exotics. Need some 14 inch MMC brakes for you Diablo, Turbo Porsche or F40? They have them. Need something for that Ferrari WSC car? Give Jeff a call.

But back to the here and now. Cooltech has a full machine shop equipped with CNC mills and lathes. They made short work out of carving us a set of super sano, nicely finished caliper mounting brackets out of 7075 T-6 aircraft aluminum billet topped off with aircraft quality metric hardware.

To complete our brake package SMC products came up with a killer braided steel line kit. Braided steel lines resist swelling under pressure and make a huge difference in pedal firmness. The difference has to be felt to be believed, but is



Because the Z-car's emergency brake is integral in the hat of the rear disk, they are often not upgraded beyond brake lines and pads. KVR was able to machine an iron lining for the aluminum brake hat. The result is a 12.5-mch disk where the stock 11.6-mch disk used to be.

very significant. Unlike most other suppliers of braided steel brake lines, SMC uses aircraft quality forged fittings not the cheaper, weaker machined or cast fittings that most other companies use. In another attention to detail, SMC covers their brake lines with a tough nylon tubing. This helps prevent the rough, abrasive braided steel hose from sawing through various parts of the chassis under vibration. The covering is available in clear or in colors. In a world where it seems that speed equipment is only made for the Honda Civic, SMC probably has the widest selection of brake lines available. Need something for an Audi or Volvo? They got em!

SMC handled the cosmetic details of the brake kit, cad plating the rotors and parking brake drum hat liner to prevent rusty shmoo from dripping out of the rotor vents to stain our wheels. SMC polished and anodized our hats red to complement the white paint on project Z.

SMC also supplied us with Motul 600 brake fluid. Motul does not boil until it reaches 600 degrees which is about twice that of regular brake fluid. We are totally amazed with Motul's performance. During SCCA and IMSA sedan racing, it

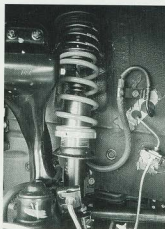
was standard procedure to bleed the brakes as many as 6 time in a race weekend to maintain a firm pedal. When we switched to Motul, the bleeding frequency dropped to maybe 6 times for an entire season. This was with Motul's older formula of fluid. Motul 600 promises to exceed that significantly. While test driving Project Z's new brake system, we noted a rock hard pedal with plenty of feel thanks to the stiff calipers and non-expanding brake lines. The car decelerates like an anchor was thrown out! The brakes feel better than those of any mass-produced car we have ever driven. The red anodized hats and the huge rotors look pretty sexy also.

If you have been drooling over our brake conversion, it should be available in kit form by the time you read this through both SMC products and KVR.

Now we have a world class set of brakes for project Z, we need some sticky tires to take advantage of them with big enough wheels to fit over the big brakes!

WHEELS AND TIRES

A trick set of wheels and tires can make or break a cool street machine. If



The Ground Control spring/strut setup combines Eibach springs with the stock strut. Adjustability is gained by adding a threaded body to the stock strut. The middle adjusting ring also serves double duty as the mounting point for the tender spring. The tender spring helps control small bumps, letting the main spring to the heavy-duty cornering work.



The Ground Control springs in the rear offer the same advantages as the front springs, with the stock strut still in place for the on-board adjustability, and the Eibach main and tender spring.

we mounted a set of Ronal Bears to Project Z we would be laughed out of existence! Our goal is to stuff the largest wheels and tires possible into the stock wheelwells of our project car.

In order to do this correctly, it was essential to find a cool looking wheel that was available in the exact offset that we wanted. Through careful measurement we determined that the biggest wheels we could run were 18 x 9 in the front with a 36mm offset and a 18 x 10 in the rear with a 50 mm offset. We wanted a thin five-spoke wheel for maximum brake cooling and ease of cleaning. The thin spokes would also show off the trick brake system. The wheels had to be as light as possible to aid acceleration and to keep down unsprung weight.

After unsuccessfully trying to find a company that had wheels with the correct offset and style in a pre-made offering, Chris Hart of Hart Sport Wheels came to our rescue. Hart makes a sporty-looking open meshed as well as five spoke wheels in any custom offset you could desire. Chris whipped up some of his 18-inch, five spoke Odyssey wheels in the exact offset and width we needed.

Hart wheels are a true 3-piece racing-type wheel made to order. Even in our large size they weigh in at a feathery 23 pounds. The centers of the Hart's are cast of A356 aluminum, which is then heat treated to T-6 for maximum strength. The rim section is made of cold forged 5454 aluminum. Forging increases the strength of the rim section allowing a thinner cross-section for lighter weight. A forged rim is also more ductile. This means it will bend under a hard impact instead of cracking like a cast wheel will. The wheels have a deeply polished rim section and chrome plated attachment hardware. Hart painted the centers of the wheels white in the same color code as project Z's original paint.

With a set of sharp looking wheels we set off looking for a set of suitable tires. What we wanted was a set of 285/35ZR-18s for the rear with 255/35ZR-18s for the front. At the time of this writing, no one had a 255/35ZR-

18 available in the United States. Some companies made this size, but they were only available overseas.

Toyo supplied us with a set of the Proxes T-1 Z-rated ultra high performance radials in 285/35ZR-18 and 245/40ZR-18. Surprisingly enough the 245/40ZR-18s were wider in section than many other brands of 255 tires once mounted, solving our problem. The Proxes T-1 has some interesting features to enhance performance. A new type of rubber compound is featured using very fine particles of carbon black (the rubber strengthening compound used in all tires) and a special resin to increase both grip and tread life. Special bead filler has been added to improve sidewall stiffness increasing transient response and grip at the limit by reducing the lifting of the inside tread. Special steel belts use an ultra fine steel wire, making the contact patch flexible for a good ride. This is an important feature for getting any kind of a smooth ride out of ultra low profile tires. The Proxes's tread pattern is designed to be stiff in acceleration and braking as well as under side load. The tread's center section has large circumferential grooves to shed water for good wet traction as well. The Toyo's also feature jointless edge and cap plys for more uniformity. This must work because our tires balanced out with almost no additional weights.

Also important for our ultra low profile tires and wide rims are the rim protector rib molded into the sidewall. This handy feature can prevent a little carelessness in parking from becoming an expensive rim-grinding disaster. We have had excellent experiences racing IMSA and SCCA sedans on Toyo Proxes R-1s, the soft compound version of these tires. They are not too practical for the street as the treadwear rating is nil. Our impression with the Proxes so far is good. They are extremely sticky for a street compound radial. We have also had excellent results with the Proxes T-1 on the 2005X SE-R that has been featured in our sister publication Sports Compact Car. On project SE-R

the tires have proven to be sticky and long wearing.

With it's lowered stance, Huge wheels and tires but otherwise stock bodywork, Project Z is sleek but still somewhat of a sleeper. Only when you look into the wheels and catch a glimpse of the racing brakes do you see a true trace of the performance yet to come. While driving, the limits of the chassis are well above what sanity will allow us to approach on the street. We can't wait to do some hot lapping on a real race track, where conditions are more controlled. Stay tuned for future issues when we test our world-class chassis underpinnings with a boost in power.

SOURCES

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De Tomaso was the featured marque this year at Concours Italiano. Naturally, plenty of Panteras were on hand.

original condition, flathead Ford V8s and all.

But both concours—as well as the many auctions that take place at the same time—ultimately don't do justice to the cars. For those who truly believe in Webster's definition, there is only one place to spend the weekend, and that's at the track.

The featured marque at the Historics this year was Shelby, and for the lovers of big, thundering American V8s, there was plenty to drool over. Shelybs of all kinds were everywhere, from 286 Cobras to 427SC side oilers to the all-conquering Cobra Coupes that won the GT class of the famous 24-hour race at Le Mans in 1964. And there was a whole fleet of 1966 Shelby GT 350 Mustangs, both in the parking lot and on the track. In fact, the Group 4A field was dedicated to the

classic racers, considered by many—even today—to be the ultimate 'Stang.

The feel this year was strongly American, with four groups either devoted to or dominated by American iron. But there was still plenty for lovers of European machines to see. Like the Group 6A and 7A racers, with former Formula One, Formula 2, and Formula Junior cars. Or for those who like their vintage racers truly vintage, there was group 1A, crowded with Bugattis of all sorts, and nothing built before 1935.

Invited by Mitsubishi to both soak in the splendor of a weekend of vintage cars and evaluate their current crop of project cars—specifically, the Eclipse Spyder Speedster and Diamante SSC (look for full road tests in a future issue)—this was my first trip to the Monterey Historics. The opportunity

ACCELERATED RHYTHM

Continued from page 71

Type blow-off valve prevents turbo compressor surge when the right foot comes off the loud pedal, and adds a nice, performance-edged whistle. Not only does it give this stunning visual car engine noises to match, it helps extend the turbo's life by smoothing the changes in the impeller and compressor's speed. It



also allows for faster turbo spool-up when you get back on the accelerator.

Up front, the engine sucks in the massive amounts of air required through an HKS Power Flow air filter system, which is much less restrictive than the stock

system. The engine exhales through a cat-back HKS Super Drager exhaust, and a 4-inch downpipe.

Oddly, Bryan chose to build this machine with an automatic transmission. But we can't fault him, as the auto-box is well suited to the power level of the car, and the electronically controlled tranny fits in well with the techie theme of the car. Chrome 18-inch Speedline wheels wear Michelin MXX3 Pilot tires, 235/45ZR-18 front, and 285/35ZR-18 rear.

Greddy's exhaust gas temperature (EGT) gauge and 30-pound boost gauge have been added to warn of excessively high exhaust temperatures and over-boost. Every good pilot should know when his engine is in danger. But the real surprise of this street fighter is in the electronics bay. The cockpit of this machine is a showcase of the latest and greatest in automotive electronics.

Sherman Daley Jr. assisted Bryan with the electronics work, which consists of a dazzling array of navigation, electronic countermeasures, security, and entertainment systems.



For navigation, a Sony Global Positioning Satellite (GPS) navigation system is also installed. A technology previously only available to the U.S. military, this system utilizes signals from 24 orbiting satellites in the GPS "constellation" to determine the location of the car down to 100 meters anywhere on the earth's surface. With this data, the computer can then use a combination of dead reckoning and map-matching to pinpoint your exact street location. Sadly, it doesn't tell you where all of the hostile police, Mustangs and Camaros are hiding sadly.

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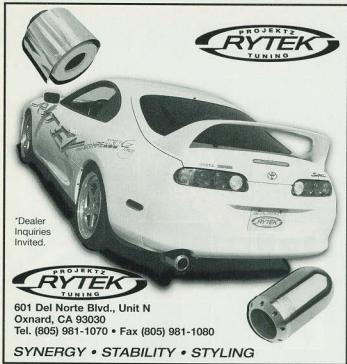
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air filters, and boost blows through twin custom intercooler with Garrett cores. Inside, a GReddy 52mm boost gauge mounted on the driver's side A-pillar keeps Linh informed of the turbos' antics, and a GReddy Turbo Timer keeps the turbos from cooking themselves after a hard run.

Feeding the engine extra fuel under boost is a set of HKS 550cc injectors. A Jim Wolf custom programmed ECU encourages the injectors to get along with the higher boost levels the turbos now squeeze out. Future engine mods include adding more boost, and two additional injectors to supplement the ones already installed.

The 300ZX did have one flaw straight from the factory: its brakes. Prone to warping in the early years, further upgrades from the factory did little to improve stopping power. Recognizing this shortcoming, Linh upgraded his brakes with Brembo cross-drilled rotors, steel-braided brake lines, Repco Metal Master pads and DOT5 brake fluid. The suspension was upgraded with Eibach Pro Kit springs and Tokico 5-way adjustable struts. Suspension Techniques anti-sway bars, adjustable front camber plates and adjustable tie-rod ends let Linh fine-tune the suspension to his personal liking. Bridgestone S-O2 tires-235/40ZR-18 in front and 265/35ZR-18 in the rear-hold the car in the turns.

Since Linh drives his car every day (believe it or not), the interior is as comfortable as it can be. A custom black/gray leather upholstery scheme from California Upholstery jazzes up the otherwise stock seats, while a Momo Phantom shift knob and Razo pedals add to the interior décor. However, the crowning achievement of the interior is the stereo system. An Alpine 7618 head unit, and 7822 CD player are the heart of the system. They are backed up by an Alpine 5-way crossover, CD changer and two AD5 six-channel amplifiers. Six MB Quart tweeters, four MB Quart 6.25-inch mids and one 12-inch JL subwoofer pump out the sound.

UNDER CONSTRUCTION

Edward Bergenholz got his red '90

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300ZX twin turbo after owning two Acura Integras. Looking for something with rear wheel drive that he could turn into a supercar, Ed found the Z fit his profile perfectly. Two years ago, he sold his '93 Integra GSR and purchased his Z.

As always there was a hitch. Although he has owned the car for two years, he has only been at work on it for one. Lack of financial resources (something I'm sure almost everyone can sympathize with) prevented him from going all out as soon as he would have liked. But a year ago, a new job equaled new money, and the Z began to come to life.

First came the suspension. Tokico 5-way adjustable struts supplement H&R Springs, while the front camber arms are adjustable for more precise handling. E Wing mesh wheels (18 x 8.5 in front, 18 x 9.5 in the rear) are wrapped in 255/35ZR-18 and 275/35ZR-18 Dunlop SP8000 tires, respectively.

The wheels are not the only exterior enhancement. A Kaminari body kit, consisting of front bumper, side and rear skirts and rear wing, are complemented by an SMZ grille panel from Stilen. Once the kit was on, the entire vehicle was painted the brilliant red you see here. Japanese clear corner lights are a subtle but effective way of setting the car apart visually.

The interior has been livened up with a carbon fiber dash kit, MOMO carbon fiber shift knob and MOMO Club 3 steering wheel. Razo CF pedals round out the carbon fiber theme. A GRReddy boost gauge supplements the stock (somewhat inadequate) unit, and a GRReddy exhaust temperature gauge gives him a better idea of the fuel mixture by its reading. Serious sounds are also part of the interior modifications. An Alpine head unit, crossover and three Alpine amps power the system's 1-inch tweeters, 5.25-inch mids and 6-inch coaxial rear speakers, as well as the 10-inch Bazooka bass tube.

But the car is hardly all flash with no dash. Ed's plan is to follow in the footsteps of Linh, but then go well beyond. He has started with an HKS exhaust and Super Power Flow performance

intake system. HKS sequential blow-off valves reduce the likelihood of boost pressure damaging the turbos or throttle between shifts. And a Jim Wolf ECU upgrade keeps the electronics happy with its newfound breathing ability. Power is transmitted through a Clutchmasters dual diaphragm clutch.

Edward has big plans for the future. Currently, his project is on hold as JG Engine Dynamics perfects a dual-DFI system for the Z. Along with a full engine build-up using JG components, bigger turbos and as much performance hardware as he can cram into it, Edward plans on building himself a serious quarter-mile racer. Already an experienced drag racer with a Honda CRX capable of kissing the magic 10-second barrier, he plans on building his Z to blow its doors off.

THE TEST

To find out how much power each Z was putting to the ground, we took both cars to Jackson Racing [(714) 379-5858]. Unfortunately, hot, humid weather conspired to reduce the power registered at the wheels, correction factor or not. Linh's car still managed to pump out an impressive 371.6 horses to the rear wheels. This was still less than he was expecting, most likely due to the restrictive pre-cats the earlier Z-cars had (they were absent in post '94 models). With its minimal performance modifications, Edward's car squeezed out a respectable 277.3 horsepower, again a little less than we expected due to the weather conditions.

With future modifications planned for both cars, power numbers are sure to climb skyward. And Speed Image will perpetuate its reputation as a tuner to beat.

Power

SOURCE:

Speed Image Motorsport
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B&B Fabrication	86
Baer Racing	29
Carusi Line wheels	44
Cosmic Marketing Corp.	61
ES Technical	79
Eibach	91
Erebuni Corp.	4
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