Killer B16/18

Why the Honda/Acura B-Series engine is the powerhouse of the import revolution

The Honda B-series engine can be likened to the venerable small block Chevy. It has powered two generations of hot rodders and is still going strong for the domestic camp as the engine of choice for an amazing third generation. Conceived in the mid '50s, the small block Chevy is stronger than ever, pumping out more than 400 hp in the latest Corvette Z06. In racing, the mouse engine, as it's affectionately called, serves yeoman duty propelling the fastest Winston Cup cars and many classes of domestic drag racing to victory. Even though the engine's design is older than most of us and has a crude (by today's standards) pushrod OHV, two-valve head architecture, the latest variants of this engine have an impressive power density. It has always been popular to the performance crowd and has tremendous aftermarket support, the best for any engine ever made.

The Honda B-series engine is the import enthusiast equivalent to the small block Chevy. It has enjoyed tremendous popularity as the performance engine of choice for the Honda/Acura nut. Stock in the Acura Integra, del Sol Si and the Civic Si, the B-series is also a popular and very easy swap into the lightweight Civic, making the classic hot rod: a powerful engine swapped into the most compact and light chassis. Since the B engine was available even more widely in the Japanese domestic market (JDM), there's an abundance of relatively cheap used JDM engines imported here to serve as a base for hybrid Civic swaps or other build-ups.

The B-series has gone through an evolution of sorts. The final most developed version is the B18C5, the rare powerplant found under the hood of the Integra Type R. This variant of the B-series pumped out an impressive 195 hp in stock naturally aspirated form. This is an amazing feat of more than 100 hp per liter, more than some factory turbocharged and supercharged engines. The B16A, first found under the hood of the del Sol Si was the first production auto engine to produce more than 100 hp per liter.

Honda's superior engineering helps the B engine put out amazing levels of power from small displacements. The B is blessed with excellent combustion chambers of a pentroof design, featuring a shallow included angle. This helps efficiency, as a shallow included angle has a lower surface-to-volume area to insure that more heat energy is used to drive the piston rather than heat the water jacket. The intake and exhaust ports, as well as the valves, are generously sized and contoured correctly for excellent flow right out of the box. Many variants of the B engine also have generous quench zones in the cylinder head to help improve combustion stability by improving fuel-air mixing and turbulent combustion.

The big B also features a lightweight die cast aluminum block with strong semi-girdled main caps and a fully counterweighted high alloy steel forged crankshaft. Forged high alloy steel rods with large bolts and generous caps combined with an excellent oiling system make bottom end failure on these engines almost unheard of.

Although many import engines from the established Japanese car makes like Nissan, Mitsubishi and Toyota share some or all of these excellent traits, Honda still has an ace up its sleeve with its wonderful innovation, VTEC. VTEC is what sets the B engines apart from other production engines. Short for Variable valve Timing with Electronic Control, it's Honda's system that combines the smooth idle, decent low-end power, good fuel economy and low emissions of a stock cam with the top end charging, high-rpm power of a nearly full-race cam. VTEC has none of a race cam's disadvantages like poor idle quality, total lack of low end power, poor part throttle driveabilty, poor fuel mileage and hydrocarbon rich tailpipe effluent.

The short-duration, low-lift, low-rpm cam lobes activate the intake and exhaust valves at partial throttle and low rpm, but when you boot it, the high-rpm, high-lift, long-duration center lobe is activated and the engine

really sings. The high-rpm lobe has a lift and duration close to that of a full race cam, allowing VTEC-equipped B engines to rev to astronomical limits, like 8000 to 9000 rpm in stock form.

Unfortunately, the year 2001 was the production swan song of the mighty B engine. But fear not Honda fans. The B's easy availability on the used market and the tons of aftermarket support for this engine family will ensure the engine's longevity in the world of import performance. Most of the B engine's parts interchange between variants, making all sorts of interesting power and displacement combinations possible. This interchangeability also increases the used parts pool considerably. I'd bet many of these engines will be hopped up many years from now as hot rod projects for some of us when we retire, much like the small block Chevy is the engine of choice for the aging baby boomers retirement project T-Bucket.

The first of the popular B engines were the B18A (1990-1993) and B18B (1994-2000), commonly known as the "LS " engine (they were standard equipment for the LS Acura Integra from 1990 to 2000). These engines feature a bore of 81mm and a stroke of 89mm for a displacement of 1835cc and a compression ratio of 9.2:1. These engines pumped out 140 hp, an impressive amount of power for the displacement even today. LS engines don't have the much-desired VTEC but respond well to mods. The LS enjoys plenty of aftermarket support and are cheap and plentiful in junkyards for those wishing to make a low-buck but potent hybrid Civic. With the long 89mm of stroke, these engines are known to put out more torque than your average Honda.

The first of the VTEC B engines was the B17A1, making its appearance in the 1992-1993 Integra GS-R. This somewhat rare engine featured a 81mm bore with a 81.4mm stroke for a displacement of 1678cc and a compression ratio of 9.7:1. This first use of VTEC in a U.S. domestic market Honda four-cylinder pumped out an impressive 160 hp. Strangely, this engine was smaller than the base LS Integra engine. Why Honda/Acura chose to do this is beyond us. The B17A1 head on the B18A1-B1 bottom end would've been awesome.

The next VTEC B engine to hit our shores was the small but mighty B16A2-A3 which powered the 1995 to 1999 del Sol Si VTEC. The mighty mite featured a 81mm bore with a short, high revving 77mm stroke. With 1587cc of screaming power and a high 10.2:1 compression, the little B16A pumped out 160 hp, making it the first mass produced naturally aspirated engine to put out more than 100 hp per liter. In 1998 to 2000 the B16A also powered the mighty sixth-generation Civic Si. The closely related, almost identical or JDM B16A was available in Japan on many vehicles from 1989 to 2000, making this a fairly common and cheap engine in the import junkyards. The JDM B16A is an ideal engine to drop into your third to sixth generation Civic to give it a fairly economical VTEC fix. The JDM B16A head can also be grafted onto non-VTEC B engines to convert them to VTEC fairly cheaply.

In mid 1993, the Integra GS-R was given a greater power fix in the form of the highly desirable B18C1. This VTEC engine featured an 81mm bore and an 87.2mm stroke and a high 10:1 compression ratio, resulting in 170 hp. The import junkyard available JDM B18C1 was almost identical but had a higher 10.6:1 compression and made 180 hp. Not only do these engines have a ton of aftermarket support, they also drop right into most third- to sixth-generation Civics with little modification to create a very potent machine. In a lightweight Civic, it's possible to have a docile car that grandma could drive with factory-like reliability and fuel economy that can rip off a high 13-second pass at the strip. In 1997, the B18C5 was introduced in the limited production Integra Type R. This engine pumped out an incredible 195 hp right from the factory. The differences between the B18C1 and the B18C5 are more than you would think. The B18C5 has an open combustion chambered head with little quench, much like the B16A, with the same intake manifold port and bolt configuration as the B16A. The head is hand ported at the factory by Honda technicians. The C5 has a simple intake manifold with larger shorter runners and a larger plenum chamber. The engine also has a very high 11:1 compression with cams featuring higher lift and longer duration. The valve springs have been redesigned for these cams. The exhaust manifold is a fabricated stainless steel tubular header. The good news is these hotter factory parts will interchange along the entire B-series family line.

Perhaps the best and most popular use for a B engine is to be dropped into a small and lightweight Civic. This is especially cool and easy in third to sixth generation Civics. Hasport makes engine swap kits to make

these conversions a relatively simple weekend project. A slightly warmed over B engine in a Civic, especially a light third- to fifth-generation Civic, has the potential to be a low-buck giant killer.

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Factory-Based, Low-Buck Hop Ups

One of the most appealing things about Honda engines is the plethora of hot parts that can be found right from the pages of the factory parts book. The other appealing thing is that you can build a really hot naturally aspirated street engine with some of these relatively inexpensive factory parts. We will focus primarily on the hot combinations of JDM and other stock Honda parts that can be used to build a potent street machine. Even though they are stock factory parts, they have a lot of extensive engineering and testing behind them. This makes for superior function and reliability. When used within their design parameters, factory parts will provide a long and reliable life. With the B-series family there is quite a bit of interchange that can be done between years and even models of different B-series engines to come up with some potent off the shelf combinations.

Not all JDM parts are strictly for speed. SPW sells these trick-looking JDM valve covers and plug wire covers for dress-up purposes.

It's possible to come up with streetable combinations that belt out more than 215 crank and 185 wheel hp with more than 150 lb.-ft. of wheel torque. When we list power figures here, it's wheel power confirmed on a DynoJet 248C chassis dynamometer. Usually the crank horsepower is about 15 percent greater than these wheel horsepower figures due to frictional losses in the drivetrain. When mixing and matching the correct factory parts with headwork, headers, intake systems and the usual bolt ons, one can obtain these power levels fairly cheaply. These are impressive power numbers and are done on pump gas with clean emissions; good low speed driveabilty and a silky smooth idle thanks to VTEC.

The number of possible combinations that can be done is mind-boggling and some are more effective than others. Note that we have not personally tried all of these, as it's impossible to have done all of the possible combinations, but most of the suggestions listed here are fairly well documented. Of course, when assembling new engine combinations, you must cc combustion chamber and piston domes, calculate compression ratios and check piston-to-valve clearances and piston-to-head clearance. These are good practices when assembling any engine, but it's even more critical when putting together combinations that weren't originally intended by the factory to be run together. Also remember that headwork like combustion-chamber cloverleafing, head milling, adjustable timing gears, changing cams and pistons can all affect compression ratio. Too high of a compression ratio can result in deadly engine breaking detonation on pump gas, especially with today's poor California grade 91 octane premium. Keeping this in mind, be careful, measure everything and get ready to kick some butt.

Frankenstein Engines

Perhaps the biggest bang for the buck is a Frankenstein Engine. A Frank is a bunch of swaps between different blocks and heads within the B engine family to make some non-factory combinations that work exceedingly well.

The most popular Frank swap is adding a VTEC B16A or B18C head from a del Sol, a Civic Si or an Integra GS-R to an LS non-VTEC Integra B18B or even, to make a really big engine, the mini-SUV CRV B20B or B20Z bottom end. The common, easy to find LS Integra B18A and B18B engines have a bore and stroke of 81x89mm, which gives you 1834cc. Powerful but expensive in salvage yards, the VTEC-enhanced B18C has a 81x87.2 bore and stroke, which gives you 1797cc of displacement. The smaller but powerful B16A has a bore and stroke of 81x77.4mm for a displacement of 1595cc. By putting the VTEC head on the LS bottom end, you pick up 35cc over the B18C and a whopping 239cc more torque-producing displacement over the B16A. The added displacement and stroke give the LS Frank engine a nice torque advantage.

YEAR VTEC SOLENOID VTEC PRESSURE SWITCH KNOCK SENSOR
1988-91 A-8 B-5 B-19
1992-95 A-4 D-6 D-3
1996-00 A-8 C-15 D-6, 9-00 SI C-3

Due to the B engine's excellent interchangeability, you can put a B16A head, a B18C head or even the expensive and rare B18C5 head from an Integra Type R on the LS bottom end to make a larger displacement, longer stroke, potent torque monster B18. It has the best of both worlds, the torque of the B18B or B18A with the screaming VTEC power of the B18C. This head swap adds about 40 hp to your typical LS engine with naturally aspirated wheel hp figures in the 170-190 hp range and torque in the 120-145 lb.-ft. zone easy to obtain on 91 octane pump gas. The engine will retain a compression ratio of approximately 10:1 with this combination of heads.

To add a VTEC cylinder head to an LS bottom end, you must tap and plug the VTEC oil supply hole found on the bottom left side of the head. A 1/8-inch pipe plug will work well for this. Next you must run an oil supply line from a T-fitting placed on the oil pressure sending unit boss on the block to the VTEC oil galley plug found on the intake side of the head near the distributor. To make the oil line, you need a piece of -4 braided steel line about 20-inch long, with two female A/N fittings attached (an industrial hydraulics shop can make this for you), a 3/8-inch NPT to -4A/N adapter for the head, a 1/8-inch NPT to -4 A/N adapter and a 1/8-inch NPT T-fitting with two female sides and one male side.

You must also open up the dowel pin holes on the VTEC cylinder head to 9/16-inch as the LS block has larger dowel pins to locate the head on the block. This is a pretty simple operation that can be preformed on a drill press. If you don't feel like doing this, the operation can be easily handled by any competent machine shop.

An LS head gasket is used with the appropriate VTEC ECU for your year and chassis of vehicle. A jumper wire running from the appropriate pin in the ECU to the VTEC control solenoid completes the VTEC activation. The proper VTEC ECU is the ECU for the VTEC model of your vehicle. Below is a chart with the pin locations where the wires to control the VTEC solenoid connect.

It is also critical to hook up the knock sensor or the VTEC function will not work. The engine's ECU looks for the knock sensor signal in order to activate VTEC. The B18A and B18B block has no provision for a knock sensor. In this case, or if you don't want to run a knock sensor, you can do several things. You can have a knock sensor not attached but grounded to the chassis and connected to your ECU, or Hasport has ECUs that are reprogrammed to allow VTEC operation with no knock sensor input.

Another very potent Frankenstein combination is using the B20 bottom end from the CRV mini sport utility, with a VTEC cylinder head. The B20 bottom ends that are desirable are the B20B ('97-'98 CRV) and the B20Z ('99-'01 CRV). With a big bore of 84mm and a stroke of 89mm with a whopping displacement of 1973cc, a B20 Frank has the potential to be the meanest of all the Frank engines.

Of the two B20 engines the B20Z has more compression at 10.2:1 over the B20B's lower 8.8:1. This is because the B20Z has a flatter top piston when compared with the to the B20B's deeper dish. The lower compression B20B is more desirable for a bolt on supercharger or turbocharger kit because of this. If you wanted to run high compression with a B20B/Z there are no factory pistons that can do this, but any number of quality custom forged piston makers, such as JE, Aires or Wiseco can make a piston for the B20B/Z. This piston should be made with a dome volume to give about compression ratios from 11:1 for the street to 13:1 for race gas. With 11:1 pistons and a VTEC head mildly worked over, it can be possible to have a very impressive engine for very little money.

The procedure to swap a VTEC head on the B20B is the same as the LS swap with the exception of using the B20 head gasket. A naturally aspirated, mild B20B can easily get more than 200 hp on pump gas with more than 150 lb.-ft. of stump pulling torque.

As a warning, when the VTEC head is installed, there's not a whole lot of piston-to-valve clearance as VTEC heads have larger 33mm intake valves vs. the B20 engine's 31mm valves. If you are dyno tuning, contact will occur between the piston and valves if the cam is advanced much more than 4 degrees, so be careful. In fact this is so close it's not advisable to advance the intake cam at all.

If running larger lift and duration aftermarket cams in your B20/VTEC Frank, or if the head has been modified for higher compression by milling, the piston's valve pockets should be modified and the valve-to-piston clearance confirmed before the head is final assembled to the block. Carefully grinding the piston's valve reliefs with a die grinder with carbide burrs and polishing the result with cartridge rolls can obtain additional clearance. A minimum clearance of 0.045-inch on the intake valves and 0.055-inch on the exhaust valves is advisable.

Camshafts, Valve Springs and Valves
When it comes to cams in the B-series engine, you can swap them back and forth without problems. The hot cams to get in this case are the U.S. market Type R Integra cams or the JDM (Japanese Domestic Market) Civic Type R cams.

JDM Civic Type R camshafts from a JDM B16AS are pretty potent and are a good upgrade.
These factory cams are quite respectable, with near racecar lift, duration and overlap on their high rpm lobes. Being VTEC, they still purr like a stock engine at idle and low speeds and will still be able to pass your local smog test.

With the exception of the Type R cams, all of the standard B-series engines have similar high rpm VTEC lobe specs. They all have 230 degrees of intake duration (measured at 1mm of checking clearance) with 10.6-10.7mm of lift. On the exhaust side, they have 227 degrees of duration and 9.4mm of lift. The cams all have about 17 degrees of overlap.

What works really well on all of these engines is to swap the cams for the Type R Integra cams or the JDM 1998 Civic Type R cams. The Integra Type R cams have 240 degrees of intake duration with 11.5mm of lift while the exhaust sports 235 degrees of duration and 10.5mm of lift. The Integra Type R cam also has 25 degrees of overlap. The JDM 1998 Civic Type R cams is slightly bigger with 243 degrees of intake duration and 28 degrees of overlap.

When installing these cams on a non-Type R VTEC B-series engine, you should install the appropriate Type R intake valve springs on the exhaust side of the head. U.S. market B engines--with the exception of the Type R--only have dual springs on the intake valve. The dual exhaust valve spring is important to help handle the extra valvetrain velocity that the much higher lift Type R exhaust cam has. The regular B-series dual intake valve spring set-up can be run with the Type R cams because they are actually stiffer than the Type R intakes. This is because the Type R valves are lighter than the regular B-series valves.

Type R cams can gain from 8-9 more top end hp--sometimes even more when the cam timing is optimized--more than the stock B-series cams and are an excellent value in streetable performance cams.
TYPE R PART US B18C5 TYPE R JDM B16B 1998 CIVIC TYPE R
Intake Cam 14111-P73-J00 14111-PCT-000
Exhaust Cam 14121-P73-J00 Same
Inner Valve Spring 14751-P73-J01 Same
Outer Valve Spring 14761-P73-J01 Same

As a cost saving measure to avoid having to buy exhaust valve springs some people have success installing only the Type R intake cam. Just the intake cam alone can result in gains from 6-7 hp.

Below is a chart with the part numbers of the hot Type R cams and the valve springs needed to run them, at least on the exhaust side.

You may also want to run the Type R valves. Although they are the same diameter as the regular B-series valves, they have an improved contour for better flow and they're lighter. A good head porter can contour

the stock B-series valves to match the Type R valves, but if you need new valves, the Type R valves are preferable.

If you don't want to run the Type R cams, desiring even more top end power, excellent streetable cams are made by Toda, Spoon Sports, Skunk 2 and JUN. The big American companies like Crane and Crower are also getting into the game with their own billet offerings. Crane in fact already offers a radical profile, friction-reducing roller cam and follwer set; they aren't cheap, however. When running other cams, please note that on finger follower engines like Honda's it's critical to run near stock base circle billet cams for long life and proper true to spec valvetrain geometry. Regrind cams just don't work well with these engines. Poor peaky power bands and rapid wear can result from regrinds.

With aftermarket cams, it's also important to run the manufacturer-recommended compatible valvetrain parts, most importantly the springs and retainers with these cams.

Pistons
For an all-motor street-driven car, the factory Type R pistons are the best bet. This is the U.S. or JDM Integra Type R piston for the B18C and the LS VTEC Frank engine with the JDM Civic Type R piston for the B16A.

The black dry film lubricant skirt coating can identify the JDM ITR pistons. This helps reduce friction and wear. The coating is very similar to the expensive aftermarket coatings that many racers have applied to their pistons.
Type R pistons are a high-pressure die cast construction. This is the best way to make a cast piston. Since they are cast, they are not the best choice for a nitrous oxide-burning engine but they are excellent in all-motor applications. An advantage for cast pistons in a daily driver sort of car is they can use a much tighter piston-to-wall clearance. This makes for an engine that's quieter and burns less oil. Cast pistons are also easier on the cylinder walls.

The Type R pistons have a black dry film lubricant coating on the skirts for longer wear and less friction as well as additional oil holes in the ring grooves for better high rpm oil control. Type R pistons also have holes in the wrist pin bosses to improve wrist pin oiling. As an interesting and useful fact, all of the B-series engines have the same compression height, so the pistons interchange.

For a Honda street engine that will run on pump gas, the maximum compression that should be run is in the low 11:1 range. The reason why Hondas can get away with this high compression ratio with modern unleaded fuel is mostly because of their superior combustion chamber shape and small bore diameters. Higher compression than this requires racing gas to avoid detonation. With cast pistons detonation should be avoided at all costs as they are more brittle than forged pistons.

The Integra Type R piston is available in two versions, the P73-00 JDM version and the P73-A0 U.S. market version. The difference between the two is that the JDM piston has a slightly taller dome, which gives about 0.2 higher compression. The U.S. Type R A0 piston is the piston to use in the larger displacement LS Frank engine, as it will yield approximately 11:1 compression with this combo due to its lower dome. The JDM 00 piston is the piston of choice for a B18C as it will yield about 11:1 in this combo.

The JDM Civic Type R or PCT piston has the highest dome of all the Type R pistons to get 11:1 compression out of the smaller B16 engine. It's not recommended this piston be installed in a B18C or a B18B or a Frank engine as the compression ratio will end up being unstreetable, close to 12:1. This compression is good for mild race applications with racing fuel, and is in fact a popular combo for hybrid Civics raced in NASA's PTTC road racing class.

When running Type R pistons on a B16A or a B17A engine, you must remove 1mm of material on each side of the small end of the connecting rod in order to have sufficient clearance where the rod meets the piston. Any automotive machine shop can easily do this operation.

The Integra Type R throttle body is 62mm up from the stock 60mm B18C throttle body.

The JDM Civic Type R B16A part is a good manifold; it has short runners, good for high rpm power and a larger plenum chamber. It is close to identical to the U.S. Integra Type R intake manifold.

The JDM ITR header works on the B16A and B18C engines; it has a slick 4-1 layout, which is good for top-end power over the stock tri-y manifolds. The JDM manifold features quality 100 percent stainless construction. Note the trick staggered collector for better ground clearance. It's hard to believe this is a stock piece. The manifold also has brackets for adding the stock heatshields if you want to go stealth.

Here is a shot of the bottom of the JDM CTR manifold; notice the short, straight runners.

Here is the JDM ITR Manifold mounted on an engine.
As a warning, since 11:1 is close to the limit of streetable pump gas compression and the fact these pistons have relatively high domes, it's important to verify your engine's compression ratio, valve-to-piston and piston-to-head clearance if your head was modified by milling or quench welding before final assembly. The head and piston domes should be cc'ed and the clearances checked by the clay method to insure that no interference will occur.

Intake and Exhaust Manifolds
A popular swap to gain some additional power is to run an Integra Type R manifold. The Type R manifold is a short, larger diameter, single stage manifold with a larger plenum. It lacks the dual-stage runner system of the B18C engine, and is optimized for top-end power. When doing a manifold swap, you can use either a U.S. Integra Type R or JDM Civic Type R manifold; both work equally well. The only difference is the location of one vacuum fitting on the manifold's plenum, which has absolutely no effect on anything.

The Type R manifold is good for about 6 hp at the wheels at high rpm, with perhaps a slight loss in power below 5000 rpm. The manifold is a direct bolt on the B16A cylinder head and thus works well for any B16A or any Frank engine using this head. It also fits on the rare B17A1 '92-'93 Integra GS-R engine. On the B18C, the flange of the manifold must be extensively modified for it to fit, as only the bottom manifold-to-head bolts line up. There's also a problem with the location and alignment of the coolant passage, this must be welded up and ported for the correct shape. The upper boltholes must be welded up and redrilled in the correct location and the head match-ported to the manifold. After welding, the manifold's head flange must be resurfaced so it will seal properly. After all of this mess, the injectors hang down into the airstream and disrupt flow, making this a poor way to do things.

Perhaps a better way is to cut the flange off of both manifolds and weld the B18C flange onto the Type R manifold. After welding, the manifold's runners can be cleaned up and match-ported for good flow. Fortunately, if this seems like a great deal of work, Skunk 2 has come up with a bolt-on copy of the Type R manifold that bolts right onto the B18C with no hassle. American aftermarket giant Edlebrock is also offering a direct bolt-on B-series manifold.

To do a clean install of a Type R manifold onto a B16A head, you need the following parts: a fuel rail from a '94 Integra; a '93 B16A del Sol; a '99 Civic Si, '92 or later JDM B16A or a B18C engine; an idle air control valve and 12mm mounting bolts from a '92 and later Integra, a '92 and later Civic Si or EX or a '97-'98 CRV; a throttle body gasket from an Integra Type R; and an intake manifold gasket from an Integra Type R.

A 62mm Type R throttle body to replace the stock 60mm one is a nice addition at this point, but it may be cheaper to get an aftermarket 64mm throttle body from RC engineering or JG.

On the exhaust side, a very effective upgrade is to install the JDM Integra Type R exhaust manifold. This is good for about six more wheel hp over the stock manifold. Interestingly enough the JDM manifold is a 4-1, equal length, tubular stainless steel header. The JDM Type R exhaust manifold fits all B-series engines.

The JDM Civic Type R rod features a stronger steel with more chromium in it. This is sort of like chrome-moly, the well-known high-strength U.S.-spec steel. In this picture, you can see the stout forged construction, beefy rod bolts and spot faced rod bolt bosses, all features that add strength.

Connecting Rods

The JDM Civic Type R with the B16A engine has improved connecting rods featuring steel with higher chromium content. Adding chromium to the steel greatly increases its strength, much like the chromium and molybdenum in chromoly makes it much stronger than regular steel. This steel is standard in the U.S. B18C and Integra Type R rods, but not in the U.S. B16A. The B16A still has pretty decent rods, so it's probably not worth it to go out and buy a set of JDM rods, but if you do have a choice, it's good to know the JDM B16A rods are stronger.

Any stock rod can benefit from polishing the beams and shotpeening. These operations can improve the rods fatigue strength by more than 100-percent.

It's impressive that with a well thought out combination of factory parts, good assembly and some headwork, a Honda engine can obtain very respectable horsepower and torque figures while still keeping factory-like reliability and loan-to-your-grandma driveabilty. There are not too many engine families on earth that can make this claim from any manufacturer. With Hondas, cheap and reliable power is just a call to a JDM engine importer or a dealer away.