

# HONDA ENGINE SWAPS

JDM and USDM  
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and ZC-Series  
Swaps into  
Civics, Integras,  
Accords, and More!

- 
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Aaron Bonk

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# HONDA

## ENGINE SWAPS

AARON BONK

**SA**  
S-A DESIGN



**CarTech®**

JUN 2008

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**Front Cover:** *Jake Johnson's '94 Civic gets fitted with a '97 B18C motor at Hookups Import Tech in Upland, California. The engine produces 195 hp at the wheels, thanks to Integra Type R rods, Civic Type R pistons, some trick head work, Mugen header, a Skunk 2 intake, and a Mugen P28 ECU. (Scott Killeen photo, courtesy of Buckaroo Communications)*

**Back Cover, Upper Left:** *Some swaps are best suited for a drag car. You'll be hard pressed to get one of these to pass a smog check legally. The guys at Honda Fiend use this CRX strictly for racing purposes.*

**Back Cover, Upper Right:** *When reinstalling the VSS, be sure that it sits flat before tightening down the bolt. If it doesn't, then the bracket shown on the right of the unit can snap off.*

**Back Cover, Lower:** *Since this is a USDM engine and this vehicle is already OBD I, smog issues will be taken care of once this vehicle is certified.*

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## ABOUT THE AUTHOR AND ACKNOWLEDGMENTS

### About the Author

Aaron Bonk appeared on my radar in 2000 as a managing partner of Holeshot Racing. The small two-man shop in Anaheim, California reminded me of so many of the speed shops my Dad took me to as a kid. Back in the early seventies, SoCal was hustling with little shops like these, each with their own group of followers and regular customers. When cars ran fast, beat other locals, and held together for more than a few weeks, folks got curious about who did the wrenching. If you drove a Honda or Acura near Anaheim around the turn of the century, you knew about Holeshot. Maybe even got spanked by a customer of theirs. Credit that to the “do it once, do it right” approach that Aaron Bonk and partner Jon Spackman applied to every car going through their shop.

I heard about Holeshot while working as a contributor to *Sport Compact Car* and *Honda Tuning* magazines. At the time, we were hungry for engine swap articles and feature cars that reflected the Hybrid trend growing within the Honda street culture. Holeshot was the place many of those articles began. Over six years and hun-

dreds of swap jobs, Bonk and Spackman developed and/or perfected many of the “standard” practices for Honda transplants still in use today. They also learned a lot about what NOT to do from the constant flow of botched and half finished swaps that they were hired to sort out.

Thinking about Holeshot’s volume of work, I once asked Aaron what he did with the numerous unwanted D-series engines left over from all those swaps. Aaron shrugged. “We just push them out into the alley behind the shop and hope they’ll disappear before morning.”

Bonk’s humble yet confident personality was mirrored in his black ‘95 Integra GSR. Clean and plain looking on the outside, there was little to give you the impression it was anything other than stock. But the turbo B18C under its hood put out 550 hp to the wheels. “Yeah,” Aaron would admit, “it’s pretty fast, I guess.”

I can think of few more qualified to write “the book” on Honda engine swaps, and none more reputable. Enjoy.

*E. John Thawley III*  
*Automotive Journalist and Photographer*

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# ENGINE SWAP CRASH COURSE

Automotive engine transplants are, without a doubt, anything but new. In fact, car enthusiasts and hot rodders have been swapping engines for the past 50 or so years. On the other hand, for those in the rapidly growing sport compact community, the engine swap is the latest, most popular trend. It's so preferred among Honda enthusiasts that they can single handedly take credit for more engine transplants than the rest of the sport compact community combined. It wasn't until the mid 1990s with the introduction of the third-generation Integra that the Honda engine swap craze had really taken off. Once the hardcore enthusiasts realized the chassis and engine similarities between the existing fifth-generation Civic and the latest Integra, the experimentation process began.

## Why a Honda Engine Swap?

Unlike any other import or sport compact vehicle, the market for Honda and Acura engine swap products has grown beyond all expectations. There are a couple of main reasons for this, the most important of which is the bang for the buck. In fact, if you think about it, the whole import scene was built on that premise. You see, the average import enthusiast's age is somewhere between late teens and early 20s, so the chances of being able to afford a 'Vette or a Mustang Cobra are pretty slim. What they

need is performance on a budget. That's where the sport compacts and imports come in to play. A '91 Honda Civic for a couple grand is a bit more within grasp when on a typical minimum-wage budget. With all of the extra cash that is saved by going with a less-expensive car, the owner can now look into performance upgrades without breaking the bank. It isn't hard to see that it is those very same reasons that make the Honda engine swap industry so demanding. Not only are the vehicles themselves affordable, but you can literally double

your horsepower rating in many cases for less than the initial cost of the car.

In addition to its extreme low price tag, the second key point in favor of Honda engine swaps is the compatibility of parts. Many of Honda's vehicles share the same chassis, electrical system, and engine mounting points as some of their Acura counterparts. This means that in many cases, everything from motor mounts to computers will be totally interchangeable. This can be the making of a total no-brainer engine swap. Equally important, they'll also keep



*Underneath the hood, this Integra is virtually identical to a '92-'95 Honda Civic, except for the engine. Although engine swaps are routinely performed on the older vehicles, the introduction of this late-model Integra is what really kicked things off.*



# Engine Swap Tips and Tricks

1. To free up room under the hood, try installing a high-performance fan from Hayden or Spal. These fans are significantly thinner than the Honda units and can be fastened to either side of the radiator as a push or pull unit.

2. Most of the engines in this book will require a minimum of 91-octane gasoline to be used at all times. Many of the JDM engines were designed for Japan's standard 93 octane.

3. It's wise to remove the throttle position sensor from the engine before installation. These sensors somehow always find a way of coming into contact with the firewall and breaking into several useless pieces.



*This TPS was broken while at the wrecking yard. They usually snap right in half.*

4. When looking for ways to reduce the vehicle's overall weight, don't overlook the air conditioning and power steering units.



*Just look at all of the components that are involved in the A/C and power steering systems. If you're careful when you remove them, they can be quite valuable to someone else.*

5. If a clutch is to be installed at the time of the swap, temporarily slide the disc onto the main shaft of the transmission

before installation. This will confirm that the splines line up properly and will ensure (to the installer) that the correct clutch is being used.

6. Always use fuel-injection-style hose clamps. Standard hose clamps tend to put small cuts in the hose when tightened, which results in possible leakage.



*Notice how these fuel-injection hose clamps don't have the ridges in them that you would normally find in a standard hose clamp.*

7. Always use fuel-injection hose when replacing or adding fuel line. Standard fuel line found in most auto parts stores is not rated for the high pressure of a fuel-injection system and will burst after time.

8. When moving the engine into place with an engine hoist, try using an adjustable load-positioning bar so that it may be lowered at an angle.

9. Make sure that you understand engine serial numbers before selecting a donor engine.

10. Be careful when selecting a transmission and relying on serial numbers as the sticker often falls off.

11. Upon removing the speedometer cable on vehicles so equipped, be sure to put the small retaining clip in a safe place, as they are often lost in the cracks of the vehicle.

12. Instead of draining the air conditioning system and removing the compressor from the vehicle, tie it to the frame with some heavy-duty zip ties.

13. Be careful when selecting the proper OEM exhaust manifold. Many upper

halves are not compatible with various lower halves. Just because they are both a B-series, for example, does not mean that they're compatible with one another.



*The clip pictured to the left will slip into the groove on the top of the vehicle speed sensor shown on the right. Without it, the cable will slip out of place.*



*With these heavy-duty zip ties in place, the A/C compressor is well out of the way for installing the new engine.*



*Notice where the downpipe connects to the upper portion of the exhaust manifold. Often times the bolt pattern differs between manifolds that you would assume would be similar.*



*The world's fastest Honda is the Progress Suspension Landspeed Civic. It relies on huge horsepower from a highly modified B-series engine. At over 200 mph, the stock D-series Civic engine just couldn't cut it. (Photo Courtesy of Progress Suspension)*

your vehicle in line with many state regulations and emissions laws. States including California enforce strict regulations and guidelines on engines that you may or may not put into your vehicle. Fortunately for engine swappers, the fact that many of the Hondas and Acuras share the same chassis means most of these projects can be done within the confines of the law. Pretty cool, isn't it? You can double your horsepower, pass smog, and still maintain a factory appearance under your hood. No wonder the Honda is such a popular transplant candidate.

## Decisions and More Decisions

So, now that you've decided to follow in the footsteps of the prevailing majority and go with a Honda engine swap, the next step is to settle on which

one. Keep in mind though, just because Hondas make up for most of the transplants out there, this doesn't mean that every Honda or Acura vehicle would be a good choice for a swap. In fact, with some vehicles it wouldn't even be a smart decision to modify them in any way, shape, or form at all. Let's cover some basic dos and don'ts, as well as some points that you might want to take into consideration before purchasing your next swap vehicle or donor engine. Some of these ideas have been acquired through lengthy research and others have just been stumbled upon accidentally. The fact that my business partner, Jon Spackman, and I performed a couple hundred or so engine swaps through our business, Holeshoot Racing, doesn't hurt either. So pay attention and read on; chances are you'll find most of your questions answered here.

You'll want to take into account several aspects before purchasing the vehicle or the engine. One very important idea to keep in mind during this decision process is to be realistic. It is important that you be realistic with the vehicle you choose, with the engine you choose, and with the amount of money that you'll be shelling out. Most important, try not to set your sights too high and dive into a swap that could possibly take you six months to finish, or worse yet, get yourself into a project that will render your vehicle unstreetable when it's done. Don't laugh; scenarios such as these occur all of the time. Whether it's a hood that refuses to close or an oil pan that almost touches the ground, there



*Unless you have the most pristine car on the road, it never really makes any sense to convert a carbureted car to fuel injection. With hundreds of pre-owned injected Hondas for sale, it's much easier to just start fresh.*

are certainly engine swaps out there that shouldn't have been done. If you don't want to end up like one of these cases, pay attention and stick to one of the recommended engine swaps. The keys to a successful transplant project are careful planning, having an open mind to all of your options, and being practical.

## Carbureted Downsides

When considering your options, you might want to heed a few simple suggestions. Now, I could ramble on and on about all of the engine swaps that I wouldn't do, but that might not be so productive. Even so, there are a few swaps in particular that customers and racers will inquire about most often and should be mentioned here with a word of caution. That being said, avoid doing a swap of any kind on any and all carbureted Hondas, including all vehicles manufactured before 1986 and many produced afterwards.

More than likely, you're planning on swapping in a fuel-injected engine. If so, converting the carbureted fuel system to fuel injection isn't an easy task at all. It consists of replacing the gas tank, fuel pump, fuel lines, and the entire electrical system. This is just unnecessary when the same chassis can usually be purchased in fuel-injection form for a little more money. The initial investment of buying a later-model car will far out-



*Several road-race teams rely on the larger and more powerful DOHC B-series engines despite their additional weight. Thanks to a wide variety of Honda suspension components available, handling can be improved upon regardless of the heavier drivetrain. (Photo Courtesy of Progress Suspension)*