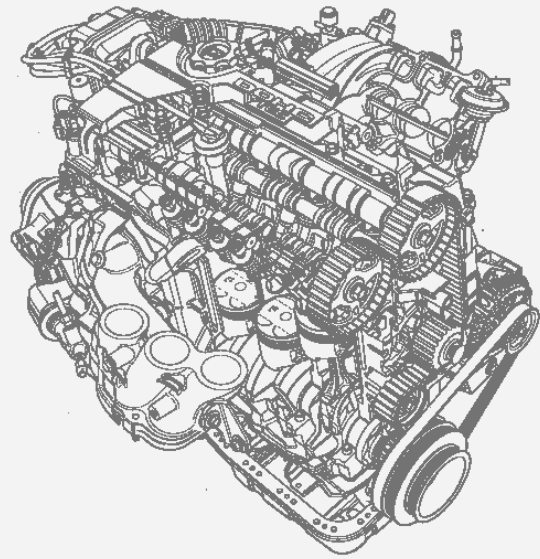


THE ULTIMATE HONDA ENGINE SWAP GUIDE

by Jared Holstein



Humankind has made a habit of one-upping the creator when it can benefit in some material sense. We figured out early on that playing matchmaker to an ass and a horse produced a creature with the strength and stamina of a horse, but the nimble sure-footedness of an ass. (That would be a donkey for those of you not up on your cross-breeding techniques.) Given that as enthusiasts, we all want our cars to run like a thoroughbred and handle like, well... an ass, the notion of installing a larger engine in a lighter chassis is appealing. The same rules that apply in nature pertain to the automotive world as well: The more closely related the parent forms, the more likely they are to produce a viable hybrid. Dropping a B16A from a Japanese domestic market Civic Type R into a

US-spec Civic will be a whole lot easier, cheaper and more successful than dropping an NSX engine into the same car—though this has not stopped people from trying.

Unlike many manufacturers who often use a small number of different engines for their entire vehicle line, and do so for decades (ala Chevy and the 350), Honda has produced just a few four-banger engine series, but a dizzying number of variants. Combine Japanese domestic market engine choices with the same engine designation but higher output, as well as European market Hondas, and owners have a smorgasboard of engine variants to choose from. Some engines, of course, are scarcer and more desired than others, leading to an unfortunate amount of Honda theft, though there are always engines with papers available (the only kind you want). Cars

MOTOR CHASSIS	ZC	D16A8/9	D16Z6 (SOHC VTEC)	B16A1	B16A2/3	B16B	B17A
3G Civic (84-87)	1	1	4	2	2	2	2
4G Civic (88-91)	1	but why?	1	2/3 (DOK)	2/3 (DOK)	2/3 (DOK)	2/3 (DOK)
5G Civic (92-95)	but why?	but why?	X	1	1	1	1
6G Civic (96+)	but why?	but why?	but why?	X	1	1	1
1G Integra (86-89)	X	X	but why?	2	2	2	2
2G Integra (90-93)	but why?	but why?	X	1	1	1	1
3G Integra (94+)	but why?	but why?	but why?	1	1	1	1
4G Accord (90-93)	but why?	but why?	but why?	but why?	but why?	but why?	but why?
5G Accord (94-97)	but why?	but why?	but why?	but why?	but why?	but why?	but why?
3G Prelude (88-91)	but why?	but why?	but why?	but why?	but why?	but why?	but why?
DOK= Depending on Kit							

MOTOR CHASSIS	B18A	B18B	B18C	B20	F22	H22	H23	"C-SERIES, V6"
3G Civic (84-87)	2	2	2	2	4	4	4	4
4G Civic (88-91)	2/3 (DOK)	2/3 (DOK)	2/3 (DOK)	2/3 (DOK)	3	3	3	4
5G Civic (92-95)	1	1	1	1	2	2	2	4
6G Civic (96+)	1	1	1	1	2	2	2	4
1G Integra (86-89)	2	2	2	2	4	4	4	4
2G Integra (90-93)	1	1	1	1	2	2	2	4
3G Integra (94+)	1	X	1	1	2	2	2	4
4G Accord (90-93)	but why?	but why?	but why?	but why?	1	1	1	4
5G Accord (94-97)	but why?	but why?	but why?	but why?	1	1	1	4
3G Prelude (88-91)	but why?	but why?	but why?	but why?	2	2	2	4

are not given the option of signing a donor card; should a Lincoln Navigator decide to back-half an Integra Type R, enthusiasts will arrive on the scene to strip the carcass of the engine faster than "1-800-SUE-4-YOU" lawyers can find whiplash victims.

Encouraged by the number of serious, performance-minded enthusiasts that comprise the Honda hybrid community, we are beginning a quest to comprehensively catalog every one of the reasonably feasible engine swaps. This quest begins in this issue, as we show the relatively easy swap of a B18B1 into a fifth-generation Civic hatchback (starting on page 136). Our engine swapping madness will not be confined to Hondas, either, as there are some very successful and well-tested hybrids with something other than H on the valve cover.

The following tables are our first stab at untangling the complex web of engines, chassis, parts and kits that comprise the brave new hybrid world. The chart above will help you decide which swap to attempt, while the table on the next page will help you find the donor engine. Look forward to more parts guides and other technical info for engine swaps in upcoming issues. The charts published in this issue can help render you a more educated buyer when selecting an engine, chassis, or transmission for your project (look for an upcoming Honda tranny guide to help better negotiate that particular quagmire).

Engine swaps vary tremendously in complexity, but there is one

common thread: They are never as easy as they seem. To give you a better idea of just what you are getting yourself into, the above table uses a rating scale that ranks the level of pain and anguish involved in each swap.

LEVEL 1: The engine bolts in using stock Honda or Acura components, with no modification to the car. This is so easy, it might even be fun.

LEVEL 2: The engine bolts in with the aid of a kit (from companies such as HASport, Place Racing, or HCP.) This may be slightly more costly, but the amount of work involved should be comparable to a level 1 swap.

LEVEL 3: The engine bolts in with the aid of a kit, but requires some modification to the car, such as clearancing the engine compartment, modifying the cross member, etc, or rewelding the mount locations. You will most likely need help with this one.

LEVEL 4: The chassis requires extensive custom modification to receive the engine. In other words, don't come crying to us when you get halfway through tearing apart your car, only to find out that the crank pulley hits your tire.

The information gathering task behind this guide was extremely complex and would have been impossible without the help of a few key people. We would like to extend a special thanks to Aaron Bonk and John Spackman of Holeshot Racing, Brian Gillespie of HASport, Jason "Katman" Kaplan, Joe Rodgers and Tommy Liang.

HONDA ENGINE SWAP GUIDE

GENERATION	YEAR	MODEL	COUNTRY OF SALE	CHASSIS	ENGINE	DISPLACEMENT (CC)	COMPRESSION RATIO	HP/TORQUE	TRANSMISSION
ACCORD									
5G	'94-'97	Accord DX/LX	USA	CD	F22B2	2156	8.8:1	130hp@5300/139lb-ft@4200	
5G	'94-'97	Accord EX	USA	CD	F22B1	2156	8.8:1	145hp@5500/147lb-ft@4500	
5G	'94-'97	Accord SiR	Japan	CD	H22	2157	10.6:1	190hp@6800/152lb-ft@5500	
4G	'90-'91	Accord	USA	CB	F22A4	2156	8.8:1	130hp@5200/142lb-ft@4000	
4G	'90-'93	Accord	USA	CB	F22A1	2156	8.8:1	125hp@5200/137lb-ft@4000	
4G	'91-'93	Accord	USA	CB	F22A6	2156	8.8:1	140hp@5600/142lb-ft@4500	
4G	'90-'93	Accord 2.0Si	Japan	CB	F20A (twincam)	1997	9.5:1	150hp@6100/137lb-ft@5000	
3G	'88-'89	Accord	USA	CA	A20A3	1955	9.3:1	122hp	
CIVIC									
6G	'99-'00	Civic Si	USA	EM	B16A	1595	10.2:1	160hp@7600/111lb-ft@7000	S4C
6G	'96-'00	Civic EX Coupe	USA	EJ	D16Z7	1590	9.6:1	127hp@6600/107lb-ft@5500	
6G	'97+	Civic Type R	Japan	EK	B16B	1595	10.8:1	184hp@8200/118lb-ft@7500	
6G	'96+	Civic SiR II	Japan	EK	B16A	1595	10.4:1	168hp@7800/116lb-ft@7300	S4C
6G	'96+	Civic Vti	Europe	EK	B16A	1595	10.4:1	168hp@7800/116lb-ft@7300	
5G	'92-'95	Civic Si	USA	EG/EH	D16Z6	1590	9.2:1	125hp@6600/106lb-ft@5200	
5G	'92-'95	Civic SiR and SiR II	Japan	EG	B16A	1595	10.4:1	168hp@7800/116lb-ft@7300	Y21
4G	'89-'91	Civic Si	USA	ED	D16A6	1590	9.1:1	108hp@6000/100lb-ft@5000	
4G	'88-'91	Civic DX	USA	ED	D15A	1493		92hp@6000	L3
4G	'90-'91	Civic EX	USA	ED	D16A6	1595		113hp@6200	L3
4G	'89-'92	Civic 1.6i/Vti	Europe	EE/ED	B16A1	1595	10.2:1	158hp@7600/111lb-ft@7000	Y1 (opt. LSD)
4G	'88-'91	Civic Si	Japan	EF	ZC	1595	9.6:1	129hp@6800/106lb-ft@5700	L3
4G	'89-'92	Civic SiR (hatch)	Japan	EF	B16A	1595	10.2:1	158hp@7600/112lb-ft@7000	Y1 (opt. LSD)
4G	'90-'91	Civic SiR	Japan	EF	B16A1	1595	10.4:1	160hp@7600/111lb-ft@7000	
3G	'86-'87	Civic Si	USA	AH	EW4	1488	8.7:1	91hp@5500/93lb-ft@4500	GM
3G	'86-'87	Civic Si	Japan	AT	ZC	1595	9.6:1	129hp@6800/106lb-ft@5700	CG
CR-X/DEL SOL									
5G	'94-'97	DelSol VTEC/Vti-T	USA/Europe	EG	B16A3	1595	10.2:1	158ps@7600/112lb-ft@7000	Y21
5G	'92-'95	CR-X/del Sol Si	USA	EG	D16Z6	1590	9.2:1	125hp@6600/106lb-ft@5200	
5G	'92-'96	del Sol CR-X SiR	Japan	EG	B16A	1595	10.4:1	168hp@7800	Y21 or S21
4G	'88-'91	CRX Si	USA	ED	D16A6	1595		113hp@6200	
4G	'88-'91	CRX DX	USA	ED	D15A1	1493		92hp@6000	L3
4G	'89-'92	CR-X 1.6i/Vti	Europe	EE	B16A1	1595	10.2:1	158hp@7600/111lb-ft@7000	Y1 (opt. LSD)
4G	'90-'91	CR-X SiR	Japan	EF	B16A1	1595	10.4:1	160hp@7600/111lb-ft@7000	
4G	'89-'92	CR-X Si16/1.6i	Japan	EF	ZC	1595	9.6:1	129hp@6800/106lb-ft@5700	

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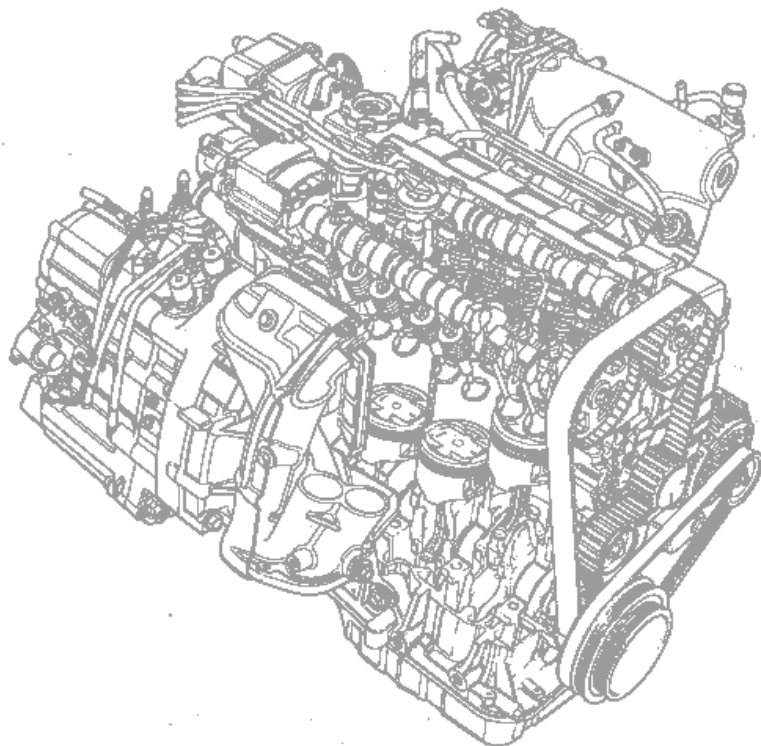
GENERATION	YEAR	MODEL	COUNTRY OF SALE	CHASSIS	ENGINE	DISPLACEMENT (CC)	COMPRESSION RATIO	HP/TORQUE	TRANSMISSION
4G	'89-'92	CR-X SiR	Japan	EF	B16A	1595	10.2:1	158hp@7600/112lb-ft@7000	Y1 (opt. LSD)
3G	'84-'87	CR-X HF	USA	EF	D15A2 (carbureted)	1488		58hp	
3G	'85-'87	CR-X Si	USA	AD	EW4	1488		91hp@5500/93lb-ft@4500	GM
3G	'85-'87	CR-X Si	Japan	AS	ZC	1595	9.6:1	129hp@6800/106lb-ft@5700	CG
INTEGRA									
3G	'94-'00	Integra GS-R	USA	DC	B18C1	1797	10.0:1	170hp@7600/128lb-ft@6200	Y80
3G	'94-'00	Integra LS/RS/GS	USA	DC	B18B1	1834	9.2:1	142hp@6300/127lb-ft@5200	S80, Y80
3G	'97-'98, '00	Integra Type R	USA	DC	B18C5	1797	10.6:1	195hp@8000/130lb-ft@7500	S80
3G	'95-'97	Integra SiR	Japan	DC	B18C	1797	10.6:1	178hp@7600/129lb-ft@6200	Y80, S80 (opt. LSD)
3G	'95-'00	Integra Type R	Japan	DC/DB	B18C	1797	11.0:1	197hp@8000/134lb-ft@7500	S80 LSD
2G	'90-'91	Integra GS	USA	DB	B18A1	1834	9.2:1	130hp@6000/121lb-ft@5000	YS1
2G	'92-'93	Integra GS	USA	DB	B18A1	1834	9.2:1	140hp@6300/121lb-ft@5200	YS1
2G	'92-'93	Integra GS-R	USA	DB	B17A1	1678	10.0:1	160hp@7600/117lb-ft@7000	YS1
2G	'90-'93	Integra	Japan	DB	ZC	1590	9.0:1	119hp@6300/105lb-ft@5500	S1, A1, J1
2G	'90-'91	Integra XSi/RSi	Japan	DA	B16A	1595	10.2:1	158hp@7600/112lb-ft@7000	S1, A1, J1
2G	'92-'93	Integra XSi/RSi	Japan	DA	B16A	1595	10.2:1	158hp@7600/112lb-ft@7000	YS1 (opt. LSD)
1G	'88-'89	Integra	USA	DA	D16A3	1590	9.5:1	118hp@5500/103lb-ft@5500	CG
1G	'86-'87	Integra	USA	DA	D16A1	1590	9.5:1	113hp@6250/99lb-ft@5500	CG
1G	'86-'89	Integra	Japan	AV	ZC	1590	9.6:1	129hp@6800/106lb-ft@5700	CG
PRELUDE									
5G	'99+	Prelude	USA	BB6	H22A	2157	10.0:1	200hp@7000/156lb-ft@5250	
5G	'97-'98	Prelude	USA	BB6	H22A1	2157	10.0:1	195hp@7000/156lb-ft@5250	
5G	'97+	Prelude SiR	Japan	BB	H22A	2157	10.6:1	200@6800rpm/161lb-ft@5500	
5G	'97+	Prelude Type S	Japan	BB	H22A	2157	11.0:1	220@7200rpm/163lb-ft@6500	
4G	'92-'96	Prelude S	USA	BB	F22A1	2156	8.8:1	135hp@5200/142lb-ft@4000	
4G	'92-'96	Prelude Si/SE	USA	BB2	H23A1	2258	9.8:1	160hp@5800/156lb-ft@4500	
4G	'94-'96	Prelude VTEC	USA	BB1	H22A1	2156	10.0:1	190hp@6800/158lb-ft@5500	
4G	'92-'96	Prelude Si	Japan	BA	F22 (DOHC, non VTEC)	2156		160hp@6000/148lb-ft@5000	
4G	'92-'96	Prelude VTEC	Japan	BB	H22	2157	10.6:1	200@6800/161lb-ft@5500	
3G	'90-'91	Prelude 2.0S	USA	BA	B20A3	1958	9.1:1	104hp@5800/111lb-ft@4000	
3G	'90-'91	Prelude 2.0Si	USA	BA	B20A5	1958	9.0:1	135hp@5800/111lb-ft@4000	
3G	'90-'91	Prelude Si	USA	BA	B21A1	2056	9.4:1	140hp@5800/135lb-ft@5000	
3G	'88-'89	Prelude Si	USA	BA	B20A5	1958	9.0:1	135hp	K4
THE ODDBALLS									
	'99+	SMX	Japan		B20Z	1972	9.6:1	146hp@6200/133lb-ft@4500	
	'97-'98	CR-V	USA	RD	B20B	1972	8.8:1	126hp@5400/133lb-ft@4300	

HYBRID HOW-TO

by Jared Holstein PHOTOGRAPHY: JARED HOLSTEIN

ENGINE SWAP #1: B18B1 ENGINE, 5G CIVIC CHASSIS

We begin our Hybrid How-To series with one of the most common and easiest Honda engine swaps: The Integra B18 engine in a fifth-generation Civic. You might expect us to begin with the VTEC-equipped B18C1 from the Integra GS-R, but those engines are alarmingly rare, highly sought-after, and consequently very expensive. As the base engine in the 94-and-up Integras, the non-VTEC B18B1 does not garner much love in the Acura camp, which also means they don't garner a very big price tag.

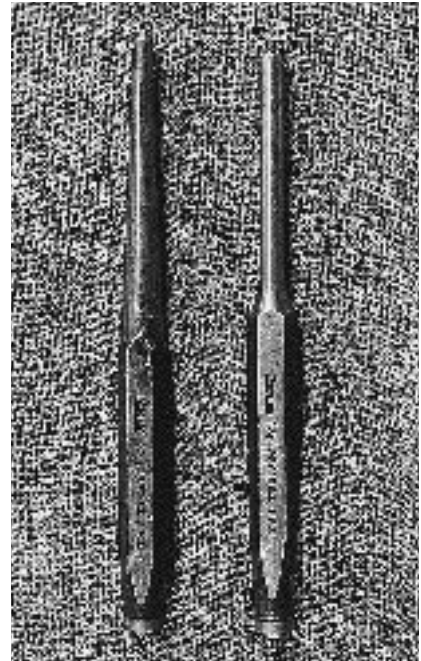
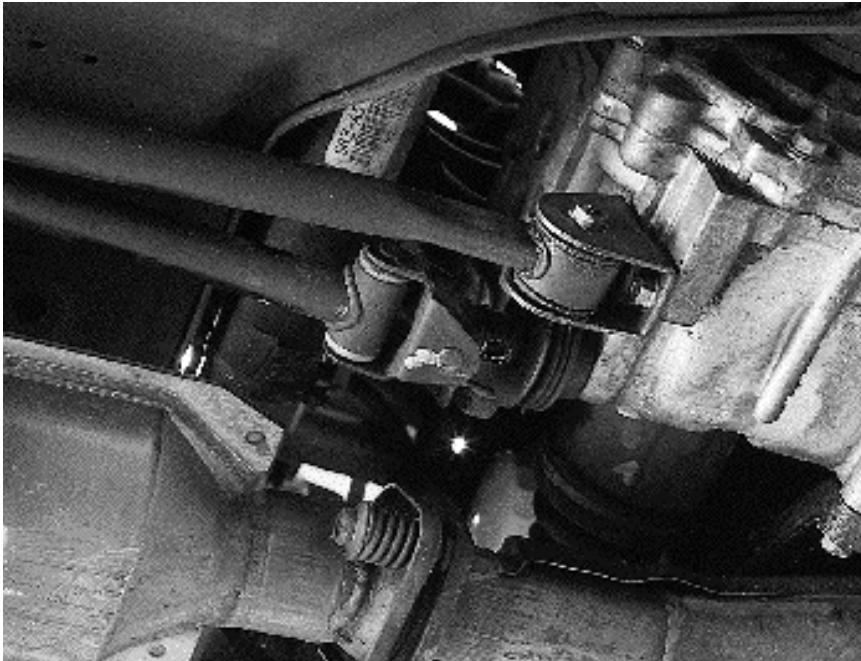


The B18B1's numbers, however are respectable: 142 hp and 127 lb/ft of torque. Drop this engine into a much lighter Civic blessed from the factory with at best a 125 hp, torqueless D16Z6, and this car scoots. Not only are they in less demand, but there were far more base-model Integras sold than GS-Rs, so finding a B18B1 is much easier and less painful on the wallet than finding one of their VTEC cousins. Best of all, these engines are a straightforward swap into the fifth generation ('92 to '95) and sixth generation ('96 and up) Civics as well as the second-generation Integras, using parts available from the dealer or wrecking yard. In addition, engine mount kits can be purchased to make dropping this engine into third and fourth generation Civics as well as first-generation Integras a bolt-in affair.

Though a straightforward swap, there are nonetheless a few tricks which make the swap go that much smoother. We sat in to document this swap on a fifth-generation Civic at Holeshoot Racing in Anaheim, Calif., where Jon Spackman and Aaron Bonk made short work of the process. We strongly suggest you have a good service manual on hand for general engine removal and installation instructions, which are useful for any application.



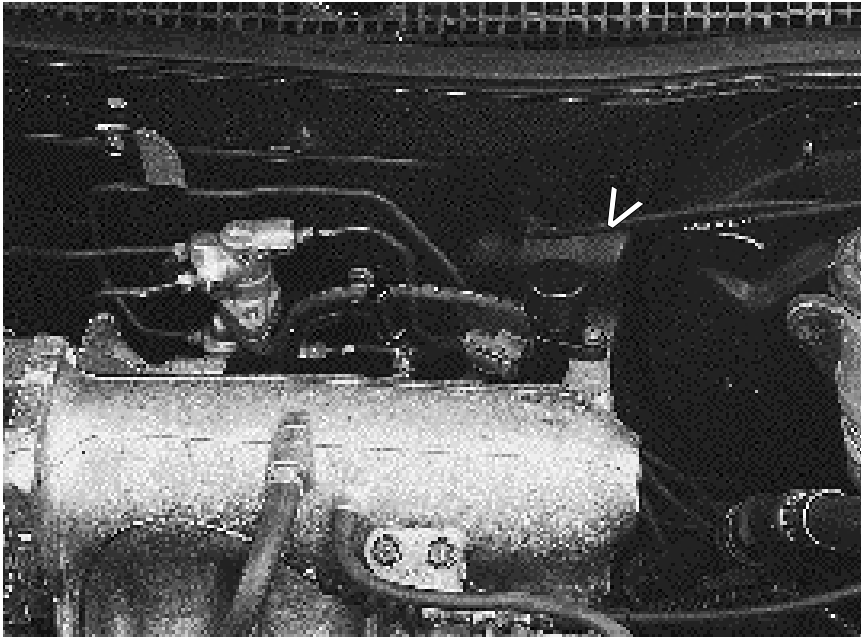
Having a lift makes the swap process quicker and easier, though it is certainly not a requisite. Cherry pickers can be bought for about \$150, or rented reasonably by the hour or day at most rental yards. When disconnecting the various liquid, vacuum, and electrical connections in the engine compartment, do so prudently. If you decide to roughhouse the hoses and other delicate items, you will find yourself replacing annoyingly small and expensive parts, with requisite trips to the dealer delaying the engine installation.



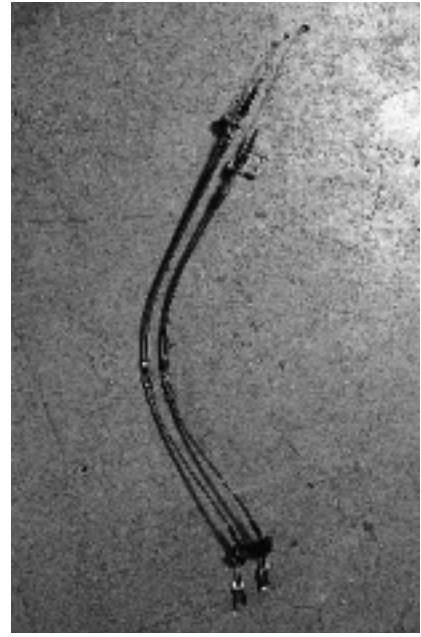
Before dropping the engine, you must first disconnect the shift linkage. The trick is to insert a quarter-inch round, non-tapered drift (like the one on the right in the photo) into the hole seen at the center to knock loose the linkage. Unlike D15s, which are of little value to anyone, D16Zs are worth holding onto; they are worth at least \$500 used, and often more to people planning on using supercharger kits and the like. Having your new engine attached to the tranny with the clutch already installed prior to the swap will speed up the process and simplify the clutch installation.

NOTES:

HONDA ENGINE SWAP GUIDE

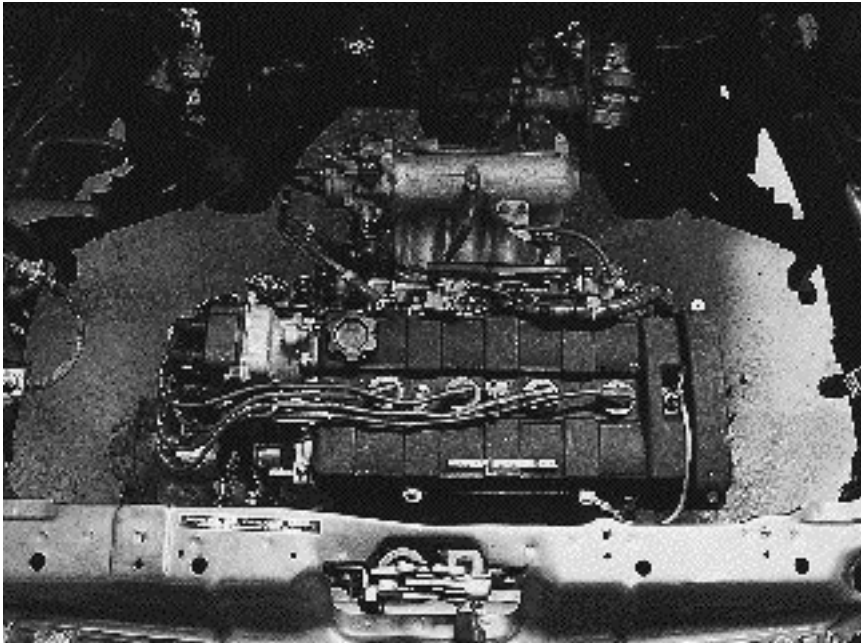


Take special care with the evaporative purge valve located near the intake manifold. The plastic neck inside is weak and will break easily when the attached rubber hose is being disconnected (silicone spray works wonders). If your car is an automatic and you want to swap in an LS engine with a five-speed, you need to procure a pedal assembly, the assorted hydraulic lines, shift linkage, clutch master cylinder, slave cylinder, and a weld-on tranny mount available from the dealer.



As is apparent in the picture, the Civic throttle cable is a few inches shorter than the Integra cable. Installing the correct Integra cable is inexpensive and duplicates what Honda engineers probably worked many hours to engineer.

NOTES:



S O U R C E

Holeshot Racing
1525 N Endeavour Pl, Unit M
Anaheim, CA 92801
(714) 772-VTEC

When installing the B18B, stock engine mounts will work for all except the front stabilizer mount, which requires a '94-plus Integra bracket, but uses the stock Civic rubber. Many hybrid enthusiasts decide to simplify the swap process by foregoing power steering and air conditioning. If, however, you want to retain power steering, you should use the '94-plus Integra pump and mounting bracket. If you want to retain air conditioning, a bracket from the '94-'97 del Sol VTEC will correctly mount the compressor.

NOTES: